PROTECTED AREA ECONOMICS AND POLICY

Linking Conservation and Sustainable Development

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Distributed for the World Conservation Union (IUCN)

by

The World Bank

Washington, D.C.

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Library of Congress Cataloging-in-Publication Data

Protected area economics and policy : linking conservation and sustainable development / edited by Mohan Munasinghe and Jeffrey McNeely ; compiled by Adelaida Schwab.

p. cm.

"Distributed for the World Conservation Union."

Includes bibliographical references (p.).

ISBN 0-8213-3132-9

1. Sustainable development—Case studies. 2. Conservation of natural resources—Case studies. 3. Natural resources—Management—Case studies. 4. Ecotourism—Case studies. I. Munasinghe, Mohan, 1945—. II. McNeely, Jeffrey A. III. Schwab, Adelaida.

HC79.E5P738 1994

333.7—dc20

94-45272

Preface

The papers in this volume originated from the Workshop on the Economics of Protected Areas at the IUCN—World Conservation Union Fourth World Congress on National Parks and Protected Areas, held in Caracas, Venezuela, during February 10–21, 1992. They seek to bring the techniques of environmental economics to bear on the vital task of improving the design and management of protected areas.

The workshop was organized jointly by the World Bank and the World Conservation Union, and this volume has been prepared and issued in the same spirit of close collaboration. We hope that it will be a useful and practical guide to the increasing numbers of people concerned with protected areas and making key decisions that affect them.

We are most grateful to the many participants who contributed to the success of the sessions, particularly the chapter authors. Special thanks are owed to those who helped to organize and manage the Workshop, including Mary B. Dyson, James P. Foley, and Walter J. Lusigi (vice chairs), and Claudia Alderman, Robert Healey, and Michael Wells (rapporteurs). Thanks are due also to Noreen Beg and Stephanie Gerard, as well as to Jay Dougherty and Rebecca Kary of Alpha-Omega Services, Inc., for assistance in putting the volume together.

Partial funding for this work, provided through grants from the governments of Norway and Sweden, is gratefully acknowledged.

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1 An Introduction to Protected Area Economics and Policy

Mohan Munasinghe and Jeffrey A. McNeely

THERE IS GROWING ACCEPTANCE, especially following the 1992 Earth Summit in Rio and the adoption of Agenda 21 by the community of nations, that sustainable development has not only economic but also environmental and social dimensions (Munasinghe, this volume). Since environmental protection is a key requirement for maintaining a sustainable way of life, we must ensure that adequate measures are taken to avoid the depletion and degradation of natural resources.

Rather than creating an illusory wealth by depleting natural capital, we need to employ all factors of production (the environment included), in the most efficient way possible, so that human society can derive benefits sustainably. For example, current international timber prices tend to reflect only the commercial value of tropical wood, ignoring the other functions of tropical forests as sources of biological diversity, clean water, and nontimber forest products. However, recent work in the field of economics has sought to value these latter benefits, thereby further enhancing the value of forest resources and encouraging the better management of such assets (Munasinghe 1992).

In purely economic terms, the production of a good is economically justified when the total benefits exceed the total costs; this must include the so-called external costs of dealing with pollution and environmental degradation. However, the production of the good may well be profitable in a commercial sense, even if it is not economic. There are many situations where true *economic* returns are negative as nature is destroyed, while *financial* returns (that neglect external costs) are positive, and private profits are made because of inadequate policy, regulations, or monitoring. This book consists of a stimulating set of papers presented during the Workshop on the Economics of Protected Areas, at the Fourth World Congress on National Parks and Protected Areas in Caracas, Venezuela, in February 1992. It examines how environmental economics can bridge the gap and contribute to the more effective design and management of protected areas. An overview of the volume and a summary of the main conclusions of the workshop are presented below.

Overview of this Volume

The papers in this volume are grouped into three sections: (a) economic policy and incentives; (b) economic valuation of protected areas; and (c) ecotourism and funding mechanisms.

Nevertheless, there is considerable overlap, not only because these broad subject areas are not entirely self-contained, but also because the individual papers often have wide coverage.

Economic policy and incentives

Conflicts between protected area management and local economic development are intensifying in many parts of the world, demanding new approaches to protecting biodiversity as well as the rights of people who live in and around protected areas. As Rodgers (this volume) has pointed out, "The big picture is one of more needs requiring satisfaction, multiplying demands on resources, and more complexity than ever. As a result, no project, regardless of mandate, financing or need, can long endure if consensus is not ensured." This may require that at least some protected areas be managed for multiple benefits, perhaps through agroecological zoning or other approaches. For example, Siebert, Belsky, and Rauf (this volume) have argued for establishing zones for the collection of rattan in the Kerinci-Seblat National Park in Sumatra, Indonesia—pointing out that it could generate approximately $5 per hectare per year, on a sustained-yield basis. Some issues arising from the concept of integrated conservation-development projects (ICDPs) are explored by Munasinghe (this volume).

Protected areas have a valuable economic characteristic—most of the benefits of a protected area can be "consumed" by one person without affecting the ability of another person to also benefit from the protected area. Such areas, therefore, could be exploited by large numbers of people, both directly and indirectly. Protected areas are not something "set aside" from the mainstream of sustainable development of a country—rather, they are part of the development process, and therefore, economics has much to say about how such areas might best contribute to this process. Economics could, for example, help to mediate the inherent conflict between the pursuit of individual self-interest and the collective self-interest of the community.

Protected areas also enable environmentalists to actually achieve some tangible gains. "Defining manageable portions of the problem to be tackled seems to be an important strategic device…it is simply too overwhelming to think concurrently of whole litanies of problems; the response is to sink into passive despair. Instead, building a series of `small wins' creates a sense of control, reduces frustration and anxiety and fosters continued enthusiasm" (Heinen and Low 1992). At the same time, it is necessary also to maintain a more comprehensive outlook.

All protected areas programs reflect a conflict of interests between alternative uses of scarce resources, and therefore, involve an economic component. Additionally, the reasons for desiring conservation of the natural environment and reduced pollution differ among nations. In affluent countries, the focus on environmental protection has been for recreational or aesthetic reasons. In poorer countries, the immediate concern is the disappearance of the resource base on which the very survival of billions of people depends.

Some economists argue that environmental degradation can be accepted so long as the gains from the activities causing the degradation (such as clearing a forest for agriculture) are greater than the benefits of preserving the areas in their natural form. The idea that there is some optimal stock of natural assets based on this comparison of costs and benefits is central to modern economic thinking. But it assumes that the full benefits of preserving the areas in their original form can be assessed accurately, and that the gains from the activities are also accurately assessed as the balance of benefits over costs. Many environmentalists question how well life support functions, such as contributions to geochemical cycles, photosynthesis, pollution control, and evolution, can be captured by cost-benefit analysis. They suggest instead that in the face of uncertainty and irreversibility, conserving what remains often might be a sound risk-averse strategy (Pearce et al. 1990).

As Tisdell (this volume) points out, the further economic development proceeds, and the more widespread the market system becomes, the greater will be the need for governments to establish protected areas as a part of the official development policy. Natural habitats are likely to remain relatively intact even without official protection, when little economic development and growth are taking place. However, once the economy starts to grow, natural resources begin to be perceived as a capital stock which could be drawn upon to finance development and to provide a cushion against economic shocks, such as a sudden deterioration in the balance of payments. In the early and intermediate stages of economic growth, natural resources are vulnerable to exploitation, and it is difficult politically for governments to protect them. At this critical stage, financial assistance and support for establishing and managing protected areas is important. Tisdell's analysis suggests that, as economies develop further and reach a mature stage, political support for protection of natural

areas increases, but by this time much biodiversity may have been lost. At this relatively mature stage, protected areas are then much more dependent on government funding, which in turn depends on political factors. Therefore, the involvement of effective conservation lobbies at an early stage becomes essential to ensure the security of protected areas.

Economic valuation of protected areas

The structure of an ecosystem includes the species contained therein, their mass, their arrangement, and other relevant information. This is the ecosystem's standing stock—nature's free goods. The functions of an ecosystem, on the other hand, are characterized by the ways in which the components of the system interact. They provide nature's free services, maintaining clean air, pure water, a green earth, and a balance of creatures, enabling humans to obtain food, fiber, energy, and other material needs for survival. Evaluating the contribution of ecosystem functioning to human welfare is a complex task, involving human social values and political factors.

One of the key tools of economic analysis is the full valuation of costs and benefits and application of cost-benefit analysis (CBA). When traditional valuation methods fail, other techniques like multicriteria analysis can be employed, as described by Munasinghe (this volume). This type of assessment is seen as essential to maintaining protected areas and specifying the place that such areas occupy in a modern society. Romero (this volume) finds that in Venezuela, such an assessment argues for decentralization of protected areas, and for the involvement of nongovernmental sectors in protected area management.

A corollary to valuation is the integration of natural resources and environmental information into the system of national accounts. Once such a framework has been established, it becomes possible to apply the preferred (and relevant) method of resource valuation on various measures, such as beginning inventory, flows (net change), or ending quantity (Cacha, this volume). Such information would be useful in the development and management of protected areas.

In order for citizens to communicate to decisionmakers their true desires about the maintenance of the natural environment and the pace of development, it is essential for the public to have a clear idea of the benefits they obtain from nature in its undeveloped state—in other words, the value of protected areas (Westman 1977). The economic value of a protected area depends greatly on the management regime applied to that area. In other words, value is influenced not only by biological and economic factors, but also by the institutions that are established to manage the resources contained in the protected area.

Of course, economics has its limits. As Morowitz (1991) put it, "we are often left trying to balance the 'good' of ethics with the `goods' of economics." It is difficult to assign economic values to species preservation because of the factors of irreversibility accompanying species extinction, difficulties in measuring the preferences of future generations, the problem of present costs and future benefits, and the distinction between commodity value and moral value. It is often necessary to contrast what is financially beneficial to private individuals against what is broadly beneficial to society as a whole—and clearly, the latter judgment is ultimately a political one. A recognition of the political nature of collective decisionmaking is described by Zinke (this volume), in a discussion on the formation of the 70-member nongovernmental organization (NGO) alliance—an initiative named "Ecological Bricks for our Common House of Europe."

Protected areas are expensive to establish and operate. However, it is less costly to protect their ecological integrity and manage the array of goods and services that they provide to the surrounding region, than it is to replace them once their biodiversity, watershed, and other environmental values have been lost. Economists can help to quantify compensation when environmental damage is an inevitable side effect of development, as is the case with the exploration and extraction of oil (Acosta Arias, this volume). Economics also helps to quantify alternative uses of protected areas, for example, through assessing the net value of alternative opportunities foregone. Hyde, Kanel, and Misomali (this volume) conclude that the social costs of conserving endangered species are generally low. Economics also could help to identify the kinds of incentives that will encourage the maintenance of protected areas by society, while motivating private landowners to engage in conservation measures on their own land.

A variety of economic valuation techniques have been used to assess the costs and benefits of rainforest management in Madagascar by Kramer et al. (this volume). Potential conflicts that could

arise among different objectives like development of the resource for ecotourism, biodiversity conservation, and protecting the rights of local people, are also explored.

Many protected areas provide substantial economic benefits to the countries in which they are located. For example, the 8,728 hectare Sarawak Mangroves Forest Reserve in Malaysia supports marine fisheries worth $21.1 million per annum and up to 3,000 jobs, timber products worth $123,217 per year, and a tourist industry worth $3.7 million per year. If the mangroves were to be damaged, all the fisheries and timber and many of the tourism benefits would be lost, while highly expensive civil engineering works would be required to prevent coastal erosion, flooding, and other damage (Bennett and Reynolds 1993). Burgstrom and Cordell (1991) estimated the total net economic value of outdoor recreation activities in the United States at $122 billion annually, much of which was directly attributable to protected areas. De Groot (this volume) has calculated that the conservation value of Galapagos National Park amounts to $64 per hectare per year. In some instances, wildlife resources are valuable for consumption purposes within the local population, as opposed to touristic use—this is the case with bushmeat in Ghana (Addo et al., this volume). Since most of the bushmeat catch is not traded, but consumed locally, the full value of the resource is not easy to calculate accurately.

Nonmarket conservation values of protected landscapes have been estimated in Australia, using both the contingent valuation (CVM) and travel cost methods (De Lacy and Lockwood, this volume). However, in a contingent valuation study performed in England to capture nonuser values for the Mersey Estuary (an internationally important wetland harboring diverse wildlife), Bickmore and Williams (this volume), found that the application of CVM to derive option and existence values was still problematic, due to the wide range of nonuser values that would have to be incorporated to render any survey effective.

Protected areas are crucial for conserving biodiversity, which itself has considerable value. The U.S. National Cancer Institute has identified 3,000 plants that are active against cancer cells, 70 percent of which come from the rainforest (Bird 1991) and can best be preserved in protected areas. In 1980, the market in the United States alone for prescriptions containing active principles from plants was worth more than $8 billion, with the world figure now exceeding $50 billion. Protected areas harbor many of the species on which this trade depends.

Knowledge and cultural association are public or collective goods, distinguishable from the private goods of market economics. In such cases, markets often do not reflect true economic values and the “invisible hand” has to be supplemented by a social contract involving regulations. Such public goods are clearly the province of government interventions, because of the likelihood of market failure.

Protected areas also serve a valuable “insurance function.” Uncertainty is a crucial part of all environmental decisionmaking. For example, it is highly uncertain what the priorities of future generations might be. In the extreme case, it may be that conserving too many resources now and restraining investment in technology might make future generations worse off, even if they do have a larger endowment of biological resources. On the other hand, when budgets are tight, it is relatively easy to cut parts of the budget designed to benefit future generations, since they do not, as yet, have an effective voice in decisionmaking.

For many economists, the prospect of the environmental agenda interfering with market forces or undermining the principle of comparative advantage in the course of open international trade, has threatening consequences—both environmental and economic. At the same time, for many leaders in developing countries, the prospect of a global environmental agenda that limits their ability to exploit and trade natural resources would be an unacceptable form of economic imperialism.

Ecotourism and funding mechanisms

Tourism is clearly a highly significant economic use of protected areas. For example, the expenditures in Nepal of tourists whose visits are directly attributable to the existence of protected areas, are very conservatively estimated to have been about $9 million in 1988, while the annual protected area management budget was only about $3 million (Wells, this volume). This apparently high benefit-to-cost ratio implies that there is inadequate public sector investment to ensure the effective management of these protected areas—due to insufficient appreciation of the economic contribution of protected areas, and to significant imbalances between economic costs and benefits at local levels. In the latter case, the communities in and around protected areas are particularly important, and economic strategies need to be devised to redistribute the benefits of tourism.

Furthermore, Filion, Foley, and Jacquemot (this volume) estimated that in 1988, some 235 million people participated in international tourism to enjoy and appreciate nature, generating economic benefits (or contributions to the national income of the countries involved) amounting to as much as $233 billion. This impressive figure can be put into perspective by considering that domestic tourism, which is not included in these figures, is larger than international tourism by a ratio of 10 to 1. However, travel costs would be less for domestic tourism, and for many developing countries, such tourism will not generate badly needed foreign exchange revenues. These authors indicated that some 32 percent of tourists stated that scenery, nature, and wildlife were the most enjoyable part of their trip, while approximately 80 percent of tourists come to Kenya and Zimbabwe primarily for the wildlife. In North America, some 70 percent of Japanese and European tourists visit national parks. In five Latin American countries, 41 to 75 percent of foreign tourists visited protected areas.

Bird-watchers visiting the Point Pelee National Park in Canada, a prime location for observing the spring migration of passerine birds, brings in at least $6 million per year in net economic value (Butler, Hvenegaard, and Krystofiak, this volume). In a preliminary study, Wescott (this volume) demonstrates, within a limited scope of preliminary indicators, that there was some economic benefit (for example, increased demand for hotel and motel rooms) as a result of an increase in tourism corresponding to the creation of the Grampians National Park in Australia.

In brief, the authors in this section generally feel that income from tourism could contribute significantly to the better management of protected areas, and outweigh the disadvantages of tourism (which can be significantly reduced by ecologically sustainable practices).

Lawrence (this volume) suggests that a tourist survey should be compared with a Delphi analysis to evaluate the acceptability of important environmental social changes for an existing or proposed tourism project. If the tourist's views differed greatly from the views of local residents, it would perhaps suggest that such visits were incompatible with chosen social and environmental goals, and tourism promotional campaigns might have to be reassessed. The importance of innovative planning to forecast changes in aggregate tourism demand, particularly in terms of nature-related tourism in Australia's Great Barrier Reef Marine Park, is highlighted by Craik (this volume).

At every phase of protected area establishment, new and different sources of funds may be required because donor interests and commitments vary considerably over time. A large donation can engender complacency which threatens the success of an area if the next source of support is not already being cultivated. Planning costs are often relatively modest, while the establishment phase can be extremely expensive if it involves land acquisition. A more significant problem is long-term funding of recurrent costs. Trust funds to support protected areas are currently in place in Costa Rica, Bolivia, Ecuador, Jamaica, Mexico, Brazil, Argentina, Panama, Bhutan, and Indonesia. A pioneering approach is being undertaken in Zimbabwe, where the Communal Area Management Programme for Indigenous Resources (CAMPFIRE), is attempting to use donor funds to make investments into the institution building process for sustainable natural resource management, and is even discussing the possibility of issuing a levy on members to finance overhead costs (Metcalfe, this volume).

A major challenge to protected areas is finding ways of maintaining well-trained and highly experienced staff at a time when the gap between public and private sector salaries is growing and many protected areas provide only the most basic of working conditions. This suggests that alternatives to public ownership of protected areas might be worth investigating. Under current economic conditions, many countries are finding it difficult to justify current, much less increased, expenditures on protected areas—especially when such costs are augmented by local and regional opportunity costs which bring about land use conflicts with local government and local populations. A partial solution would be to devolve control of the protected areas to local communities, although it is essential that this process be backed up by a legal and policy framework empowering local communities to assume responsibility and authority for natural resources management and land management contracts with representatives of the government (Lusigi, this volume).

Economics may also help societies in finding ways to improve the funding of protected areas. For example, LaPage (this volume) describes how the state park system of New Hampshire became a self-funded agency as of April 1991. Consisting of 24 natural areas, 12 historic sites, and 34 recreation areas, the system now retains all earnings and reinvests its profit in new programs, expansion of services, and accelerated maintenance. Independence from the budgeting process of the state government has led to innovative sources of funding, as well as measures like an extended volunteer corps and a growing array of innovative partnership programs. This is a very encouraging initiative, which strikes a responsive chord in managers of protected areas who seek freedom from the

oppressive and destructive constraints of the “general fund” budget philosophy. However, other state park systems in the United States, including those in both California and Florida, have not been nearly so successful in their efforts to become self-supporting. An essential policy step needs to be taken in countries wishing their protected area systems to become more self-reliant in funding, especially to enable them to retain fees, rents, commissions, and other sources of revenue.

One implication of economic analysis is that the efficient management of protected areas may be enhanced if at least some of them are privately owned and managed. Alderman (this volume) has shown that private protected areas have considerable potential to complement the national protected area system. While governments can provide economic policies and regulations to enable nature tourism to flourish, they are generally not efficient as tour operators or hoteliers—thus, the private sector can contribute to sustainable development and conservation strategies. Alderman identifies some 69 private protected areas in Latin America and 24 in Africa. Many of these areas are adjacent to government-established protected areas, but include tourism facilities which supplement the infrastructure of the established protected areas.

Private reserves generate considerable employment for local communities. Economic policies by governments that would promote the establishment of private protected areas include (a) recognizing nature tourism as a valid use of forested land (thus obviating the necessity to clear the forest to establish ownership); (b) allowing foreign investment in tourism; (c) enabling the establishment of nonprofit foundations to ensure the continued management of the land as a reserve; (d) economic incentives such as lower taxes; and (e) commitments on the part of government not to expropriate the lands.

Alderman concludes that the economic success of private protected areas are often dependent upon nonconservation factors such as accessibility, management, and the political situation of the country in which they are located. Those with the highest ecological value are not necessarily the ones which attract the most tourists and therefore can do well financially. Ecologically important, but financially weak, reserves should be given assistance by conservation groups to help such areas concentrate on research and conservation, using tourism only to supplement funds.

In the case of Eastern Europe, Zupancic-Vicar (this volume) notes that reprivatization is a serious concern to environmentalists in the region, who believe that the right of ownership should not be absolute, but should contain some protective measures involving the state.

Main Conclusions of the Workshop

The aim of the workshop on the economics of protected areas was to present the state of the art in assessing the economic contributions that protected areas make to society, and to address the policy and institutional changes that are required to enable protected areas to enhance their economic contribution to society (for example, changes in ownership and land tenure). The following helped to manage the sessions—chair: Mohan Munasinghe; vice chairs: Mary Dyson, James Foley, and Walter Lusigi; and rapporteurs: Claudia Alderman, Robert Healey, and Michael Wells.

The workshop covered both terrestrial and marine environments, and included efforts at different levels (that is, local, regional, national, and international levels). Approximately 125 people attended the workshop. Twenty-six papers and nine short interventions were presented. Three smaller groups discussed economic analysis, multiple use strategies, and economics of tourism, respectively.

Economic analysis: techniques and applications

Significant progress has been made in the application of economic analysis to protected areas, particularly in valuing some of the nonmarket costs and benefits. However, further work is required on the irreversibility of biodiversity loss, intergenerational effects and inequitable income distribution. In developing countries, where economic growth has high priority and there are large numbers of poor people, special emphasis must be placed both on methods of economic analysis and on practical policy instruments that will simultaneously protect natural habitats and alleviate poverty.

Valuation of biodiversity itself has been limited by the availability of scientific information and knowledge of the relationships among species, ecosystems, and the physical environment. It is important to recognize that economic analysis cannot estimate all of the costs and benefits relating to protected areas—and that existing techniques must be used cautiously. When monetary evaluation is

not possible, other methods such as multicriteria analysis could be used to give appropriate weight to nonvalued environmental impacts.

Microeconomic analysis

Most theoretical and empirical work has concentrated at the micro level. It is recommended that this work now provide the basis for an expansion of case studies to demonstrate the practical feasibility of site-specific analysis, especially in developing countries. Specific microeconomic areas requiring further study include:

- the distribution of costs and benefits
- treatment of intergenerational effects
- financial viability of investments in protected areas
- maximizing rent capture through appropriate pricing (for example, park entry fees)
- use of incentives to mitigate local financial burdens

Expanding the analysis

It is recommended that site-specific economic analyses of protected areas be expanded beyond protected area boundaries to encompass land use and other decisions involving local communities and linkage with regional economic planning and development.

Macroeconomic analysis

Greatly expanded attention should be given to linkages between the environment and economy-wide processes and policies in macro policies (such as soil, exchange rate management, and trade policies); and specific sectoral policies, such as energy pricing. In both cases, the emphasis should be on identifying and correcting market distortions and getting prices to reflect full economic costs, including environmental externalities.

The proposed biodiversity Convention on Biological Diversity (signed in June 1992 by 157 countries) should be subject to appropriate economic analysis, particularly to identify effects on the distribution of costs and benefits of biodiversity conservation among countries, communities, and individuals.

Multiple-use strategy and impacts on local residents

Protected areas can meet the needs of society only if social analysis is fully integrated with economic and ecological-biological analyses in their application to protected areas. Areas will not be protected unless their management is acceptable to the local communities and they themselves are involved in, and benefitted by, their existence.

Compromises and solutions between conservation and development issues are site-specific, and a site-specific approach is the best hope of a culturally appropriate solution. Socioeconomic analysis should be the first step in evaluating the potential sustainability of a protected area. Part of such analysis would entail establishing local use of a protected area and identifying local needs and preferences as a means of providing incentives towards positive acceptance of any burdens or limits put on local communities by others in the process of their land being “protected.”

Education is the primary means of providing opportunities for development to all people, and it is usually recognized as such by subsistence-level and illiterate communities. Basic subsistence needs, such as health and water, would also be high priorities.

Extension work and new technologies to improve use of available land to reduce pressure on protected areas should be researched and promoted.

Land tenure needs to be secure, whether for communities or individuals. Perverse legal incentives which foster deforestation and infringement should be removed. Positive legal status should be reinforced, rather than *de facto* ownership.

Economic distortions, such as water subsidies which promote abuse of water and ultimately affect catchment areas, should be abolished. People should be educated and motivated so that they will give up trading in endangered species or other forms of behavior that threaten biodiversity.

Institutional mandates should not be self-contradictory and self-defeating, and institutions should not provide incentives for misuse of resources.

Managing tourists and tourism

It has been estimated that tourism to appreciate and enjoy nature accounts for 40 percent to 60 percent of all international tourism. The economic impact worldwide is in the range of hundreds of billions of dollars. But tourism is not just big business—it is an activity that can be harnessed as a tool for conservation. Like all forms of tourism, nature-based tourism should not degrade the resource and should contribute actively to sustainable development.

Understanding tourism and tourists

Nature-based tourism is difficult to define because, among other things, "ecotourists" are often also cultural tourists and because many parks are visited by both tourists and local recreationists. As the IUCN—World Conservation Union becomes involved in nature-based tourism, it needs to define the term better, and examines its interactions with other types of tourism and recreation. Research is needed on the scale of tourism to protected areas, the motivation and satisfaction of the tourists and on the tourism life cycles of particular areas. The World Tourism Organization (WTO) and tourism researchers should be involved. In promoting tourism to protected areas, it should be realized that most tourists demand a high-quality product. There is a limit to what they are willing to pay, particularly if the product is perceived to be of insufficient quality.

Involvement of local people

Many parks that receive tourists are surrounded by poverty. At present, the tourism business is in the hands of only a few relatively wealthy people, while responsibility for care of protected area resources is diffuse. Much of this responsibility lies with local communities that lack the funds for proper management. In order to compensate local people for the loss of use of nearby resources, and to obtain their collaboration in protecting parks, a larger proportion of tourism revenues should be recycled locally. More attention should be paid to developing national as well as multinational tour operators, and smaller-scale enterprises, including community-controlled enterprises.

Education

Education is necessary for both the tourists and the local people. Tourism to protected areas may be considered a form of adult education, and sophisticated tourists are demanding a high level of knowledge on the part of tourist guides. Some areas are considering certification or licensing of guides so as to ensure a high quality of service. Local people need to be informed of the potential benefits of tourism. Exchange of information is needed among all those with a stake in tourism. Local people and tourists can be involved in projects, furthering mutual understanding. Tourism by nationals should be promoted since it is a powerful form of education and can build a constituency for protected area systems.

Appropriate pricing

Ways must be found to extract revenues from tourism for the support of protected areas, without discouraging their use by nationals. Entrance fees that differentiate among classes of visitors offer considerable promise and are already used in many countries, including the Galapagos Islands of Ecuador and St. Kitts.

Carrying capacity

More information is needed on the carrying capacity of destinations, and that information should be put in the hands of local park managers. Carrying capacity information can be useful in zoning tourism areas and in setting visitation limits. The possibilities and the costs of replenishing or restoring areas degraded by unsustainable tourism also need to be better understood.

Access

Access to tourism opportunities should be widely available, including access for local people and for the handicapped. Access helps create a constituency for parks.

Bibliography

Batisse, Michel. 1992. “The Struggle to Save Our World Heritage.” *Environment* 34(10):12–20 and 28–32.

Bennett, Elisabeth L., and Colin J. Reynolds. 1993. “The Value of a Mangrove Area in Sarawak.” *Biodiversity and Conservation* 2:359–75.

Bird, Chris. 1993. “Medicines from the Rainforest.” *New Scientist*, 17 August, pp. 34–39.

Burgstrom, John C., and H. Ken Cordell. 1991. “An Analysis of the Demand for and Value of Outdoor Recreation in the United States.” *Journal of Leisure Research* 23(1):67–86.

Heinen, Joel T., and Roberta S. Low. 1992. “Human Behavioural Ecology and Environmental Conservation.” *Environmental Conservation* 19(2):105–16.

Morowitz, Herald J. 1991. “Balancing Species Preservation and Economic Considerations.” *Science* 253:752–54.

Munasinghe, Mohan. 1992. “Biodiversity Protection Policy: Environmental Valuation and Distribution Issues.” *Ambio* 21(3), May.

Munasinghe, Mohan. 1993. “Environmental Economics and Sustainable Development.” Environment Paper no. 3. Washington, D.C.: World Bank.

Pearce, David, E. Barbier, and A. Markandya. 1990. *Sustainable Development: Economics and Environment in the Third World*. London: Edward Elgar Ltd.

Prendergast, J. R., R. M. Quin, J. H. Lotten, B. H. Eversham, and D. W. Gibbons. 1993. “Rare Species, the Coincidence of Diversity Hotspots and Conservation Strategies.” *Nature* 365:335–37.

Westman, Walter E. 1977. “How Much Are Nature’s Services Worth?” *Science* 197:960–64.

A Economic Policy and Incentives

2 Economic and Policy Issues in Natural Habitats and Protected Areas

Mohan Munasinghe

IN RECENT TIMES, the degradation of the environment has emerged as a major worldwide concern. In particular, pollution in the industrial countries has become a serious threat to the quality of life—hitherto measured mainly in terms of growth in material output. These wealthier countries which have achieved reasonably adequate broad economic goals have begun to reorient their national objectives by placing greater emphasis on improved environmental quality.

At the same time, developing nations are beginning to realize that natural resource degradation is a serious impediment to their central goals of economic development and the alleviation of poverty. Thus these poorer countries are seeking sustainable development paths that will permit them to simultaneously address both socioeconomic and environmental concerns. The concept of sustainable development encompasses three major points of view: economic, social and ecological, as shown in Figure 2-1. It is a formidable task to reconcile these various concepts and implement them as a means of achieving sustainable development.

The economic approach to sustainability is based on the Hicks-Lindahl concept. This concept defines the maximum flow of income that could be generated while maintaining or increasing the stock of assets or capital that yield these benefits (Solow 1986; Maler 1990). The Hicks-Lindahl concept includes an underlying concept of optimality and economic efficiency applied to the use of scarce resources. Problems of interpretation arise in identifying the kinds of capital to be maintained, whether manufactured, natural, or human. Problems may also arise in their substitutability, as well as in valuing assets like ecological resources. The issues of uncertainty, irreversibility, and catastrophic collapse pose additional difficulties (Pearce and Turner 1990).

The *social* concept of sustainable development is people-oriented, and seeks to maintain the stability of social and cultural systems, including the reduction of destructive conflicts (United Nations Environment Programme and others 1991). Both intragenerational equity, especially elimination of poverty, and intergenerational equity, involving the rights of future generations, are important aspects of this approach. Human society needs to pursue the preservation of cultural diversity across the

globe and the better use of knowledge concerning sustainable practices embedded in less dominant cultures. Modern society needs to encourage and harness pluralism and grass-roots participation into a more effective decision-making framework for socially sustainable development.

The *ecological* view of sustainability focuses on the stability of biological and physical systems. Of particular importance is the viability of subsystems that are critical to the global stability of the overall ecosystem (Perrings 1991). Protection of biological diversity is a key aspect of the ecological view. Furthermore, natural systems may be interpreted to include all aspects of the biosphere, including manmade environments such as cities. The emphasis here is on preserving the resilience of these systems, as well as on their dynamic ability to adapt to change, rather than on the conservation of some ideal static state.

One serious manifestation of ecological unsustainability is the accelerated destruction of natural habitats in the second half of this century, due to the increased burden that human economic activity has placed on these habitats. The status of forests and biological diversity provides an illustrative example. Forests account for about 28 percent of the world's land area, or 3.6 billion hectares. Currently, about 17–20 million hectares of forest area are lost per year worldwide, of which the major share is tropical moist forests (World Bank 1991). Tropical moist forests fall primarily within the developing countries and account for over half the world's biodiversity. Since many species are endemic to relatively small areas, ecologists estimate that more than several hundred species are becoming extinct each year (McNeely 1990). Other habitats such as temperate forests, wetlands, and marine ecosystems have also been significantly affected or are under threat due to human interventions.

Another consequence of deforestation is the acceleration in the build-up of greenhouse gases, caused by the loss of carbon sinks and the burning of forests. The forests of the world hold about 1,200 billion metric tons of carbon, 60 percent more than is contained in the atmosphere at present (Ramakrishna and Woodwell 1991). Over the last century, deforestation has contributed about 125 billion metric tons of carbon to the atmosphere, as compared to approximately 200 billion metric tons of carbon released from worldwide combustion of fossil fuels over that same period, the great majority of these emissions having originated in the now industrial world. Because of their high per unit density of biomass, tropical moist forests account for 55 percent of the world's organic carbon. Their clearance by burning contributes significantly to the buildup of carbon in the atmosphere, with the potential long-term consequences of induced global climate change (World Bank 1991).

Rationale for Protecting Natural Habitats and Biodiversity

Mankind's relationship with the environment has gone through several stages, as shown in Figure 2-2. In primitive societies, human beings lived in a state of symbiosis with nature. As civilization advanced, man increasingly sought to master nature, culminating in the industrial age. In the twentieth century, as the scale of economic activities has expanded, the adverse effects of those activities on natural resources have increasingly demanded more attention. This has led to a reactive approach to environmental damage, through increased cleanup and mitigation activities. In the past several decades, our attitude toward the environment has progressed to the point where there is a growing emphasis on proactive design of projects and policies to anticipate and avoid environmental degradation.

Recently, mankind has begun to look for practical sustainable development options that will permit continued improvements in the quality of life with a lower intensity of resource use. This focus will permit future generations to inherit an undiminished or even enhanced stock of natural and other assets. A symbolic long-run hope held by a few determined environmentalists envisages humanity achieving a state of deep ecology that would bring us closer to our original symbiosis with the environment. An important element of the current search for sustainable development is the protection of natural habitats and biological diversity.

The environment, including natural habitats and ecosystems, provides three main types of services to mankind. The specific role of forests as one key type of natural habitat is summarized in Table 2-1. First, the environment is a source of essential raw materials that support human activities. In particular, natural habitats provide the basis for food and cash crops, fish stocks, forests, domesticated and wild animals, and other natural assets, all of which benefit human society.

The generation and maintenance of soils is an example of a less obvious yet crucial productive service provided by ecosystems. The living components of soil ecosystems contribute crucial services

to the support of crops and forests. In some forests where trees appear to be the most visible organisms, their very existence is dependent upon the functioning of mycorrhizal fungi in the soil. Ecosystems may act as a natural pest-control mechanism, as some species of insects prey on the herbivorous insects that attack crops (Ehrlich 1990). Ecosystems are inherently renewable if they are well managed, thereby providing sustainable yields for indefinite periods of time.

Second, the environment serves as a sink that absorbs and recycles the waste products of economic activity, normally at little or no cost to society. Once again, the physical and biological systems in natural habitats play an essential part in accepting and breaking down pollutants and recycling nutrients. For example, decomposers in soil break wastes down into simpler constituents that in turn serve as fresh nutrients such as oxygen, phosphorus, and other elements, essential to the growth of green plants.

Third, the environment provides irreplaceable life support functions without which life on earth would be drastically altered or even destroyed. In this context, ecosystems—for example, forest and marine ecosystems—play an important role in stabilizing climate and hydrology and also in maintaining the essential gene pool whose diversity helps to preserve the resilience and richness of living organisms.

It is the preservation of this global web of life, whose complexity is still poorly understood, that underlies the basic concern for the protection of biological diversity. A vast genetic library exists that is still largely untapped. Only a small portion of plant species have been screened for potential medical value,[1] and only 7,000 plant species are currently used for food, out of a possible total of 75,000 plants reported to have edible parts (Ehrlich 1990). Tropical moist forests comprise a significant segment of the genetic library, containing between 50 and 90 percent of all species.

Apart from the direct uses mankind has for biodiversity, it could be argued that diversity is inherently more interesting and attractive than its loss. There is a growing body of environmentalists who argue in favor of a moral obligation to protect our only known living companions in the universe—many of which provide us with pleasure through the mere knowledge of their existence. Humanity appropriates 25 percent of global net primary production and 40 percent of all net primary production generated on land.[2] The foregoing suggests that humanity has an ethical responsibility to at least attempt to redress this inequity, by actively protecting biodiversity.

Looking at the problem from a somewhat different viewpoint, if environmental issues are ordered according to geographic scale, natural habitats and ecosystems are important at every level. First, among the truly global environmental issues, the preservation of biodiversity has been internationally accepted as a priority that is comparable with other global and transnational issues such as global climate change, ozone layer deterioration, and water resource degradation. In the same context, ecosystems such as forests play a vital role in regulating the planetary climate. Deforestation plays a significant role in altering the “albedo,” or reflectivity, of a region, that changes the amount the earth’s surface is heated by the sun.

At the national and subnational levels, air pollution, water contamination, and land degradation are caused by a range of urban-industrial and rural-agricultural activities. These effects on the environment degrade natural habitats on the local scale, threaten the sustainability of living species, and diminish biodiversity. Some of the specific environmental functions that are threatened by the destruction of tropical forests are summarized in Table 2-1. Many biologists believe that there will be a critical threshold beyond which remaining forests will be unable to maintain the climate necessary for regeneration. The deforestation of watersheds affects the regional hydrological cycle, leading to higher incidence of alternating floods and drought, and aquifer depletion.

Degradation of the physical environment has already begun to undermine the long-term basis for sustainable development. Moreover, the accelerating loss of large numbers of species continues to disrupt highly interconnected biological systems, with unforeseen and very likely damaging consequences for humanity. Most organisms are highly adapted to their habitats. If dramatic changes to a habitat occur there is a risk that most or all the plants, animals, and micro-organisms that once occupied it will migrate or die out. Clearly, the protection of biological diversity is a crucial subject, as recognized by the recently published *Global Biodiversity Strategy* (1992).

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[1] Quinine, a plant compound, is still a primary defense against malaria.

[2] Ehrlich defines net primary production as roughly the total food supply of all animals and decomposers.

The Role of Environmental Economics

Environmental economics play a key role in identifying efficient natural resource management options for sustainable development (Munasinghe 1993). It is an essential bridge between the traditional techniques of decisionmaking and the more environmentally sensitive approach, now emerging.

Framework for Policy Analysis

Environmental economics helps us to incorporate ecological concerns into the conventional framework of human society, as shown in Figure 2-3. The right side of the diagram indicates the hierarchical nature of modern society, where the global and transnational level consists of sovereign nation states. In the next level are individual countries, each having a multisectoral macroeconomic structure. Various economic sectors, such as energy, industry, agriculture, and transport, exist within the macroeconomic structure of each country. Finally, each of these sectors consists of different subsectors, projects, and local schemes.

Unfortunately, the analysis of the environment cannot be readily carried out using the above socioeconomic structuring. As shown on the left side of Figure 2-3, one convenient breakdown recognizes environmental issues that are (a) global and transnational such as climate change or ozone layer depletion; (b) natural habitat such as forests and other ecosystems; (c) land such as agricultural zones; (d) water resource such as river basin, aquifer, or watershed; and (e) urban-industrial such as metropolitan area, or airshed. In each case, a holistic environmental analysis would seek to study physical or ecological systems in their entirety. Complications arise because such natural systems tend to cut across the decisionmaking structure of human society. For example, a forest ecosystem such as the Amazon could span several countries, and also interact with many different economic sectors within each of those countries.

Environmental degradation may be said to arise from human activity, leaving aside for the moment natural disasters and other events of nonhuman origin. Therefore, we begin on the right side of Figure 2-3. The physical, including biological and social, effects of socioeconomic decisions on the environment must then be traced through to the left side. The techniques of environmental assessment (environmental assessment) have been developed to facilitate this difficult analysis. For example, deforestation of a primary moist tropical forest may be caused by hydroelectric dams (energy sector policy), roads (transport sector policy), slash-and-burn farming (agriculture sector policy), mining of minerals (industrial sector policy), land clearing encouraged by incentive land-taxes (fiscal policy), and so on. Disentangling and prioritizing these multiple causes, seen on the left side of Figure 2-3 and their effects, seen on the right side, will involve a complex environmental assessment exercise.

Meanwhile, the usual decision-making process on the right side of Figure 2-3 relies on techno-engineering, and on financial and economic analyses of projects and policies. In particular, we note that conventional economic analysis has been well developed over the past several decades, and uses techniques including project evaluation or cost-benefit analysis, sectoral or regional studies, multisectoral macroeconomic analysis, and international economic analysis at the various hierarchical levels.

Figure 2-3 also shows how environmental economics plays a bridging role by mapping the environmental assessment results onto the framework of conventional economic analysis. Once again, a variety of environmental economic techniques including economic valuation of environmental effects at the local or project level, integrated resource management at the sector or regional level, environmental macroeconomics and environmental accounting at the economy-wide, multisectoral level, and global or transnational environmental economics at the international level facilitate this process of incorporating environmental issues into traditional decisionmaking. We note that there is considerable overlap among the analytical techniques described above, and therefore conclude that we should not interpret this conceptual categorization too rigidly.

Issues in Practical Policy Formulation

Establishing a precise value on environmental and natural resources is an important step in incorporating the costs and benefits of using such resources into the conventional calculus of economic decisionmaking. The failure of market mechanisms and the waste or overuse of scarce environmental assets may be caused by the absence of property rights over environmental resources.

The failure may also be caused by the ability of some economic agents to use natural resources while imposing the burden of their external costs on others. Parks and natural habitats are particularly vulnerable to such market failures. Remedial policies to address these issues should be based on sound valuation of the environment, from the viewpoint of society as a whole.

In the same context, there is a growing body of empirical evidence showing that an insignificant overlap exists between groups who benefit most from the loss of natural habitats, and those who bear the costs. This leads to classic externality issues involving both efficiency and equity among economic agents within a given country, as well as among different countries, at a global level.

Once the analysis is complete, we must redesign projects and policies in order to reduce their environmental effects and to shift the development process toward a more sustainable path. Clearly, the formulation and implementation of such policies are themselves difficult tasks (see the section entitled *Policy Implementation Issues*). In the deforestation example used above, the decisionmakers who wish to protect this single ecosystem are likely to face problems in coordinating policies in a large number of disparate and (usually) noncooperating ministries and line institutions (such as energy, transport, agriculture, industry, finance, or forestry).

Valuing the Environment

Determining the environmental effects of a project or policy is the first step toward incorporating environmental concerns into conventional economic decisionmaking. These biological, physical, and social effects are determined by comparing the "with" and the "without" project scenarios. To determine such effects, the economist will have to rely on the expertise of engineers, ecologists, agronomists, social scientists, and other experts. An important issue, outside the scope of this chapter, is that such physical effects are complex and often poorly understood. The establishment of an economic value on the environmental effects is the second step in taking the environment into account. Finally, we may redesign projects and policies to mitigate harmful environmental and social effects. The development of policy tools and the strengthening of human resources and institutions is particularly important in order to manage natural resources on a sustainable basis.

From an economic viewpoint, the valuation of environmental resources and effects is a key step toward the sustainable management of natural resources (Munasinghe 1993). Conceptually, the total economic value of a resource consists of its use value and nonuse value. Use values may be broken down further into the direct use value, the indirect use value and the option value, or potential use value. It is important that we not double count both the value of indirect supporting functions and the value of the resulting direct use (Aylward and Barbier 1992). One major category of nonuse value is existence value. We may write: TEV = UV + NUV or TEV = [DUV + IUV + OV] + [NUV].[3]

Figure 2-4 shows this disaggregation of total economic value in schematic form. Below each valuation concept, the figure provides a short description of its meaning and a few typical examples of the environmental resources underlying the perceived value. Thus, the contribution an environmental asset makes to current production or consumption determines its direct use value. Indirect use value includes the benefits derived basically from functional services that the environment provides to support current production and consumption. Option value is the present willingness to pay based on the future benefit to be derived from an unutilized asset when the option to use it will be exercised (for a more detailed explanation, see Bishop 1982). Existence value arises from the satisfaction of merely knowing that the asset exists, although the person assigning the value has no intention of using it.

Option values and nonuse values are shaded in the figure, to caution the analyst concerning some of the ambiguities associated with defining these concepts. As shown in the examples, they can spring from similar or identical resources. Economic theory clearly defines total use value (see the section entitled *Policy Implementation Issues*), but there tends to be considerable overlap and ambiguity in the breakdown categories, especially with regard to nonuse values. Therefore, these categories are useful mainly as an indicative guide. The distinctions often become irrelevant in practical estimation since the objective is to measure total use value rather than its components (Randall 1991). Use values tend to be conceptually clearer, whereas nonuse values are linked to more altruistic motives (Schechter and Freeman 1992).

[3] Where TEV is total economic value, UV is use value, NUV is nonuse value, DUV is direct use value, IUV is indirect use value, and OV is option value.

Option value, as defined technically by Smith (1987a), is the algebraic difference between the *ex ante* option price (a sum paid to preserve the environmental option regardless of the future state of the environment) and *ex post* expected consumer surplus (consumer surplus from use value, weighted by the probabilities of the respective states of nature). Randall (1991) notes the discrepancies that may arise from combining *ex post* measures of option value with *ex ante* measures of other values. Quasi-option value, which focuses on the intertemporal aspects of development, is perhaps most relevant to environmental economists in deciding whether to delay a project, given the possibility of irreversible environmental losses. Quasi-option value arises from new information that might emerge in the future regarding the value of a natural resource that would be irreversibly lost if the project was undertaken today (Arrow and Fisher 1974). Fisher and Hanemann (1987) conclude that "[quasi-]option value can be calculated empirically given appropriate biological, engineering, and economic data and that it may be substantial relative to conventionally estimated benefits."

Nevertheless, whatever the conceptual basis of economic value, there are several practical techniques that permit us to estimate a monetary value for many environmental assets and effects. The basic concept of economic valuation underlying all these techniques is the individual's willingness to pay for an environmental service or resource (for details, see Braden and Kolstad 1991; Randall 1991). This willingness to pay is based on the area under the compensated or Hicksian demand curve that indicates how demand varies with price while keeping the user's utility level constant. Equivalently, the willingness to pay for an environmental asset could be defined in terms of the difference between the values of two expenditure functions. The latter are the minimum amounts required to achieve a given level of utility (or welfare) before and after varying the price of, access to, or quality of the environmental resource in question, while keeping all other aspects constant. Problems of measurement arise because the commonly estimated demand curve is the Marshallian demand curve that indicates how demand varies with the price of the environmental good, while keeping the user's income level constant. In practice, it has been shown that the Marshallian and Hicksian estimates of willingness to pay are in good agreement for a variety of conditions. In a few cases, we may derive the Hicksian function, once we have estimated the Marshallian demand function (Willig 1976; Kolstad and Braden 1991). An economic measure related to willingness to pay is what people are willing to accept as compensation for environmental damage. willingness to pay and willingness to accept could diverge (Cropper and Oates 1992). In practice, either or both measures are used for valuation. Therefore references to willingness to pay below may be broadly interpreted to include willingness to accept.

Table 2–2 categorizes valuation methods, according to which type of market they rely on, and by considering how they make use of actual or potential behavior (for more details on these techniques, see Annex A).

In certain cases, we may use direct market-based techniques, including the evaluation of reduced production due to degradation of natural habitats, loss of income due to sickness and death, or the actual costs of measures needed to conserve protected areas. More sophisticated but indirect approaches for estimating the economic value of environmental resources are also available. Among these, hedonic wage and price techniques seek to compare wage rates and property values in environmentally degraded areas as against the same indicators in environmentally undamaged regions. The differences in such market indicators are ascribed to the value that people place on an undamaged environment. Another indirect approach uses travel costs. In this case, the willingness of tourists or visitors to bear increased transport and other costs to reach scenic or recreational areas provides an indicator of the intrinsic value of such areas.

We may also use the hypothetical cost of replacing a damaged environmental asset, including a shadow project or the replacement cost, to value the environment. Artificial markets are used to pilot test the willingness to pay for new environmental products or services. Finally, the contingent valuation technique uses surveys and hypothetical questions to determine consumer willingness to pay for protecting or improving environmental quality. In certain cases, where economic valuation is not feasible, multi-objective decisionmaking methods may be used to trade off the incommensurable damage to natural habitats and the diminution of biodiversity against other economic costs and benefits (see Annex B for details). The recent application of this approach in a developing country is described in Meier and Munasinghe (1992).

The discount rate is an important parameter which is applied to future costs and benefits in order to compare them with those of the present. We may reach the following conclusions based on the more detailed discussion in Annex C, within the context of environmental cost—benefit analysis:

- The normal range of opportunity cost of capital (that is, 6–12 percent) may be used as the discount rate.
- Efforts should be made to ensure that compensating investments offset capital stock degradation arising from policy and project decisions.
- In the case of projects leading to irreversible damage, cost—benefit analysis should be adapted to the extent possible in order to include the foregone benefits of preservation in the computation of costs.

Risk and uncertainty also raise fresh issues in environmental analysis, especially when potentially irreversible and catastrophic environmental effects might occur. Annex D examines these problems.

Policy Implementation Issues

After we have used the analytical tools of environmental economics as effectively as possible to address the valuation issue, practical policies must be devised to implement the resulting decisions. The most obvious question to ask is how the valuation of environmental effects of a policy or project should affect its design and implementation.

Economy-Wide Policies and the Environment

Fiscal and monetary policies, structural adjustment programs, and stabilization measures all have an effect on the natural resource base. These complicated interactions, nevertheless, are not well understood. The ideal approach is a general equilibrium analysis that traces both the economic and environmental effects of economywide policy reforms. Such comprehensive methods, however, are not possible in developing countries where data and skills are scarcer. Partial approaches that help to identify the most important effects of economy-wide policies may be more practical.

Simple generalizations are not possible. Many instances of environmental damage, however, are due to market failures and policy distortions, exacerbated by unemployment, landlessness and poverty (Munasinghe and others 1993). Broad policy reforms that usually promote efficiency or reduce poverty, therefore, should also be generally beneficial for the environment. Some of these reforms may have negative environmental effects, depending on pre-existing, and often localized constraints, such as inadequately defined property or resource rights. The challenge is to trace the complicated paths by which such policy changes ultimately effect incentives for efficient resource use at the firm or household level. The objective is not necessarily to modify the original broader policies which have conventional economic or poverty related goals, but rather to design more specific or localized complementary measures. The latter would help mitigate negative effects or enhance positive effects of the original policies on the environment. Such complementary actions would include both market-based approaches, such as Pigouvian taxes on environmental externalities or allocation of limited pollution rights coupled with marketable permits, as well as nonmarket methods, such as command-and-control techniques. This process of articulating a range of policies becomes more difficult when economy-wide reform programs address very broad macroeconomic issues.

In particular, more work is needed to understand the adverse effects of economy-wide and sectoral policy decisions on natural habitats and parks. These effects often dwarf the efforts of those working to protect natural habitats at the local level (see the section entitled *Integrating Conservation and Development*), and complicate the policy implementation process as described below.

Recently, environmental accounting has highlighted the growing importance of valuing environmental assets in order to prepare a set of additional national income statistics. These statistics would supplement conventional indices such as gross national product (GNP) and net primary production used in macroeconomic decisionmaking (Lutz and Munasinghe 1991). The drawbacks of relying solely on the commonly used system of national accounts, and proposed methods to develop environmentally adjusted net domestic product and net income, are described further in Annex E.

Policy Implementation Constraints

Problems of environmental policy implementation that particularly hamper efforts to preserve biodiversity include: weak analytical tools, lack of skilled human resources, inadequate political will, and fragmented institutional frameworks. The difficulties with analytical tools have been discussed already, and could be remedied only gradually through greater efforts to improve scientific

understanding of complex ecosystems, and improving economic valuation methods. The lack of trained personnel and political will to take sometimes unpopular measures are also difficulties that loom especially large in developing countries beset by a host of other pressing problems including poverty and starvation. The issue of organizational framework is examined in more detail below.

The fragmentation of institutions is a serious problem, because of the way human societies are structured. Environmental problems are essentially holistic and best studied in terms of complete natural resource systems. Thus, we might analyze the pollution of air, water and land resources, or the degradation of a natural habitat in terms of these systems. Nevertheless, the causes of environmental problems are rooted in socioeconomic systems that are structured quite differently from these natural resource systems. For example, the destruction of a forest ecosystem may arise from tax policies that encourage land clearing by large landowners, agricultural and land settlement policies that increase migration and population pressures in the forested area, energy supply and pricing policies that encourage fuelwood use by industries and households, the construction of a road that suddenly opens up the forest hinterland, or just the basic survival needs of desperately poor people. The overall results of these combined effects will accelerate deforestation. However, addressing the underlying causes will require a series of policy changes by a large number of disparate ministries and line agencies that might cover finance, agriculture, land settlement, migration, energy, transport, and so on. It is a formidable task in itself to effectively coordinate the separate actions of such a large number of institutions.

Environmental economics and the valuation of environmental effects play a critical role in providing a common numeraire or basis for comparing a variety of different outcomes, from the viewpoints of many sectors. They also play a key role in facilitating pragmatic and efficient tradeoffs among alternatives. Furthermore, where economy-wide measures such as those applied to achieve nonenvironmental goals (for instance, reducing inflation or increasing exports) have adverse environmental consequences at the local level, further articulation of policy can be carried out by fine-tuning micro-level measures that offset the negative effects of macro-level policies.

The Distribution of Costs and Benefits

A better understanding of who bears the costs and who reaps the benefits is an important requirement in the formulation and implementation of effective policies to preserve natural habitats. First, from a general economic viewpoint, ensuring that those who derive the benefits also pay the costs will lead to the more efficient use of natural resources. In this context, it is especially important that we prevent beneficiaries from imposing environmental externality costs on others. Second, social equity normally requires that costs and benefits are fairly distributed. In particular, there is increasing concern that the degradation of protected areas should not allow the rich to gain at the expense of the poor.

There are two facets to the question of the distribution of costs and benefits: that is, who are the losers and winners when natural habitats are: (a) overexploited; and (b) conserved (McNeely 1990).

To address the overexploitation issue first, very often the poorest groups who live near or within protected areas in developing countries are the most adversely affected. They suffer because of the progressive loss of the flora and fauna that provide them with basic necessities for subsistence, including fresh water, meat and fish, fruits and vegetables, herbs and medicines, and timber and other materials. Meanwhile, loss of irrigation water to farmers, watershed degradation, siltation of reservoirs and rivers, and damage to downstream freshwater and marine habitats, could also affect the welfare of many others.

On the other hand, the beneficiaries of nonsustainable use, such as deforestation, are mainly wealthier timber merchants and other nonresident exploiters. Since they are able to externalize the costs of their overexploitation, there is a strong incentive to use the resources nonsustainably, while reaping quick profits. Poorly conceived policies may exacerbate matters. For example, many developing countries have ceded timber rights in public forests to a few wealthy concessionaires, at a minimal cost (Repetto and Gillis 1988). Two classic studies by Mahar (1989) and Binswanger (1989) highlight how distorted public policies have worsened environmental problems in the Brazilian Amazon region over several decades. Mahar showed that poor and landless peasants have contributed to deforestation, basically responding to incentives such as highways that open up jungle areas, government land grants, access to public infrastructure, and cash subsidies.

Some of the blame is attributable directly to government settlement projects. In Brazil, large-scale livestock operations as well as iron ore smelting have contributed to land degradation. Binswanger, focusing on the agricultural sector, argues that tax and land distribution policies and the provision of credit to farmers not only encourage deforestation but also worsen income distribution by favoring larger landowners. More recently, Schneider and others (1993) argue that destruction of the Amazon is the result of farmers, ranchers, and loggers responding predictably and rationally to distorted incentives arising from poor government policies and political instability.

Turning next to the issue of conserving protected areas, again, those who bear the costs of the conservation are not necessarily its main beneficiaries. From a global perspective, the most valuable natural habitats with the greatest biodiversity and species endemism, are in the very tropical countries that are among the world's poorest. Moreover, conservation policies that rely on denial of access to protected areas or on admission fees impose a large opportunity cost on the poorest groups living contiguously to those areas, who had hitherto relied on these same natural resources for survival. It is both unrealistic and unfair to expect poorer countries and the poorer groups within those countries to shoulder the main burden of preserving natural habitats.

Much of the benefit of nature conservation are likely to accrue to citizens of wealthier countries who have indicated willingness to pay to preserve such assets, as well as wealthier groups within the developing world such as hotel owners and tour operators. This suggests that public policy should seek to extract economic rents from those who are willing and able to pay, to preserve natural habitats. The international implications of this conclusion are discussed in the next section.

Global and Transnational Policy Issues

Decisionmakers, as well as ordinary citizen in the developing countries, share the worldwide concerns about environmental issues generally, and degradation of natural habitats in particular. In the process of instituting policies to improve natural resource management as an essential step toward sustainable development, these countries also seek to conserve protected areas. However, such efforts are constrained by the fact that the poorer nations must simultaneously confront other urgent issues such as poverty and malnutrition. The paucity of resources available to address these pressing problems limits the ability of these countries to protect natural habitats. They have to reconcile development goals and the struggle to eliminate poverty, with responsible stewardship of the environment. Therefore, their own scarce resources are likely to be used for conserving protected areas only to the extent that this application also promotes broader development goals.

The industrial countries have an important role to play, to the extent that protecting natural habitats and conserving biodiversity yield significant global benefits. They have already attained most reasonable goals of development, and thus could commit resources to global environmental protection. Transfers of capital, knowledge, and technology from the developed to the developing nations are essential to enable the developing countries to share in the effort of protecting the "global commons," of which natural habitats are a major element (Munasinghe and Munasinghe 1991).

Presently, discussions are under way among governments and world bodies to define effective criteria and mechanisms for both generating and disbursing funds to address global environmental issues. Whereas a broad workable agreement will not be easily achieved, global financing issues may be analyzed and resolved through a tradeoff involving several criteria: affordability, additionality, fairness or equity, and economic efficiency (Munasinghe 1990).

First, many developing countries can hardly afford to finance their existing development efforts themselves. Therefore, in order to address global environmental issues they will need financial assistance, such as grants, on concessionary terms in addition to existing conventional aid. Furthermore, the latter will need to be increased, to deal with local environmental issues in the developing world.

Second, the disparity in energy use per capita between the industrial countries and developing countries raises issues in the context of current global environmental concerns, and the heavy burden placed on mankind's natural resource base by past economic growth. A good example of this is the accumulation of greenhouse gases, particularly carbon dioxide, in the atmosphere due to the burning of fossil fuels. The industrial countries, representing about 25 percent of the world's population, accounted for over 80 percent of such cumulative worldwide emissions during 1950–86. On a per capita basis, the contrasts are even more stark. The average North American emitted over 20 times more carbon dioxide than a resident of the developing countries. The developed countries as a whole

were responsible for over eleven times as much total cumulative carbon dioxide emissions as the developing countries during that period.

Clearly, the development of industrial countries has effectively exhausted a disproportionately large share of global resources. These resources include those that are consumed in productive activity, such as oil, gas, and minerals, and the environmental assets, such as natural habitats, that absorb the waste products of economic activity, as well as those that provide irreplaceable life support functions, such as the high altitude ozone layer. Indeed this development path has significantly indebted the industrial countries to the rest of the global community (WCED 1987). If the division of responsibility in the worldwide effort to resolve global environmental problems were to be based fairly on the unbalanced use of common resources in the past, then the industrial countries would be required to assume a larger role than the developing countries in protecting the global commons. This approach would also help determine how the remaining finite global resources may be shared more equitably and used sustainably.

Finally, the economic efficiency criterion indicates that the "polluter pays" principle may be applied to generate revenues, to the extent that global environmental costs of human activity can be quantified. For example, in the case of carbon dioxide discussed above, if total emission limits are established under a permit system, then trading in emission permits among nations and other market mechanisms can be harnessed to increase efficiency.

The principle of international assistance to developing countries for global environmental protection efforts, specifically in terms of technology transfer and financial support, is already well established. One assistance mechanism that has recently been established is the Global Environment Facility, a core multilateral fund of about $1.5 billion, implemented as a pilot program during 1991–93. This fund is financing investment, technical assistance, and institutional development activities in four areas: global climate change, ozone depletion, protection of biodiversity, and water resource degradation. One important and distinct element of the Global Environment Facility is the Ozone Fund of about $200 million, set up to help implement measures to reduce chlorofluorocarbon (CFC) emissions under the Montreal Protocol. Both funds are being managed under a collaborative arrangement between the United Nations Development Programme, United Nations Environment Programme, and the World Bank. The pilot phase of the Global Environment Facility has just been completed, and it is now moving into another multiyear implementation phase with a replenishment of about $2–3 billion.

In particular, the Global Environment Facility is funding activities to protect biodiversity and natural habitats that would provide cost-effective benefits to the global environment. These activities would not have been undertaken by individual countries without concessions because the measurable benefits to a national economy are too low to trigger their own investment. It is particularly troubling that natural habitats that need to be protected in perpetuity will need a permanent stream of funds, whereas the Global Environment Facility projects must necessarily have a finite operational lifetime. The use of trust funds to generate such long term streams of income are being explored as a potential solution to this problem.

A second issue is the concern that the sudden infusion of large sums of money to support relatively short-term, high-visibility projects may be counterproductive, resulting in time, attention, and government monies being diverted from lower-profile issues that are central to the conservation of biodiversity in the long run (McNeely 1991). According to this viewpoint, biodiversity conservation problems may be better addressed by adopting an approach that is less capital-intensive, but that can be implemented over the long term. Projects should be developed based on a reflection of local needs and perceptions, that can be modified to meet changing conditions. One promising approach to implementing both national and global natural habitat conservation projects is discussed below.

Integrating Conservation and Development

A new group of pilot schemes called integrated conservation—development projects (ICDPs) has been started recently. These projects include biosphere reserves, multiple-use areas, and a variety of rural development initiatives on the boundaries of national parks (including buffer zones), as well as regional land use schemes with protected area components. They are attempting to link the conservation of protected areas with the social and economic development of local communities near, or sometimes within, protected area boundaries. As mentioned earlier, such local populations frequently bear the cost of the establishment of parks and reserves through denied resource access, while receiving few benefits in return. These projects aim to achieve their conservation goals by

promoting development and providing local people with alternative income sources that sustain rather than threaten the flora and fauna in natural habitats. The projects are based on the premise that protected area management must reach beyond traditional conservation activities inside park and reserve boundaries to address the needs of contiguous local communities.

The establishment of field-level linkages between conservation and development has been promoted by the 1980 World Conservation Strategy, the 1982 World Parks Congress in Bali, and the 1987 Brundtland Report. Therefore, the ICDP approach has received increasing attention from multilateral and bilateral development institutions, as well as conservation organizations and government agencies.

The World Bank recently completed its "People and Parks" study, which reviewed lessons learned from 23 ongoing ICDPs in Africa, Asia, and Latin America (Wells, Brandon, and Hannah 1991). Some key implications of the study results stretch beyond the realm of protecting biodiversity in parks and reserves. These findings broadly encompass the protection and management of tropical forest areas, in the increasingly common situation where there is a potential conflict of interest between local people and those responsible for forest protection and management.

Progress in most of the case study projects has been modest up to now, because these projects are:

- less than five years old.
- relatively small scale, most having annual operating budgets below $100,000.
- involve linkages and issues that are complex and not well understood, as yet.

Despite these caveats, the early experiences of the case study ICDPs offer the following useful insights:

- Often, the main problems are not caused by local people, the targeted beneficiaries of ICDPs. Pressures on natural ecosystems can ultimately arise from poorly designed laws, policies, social changes, and economic forces over which poor rural people have no influence and which can severely curtail their options. Park management cannot therefore be regarded solely as a local issue.
- Some of the ICDPs have led to the reduced incidence of illegal park use, although these improvements appear to be attributable primarily to intensified enforcement through the deployment of additional guards. In some cases, hostile relations between park personnel and local communities have become substantially more amicable as a result of project personnel performing a mediation role.
- Public agencies responsible for protected area management tend to lack both financial and human resources as well as political support. These factors, in combination with the traditional orientation of such organizations toward a policing or enforcement role, inhibit their ability to either carry out their original mandate of park protection or to participate effectively in ICDPs.
- Serious design and implementation flaws have hampered several ICDPs. In some cases, errors known to have hampered earlier rural development projects have been needlessly repeated. Another drawback has been the rather modest capabilities of some of the ICDP implementing organizations, particularly in terms of their development experience.
- Genuine local participation in ICDPs is difficult to achieve. However, some of the case study projects have shown signs of promise in terms of:
    - winning the trust and confidence of local people.
    - eliciting the participation of community members in project-initiated activities.
    - starting institutions for local resource management decisionmaking.
- These ICDPs may offer the greatest potential for eventual success. However, there is little evidence so far that these steps could lead to the achievement of project conservation goals or sustainable improvements in local communities once the original project has finished.

- Largely because of confused land and resource access rights, conservation projects have had difficulty in designing approaches that reflect different degrees of indigenousness in local populations. For example, both established, traditional societies and recent immigrants tend to have vastly different needs and aspirations. The impact of their activities on the natural habitat may differ significantly.

In another comprehensive survey on residents and national parks (West and Brechin 1991), several case studies demonstrate a commonality in the methods employed to incorporate local people into the planning process. In many projects, public relations have been confused with true participation. Rather than serving as a vehicle for local participation and power sharing, participation exercises tended to focus on educating the local people in order to facilitate plans already determined by the authorities. Of course, the importance of education cannot be ignored, but care should be taken to ensure that it is not used to propagate a predefined policy, under the guise of participation. West and Brechin also point out the dangers of formal co-optation to preempt conflict, or the token involvement of local communities without true decentralization of decisionmaking. Such tactics lead to a loss of confidence in the authorities, and will reduce the likelihood of cooperative policies in the future. In any power-sharing agreement, the project should be continually monitored to ensure that the local elite does not dominate the project to the detriment of the rural poor who are intended to be the primary beneficiaries. Real participation is best achieved by confidence-building and conflict resolution measures that entail a genuine and realistic apportionment of decisionmaking power.

Cernea (1992) warns of the social complications and costs arising from the involuntary resettlement of forest dwellers, caused by ill-conceived approaches to protection of forest areas, often implemented by local or foreign agencies who have little knowledge of the sociological issues. He points out that three broad groups of inhabitants live within or near forests—indigenous, or tribal people; more recent settlers; and nonresidents who periodically extract forest resources. Each group has distinct characteristics and requires specific policies to enlist their support for sustainable management of natural habitats.

To conclude, ICDPs may offer an important new alternative to traditional approaches that stressed policing and anti-encroachment measures for conserving protected areas. Increasing resource demands from growing rural populations and continuing large-scale conversion or degradation of natural ecosystems will continue to impose increasing pressure on parks and reserves. Although traditional enforcement will continue to play a critical role—and in many cases it needs to be significantly strengthened—it is inconceivable that networks of protected areas can be maintained indefinitely by policing. Innovative ICDPs that constructively address people—park issues and elicit the support of local communities are therefore an essential component of sustainable development.

There appear to be five principal constraints to increasing the effectiveness of initial ICDPs, and later replicating promising approaches on a scale that could have more extensive effects:

- the limited effectiveness of the agencies responsible for protected area management.
- inadequate long-term funding commitments from lenders and donors.
- the lack of commitment from governments, in many cases tied to insufficient financial resources.
- legislative and policy environments that are not conducive to the implementation of ICDP development activities outside park boundaries.
- limited capacities to identify, plan, and implement projects, both among responsible government agencies and among implementing nongovernmental organizations.

Conclusions

This chapter has emphasized that the conservation of natural habitats and the protection of biological diversity is important for sustainable development at all levels ranging from the global to the local. By improving the incomes and welfare of local communities and simultaneously preserving physical and biological systems in protected areas developing countries may pursue both environmental and developmental goals in a complementary manner.

The acceleration in natural habitat destruction in the latter half of this century is primarily attributable to the increased burden of unsustainably managed human economic activity. A more accurate valuation of such resources would lead to a greater realization of the often irreversible

environmental damage being incurred. The establishment of an environmental economic framework facilitates the incorporation of environmental economic concerns into conventional economic analysis, thereby improving decisionmaking at the economy-wide, sectoral, and micro levels.

The chapter reviewed a policy framework and identified constraints to policy implementation, particularly in developing countries. It is evident that there is a need for a set of policy measures that will more adequately reconcile private and social costs and benefits. These policy measures need to address the issue of unequal distribution between those who bear the costs of degradation and conservation of protected areas, and those who are the beneficiaries. To the extent that the beneficiaries are wealthy, as individuals or as nations, it would seem appropriate for public policy to extract economic rents from those who are willing and able to pay for conservation.

The linkage of protected area management with social and economic development of local communities has been attempted through integrated conservation development projects (ICDPs). These ICDPs were developed as an alternative to traditional approaches that stressed policing and anti-encroachment measures. A review of ICDPs suggests that, if such programs constructively address people—park issues and win the trust and support of local communities, they can play an important role in sustainable development.

In conclusion, the following are specific aspects that merit more detailed attention.

- A greater emphasis needs to be placed on the comprehensive valuation of natural habitats and their associated physical and biological systems, in terms of their economic contribution to society, rather than focusing on them simply as sources of timber or land to be cleared for agriculture. An examination of the value of environmental assets can then be used to improve and redesign development assistance policies and projects. This examination may eventually be used to modify national income accounts so that economic loss resulting from degradation of natural resources and biodiversity loss is reflected in GDP.
- Better understanding is needed of the distribution of costs and benefits of the exploitation and conservation of natural habitats; explore the role of private agents in the conservation and management of parks; and improve the use of incentive structures to make this involvement more effective.
- Mobilization of large scale concessionary funding needs to be continued to protect national habitats. An effective example of this funding is the Global Environment Facility that addresses transnational issues relating to preservation of biodiversity, and seeks to facilitate technology transfer for conservation and the sustainable management of biodiversity.
- Clarification of the relationship between conservation of natural habitats and alternative strategies is needed in order to manage these environmental assets, determine how local peoples' knowledge of natural habitats can be optimally utilized, and effectively integrate the participation of women in conservation and management projects.
- An improved understanding is needed of the relationship between macroeconomic and sectoral policies and programs outside the forest sector. The focus needs to turn to tax policies, currency devaluations, agricultural and energy pricing policies, land settlement policies, as well as to resource degradation and loss of biodiversity in natural habitats, including marine, coastal, and forest ecosystems.

Table 2-1. Environmental Functions of Forests

Source of materials and services	*Sink for wastes*	*General and life support*
Timber	Absorption of waste	Genetic pool
Fuelwood	Recycling nutrients	Climate regulation
Other business products	Watershed protection	Carbon fixing
Nonwood products	Protecting soil quality and erosion resistance	Habitat for people, flora and fauna
Genetic resources		
Agricultural production		Aesthetic and spiritual source
Recreation and tourism		Scientific data

Source: Adapted from World Wide Fund, *Economic Analysis of Conservation Initiative*, WWF—UK, London, October 1990.

Table 2-2. Taxonomy of Relevant Valuation Techniques

	Conventional market	*Implicit market*	*Constructed market*
Based on actual behavior	•Effect on production	• Travel cost	• Artificial market
	• Effect on health	• Wage differences	
	• Defensive or preventive cost	• Property values	
		• Surrogate goods	
Based on potential behavior	• Replacement cost		• Contingent valuation
	• Shadow project		

Figure 2-1. Evolution of Human Attitudes Toward the Environment

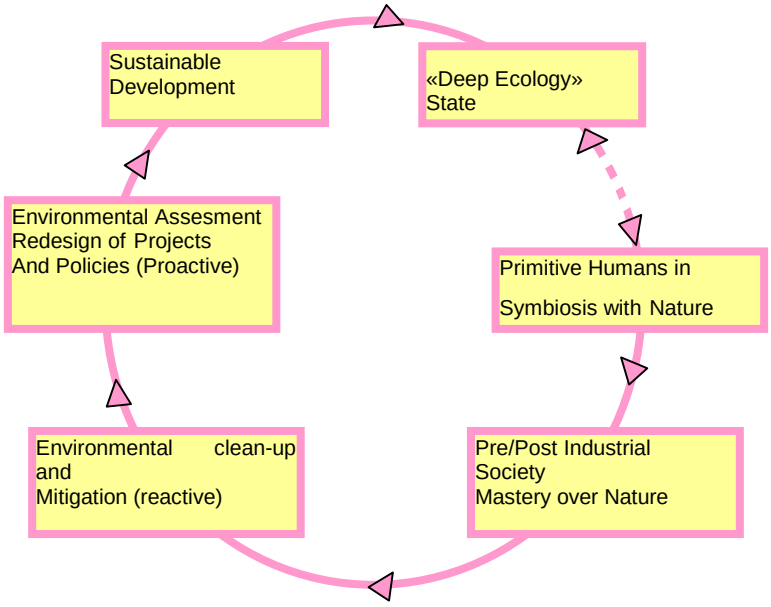


Figure 2-2. Incorporating Environmental Concerns into Decisionmaking

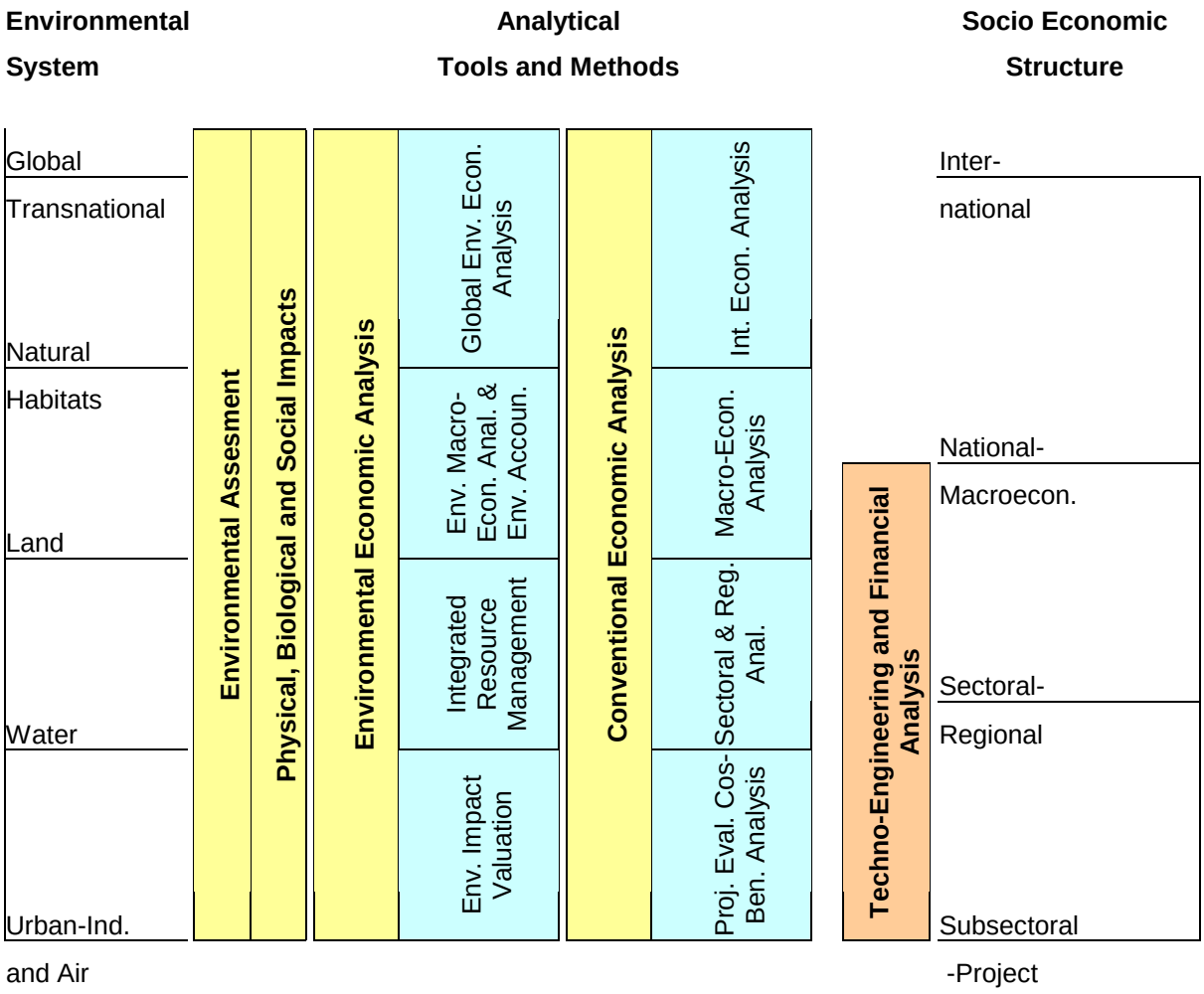
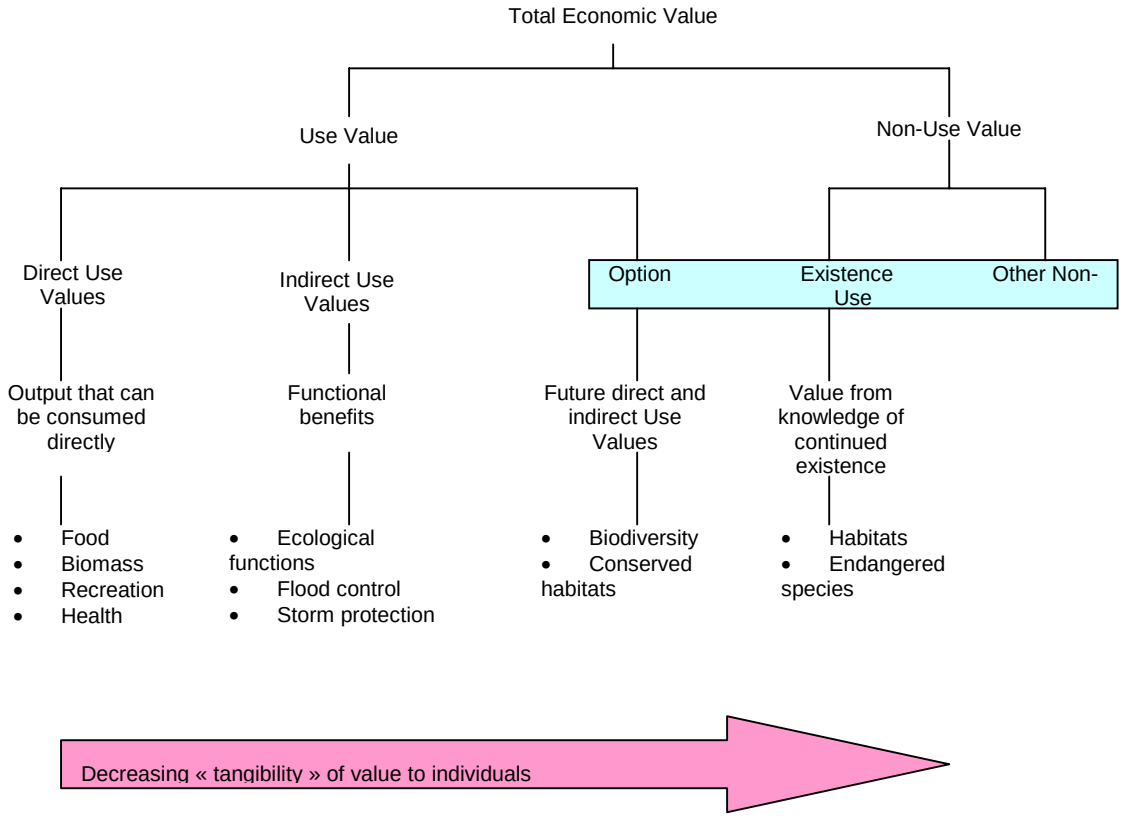
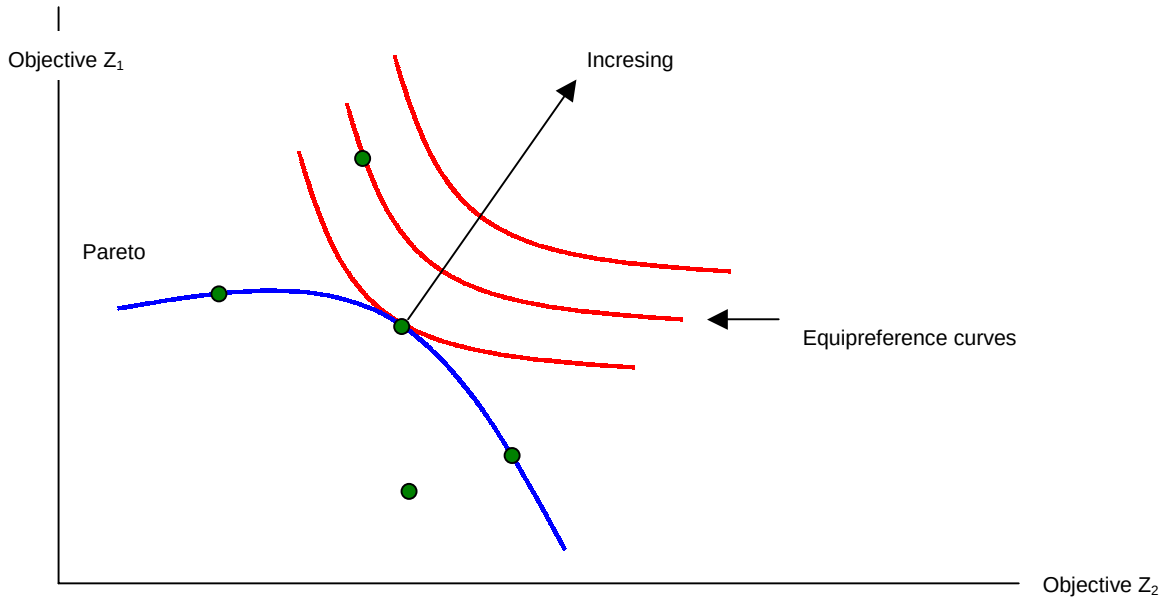


Figure 2-3 Categories of Economic Values Attributed to Environmental Assets (with Examples from a Tropical Forest) (with Examples from a Tropical Forest)



Source : Adapted from Pearce (1992)

Figure 2-4 Pareto Optimal Curve and Isopreference Curves



Annex 2—A Techniques for Valuing Environmental Costs and Benefits

The various techniques of environmental valuation are described in relation to Table 2-2, found in the main text.

Direct Effects Valued on Conventional Markets

Methods considered in this section are based on how a change in environmental quality directly affects actual market-related production.

Effect on Production

An investment decision often has environmental effects that in turn affect the quantity, quality, or production costs of a range of outputs that may be readily valued in economic terms. Increased production from conserved land is estimated in a case study on soil conservation in Lesotho (Bojo 1991). The values of different production schemes are compared in the valuation of a Peruvian rainforest (Peters and others 1989). Other examples include effects on tropical wetlands (Barbier and others 1991) and the effects of sedimentation on coral diversity and fish production (Hodgson and Dixon 1988).

Effect on Health

This approach is based on health effects caused by pollution and environmental degradation. A relevant practical measure is the value of human output lost due to ill health or premature death. The loss of potential net earnings, called the human capital technique, is one proxy for foregone output, to which the costs of health care may be added as a replacement or preventive expenditure. The above measure assumes that earnings reflect the value of marginal product and that medical treatment costs are well defined. The method encounters difficulties when the cause—effect link between environmental quality and ill health is unclear, or when the sickness is chronic, or of long duration. This technique seeks to avoid ethical controversies associated with valuing a single life attempting instead to place a value on the statistical probability of ill health or death. This is comparable to the actuarial values used by life insurance companies. Moreover, governments and public health authorities routinely set priorities and allocate health expenditures that affect human well-being. This in turn provides a baseline for determining implicit values placed by society on various health risks.

Defensive or Preventive Costs

Often, costs may have been voluntarily incurred by communities or individuals to mitigate or correct the damage caused by an adverse environmental impact. For example, if the drinking water is polluted, extra filtration or purifying chemicals, or both, may be needed. In that case, additional defensive or preventive expenditures could be taken as a minimum estimate of the benefits of mitigation. The assumption is that the benefits of avoided environmental degradation at least exceed the costs of avoidance. The advantage of the technique is that defensive or preventive outlays which have already been made are easier to determine than the value of the original environmental damage. One weakness of this technique is that the defensive actions are sometimes arbitrarily determined with little reference to market forces, so that the costs bear little relation to the potential environmental benefit. Recently, Harrington and others (1989) evaluated the economic damages of a waterborne disease outbreak, emphasizing that the valuation of averting behavior requires the establishment of a relationship between observable defensive expenditures, and nonobservable willingness to pay.

Potential Expenditures Valued on Conventional Markets

This section summarizes techniques in which future actions could be valued in conventional markets to provide a measure of environmental degradation, provided there is a high degree of certainty that such actions will be undertaken.

Replacement Cost and Shadow Project

If an environmental resource that has been impaired is likely to be replaced in the future by another asset that provides equivalent services, then the costs of replacement may be used as a proxy for the environmental damage. This is an *ex ante* measure similar to the *ex post* defensive

costs approach. It may be argued that the benefits from the environmental resource should be at least as valuable as the replacement expenses. The replacement cost approach has been applied to protecting groundwater resources in the Philippines by determining the cost of developing alternative water sources (Munasinghe 1990c).

A shadow project is usually designed specifically to offset the environmental damage caused by another project. The cost of the shadow project reflects an institutional judgment on the value of environmental assets that are thereby restored. This approach has been discussed in the context of project-level sustainability. The original project and shadow project together form a sustainable package that helps to maintain undiminished some vital stock of environmental resources. For example, if the original project was a dam whose construction caused some forest land to be inundated, then the shadow project might involve the replanting of an equivalent area of forest elsewhere. Often, the equivalency criterion is hard to satisfy precisely. In the above example, the two tracts of forest may have the same volume of biomass, but could differ widely in terms of biodiversity.

Valuation Using Implicit or Surrogate Markets

Often, relevant market data to value environmental resources are not available in a directly usable form. In such cases, analysis of indirect market data using, for instance, statistical and econometric methods, permits the valuation to be carried out implicitly. A variety of such surrogate market-based methods, including travel cost, the hedonic methods and proxy goods, as well as their applicability under different circumstances, are described below.

Travel Cost

This method seeks to determine the demand for a recreational site, based, for instance, on the number of visits per year to a park, as a function of variables such as consumer income, price, and various socioeconomic characteristics. The price is usually the sum of observed cost elements such as (a) entry price to the site; (b) costs of traveling to the site; and (c) foregone earnings or opportunity cost of time spent. The consumer surplus associated with the demand curve provides an estimate of the value of the recreational site in question. More sophisticated versions include comparisons using regression analysis across sites, where environmental quality is also included as a variable that affects demand. Until a few years ago, most applications of this technique were found in the market economies, but quite recently, several examples have emerged involving developing world applications. The travel cost for domestic trips to a forest is estimated in a Costa Rica case study (Tobias and Mendelsohn 1991). In another study on the value of elephants in Kenya, the travel cost of tourists from Europe and North America is used to estimate consumer surplus (Brown and Henry 1989).

Property Value

In areas where relatively competitive markets exist for land, it is possible to decompose real estate prices into components attributable to different characteristics such as house and lot size, proximity to schools, shops and parks, and so forth (Cropper and Oates 1992). To value an environmental variable such as air or water quality, the method seeks to determine that component of the property value attributable to the relevant environmental variable. Thus, the marginal willingness to pay for improved local environmental quality is reflected in the increased price of housing in cleaner neighborhoods. This method has limited applicability in developing countries, because it requires a well-functioning housing market, as well as sophisticated information and tools of statistical analysis. Jimenez (1983) used this technique to explain changes in housing prices in a Manila slum area, upgraded partly due to water and sanitation service improvements.

Wage Differences

As in the case of property values, the wage differential method attempts to relate changes in an economic price variable (the wage rate), to environmental conditions. The underlying assumption is that there is some component of the wage that is determined by the environmental pollution or hazard associated with the job or work site. The technique is relevant when competitive labor markets exist, and where wages that reflect the marginal product of labor equilibrate the supply and demand for labor (see earlier discussion on shadow pricing). One concern is that the approach relies on private valuations of health risks, rather than social ones. In this context, the level of information on occupational hazards must be high for private individuals to make meaningful tradeoffs between

health risk and remuneration. Finally, the effects of all factors other than environment (for example, age, skill level, job responsibility, and so forth) that might influence wages must be accounted for, to eliminate bias and isolate the effects of environment.

Proxy Marketed Goods

This method is useful when an environmental good or service has no readily determined market value, and a close substitute exists that does have a competitively determined price. In such a case, the market price of the substitute may be used as a proxy for the value of the environmental resource. Barbier and others (1991) provide an example involving marketed and nonmarketed fish substitutes.

Valuation Using Constructed Markets

In cases where market information cannot be used directly or indirectly, market-like behavior needs to be deduced through construction or simulation. The methods summarized below depend on direct questions, surveys or marketing experiments.

Artificial Markets

Such markets are constructed for experimental purposes, to determine consumer willingness to pay for a good or service. For example, a home water purification kit might be marketed at various price levels, or access to a game reserve may be offered on the basis of different admission fees, thereby facilitating the respective estimation of values placed by individuals on water purity or on the use of a recreational facility.

Contingent Valuation

When relevant market behavior is not observable, the contingent valuation method puts direct questions to individuals to determine how much they might be willing to pay for an environmental resource, or how much compensation they would be willing to accept if they were deprived of the same resource. The contingent valuation method is more effective when the respondents are familiar with the environmental good or service (for example, water quality) and have adequate information on which to base their preferences. The contingent valuation method is likely to be far less reliable when the object of the valuation exercise is a more abstract aspect, such as existence value.

Generally, declared the willingness to accept tends to be significantly greater than the corresponding willingness to pay. This may be partly attributable to strategic bias where respondents feel they would be better off inflating the amounts they would receive rather than the sums to be paid out, if the hypothetical questions posed were somehow to become a reality in the future. In the case of poorer individuals, the willingness to pay may be limited by the ability to pay, whereas the willingness to accept is not. The questionnaires have to be carefully designed, implemented, and interpreted to overcome the above mentioned difficulties, as well as other types of bias.[4] Munasinghe (1990b) provides several early examples of the application of the contingent valuation method to value the quality of electricity services in developing countries.

A review by Pearce and Markandya (1989) compared valuation estimates obtained from market-based techniques and the contingent valuation method, using results from seven studies carried out in industrial nations. They found that the corresponding estimates overlapped within an accuracy range of plus or minus 60 percent. The conclusion is that the contingent valuation method, cautiously and rigorously applied, could provide rough estimates of value that would be helpful in economic decisionmaking, especially when other valuation methods were unavailable. The case study using the contingent valuation method for estimating the value of elephants in Kenya (see below) shows that it is possible to achieve an understanding of the order of magnitude of the benefits through modest methods. The other study, on willingness to pay for water services in southern Haiti, tests the contingent valuation method for different biases, indicating the limits of its reliability.

[4] For details, see *The Energy Journal* 1988.

Annex 2-B Multi-Objective Decisionmaking

The methods described above seek to estimate costs and benefits of a given project in monetary terms. When environmental effects cannot be easily valued in monetary terms, multi-objective decisionmaking is an alternative approach that may facilitate better choices among projects or policies available.

Desirable objectives need to be specified. These often exhibit a hierarchical structure. The highest level represents the broad overall objectives often vaguely stated and, hence, not very practical such as improving the quality of life. Some of these, however, can be broken down into more operational lower level attributes such as income, so that the extent to which the latter are met may be practically assessed. Sometimes only proxies are available. For example, if the objective is "to enhance recreation opportunities," the attribute "number of recreation days" may be used. Value judgments may be required to choose the proper attribute, especially if proxies are involved, but measurements do not have to be in monetary terms, which is the single criterion used in economic cost—benefit analysis. More explicit recognition is given to the variety of nonmonetary concerns associated with planning decisions.

An intuitive understanding of the fundamentals of multi objective decisionmaking can be provided by a two-dimensional graphic exposition such as in Figure A2.1. Assume that a scheme has two noncommensurable and conflicting objectives, Z_1 and Z_2. For example, Z_1 could be the additional project cost required to protect biodiversity, and Z_2 some index indicating the loss of biodiversity. Assume further that alternative projects or solutions to the problem (A, B, and C) have been identified. Clearly, point B is superior to or dominates A in terms of both Z_1 and Z_2 because B exhibits lower costs as well as less biodiversity loss relative to A. Thus, alternative A may be discarded. However, we cannot make such a simple choice between solutions B and C since the former is superior to the latter with respect to objective Z_1, but inferior to Z_2. In general, more points or solutions such as B and C may be identified to define the set of all nondominated feasible solution points that form an optimal tradeoff curve or curve of best options. This line is also analogous to the production possibility frontier or efficient product transformation curve in the theory of the firm.

For an unconstrained problem, further ranking of alternatives cannot be conducted without the introduction of value judgments. Specific information has to be elicited from the decisionmaker in order to determine the most preferred solution. In its most complete form, such information may be summarized by a family of equipreference curves that indicates the way in which the decisionmaker or society trades off one objective against the other. Typical equipreference curves are illustrated in Figure 3. The preferred alternative is that which results in the greatest utility, that occurs (for continuous decision variables as shown here) at the point of tangency D of the best equipreference curve, with the tradeoff curve.

Several multicriteria methods have been developed (Romero and Rehman 1987; Petry 1990; Munasinghe 1992). Which practical method in particular is suitable to determine the best alternative available depends upon the nature of the decision situation. The advantage of multi-objective decision models is that they allow for more accurate representation of decision problems, since several objectives may be accounted for. However, a key question concerns whose preferences are to be considered. Various interested groups will often assign different priorities to the respective objectives. Nevertheless, in constructing the model the analyst communicates information about the nature of the problem, and clarifies why factors are important and how they interact. Although developing country applications are scarce, a study by Meier and Munasinghe (1992) seeks to incorporate nonvalued environmental considerations into energy decisionmaking in Sri Lanka.

Annex 2-C The Discount Rate

Economists typically use a forward-looking approach in which past or "sunk" costs and benefits are ignored, though a discount rate is applied to future costs and benefits to yield their present values. Standard criteria for cost—benefit analysis, such as the net present value and internal rate of return are derived in this way. The issue of choosing an appropriate discount rate has been discussed in the context of general cost—benefit analysis for many years (Dasgupta and others 1972; Harberger 1976; Little and Mirrlees 1974).

Two concepts help to shape the discount or interest rate in a market economy. First, there is the rate of time preference of individuals that determines how they compare present consumption with future consumption. Second, there is the rate of return on capital that determines how an investment

made by foregoing today's consumption would yield a stream of future consumption, or the net of replacement. In an ideally functioning market, the interest rate that equilibrates savings and investment also equals both the marginal rates of time preference and return on capital. In practice, government policy distortions and market failures lead to divergences between the rates of time preference and return on capital. Furthermore, the social rate of time preference may be less than the individual time preference rate since societies are likely to have a greater stake in the future than the comparatively short-lived individuals.

The long-term perspective required for sustainable development suggests that the discount rate might play a critical role in intertemporal decisions concerning the use of environmental resources (Lind and Arrow 1982). The rate of capital productivity is high in many developing countries because of capital scarcity, and the rate of time preference also is elevated because of the urgency of satisfying immediate food needs rather than ensuring long term food security (Pearce and Turner 1990). Projects with social costs occurring in the long term and net social benefits occurring in the near term will be favored by higher discount rates. Conversely, projects with benefits accruing in the long run will be less likely to be undertaken under high discount rates. Thus, some environmentalists have argued that discount rates should be lowered to facilitate environmentally sound projects meeting the cost—benefit analysis criteria. However, this would lead to more investment projects of all types, thereby possibly threatening fragile environmental resource bases. Norgaard (1991) argues that lowering discount rates can in fact worsen environmental degradation. By lowering the cost of capital and thereby lowering the cost of production, more is consumed in the near-term relative to the case where discount rates were higher. Furthermore, using a very low discount rate to protect future generations is inequitable, since it would penalize the present generation and increase inequalities across time periods, especially if the present generation included widespread poverty (Pearce 1991).

In order to facilitate such intergenerational transfers, a sustainability constraint may be imposed, whereby current well-being is maximized without reducing the welfare of future generations below that of the current generation. In practice, this would entail the monitoring and measurement of capital stocks, manmade, human, and natural It would also entail a broad investment policy that sought to ensure that compensating investments offset depreciation of existing assets (Pearce 1991). Theoretically, the aim would be to ensure that the overall stock of assets is preserved or enhanced for future generations. Practical application of this principle would be difficult.

Annex 2-D Risk and Uncertainty

Risk and uncertainty are an inherent part of economic decisions. Risk represents the likelihood of occurrence of an undesirable event, such as an oil spill. In the case of uncertainty, the future outcome is basically unknown. Therefore, the risk of an event may be estimated by its probability of occurrence, whereas no such quantification is possible for uncertainty since the future is undefined. The risk probability and severity of damage could be used to determine an expected value of potential costs, that would be used in the cost—benefit analysis. However, the use of a single number (expected value of risk) does not indicate the degree of variability or the range of probability values that might be expected. Additionally, it does not allow for individual perceptions of risk. The risk probability may be used to devise an insurance scheme to protect against the risk.

In the case of uncertainty, it is not possible to estimate the expected value of costs or insure against an unknown eventuality. The increasing scale of human activity, the complexity of environmental and ecological systems, and the lack of knowledge of how these systems might be affected all emphasize the need to deal with uncertainty more explicitly. The key to dealing with uncertainty is a cautious approach. An illustrative example is global warming. In the past, the greenhouse effect of carbon dioxide emissions was not known or recognized as a risk. At the present time, there is still considerable uncertainty about the future effects of global warming, but given the large magnitude of potential consequences, caution is warranted.

The traditional and simple way of incorporating risk and uncertainty considerations in project level cost—benefit analysis has been through sensitivity analysis. Using optimistic and pessimistic values for different variables, we can indicate which variables will have the most pronounced effects on benefits and costs. We note that although sensitivity analysis need not reflect the probability of occurrence of the upper or lower values, it is useful for determining which variables are most important to the success or failure of a project (Dixon and others 1988). More sophisticated approaches to analyze risk and uncertainty are available (Braden and Kolstad 1991).

The issue of uncertainty plays an important role in environmental valuation and policy formulation. Option values and quasi-option values are based on the existence of uncertainty. Option value is essentially the premium that consumers are willing to pay to avoid the risk of not having something available in the future. The sign of option value depends upon the presence of supply or demand uncertainty, or both, and on whether the consumer is risk-averse or risk-loving. Quasi-option value is the value of preserving options for future use in the expectation that knowledge will grow over time. If a development takes place that causes irreversible environmental damage, the opportunity to gain knowledge through study of flora and fauna is lost. Increased benefits to be derived through future knowledge expansion, independent of exploitation, leads to a positive quasi-option value. This suggests that the resource exploitation should be postponed until increased knowledge facilitates a more informed decision. If information growth depends on the use taking place, unlikely in an environmental context, then quasi-option value is positive (negative) when the uncertainty applies to the benefits of preservation (exploitation) (Pearce and Turner 1990; Fisher and Hanemann 1987).

Bromley (1989) suggests that the way in which policymakers address uncertainties depends on their perception of the existing entitlement structure. The interests of the future are only protected by an entitlement structure that imposes a duty on current generations to consider the rights of future generations (or, as he terms them, “missing markets” because “future generations are unable to enter bids to protect their interests”). Without such a structure, decisionmakers may tend to ignore costs to future generations, and minimize costs to current generations at the expense of the future. If the entitlement structure is adjusted, the policymaker can then examine three policies to protect the interests of future generations: (a) mandated pollution abatement; (b) full compensation for future damages (taxation); and (c) an annuity to compensate the future for costs imposed in the present. In the face of uncertainty, the first option might be the most efficient.

Other important sources of uncertainty linked with environmental issues include uncertainty over land tenure, which leads to deforestation and unsustainable agricultural practices, and uncertainty of resource rights which can accelerate the rate of depletion of a nonrenewable resource. Policymakers can address these issues by instituting land reforms, and by designing appropriate taxation policies that return rents to public sources rather than to private agents.

Annex 2-E Environmental Accounting and Macroeconomic Performance

To adequately include environmental concerns in economic analyses, standard income accounting techniques must be re-examined. Gross domestic product (GDP) is the commonly used growth measure, based on transactions in markets. GDP is the basis on which many aspects of macroeconomic policy are determined. However, its shortcomings include neglect of income distributional concerns, non-market activities, and, even more crucially, environmental degradation. In terms of the environment, there are three weaknesses in the current national accounting framework:

- National accounts may not represent welfare accurately, because the balance sheets do not fully include environmental and natural resources, and therefore, important changes in the status of such resources are neglected.
- the depreciation of natural capital essential for human life, such as a nation’s stock of air, soil, water, minerals, and wilderness areas usually are not included in national accounts.
- cleanup costs, such as, expenditures incurred to restore the environment, often serve to inflate national income, while offsetting environmental damages are not included (Lutz and Munasinghe 1991).

The resulting GDP estimates are incorrect because harmful outputs such as pollution are overlooked, whereas beneficial inputs related to environmental needs are implicitly undervalued.

To overcome these deficiencies, it is necessary to develop a system of national accounts that will yield an environmentally-adjusted net domestic product and an environmentally-adjusted net domestic income. National-level decisionmakers rely on the conventional system of national accounts to formulate economic policies. Thus, a supplementary environmentally-adjusted system of national accounts and corresponding performance indicators would encourage them to reassess the macroeconomic situation in light of environmental concerns, and to trace the links between economy-wide policies and natural resource management (Muzondo and others 1990).

The World Bank has worked closely with the United Nations for the past decade to better incorporate environmental concerns into the present round of revisions of the system of national

accounts framework. The interim system for environmentally-adjusted economic accounts has been proposed (Bartelmus and others 1989). The system for environmentally-adjusted economic accounts seeks to maintain the essential integrity of the existing system of national accounts, but at the same time encourages the collection and compilation of relevant data on environmental and natural resources through a new set of satellite accounts. These satellite accounts constitute an important step toward the eventual goal of computing the EDP and EDI (Repetto and others 1989; Peskin with Lutz 1990). Recently, the World Bank and UN Statistical Office have completed two joint case studies for Mexico and Papua New Guinea, to determine how such accounts could be prepared (van Tongeren and others 1991; Bartelmus and others 1991).

Bibliography

Aylward, B., and E. Barbier. 1992. Valuing Environmental Functions in Developing Countries. *Biodiversity and Conservation*.

Arrow, K. J., and A. C. Fisher. 1974. "Environmental Preservation, Uncertainty, and Irreversibility." *Quarterly Journal of Economics* 88:313–19.

Barbier, E. B., W. M. Adams, and K. Kimmage. 1991. "Economic Valuation of Wetland Benefits: The Hadejia-Jama'are Floodplain, Nigeria." LEEC Discussion Paper No. DP91–02. IIED/UCL London Environmental Economics Centre, London.

Bartelmus, P., C. Stahmer, and J. van Tongeren. 1989. "Integrated Environmental and Economic Accounting—Framework for an SNA Satellite System." *Review of Income and Wealth*.

Binswanger, Hans. 1989. "Brazilian Policies that Encourage Deforestation in the Amazon." Working Paper 16, World Bank, Environment Department, Washington, D.C.

Bojo, J. 1990. "Economic Analysis of Agricultural Development Projects. A Case Study from Lesotho." EFI Research Report. Stockholm School of Economics, Stockholm.

Braden, J. B., and C. D. Kolstad, eds. 1991. *Measuring the Demand for Environmental Quality*. New York: Elsevier, Chapter 2.

Bromley, D. W. 1989. "Entitlements, Missing Markets, and Environmental Uncertainty." *Journal of Environmental Economics and Management* 17:1181–1194.

Brown Jr., G., and W. Henry. 1989. "The Economic Value of Elephants." Discussion Paper 89–12. London Environmental Economics Centre.

Cernea, Michael. 1992. "A Sociological Framework: Policy, Environment and the Social Action for Tree Planting." World Bank, Washington, D.C. Forthcoming.

Cocklin, C. 1989. "Mathematical Programming and Resources Planning I: The Limitations of Traditional Optimization." *Journal of Environmental Management* 28:127–41.

Cropper, M. L., and W. E. Oates. 1992. "Environmental Economics: a Survey," *Journal of Economic Literature* XXX (June): 675–740.

Dalfelt, A. 1991. "Ecological Constraints to Sustainable Management of the Tropical Moist Forest." Working Paper 25. World Bank, Environment Department, Washington, D.C.

Dasgupta, P., and K. G. Maler. 1990. "The Environment and Emerging Development Issues." Paper presented to the Annual Conference on Development Economics. World Bank. Conference proceedings, p. 101.

Dasgupta, P., S. Marglin, and A. K. Sen. 1972. *Guidelines for Project Evaluation*. United Nations Industrial Development Organization, New York.

Dixon, J. A., R. Carpenter, L. Fallon, P. Sherman, and S. Manipomoke. 1988. *Economic Analysis of the Environmental Impacts of Development Projects*. London: Earthscan in association with the Asian Development Bank.

Ehrlich, P. R. 1990. "Biodiversity and Humanity: Science and Public Policy." Crafoord Lecture, Stockholm, delivered September 26.

Energy Journal. 1988. Special Issue on Electricity Reliability. Vol. 9 (December).

Fisher, A. C., and M. Hanemann. 1987. “Quasi Option Value: Some Misconceptions Dispelled.” *Journal of Environmental Economics and Management* 14:183–90.

Global Biodiversity Strategy. 1992. World Resources Institute, World Conservation Union (IUCN) and the United Nations Environment Program, Washington, D.C.

Hanley, N. D. 1989. “Valuing Rural Recreation Benefits: An Empirical Comparison of Two Approaches.” *Journal of Agricultural Economics* 40(3):361–74.

Harberger, A. C. 1976. *Project Evaluation: Collected Papers*. University of Chicago Press.

Harrington, W., A. J. Krupnick, and W. O. Spofford, Jr. 1989. “The Economic Losses of a Waterborne Disease Outbreak.” *Journal of Urban Economics* 25(1):116–37.

Hodgson, G., and J. A. Dixon. 1988. “Logging Versus Fisheries and Tourism in Palawan.” Paper No. 7. East West Center, Honolulu.

Jimenez, E. 1983. “The Magnitude and Determinants of Home Improvement in Self-Help Housing: Manila’s Tondo Project.” *Land Economics*. 59(1):70–83.

Kramer, R., Mohan Munasinghe, Narendra Sharma, Evan Mercer and Priya Shyamsunder. 1992. “Valuing and Protecting Tropical Forests: A Case Study of Madagascar.” Paper presented at the IUCN-World Conservation Union World Parks Congress, Caracas, February.

Liebman, J. 1976. “Some Simple-Minded Observations on the Role of Optimization in Public Systems Decisionmaking.” *Interfaces* 6:102–108.

Little, Ian M. D., and J. A. Mirrlees. 1974. *Project Appraisal and Planning for Developing Countries*. Basic Books, New York.

Lutz, Ernst, and Mohan Munasinghe. 1991. “Accounting for the Environment.” *Finance and Development* 28(March):19–21.

Mahar, D. 1989. “Government Policies and Deforestation in Brazil’s Amazon Region.” A World Bank publication in cooperation with the World Wildlife Fund and the Conservation Foundation, Washington, D.C.

Maler, K. G. 1990. “Economic Theory and Environmental Degradation: A Survey of Some Problems.” *Revista de Analisis Económico* 5(2) (November):7–17.

Marglin, S. A. 1963. “The Opportunity Costs of Public Investment.” *Quarterly Journal of Economics* 77(2).

Markandya, A., and D. W. Pearce. 1988. “Environmental Considerations and the Choice of the Discount Rate in Developing Countries.” Working Paper 3, World Bank, Environment Department, Washington, D.C.

McNeely, J. A. 1991. “Global Environment Facility: Cornucopia or Kiss of Death for Biodiversity.” *Canadian Biodiversity* 1(2), Canadian Museum of Nature.

McNeely, J. A., K. R. Miller, W. B. Reid, R. A. Mittermeier, and T. B. Werner. 1990. *Conserving the World’s Biodiversity*. World Bank, World Resources Institute, IUCN-World Conservation Union, Conservation International and World Wildlife Fund. Washington, D.C.

Meier, P., and Mohan Munasinghe. 1992. “Incorporating Environmental Concerns into Energy Decisionmaking: A Case Study of Sri Lanka.” ENVPR report, World Bank, Washington, D.C., January.

Mendelsohn, M. 1987. “Modelling the Demand for Outdoor Recreation.” *Water Resources Research* 23(5):961–67.

Mitchell, R. C., and R. T. Carson. 1989. Using Surveys to Value Public Goods: The Contingent Valuation Method. Resources for the Future. Washington, D.C.

Munasinghe, Mohan. 1990a. “The Challenge Facing the Developing World.” *EPA Journal* 16(2) (March/April).

Munasinghe, Mohan. 1990b. *Electric Power Economics*. London: Butterworths Press. Chapters 2, 7, 8, and 9.

Munasinghe, Mohan. 1990c. “Managing Water Resources to Avoid Environmental Degradation.” Working Paper 41, World Bank, Environment Department, Washington, D.C.

Munasinghe, Mohan. 1992. *Water Supply and Environmental Management*. Boulder, Colorado: Westview Press.

Munasinghe, Mohan. 1993. *Environmental Economics and Sustainable Development*. Working Paper 3. World Bank, Environment Department, Washington, D.C.

Munasinghe, Mohan, W. Cruz, and J. Warford. 1993. "Do Economywide Policies Help the Environment." *Finance and Development* (September) 30:40–43.

Munasinghe, Mohan, and Sria Munasinghe. 1991. "Energy Policy, Technology Cooperation and Capital Transfers, to Address Global Climate Issues in Developing Countries." In T. Hanisch, ed., *A Comprehensive Approach to Climate Change*, CICERO, Oslo.

Muzondo, T. R., K. M. Miranda, and A. L. Borenberg. 1990. "Public Policy and the Environment." IMF Working Paper. Washington, D.C.: International Monetary Fund, June.

Norgaard, R. B. 1991. "Sustainability as Intergenerational Equity: The Challenge to Economic Thought and Practice." Discussion Paper, Asia Regional Series, Report No. IDP 97, World Bank, Washington, D.C., June.

Pearce, D. W. 1991. "Economic Valuation and the Natural World." Background paper for inclusion in *World Development Report 1992: Development and the Natural World*, World Bank, Washington, D.C., August.

Pearce, D. W., and A. Markandya. 1989. *Environmental Policy Benefits: Monetary Valuation*. OECD, Paris.

Pearce, D. W., and K. Turner. 1990. *Economics of Natural Resources and the Environment*. New York: Harvester Wheatsheaf.

Perrings, C. 1991. *Ecological Sustainability and Environmental Control*. Centre for Resource and Environmental Studies, Australian National University.

Peskin, H. M., with Ernst Lutz. 1990. "A Survey of Resource and Environmental Accounting in Industrialized Countries." Working Paper 37. World Bank, Environment Department, Washington, D.C.

Peters, C. M., A. H. Gentry, and R. O. Mendelsohn. 1989. "Valuation of an Amazonian Rainforest." *Nature* 339(20) (29 June):655–56.

Petry, F. 1990. "Who Is Afraid of Choices? A Proposal for Multi-Criteria Analysis as a Tool for Decisionmaking Support in Development Planning." *Journal of International Development* 2:209–31.

Ramakrishna, K., and G. M. Woodwell. 1991. *Report of the Workshop on the Conservation and Utilization of World Forests*. The Woods Hole Research Center, Woods Hole, Massachusetts, 17–20 October.

Randall, A. 1991. "Total and Non-Use Values." In J. B. Braden and C. D. Kolstad, eds., *Measuring Demand for Environmental Quality*. New York: Elsevier.

Randall, A., and J. R. Stoll. 1983. "Existence Value in a Total Valuation Framework." In *Managing Air Quality and Scenic Resources at National Parks and Wilderness Areas*. Boulder, Colorado: Westview Press.

Repetto, R. 1988. "Economic Policy Reform for Natural Resource Conservation," Working Paper 4. World Bank, Environment Department, Washington, D.C.

Repetto, R., and M. Gillis, eds. 1988. *Public Policies and the Misuse of Forest Resources*. Cambridge, Cambridge University Press.

Repetto, R., W. Magrath, M. Wells, C. Beer, and F. Rossini. 1989. *Wasting Assets: Natural Resources in the National Income Accounts*. World Resources Institute, Washington, D.C.

Romero, C., and T. Rehman. 1987. "Natural Resource Management and the Use of Multiple Criteria Decisionmaking Techniques: A Review." *European Journal of Agricultural Economics* 14:61–89.

Schecter, M., and S. Freeman. 1992. "Some Reflections on the Definition and Measurement of Non-Use Value." Haifa: Natural Resources and Environmental Research Center and Department of Economics, University of Haifa. Draft, June.

Schneider, R., G. Platais, D. Rosenblatt, and M. Webb. 1993. “Sustainability, Yield Loss and ‘Imediatismo’.” LATEN Dissemination Note 1, Washington, D.C.: World Bank, April.

Sen, A. K. 1967. “Isolation, Assurance, and the Social Rate of Discount.” *Quarterly Journal of Economics* 81(1).

Smith, V. K. 1987. “Non-Use Value in Benefit Cost Analysis, and the Treatment of Option Value.” *Southern Economic Journal* 54(1):19–26.

Solow, R. 1986. “On the Intergenerational Allocation of Natural Resources.” *Scandinavian Journal of Economics* 88(1):141–49.

Tobias, D., and R. Mendelsohn. 1991. “Valuing Ecotourism in a Tropical Rain-Forest Reserve.” *Ambio* 20(2) (April).

United Nations Environment Programme, World Conservation Union, and World Wide Fund for Nature-International. 1991. *Caring for the Earth*, Nairobi.

United Nations Statistical Office. 1990. “SNA Handbook on Integrated Environmental and Economic Accounting.” New York. Preliminary draft, October.

van Tongeren, J., S. Schweinfest, E. Lutz, M. Gomez Luna, and F. Guillen Martin. 1991. “Integrated Environmental and Economic Accounting: A Case Study for Mexico.” Working Paper 50. World Bank, Environment Department, Washington, D.C.

Walsh, R. G., J. B. Loomis, and R. A. Gillman. 1984. “Valuing Option, Existence and Bequest Demands for Wilderness.” *Land Economics* 60(1) (February).

Wells, M., and K. Brandon, with L. Hannah. 1992. People and Parks: Linking Protected Area Management with Local Communities. World Bank, World Wildlife Fund, and U.S. Agency for International Development, Washington, D.C.

West, P. C., and S. R. Brechin, eds. 1991. *Resident Peoples and National Parks*. University of Arizona Press.

World Bank. 1991. *The Forest Sector: A World Bank Policy Paper*. World Bank, Washington, D.C.

World Commission on Environment and Development. 1987. *Our Common Future*. Oxford: Oxford University Press.

World Wide Fund for Nature-International. 1990. *Economic Analysis of Conservation Initiative*. London: WWF-UK, October.

3 Conservation, Protected Areas, and the Global Economic System: How Debt, Trade, Exchange Rates, Inflation, and Macroeconomic Policy Affect Biological Diversity

Clem Tisdell

The Basic Global Economic System

THESE DAYS, MOST ENVIRONMENTS and the lives of virtually everyone are affected by the global economic system. These effects arise from international trade in goods and services, from international capital, from the transfer of technology, and from expanded international communication, as well as from direct environmental spillovers from economic activities.

Scientific and technical developments in transportation and communication have widened the scope for the international exchange of commodities and for the operation of market systems.

The global economic system is characterized by

- International specialization in production by countries and regions.

- Greater specialization by individuals and economic agents in productive and economic activities than formerly.
- Heavy dependence on capital-intensive technologies which rely for their operation on the use of nonrenewable resources, such as fossil fuels, and on mechanical-chemical technologies, and increasingly on electronic technologies, even in agriculture.
- Enormous and increasing levels of economic production, which tax the environment both in terms of the provision of raw materials for this production and in terms of its ability to assimilate wastes and pollutants generated by the production.

To function and maintain its viability, the global economic system requires exchange of commodities on a gigantic scale. This exchange, which makes specialization in production and economic activity possible, is facilitated (a) by the use of monetary systems (in which cash actually now plays a small part) and (b) by the extension of market systems. The use of market and monetary systems has altered relationships between humanity, nature, and the environment in the ways discussed below. Efforts are continually being made to extend and perfect these systems, for example, by urging countries to remove or reduce restrictions on international trade (for example, through the General Agreement on Tariffs and Trade); by encouraging subsistence and semi-subsistence communities to become more cash-, monetary-, and exchange-oriented; and by exhorting centrally-planned socialist countries to extend the operation of market mechanisms. While it is usually argued that such developments will reduce economic scarcity and increase economic welfare, they can also have environmental and social costs, and any economic benefits or scarcity-reduction may be merely temporary or unsustainable. Thus such developments can result in one set of problems being replaced by another.

At the same time that market and monetary systems have been extended globally, other institutional developments and changes have occurred. These include the rise of centralized states and centralized monetary and banking systems; the emergence of large companies and business organizations, including multinational enterprises and the development of relatively large public sectors; and international bureaucracies, including bodies such as the United Nations, the World Bank, and the International Monetary Fund. As a result, the control of local communities over their own affairs has been reduced. The control of individuals over their economic circumstances has increased in some respects but has been reduced in other respects because of their growing dependence on others—but dependence on others in the abstract, or *impersonally*. Furthermore, where “economic development” has proceeded furthest, most individuals lack direct access to the means of production and most sell their labor to survive. For example, as “economic development” proceeds, landlessness becomes more common, thus depriving people of direct access to an important means of subsistence. All these changes are occurring against a background of considerable wealth and income inequality between developed and developing nations and within many nations (cf. Schor 1991).

Given current trends, the global economic system can be expected to become more pervasive, drawing individuals and countries more thoroughly into it, including those at present only barely dependent on it. This is likely to mean greater dependence on economic growth, markets, economic exchange, and monetary systems, and this could pose increased environmental dangers. What should be the political reaction of conservationists to these trends?

One possibility is to oppose these economic trends, for example, by supporting the setting up of small, almost self-sufficient communities (Schumacher 1973). Although such a system has some economic cost because it results in loss of scale economies and loss of some economic benefits from large markets, such as productivity benefits of specialization, it *is* an option. Another option would be to support centralized socialism in order to foster planned control. However, not only does this run against the tide of prevailing political sentiment, but it is likely to have economic and other costs. Furthermore, most centralized socialist systems have had a poor record of environmental conservation. Yet another possibility is to accept the basic trend in the global economic system as described above, but to modify or transform it so as to harness its characteristics to support conservation. This may involve, for example, the establishment of private property rights in natural resources, greater marketing of rights to use environmental resources, and application of fiscal policies, such as taxes or subsidies, in order to promote conservation. This approach of “working with the trend” and supporting the use of economic instruments as a means to further conservation has been adopted to a large extent in the update of the World Conservation Strategy (IUCN-World Conservation Union-United Nations Environment Programme-World Wildlife Fund [WWF] 1991).

International Economic Interdependence and Conservation

Because of growing international economic interdependence, individuals have been converted from being ecosystem people to being biosphere people, that is, from being dependent upon their own local ecosystems to drawing upon the resources of the whole biosphere (R. Dasmann quoted in Klee 1980). Thus, biosphere people show reduced concern for sustaining their own local ecosystems because they are less dependent upon ecosystems for consumption. Furthermore, extension of the market system, a system widely adopted by biosphere people, results in impersonal and often anonymous links between communities. For instance, consumers know nothing or little about the geographical origins of ingredients used in products purchased by them, or about the environmental consequences of producing these products. Biosphere people are involved in consumption satisfied by production that occurs mainly in local ecosystems remote from them. Thus they externalize the environmental costs of economic activity required for their consumption by passing these principally on to local people elsewhere or to future generations (cf. Dasmann 1975/76). Furthermore, they show little concern for local ecosystems because it is so easy for them to transfer their consumption from one local system to another. In addition, company structures and competition between producers and economic agents result in the neglect of environmental spillovers by producers (cf. Tisdell 1990).

The modern socioeconomic system has become depersonalized, and this has adverse consequences for nature and in some cases for the mental health of many individuals. For example, biosphere people often develop anxieties about their economic security (for example, employment) or about economic competition and suffer from a lack of a sense of belonging due to loss of community cohesion and the impermanence of their social and economic relationships (cf. Toffler 1970). On the other hand, the modern economic system results in less social pressure on individuals and gives them greater geographical mobility. So it provides greater personal freedom than might have been typically the case among ecosystem people.

The main advantage of a global market economy is claimed by most economists to be reduced economic scarcity. This is because international trade allows specialization in production according to comparative advantage, permits economies of scale in production to be reaped, and allows (even in the absence of production advantages) welfare-enhancing exchanges given differences in resource endowments or differences in the preference of individuals for commodities. Theoretically, the system permits greater economic production or human satisfaction to be achieved using the same amount of resources as would be utilized in its absence.

Alternatively, with a global economy, it is possible to achieve the same level of production of goods and services using fewer resources than in its absence. Potentially, therefore, such a system provides greater scope for conservation or reduced resource use than in its absence. Although this is theoretically true, this potential is unlikely to be realized in practice.

Western economists claim that human desire for economic goods is infinite. If that is so, the *potential* of the system for greater conservation is likely to be foregone for greater production and consumption. Furthermore, contact with “more developed” countries is likely to lead to greater emphasis on the acquisition of material possessions and expand the range of perceived needs (Yellen 1990). Natural resource stocks, such as forests and minerals, can now be drawn on to provide income and funds for capital investment via international sales and *may* provide a springboard to economic growth, as is reputed to have occurred in the case of Sweden. Resources may now be utilized that were not previously utilized or may be utilized more intensively. Capital and new technology may flow in from abroad to speed up this process if natural resource exploitation and the economic growth “imperative” becomes globally pervasive. This seems to be the reality.

Another *possible* adverse impact on natural resource conservation of drawing developing economies into the international economic system is that it may reduce limits to human population growth in the countries concerned. The potential per capita income-enhancing benefits of international trade and exchange may be frittered away because of Malthusian effects on the level of human population. In consequence, a country experiencing this ends up with a larger human population at subsistence level and less conservation of natural resources (Tisdell and Fairbairn 1984). Bangladesh may be considered a case in point.

On the positive side, a fully developed market system provides new policy opportunities for environmental control. It enables use to be made of market mechanisms and fiscal policies (such as appropriate taxation policies) to achieve conservation objectives. For instance, it provides some (but not unlimited) scope for market-making in relation to environmental goods (for example, the creation

of markets in rights for environmental use). But even in those advanced market economies where law and order is the norm, there are limits to these possibilities. In those developing countries which are socially and politically unstable and not yet transformed into a complete market economy, there may be much less scope for such measures. Indeed, the conservation of an area may *sometimes* be best secured by minimizing contact of the area with the international economy, for example, by avoiding the construction of access roads to an area until such time as the socioeconomic situation enables resource-use in the area to be controlled adequately by the government. Parts of Madagascar, for example, contain unique wildlife, but at present difficulties of access to these areas mean that they are not generally visited by foreign tourists. Better access, although it would encourage tourism, could lead to other economic developments in the area which *might* endanger biodiversity there. At the very least, the government's continuing ability to control the development pattern started by it needs to be considered before an economic development project is launched.

Trade Policies, Balance of Payments Difficulties, and Exchange Rates

International trade extends the size of markets for commodities and, as mentioned earlier, results in socioeconomic benefits as well as disadvantages. Most economists believe that the net welfare benefits from international trade are positive and that they usually support policies to reduce barriers to trade, such as initiatives taken through the General Agreement on Tariffs and Trade or the type of "structural adjustment policies" being pursued by the International Monetary Fund and the World Bank. They are also sympathetic to the slogan which was common, at least in the 1970s, of "trade not aid," that is, of allowing the exports of developing countries access to the markets of developed countries on favorable terms, or at least allowing such goods to be imported without trade discrimination.

Nevertheless, gains from international trade can be uneven. Some groups can lose from it. One can imagine conditions also in which international trade may not be advantageous on balance to a country, even though these conditions may be rare. Such conditions have been outlined by those proposing "de-development" theses based on the center-periphery paradigm (for example, Frank 1971; Myrdal 1956).

Even in cases where international trade is judged to be economically advantageous, it need not result in greater conservation of natural resources, even though it theoretically provides *scope* for greater conservation. As mentioned earlier, international trade may stimulate greater consumption by residents of a trading nation. Second, it may provide markets, or larger markets, for natural resources that would be little used in the absence of access to the international market. Thus, international trade provides an enlarged market for timber resources or for wildlife products. With international trade, countries with a comparative advantage in supply of these commodities will exploit them more heavily. On the other hand, countries with a comparative disadvantage in supply of such natural products may reduce their utilization of these. For example, access to the natural resources of developing countries may have reduced pressure on the natural resources of Europe, but increased that in developing countries. However, overall pressure on natural living resources has increased as a result of the extension of the global economic system.

Again, restrictions on trade have been unfavorable to conservation in some areas, but have assisted conservation elsewhere. The Common Agricultural Policy of Europe, for example, has helped to maintain agricultural land use in Europe. In its absence, more land is likely to have reverted to woodland or forest. On the other hand, restrictions on agricultural imports from the rest of the world may have held back the expansion of agriculture elsewhere.

Lutz (1990) suggests that the environmental effects of an agricultural trade liberalization in industrial countries are expected to be positive, even though some adverse environmental effects from increased price variability or uncertainty *might* partially offset the positive conservation effects of lower agricultural production intensity and output, assuming normal supply curves. On the other hand, agricultural trade liberalization in industrial countries will result in higher prices for agricultural produce in developing countries and consequently greater intensification and extension of agricultural production with adverse environmental impacts in developing countries. Taking the world as a whole, Lutz believes that the environmental effects of international agricultural trade liberalization would be uncertain and that no firm conclusion can be drawn without empirical work. I would also add that one needs to decide *conceptually* what is and what is not an environmental improvement before any firm conclusion can be drawn.

That free international trade need not result in optimal conservation outcomes is recognized by the Convention on International Trade in Endangered Species (CITES), which restricts international trade in products obtained from listed endangered species. By reducing the market for such products, CITES aims to make poaching less attractive and thereby reduce this practice. But, of course, CITES does not address problems of preserving habitats (the disappearance of which is a principal cause of extinction of species) or the difficulty of providing economic rewards for those who conserve species.

In practice, most developing countries experience balance of payment difficulties as a result of international trade. There are many reasons for this. There has been a long-term tendency for the terms of trade to move against exporters of primary products. Most developing countries rely on exports of primary products. Many developing countries, being short of capital, are also prone to live beyond their means, financing their excess expenditure by foreign borrowing. Governments of developing countries often borrow from abroad to finance public consumption and capital works because their tax bases are weak and because domestic financial markets are often limited. Where the countries concerned also have substantial defense expenditure, additional pressure is placed on their balance of payments. Furthermore, many residents of developing countries try to invest in developed countries rather than at home. All these factors have resulted in mounting international debt for many developing countries, the effects of which will be discussed later.

As a result of balance of payments difficulties, developing countries are likely to be forced to devalue their currency. The consequences of devaluation for conservation are unclear, but, provided a devaluation is sustained and is not fully offset by inflation, it encourages the growth of export industries, reduces imports, and stimulates aggregate demand at home. It *may* reduce conservation at home, but, as discussed below and as pointed out by Lutz and Young, “Tracing the effects of changes in macroeconomic policies on the national resource base is difficult as interactions between the economic system and the environment are complex and our understanding of them limited. Also a policy change such as devaluation can have both positive and negative effects.”

In developing countries, international trade may encourage urbanization. Urban elites often favor growth in international trade because it provides a base for taxation to support the public sector on which many urban groups depend for employment or economic support. Such trade may also support a dual economy—a relatively advanced urban sector and a backward rural sector. In the urban sector of developing countries, wage rates may be relatively rigid against reduction and effective demand for labor. Employment can depend heavily on the extent to which the country’s balance of payments is in deficit or surplus. Sudden reduction in exports of a developing country can be expected to increase urban unemployment and reduce government revenues. This may be countered by governments of developing countries by drawing detrimentally on their stock of conserved natural resources. For example, after the coup in Fiji in May 1987, a sharp decline in international receipts resulted in exports of giant clam meat being allowed, at least for a time, even though stocks of giant clams were dangerously low in Fiji.

Structural Adjustment and the International Economic System: Policies of the International Monetary Fund and the World Bank

Developing countries, especially in Latin America and Sub-Saharan Africa, experienced economic difficulties during the 1980s involving balance of payments deficits, high interest rates, reduced availability of international finance, and falling terms of trade. In many cases, these difficulties were compounded by inadequate domestic economic policies and have left an unwelcome legacy for the 1990s. Major international finance agencies, principally the International Monetary Fund and World Bank, have made it a condition of financial assistance to such countries that they adopt a package of policies aimed at macroeconomic stabilization and structural adjustment of their economies. Sometimes, by way of shorthand, these are merely referred to as Structural adjustment policies. Our interest in these policies is, first, that they are influential in the context of the global economic system and, second, that some have claimed that, on balance, they are beneficial for conservation. Before discussing the latter contention, let me briefly outline the nature of these Structural adjustment policies.

Structural adjustment policies basically involve a two-pronged approach: (a) reductions in domestic aggregate demand, that is, expenditure reductions, especially by government, with the aim of creating a smaller public sector; and (b) measures to increase supplies, particularly by making greater use of free-market forces. The second prong involves (a) expenditure switching within the government budget and within the economy of resources to more productive sectors, and between

the home market and export markets via exchange rate devaluation, (b) liberalization of controls on foreign trade, and (c) liberalization of the domestic price system, especially the prices received by farmers for their output and those paid by farmers for inputs such as fertilizers and pesticides.

Such measures are intended (a) to ensure that the resource demands of developing countries are more in line with their means of meeting these and (b) to increase their available supply of commodities by improving the efficiency of their allocation of resources between economic uses. Although the primary aim of such policies is an environmental one, claims have been made that a coincidental spinoff from such policies is greater conservation.

Sebastian and Alicbusan (1989), after reviewing the World Bank's adjustment lending operations, conclude that "far from being a major source of environmental degradation in developing countries, adjustment policies appear, in balance, to have a bias in favor of the environment. With adequate complementary measures to make sure they are implemented correctly, the policies can be manipulated to achieve environmental as well as economic objectives".

Hansen suggests that his studies also support this broad conclusion in relation to the Asian Development Bank (Hansen 1990b) and with some qualifications more generally (Hansen 1990a, c). On the other hand, Mearns (1991), after reviewing structural adjustment in Malawi, concludes that such policies could well be environmentally detrimental. There are, in his view, no grounds for presuming these to be environmentally favorable. Environmental effects can go either way.

But before discussing this difference in point of view, a problem should be noted. Discussants do not indicate their *measure* of environmental quality nor of the extent of conservation achieved. While one resource might show greater conservation with a change in economic policy, another may show reduced conservation. For example, Sebastian and Alicbusan (1989) suggest that devaluation will result in a higher price being paid to farmers for export crops. This, they suggest, will encourage farmers to look upon their land as a more valuable asset and pay more attention to soil conservation. On the other hand, devaluation may result in the extension of agriculture and the increased destruction of the habitat of native animals as the habitat is transformed to agricultural use, as well as a probable reduction in biodiversity. Sebastian and Alicbusan ignore the latter effect and effects of structural adjustment policies on natural areas. Also, effects on the environment may depend on the type of agriculture which is encouraged (Mearns 1991). For example, if the growing of tree crops rather than field crops is encouraged, this may be environmentally more advantageous than if the opposite pattern is encouraged.

On the other hand, the elimination of subsidies on pesticides and fertilizer use could have favorable environmental effects. Possibly, as Sebastian and Alicbusan suggest, a reduction in the size of the government budget and expenditure could have favorable conservation effects. For example, such a reduction might result in less road building and thereby retard the "development" of remote land areas with natural vegetation cover. However, a reduction in government expenditure may also result in pruning of governmental expenditures, such as soil conservation services and a reduction in environmental education, to protect the environment. Also, expenditure on national parks and wildlife services could be slashed, and few if any new land areas may be acquired for state protection. Indeed, national parks and wildlife services seem as a rule to suffer severely when government budgets are cut.

Naturally, developing countries must live within their means internationally in the long term. Therefore, where they are living beyond their means, they need to adopt appropriate adjustment policies. But the adjustment policies suggested by the International Monetary Fund and the World Bank do not specifically address conservation goals, so their impact on conservation is likely to be mixed. In some circumstances, these policies could hasten the disappearance of natural areas and endangered species. We cannot rely on generalized policies that lack a definite conservation aim. Policies must be targeted specifically to the conservational aims which are sought, and in certain cases this will require aid or income transfers to developing countries from developed nations for this specific purpose (cf. Harris 1991). International lending agencies such as the World Bank have started to recognize this. Some funds (for example, Global Environmental Facility) are now becoming available on concessionary terms for projects that have positive conservation benefits and that may provide favorable global spillovers (Anonymous 1991).

Bauer (1989) has suggested that adjustment policies promoted by bodies such as the International Monetary Fund and the World Bank in providing more aid to debtor countries that agree

not to repudiate their debts or to do so immediately are rarely monitored or enforced. He says the following:

> Most [government] debtors, especially major debtors, rarely change their policies significantly under these arrangements. Policies such as the maintenance of a large state sector, extensive control over economic activity, state export monopolies and the like accord with their interests and may even be necessary for their political survival. They will abandon them only if continued pursuit would result in economic breakdown threatening their own position. If they are rescued they will persist in their policies though they may pay lip service to the market and effect some changes in their exchange rate policies.

Clearly if this is the case, the structural adjustment policies being praised by Sebastian and Alicbusan (1989), and others are in reality not being put into effect.

International Capital Flows, Multinational Enterprises, Loans, and Aid

International capital flows, apart from enabling capital equipment to be purchased from abroad, help to transfer technology and provide a means for economic growth. Such flows may result, for example, from direct private investment (for instance, by multinational companies) through private and public loans, through government aid, private aid, and transfers (remittances). But such transfers do not necessarily have friendly environmental effects.

International capital flows may enable incomes in recipient countries to rise and may promote urbanization. In the long term, but not necessarily in the short term, this may be favorable to conservation. In the longer term, population growth, for example, may be reduced, and a population with a higher per capita income may be more favorable to conservation. The Brundtland Report (World Commission on Environment and Development 1987) argued that without a rise in per capita incomes in developing countries, there is little chance of conservation occurring in developing countries on a significant scale.

Perhaps a typical relationship exists between the pursuit of conservation objectives and the stage of economic "development." At low levels of per capita income and in the early stages of economic development, environmental conservation is not a high priority. Only after substantial economic development has been achieved does environmental conservation become a major goal. This seems to be because the demand for environmental goods is income-elastic and also education-elastic. This suggests that in the absence of substantial and effective foreign aid, pressure on the environments of developing countries is likely to intensify as they attempt to achieve economic growth. Many are still well below the stage of development where environmental conservation is a high priority. The only type of conservation that they are likely to favor at present is that of adding demonstrably to production or income or in certain cases defensive conservation, that is, conservation demonstrably necessary to prevent a substantial fall in their production or level of income.

On the whole, international capital flows seem to assist the economic growth of developing countries, although some economists have argued that they can be a source of "de-development," that is, a source which keeps developing countries in a dependent international relationship and economically backward. In the initial stages of economic development, these flows are, in any case, likely to add to pressures on natural resources, especially if investment by multinational companies is involved.

Multinational enterprises, particularly when they are part of a large public company, may not be sensitive to local environmental conditions and issues. Directors and shareholders of the overseas parent company of a multinational, being far away from the scene of operations of its subsidiary in a developing country, for example, may have little knowledge of the environmental effects of its operation and may escape local criticism and social pressure that might be experienced by a local entrepreneur. Competition both in the market for capital and commodities may also make a company insensitive to its environmental effects. Commercial enterprises aim to maximize their profits. As a rule they will only pay attention to environmental effects that directly affect the profits of their firms (Tisdell 1990). Therefore, environmental effects external to a firm will not be taken into account by it unless the government adopts appropriate environmental policies, such as taxing the firm on its unfavorable environmental spillovers. But because many developing countries are eager to attract foreign investment and because investors have alternative investment possibilities, most governments in developing countries are reluctant to impose environmental controls. Greater coordination of

environmental policies between nations is needed to avoid competition between them at cost to the environment.

Loans can be an alternative or a supplement to direct foreign investment in a country. Loans may be made by private lenders, in which case they are purely commercial loans, or they may be made by foreign governments or by international bodies, such as the International Monetary Fund or the World Bank. In the latter case, the terms of the loans may not be entirely commercial. Nevertheless, borrowers need to be reasonably sure that the benefits expected from a loan exceed its costs and that they have the capacity to repay the loan without undue economic difficulty on the basis of the agreed terms.

The capacity of a government to repay a foreign loan for a particular project does not depend solely on returns and cash flows from that particular project, but also on the government's overall foreign commitments. For example, the financial capacity of governments of some developing countries to repay other foreign loans was reduced because of their large foreign debt incurred for purchases of armaments (Bauer 1989). Armament purchases resulted in a drain on foreign reserves and, although there is some debate about this issue, were largely unproductive, did little to relieve poverty, and possibly had adverse consequences, both directly and indirectly, on conservation. The World Bank is considering refusing loans to governments of developing countries with large defense expenditures in relation to their gross domestic product.

Soft loans may be made by lenders when they expect a beneficial, indirect spillover from the loan. The World Bank, for example, is to consider loans to countries at concessionary rates of interest for projects that have global environmental benefits. These may, for example, be projects that assist in maintaining biodiversity of worldwide value or projects that help to reduce global pollution. Nevertheless, the World Bank will still require the benefits received by the borrowing country from the project and the loan to equal or exceed the concessionary rate of interest charged.

In foreign aid, environmental and sustainability factors are being increasingly taken into account by donors, especially in bilateral aid. For instance, the Australian International Development Assistance Bureau has indicated that in giving aid it will, in the future, place greater "emphasis on the reduction of population growth, alleviation of poverty, the use of renewable resources, the sustainable management of natural resources, energy efficiency and pollution control" (AIDAB 1990).

While this new emphasis seems desirable, it is not without some difficulties. For example:

- Some developing countries complain that the effective amount of aid (or loans) made available to them is reduced because of environmental conditions and costs imposed upon them. Some complain that their available funds go less far, and that their benefits as a proportion of global benefits are reduced. This is a complex matter and will be discussed later when global spillovers are considered.
- There can be problems in measuring and valuing environmental spillovers. To some extent, valuation methods are culture-specific. Western value systems are not universally accepted. There may also be a clash between what is locally predicted to be the environmental consequences of a project and foreign predictions of these consequences. The "truth" may reside with neither party, and *a priori* it may be impossible to decide which party is likely to be closer to the truth. Even though some conservationists have argued that empowerment of local groups will result in improved environmental decisions, this result does not always follow (Tisdell 1991a). Neither local experience nor foreign expertise ensures *the* correct environmental answer, even if such an answer exists. Therefore, despite its psychological inconvenience, some agnosticism about all sources of knowledge seems appropriate.

National Debt and Debt-for-Nature Swaps

In recent years the foreign debt of many developing countries has been larger than they have been able or willing to service. Despite this, foreign debt can provide a net economic benefit to a borrowing country. This will be so if the economic yields from the foreign loan exceed its costs. The loan may, for example, enable capital equipment and technology unavailable at home to be imported from abroad. As a result, it can help to speed up economic growth. After 1979, for example, China began to rely increasingly on foreign loans to provide foreign imports to help it modernize.

In the short run such economic growth may be unfavorable to the natural environment because it accelerates natural resource utilization and increases pollution, for instance, through industrialization and urbanization. In the longer run, if such growth raises per capita incomes and reduces population growth, it could be favorable to the environment and to conservation. With rising incomes, the demand for improved environmental quality rises, and the real cost of supplying it is likely to decline. Nevertheless, the question remains unanswered of whether environmentally the globe can sustain the existing world population at the standard of living of the more developed countries. For example, the industrialization of China and India can be expected to add substantially to carbon dioxide emissions and may accelerate greenhouse effects (Myers and others 1990).

The optimistic view is that developing countries can follow a path of development similar to that of present developed countries, and that in the longer term this will be beneficial to the environment. The pessimistic view is that this policy is environmentally impossible or unsustainable (cf. Tisdell 1991c). Therefore, from a global perspective, developing countries should be less ambitious in their economic growth objectives, and developed countries should to some extent reduce their pressures on natural resources to provide greater environmental scope for economic growth by developing countries. In addition, it is argued that environmentally defensive policies should be supported, for example, maintenance of biodiversity, family planning initiatives, reforestation, research into increased energy-use efficiency, and alternatives to carbon fuels. According to this view, the previous economic growth path pursued by developed countries is not available to the bulk of remaining developing countries for environmental reasons. Late starters are subject to negative externalities from early starters, and that raises the question of whether late starters should be compensated by the early starters.

The Brundtland Report (World Commission on Environment and Development 1987) on the issue of the extent to which economic growth in developing countries is compatible with environmental sustainability seems equivocal; however, it claims that economic growth in developing countries is a precondition for successfully dealing with environmental concerns. Basically, its remedy is more economic growth in developing countries but with an increase globally in environmentally defensive expenditure. As interpreted by the World Institute for Development Economics Research of the United Nations University, Helsinki, this seems to require greater economic growth both in developed and developing countries, with defensive environmental expenditure being largely financed by the “peace dividend,” the reduction in global defense expenditure made possible by new international relationships between the republics of the former Soviet Union, Eastern Europe, and the rest of the world (Jayawardena 1990).

The Brundtland position accords broadly with that of the People’s Republic of China, which may be typical of the position of many developing countries. For example, leading members of the Institute of Economics, Chinese Academy of Social Sciences, Liu Guoguang, Liang Wensen and others (1987) say the following:

> We advocate a line of action which requires that economic growth and environmental protection go hand in hand. There are two aspects to the relationship between economic growth and environmental protection: While they are mutually contradictory, they are also mutually complementary. Economic growth does bring along environmental problems, but it can also strengthen man’s hand in tackling these very problems whose successful solution will, in turn, create more favorable conditions for economic growth. This fact has been fully borne out by the experiences a number of developed countries have gained in improving the environment.

China’s environmental protection policies are still evolving. In relation to wild animals and plants, Liu Guoguong and others (1987) states that China abounds in wild animals and plants, with over 400 species of mammals, 1,100 species of birds, and nearly 30,000 species of higher plants, many of them rare. But it is necessary for China to enact and enforce laws and regulations to give rare animals really effective protection.

In the future, greater attention will be given to the economic benefits of better management of the environment in China. For example, with the extension of the market system in China, polluters may more frequently be required to pay for the environmental cost of their pollution (Hong and others 1991; Mao 1991). In addition, with China’s opening up to the outside world, scope exists for China to attract more “ecotourists” who are interested in its rare animals and plants, and to earn extra income from its conservation of its natural areas. Such possibilities, however, must be followed up *effectively*.

Returning specifically to the foreign debt issue, the foreign debt may involve (a) private lending to private borrowers in the borrowing country, (b) private lending to the government in the borrowing country, and (c) nonprivate lending to the government in the borrowing country. While in the first case only private risks are involved, failure to repay loans can influence perceptions of foreigners about the general credit-worthiness of a country and make it more difficult for the country to borrow. Increased foreign debt held by governments can have widespread adverse effects on their communities. If, for example, a government has difficulty in repaying a loan because of a shortage of foreign exchange, it may ration other users of the nation's foreign exchange or allow natural assets to be exploited at a faster rate than desirable in order to sell such products abroad and obtain much-needed foreign exchange. For example, as mentioned earlier, after the coup d'état in Fiji in 1987, foreign exchange became short, and exports of clam meat from the already depleted natural stocks were allowed for a time to generate foreign exchange.

Especially when foreign loans are obtained for military purposes, those in power may be prepared to run down the capital and natural assets of a country for their own short-term goals, particularly if actual war is occurring or imminent or if the army is important domestically in maintaining the ruling group in power. Thus the effect of a foreign debt on resource conservation in a country depends upon several factors which must be considered simultaneously.

Bauer (1989) has argued that the foreign debt crisis is a misnomer and that, in effect, it is politically contrived and that servicing it would not have affected living standards substantially. He rejects as fantasies any views that debt service is a major cause of misery in the developing world. He suggests that "the crisis" has been used selectively to enhance the power of Western governments, the International Monetary Fund, and the World Bank. His trenchant comments should be noted, but have yet to be empirically tested.

The fact is that several governments in developing countries, especially in Africa and South America, have been unable or unwilling to meet foreign debt commitments in recent years. This has provided opportunities for debt-for-nature swaps. For example, an article in *The Wall Street Journal* (January 20, 1988) entitled "What Do Monkeys in Bolivia Have to Do with the Debt Crisis?" gave some details about a debt-for-nature swap involving the Bolivian government, a Swiss bank, and Conservation International, a Washington-based nonprofit group. This conservation group purchased $650,000 of Bolivia's foreign debt from a Swiss bank for $100,000. It then swapped the $650,000 debt with the Bolivian government for an extension of 4 million acres to the El Porvenir conservation reserve, and the Bolivian government agreed to provide $250,000 in local currency for administration of the reserve and to retain Conservation International as an adviser. Apart from Bolivia, Costa Rica, Madagascar, and Mexico have been involved in debt-for-nature swaps (*Financial Times*, March 21, 1991, p. 6). But so far on a global scale, their impact on nature conservation has been very small.

While debt-for-nature swaps provide a means for greater conservation, they are likely to impose some costs on the borrowing country, especially if the benefits received from the conservation go mainly to foreigners. Land used for conservation is likely to have some opportunity costs locally, although both local and foreign interests could gain from such conservation projects. But mutual benefit is not always the case. Secondly, the areas or species targeted for conservation under debt-for-nature swaps are unlikely to be determined systematically but are more likely to be determined piecemeal, as a result of social and political processes. Swaps will depend upon the existence, particular focus, and relative drive of conservation groups.

Macroeconomic Policies: Inflation, Full Employment, and Economic Growth

For some 50 years, macroeconomic issues have dominated economic policies. The main policy issues in economics have been perceived as ones of controlling inflation, of achieving full employment of labor (or of at least avoiding unacceptably high levels of unemployment), attaining a high rate of economic growth, and maintaining a satisfactory balance of payments or a satisfactory external account situation.

Policies have been directed towards (a) increasing effective aggregate demand without fostering an unacceptably high rate of inflation and (b) expanding aggregate supplies of goods and services so as to dampen inflation, achieve greater economic growth, and increase international competitiveness. The main interest of macroeconomists in microeconomic reform has been as a vehicle to expand aggregate supplies and to increase international competitiveness, thereby increasing exports.

Prevailing macroeconomic policies and paradigms conflict to a considerable extent with those proposed by conservationists such as Daly (1980), favoring steady state economies. In reality, the latter have little political support. Few individuals are prepared to follow Daly's prescription of limiting or reducing their level of consumption. Most still want to increase it. This means that in modern economies and in the modern sectors of developing countries, wages tend to be inflexible downwards and to creep upwards over time. In turn, this creates difficulties for maintaining employment levels unless economic growth is always forthcoming to provide sufficient demand for labor. The *structure* of modern economies gives rise to a fundamental employment problem, a problem which requires continuing economic growth to avoid increasing unemployment.

Many developing countries are developing the same economic structure as developed economies. Indeed, in most developing countries a dual economy exists, and thus this problem is already present in their urban or modernized areas. Western economists are encouraging the further development of this system, encouraging the remaining subsistence sectors and socialist countries to join the cash-market economy.

How to maintain full or near full employment and satisfy income aspirations without creating environmental problems and ecological disaster still remains the major policy issue to be solved. Most likely, all these goals cannot be simultaneously satisfied. Still too many people want to have their income-employment aspirations met and hope to satisfy, as if by a miracle, all their conservation-environmental goals without any tradeoff. More attention must be given to this fundamental issue. Should, for example, there be more job-sharing in developed countries to reduce unemployment and not raise production? Should service industries that make few demands on natural resources be encouraged? Should individuals give more attention to the "profitable" use of their leisure time, and should educational systems compared to current practice provide more training for leisure relative to that for work? Should our societies be less work oriented?

Global Environmental Spillovers and the Economic System

The world has become a global village from an environmental point of view. Economic activities in a single country often have direct environmental impacts or consequences for other countries (Tisdell 1990, 1991b). Consider, for example, acid rain, nuclear pollution, greenhouse gases, loss of biodiversity and loss of existence, option and bequest value as a result of the loss of natural environments and species of worldwide significance. Such environmental spillovers have had an impact on foreign aid policies.

Donors are giving more attention to the environmental consequences of the projects that they support by aid and soft loans. While this is desirable, leaders in some developing countries have expressed concern. They point out that the net benefits to an aid recipient may be reduced by such considerations when a fixed aid allocation is available. An increased amount of aid is said to be necessary to compensate for the "extra costs" imposed on developing countries or aid recipients of having to take environmental factors into account, for example, land which now must be kept undeveloped, or extra environmental protection controls on factories. This assumes that the aid recipient loses when allowance is made for the environmental effects in allocating funds for economic projects. While this is possible, it is by no means the only possible outcome.

A range of possible global welfare consequences as summarized in Table 3–1 exists for systems which take environmental factors into account in distributing aid funds. The welfare changes are evaluated in relation to aid policies that do not pay particular attention to environmental considerations. In Table 3–1, the second column lists the sign of the possible welfare change in the developing country given aid and the third column that in the rest of the world as a result of environmentally sensitive aid. The fourth column indicates the direction of change in global welfare increases in this context, provided one country is made better off without another being made worse off.

Leaders in some developing countries are concerned that possibility 4 in Table 3–1 will prevail. This involves a redistribution of welfare in favor of the rest of the developed world if environmentally sensitive aid programs are followed. In this case, the net welfare benefits received by developing countries from aid will decline unless greater aid is supplied. However, as can be seen, cases 1–3 are also possibilities. In these cases, environmentally sensitive aid policies increase the welfare of recipients of aid. We cannot *a priori* rule out any of the sets of possibilities in Table 3–1, even possibility 6. Possibility 6 may, for example, arise if the environmental consequences of projects are inaccurately or falsely predicted.

Of course, Table 3–1 glosses over many problems of evaluation. Nevertheless, it does highlight some of the international distribution issues raised by environmentally sensitive aid policies.

Conclusions

Relationships between the global economic system, conservation, and the provision and safeguarding of protected areas are complex. In its early stages, economic growth and the extension of the market system seem to be detrimental to the conservation of natural living resources, even though in the medium term such changes may result in an improvement of environmental quality judged from a human perspective. In the longer run, such developments may be increasingly beneficial for environmental protection. Thus to recapitulate, the early stages of economic development may be unfavorable to the state of the environment, whereas development in its later stages may be favorable to the environment. Unfortunately, a number of environmental changes occurring during the earlier stages, such as extinction of particular species, are irreversible at the later stages.

But even if economic development eventually results in a more favorable attitude toward the environment, it does not follow that economic growth for all nations is environmentally feasible. The global environment may not be able to support the level of economic production that would be required to raise the per capita income of populations in developing countries to the current level in developed countries (cf. Culbertson 1971, Tisdell 1991b). We still have to come to terms with this possibility.

But the early stages of economic growth and extension of the market system need to be as destructive of the environment as in the past. We are now clearer about of the types of adverse environmental consequences that may occur and the circumstances in which state intervention in the development process and the market system is justified. Incidentally, in this regard we should not discount the possibility that state intervention to achieve environmental goals is likely to be easier or more effective in a market system than in a relatively centralized socialist system.

This all suggests that we need economic policies specifically targeted at conservation of living natural resources. In particular, we cannot rely solely on broad-brush macroeconomic or even microeconomic policies such as those recently supported by the International Monetary Fund and the World Bank. Furthermore, we are still far from resolving the basic conflict between objectives of traditional macroeconomic policy and those objectives espoused by conservationists favoring steady-state economies or reduced rates of economic growth. Greater employment and rising incomes remain high on political agendas, and those in employment do not seem to be ready to share their jobs and their incomes with the unemployed, or to accept lower incomes for conservation ends. This may be so for several reasons: (a) individuals may not believe that rising incomes have adverse environmental consequences; (b) they may take the view that only humanity should count and although other species may suffer, rising incomes on balance have positive consequences for humanity; (c) although it may be accepted that rising incomes will have adverse consequences for humanity as a whole, individual selfishness may lead individuals to follow the income-raising path. Thus, in this case, rational pursuit of individual self-interest conflicts with collective self-interest. The problem of a prisoner's dilemma exists.

Finally, observe that there is considerable discussion in the literature about improvement and deterioration in the conservation of natural resources without much attention to the concept itself. How do we decide whether conservation has increased if conservation of some resources, such as soil, improves but that of other resources declines. For example, if increased agricultural prices lead to greater conservation of soils used for agriculture but result in extension of agriculture at the expense of survival of species or preservation of natural areas, does this constitute greater conservation? So far, biological diversity itself has not been a focus in the structural adjustment debate. This matter is not effectively addressed in Sebastian and Alicbusan's (1989) review of the World Bank's adjustment lending operations nor in a similar review of the Asian Development Bank by Hansen (1990b).

One implication of the above discussion is that the further economic development proceeds, and the more widespread the market system becomes, and the more dominant the presence of biosphere people, the greater is the need for governments to maintain and protect natural areas, thereby helping to maintain biodiversity *officially*. When there is little economic development and growth, natural areas are likely to remain intact without official protection. Natural areas become particularly vulnerable once economic growth and development get under way. Natural resources provide a capital stock which can be drawn on to finance development, but at the expense of

biodiversity. They also provide a cushion against economic misfortune, such as an external macroeconomic shock, for example, a sudden and unpredicted deterioration in the balance of payments, but at the expense of biodiversity. In such cases, natural capital may be sacrificed to prevent a sudden decline in income or rise in unemployment; for example, timber may be cut from "protected" areas for export. In the early and intermediate stages of economic growth, natural resources are very vulnerable to exploitation and difficult for governments to protect politically. At this time, foreign aid and support for nature conservation is of crucial importance for provision and maintenance of national parks and protected areas. As economies develop further and reach a mature stage, political support for protection of natural areas increases, but by this time much biodiversity is usually lost. Furthermore, availability of natural areas by then is almost entirely dependent on government funding and supply, which depend on political factors. Then the security of such areas and their extension becomes extremely dependent on the maintenance of effective conservation lobbies.

Table 3–1. Distribution of Possible Net Gains and Losses from Environmentally Sensitive Aid Policies: Global Welfare Consequences

Possibility	*Net benefit to aid recipient (developing country)*	*Net benefit to rest of world*	*Global welfare change*
1	+	+	+
2	+	0	+
3	+	-	?
4	-	+	?
5	-	0	-
6	-	-	-
7	0	+	+
8	0	0	0
9	0	-	-

Bibliography

Anonymous. 1991. "The Global Environmental Facility." *Finance and Development* March 1991:24. Washington, D.C.: The International Monetary Fund and The World Bank.

Australian International Development Assistance Bureau. 1990. Ecologically Sustainable Development in International Development Cooperation. *AIDAB Discussion Paper*, November.

Bauer, P. T. 1989. "The Third World Debt Crisis: Can't Pay or Won't Pay?" Seminar paper delivered to the Department of Economics, University of Melbourne, November 11, 1989.

Culbertson, J. M. 1971. *Economic Development: An Ecological Approach*. New York: Knopf.

Daly, H. 1980. *Economics, Ecology, Ethics*. San Francisco: Freeman.

Dasmann, R. 1975/76. "National Parks, Nature Conservation and `Future Primitive."' *Ecologist* 6(5):164–67.

Daly, H. E., and J. Cobb. 1989. *For the Common Good: Redirecting the Economy Towards the Community, the Environment and a Sustainable Future*. Boston: Beacon Press.

Frank, Andre G. 1967. *Capitalism and Under-development in Latin America: Historical Studies of Chile and Brazil*. Monthly Revias Press: New York.

Hansen, S. 1990a. "Macroeconomic Policies: Incidence on the Environment." Paper presented at the Overseas Development Institute Conference on *The Environment, Development and Economic Research* at Regent's College, London, March 27–28.

Hansen, S. 1990b. *Environmental Considerations in Program Lending*. Environment Division, Asian Development Bank, Manila, Philippines.

Hansen, S. 1990c. "Macroeconomic Policies and Sustainable Development in the Third World." *Journal of International Development* 2(4):533–57.

Harris, J. M. 1991. "Global Institutions and Ecological Crisis." *World Development* 9(1):111–22.

Hong, Zhiyong, Bao Keguang, and Clem Tisdell. 1991. “Cadmium Exposure in Daye County, China: Environmental Assessment and Management, Health and Economic Effects.” *Environmental Management and Health* 2(2): 20–25.

IUCN-World Conservation Union—United Nations Environment Programme—WWF. 1991. *Caring for the Earth: A Strategy for Sustainable Development*. IUCN—World Conservation Union, Gland, Switzerland.

Jayawardena, L. 1990. “The Mission of the University in Economic Development and Environmental Preservation: Management of Local and Regional Resources in an Interdependent World System.” A paper presented to the Ninth General Conference of the International Association of Universities, Helsinki, August. World Institute for Development Economics Research, United Nations University Helsinki.

Klee, G. A. 1980. *World Systems of Traditional Resource Management*. London: Edward Arnold.

Liu Guoguang, Liang Wensen, and others. 1987. *China’s Economy in 2000*. Beijing: New World Press.

Lutz, Ernst. 1990. “Agricultural Trade Liberalization, Price Changes and Environmental Effects.” Environmental Policy and Research Division Working Paper No. 1990–16, World Bank, Washington.

Lutz, Ernst, and M. Young. 1992. “Integration of Environmental Concerns into Agricultural Policies of Industrial and Developing Countries.” *World Development*, Vol. 20, No. 2, pp. 241–53.

Mao, Yushi. 1991. “Environmental Problems in China and the USA and China’s International Collaboration.” Institute of American Studies, Chinese Academy of Social Sciences, Beijing. A paper presented at an International Conference on The United States and the Asian Pacific Region in 20th Century, Beijing, May 23–25.

Mearns, R. 1991. “Environmental Implications of Structural Adjustment: Reflections on Scientific Method.” Institute of Development Studies Discussion Paper No. 284. Institute of Development Studies, University of Sussex, Brighton, United Kingdom.

Myrdal, G. 1956. *On International Economy: Problems and Prospects*. London: Routledge and Kegan Paul.

Myers, N. P. R. Ehrlich, and A. Ehrlich. 1990. “The Population Problem: As Explosive As Ever?” A paper presented at the Fourth International Conference on the Environmental Future: Surviving with the Biosphere, Budapest, April. Forthcoming in J. Barnett and N. Polunin, eds., *Surviving with the Biosphere*, Edinburgh University Press, Edinburgh.

Schor, J. B. 1991. “Global Equity and Environmental Crisis: An Argument for Reducing Working Hours in the North.” *World Development* 19(1):73–84.

Schumacher, E. F. 1973. *Small is Beautiful: A Study of Economics as if People Mattered*. London: Blond and Briggs.

Sebastian, Iona, and Adelaida Alicbusan. 1989. “Sustainable Development: Issues in Adjustment Lending Policies.” Environment Department Divisional Working Papers 1989–6, The World Bank, Washington, D.C.

Tisdell, Clem A. 1990. *Natural Resources, Growth and Development*. New York: Praeger.

Tisdell, Clem A. 1991a. “Project Appraisal, the Environment and Sustainability for Small Islands.” Paper presented at an International Conference on Islands and Small States, Foundation for International Studies, University of Malta, May 23–25.

Tisdell, Clem A. 1991b. *Economics of Environmental Conservation*. Amsterdam: Elsevier Science Publishers.

Tisdell, Clem A. 1991c. “Population Growth and Environmental Protection: The Situation of Developing Countries—Global Perceptions.” In K. Roy and others, eds., *Economic Development of Poor Countries*. Calcutta: The World Press Private Ltd.

Tisdell, Clem A., and T. I. Fairbairn. 1984. “Sustainable Economics and Unsustainable Development and Trade: Some Simple Theory.” *Journal of Development Studies* 20:227–41.

Toffler, A. 1970. *Future Shock*. London: The Bodley Head.

World Commission on Environment and Development. 1987. *Our Common Future*. Oxford: Oxford University Press.

Yellen, J. E. 1990. “The Transformation of the Kalahari !Kung!” *Scientific American*, April:72–79.

4 Conservation in the Big Picture: Development Approaches for the Next Decade

Kirk P. Rodgers and Richard E. Saunier

OUR ASSIGNED OBJECTIVE is to look at some of the emerging responses to the challenges that wildland conservation will face in the next decade. To do that we will need briefly to review what some of these challenges are. We will do so, however, from a viewpoint that clearly is not mainstream conservation.

This viewpoint can be perceived in a group of three paintings by Thomas Moran which hang in the National Museum of American Art in Washington, D.C.

The first of these paintings, finished in 1872, is of the “Grand Canyon of the Yellowstone.” Some people, of course, recognize that it was this painting that helped convince a skeptical U.S. Congress to establish Yellowstone National Park. The second is the “Grand Canyon of the Colorado,” painted from the north rim of that wondrous area, and the third is a restatement of the first, showing 20 years of Moran’s evolution as an artist. All three paintings are immense, measuring on the order of 7 by 12 feet and all are worthy of the position they hold in the gallery. However, despite the success of the paintings in capturing the grandeur of these scenic places, in reproducing their colors at but one moment in time, and in suggesting the immensity of the real thing, Moran himself correctly declared that these places “were beyond the reach of human art.”

One can repeatedly and comfortably visit and explore these paintings for hours. But, at some time during the visit, one becomes aware that the paintings also contain people. Perhaps the artist put them there to provide a sense of scale or, possibly, he put them there conscious that the scenes would have been less than whole had the human element been left out. Our purpose for mentioning this here is to make the point that, as much as we sometimes wish it were not so, humans, without exception, are a part of the big picture and that no matter how earnestly many of us may respect an ethic which teaches conservation of nature for its own right, our efforts at conservation always have to do with people: their likes and dislikes, their needs and desires, their artifacts and presence, and their activities and institutions.

The Big Picture

A reading of recent headlines easily lays a groundwork for describing the big picture. What one finds there are hundreds of column inches dedicated to reports and analyses of the dissolution of the Eastern bloc, the end of the cold war and the dying out of the rhetoric and cost of the surrogate wars it spawned. One also finds a seemingly endless account of financial scandals of worldwide scope: the AIDS epidemic; problems originating with the production, distribution, and use of illegal drugs; and the plight of the world’s poor on the one hand and the state of the global environment on the other. The search for ways to finance solutions to problems and to assuage the more difficult consequences of these events, of course, is high on everyone’s agenda.

The search for solutions to these problems is especially important in the developing world, where the finances required to solve its problems have steadily diminished relative to the needs. As a result, management and control of development activities have become more centralized, and while concerns at the local level are frequently heard, they are not so often heeded. And although a few of the individual development sectors have gained in strength, *integration* is a word once again heard in the halls of academia and in the offices of development assistance institutions.

The word *integration* is mentioned for many reasons—economics being one of these. More importantly, the concept is being discussed because it is the appropriate response to the complexity and change that define the big picture of today. This complexity is reflected in the barrage of numbers so often put on display by many of our colleagues. These numbers frequently are of dubious origin and suspect methods, and they are meant to convince us of a particular point of view as much as they are meant to keep us informed. Estimates of annual deforestation rates in Amazonia, for example, vary from 2.3 million hectares per years as reported by the Brazilian Space Agency (National Space Research Institute of Brazil 1989) to 8 million hectares per year as reported by nongovernmental organizations of the north (World Resources Institute 1990). Along with the forests themselves,

species also disappear, but the estimates of how many disappear also depend on who is making the estimate and why. For example, rates of from 100 (Kaufmann and Mallory 1986) to 100,000 (Mann 1991) to 150,000 a year (Goodland 1991) can be found in recent literature.

Such figures shock us—as indeed they were meant to do. But for many, even more shocking numbers appear in the *Human Development Report* of the United Nations Development Programme (1991). Table 4–1, for example, is adapted from this source. It suggests that there is much more to the big picture than what we conservationists would like to see. In addition to people, their problems and activities, we see that the big picture is fraught with complexity and rapid change.

Given a world in which we lament the so-called homogenization of humanity, these data indicate some startling differences: 77 percent of the world's people earn 15 percent of its income, and the average gross national product for the industrial countries is $12,510, while for those countries still developing, it is $710. One fifth of the population still goes hungry every day, and more than 1 billion adults are illiterate—including half the rural women over 15 years of age. Basic health care is still lacking for some 1.5 billion people; over 1.5 billion do not have safe water, and over 2 billion lack adequate sanitation. Fifteen million new cases of HIV infection will be reported in the 1990s—the majority in people between 15 and 49 years of age. Natural hazardous events, such as cyclones, earthquakes, and floods, have caused three million deaths over the last two decades and violent dislocation for at least 1 billion people.

These are frightening numbers. What is even more frightening, however, is that the technical know-how and conceptual understanding required to solve virtually all such problems exists but they go largely unused. Most of the 24 million children and young adults who die each year die from preventable causes. Why the technical knowledge and conceptual understanding go unused is both a part and a consequence of a complex set of problems that includes competition from nonconservation interests such as markets, geopolitics, protectionism, competition, and historical conflicts of increasing variety and ideology. Declining social and economic welfare, global financial chaos, recession, a new world order, and the greatly expanded number of people who now wish to speak for themselves are also involved.

Hoped-for funds for conservation from a "peace dividend" have not appeared. Indeed, the requirement for additional funding to solve the problems related to ending the cold war itself has resulted in a general scarcity of funds elsewhere, and the availability of certain kinds of financing for conservation may even decrease in the short and medium terms. The elimination of the equipment and infrastructure of war, the repatriation of armed forces, care for the refugees of conflict, and valid responses to the aspirations of newly independent peoples are all expensive items.

The activities of wildland conservation also reflect the increased complexity and faster pace. Indeed, they have grown to the degree that the field now appears hyperactive. Here, as elsewhere, the earlier endeavors were uncomplicated and, possibly, even naive. Being able to establish a national park or other conservation area with little more than the addition of a line to a map followed by the stroke of a politician's pen is now unthinkable. We have been forced to realize that there are people on those landscapes whose demands and activities have made complexity a part of the big picture. Working with, and within, that complexity will require much of our attention from now on regardless of our objectives.

Emerging responses

Several responses to the problems mentioned above are now evolving. Each has features that are useful, as well as questionable. Only time will prove their adequacy and which, if any, will carry the day. They include the following topics.

Conservation and developing world debt relief

Conservation over the next few years will require an estimated $50 billion per year (World Resources Institute 1989). Although funds have not generally accrued from a peace dividend, they have become available because of the previous misfortune and indebtedness of the developing countries. Through mechanisms such as "debt-for-nature swaps" and, regionally, through the "Enterprise for the Americas" initiative, some of the indebtedness of the developing world is now being used for conservation purposes. Funding from this source—now on the order of $100 million—is significant compared with previous amounts for wildland conservation, but it is relatively insignificant compared with the $1.3 trillion capacity of the initiative (World Resources Institute 1989).

The potential for making additional debt-for-nature swaps does exist. Brazil, for example, has recently agreed to make such a swap for the first time, and will allow up to $100 million in outstanding loans to be exchanged to sponsor “environmental” activities. Here, international nongovernmental organizations will buy the outstanding debt at a reduced rate and sell it back to the Government, where about 75 percent of the original market value of the debt will be invested in environmental programs.

However, despite the success of the debt-for-nature formula, there are indications that fascination with the process as currently structured is waning. For example, a spring 1991 meeting of the International Facilitation Committee attended by a number of Latin American nongovernmental organizations requested that no further backing be provided for debt-for-nature swaps until governments and nongovernmental organizations can work out terms for these agreements. Some southern nongovernmental organizations feel that, as currently designed, the swaps place them on unequal footing compared with the North when negotiating the terms of the loan repayments (Anonymous 1991).

In some cases funding may become accessible through the use of the Global Environment Facility of the World Bank, and the United Nations Environment Programme. The Global Environment Facility is a pilot effort that looks toward disbursement of nearly $1.5 billion before 1994. But even here, the amount allotted for wildland conservation competes with other important global issues, including global warming, ozone depletion, and protection of international waters. Despite a formal organization, staff, mandate, and the fact that targets need to be met, progress has been slow, and, so far, none of the disbursements has been to conserve the so-called biodiversity hot spots of the developing world.

The biodiversity convention being proposed appears to be another vehicle of promise. As it is being negotiated, it calls for a Multilateral Trust Fund of $500 million as a beginning (Tolba 1991a). But it too is having problems, and we must wait for the results of the United Nations Conference on Environment and Development before we can see just what financing arrangements are negotiated for wildlands conservation.

What one hears on the fringes of international debate on the financing of environmental projects, however, casts a shadow over the possibilities. Here, the demands that such funding be “new and additional” appear more and more difficult for those whose view covers the also urgent needs of the newly independent countries of Europe and Asia. The negotiations at the United Nations Conference on Environment and Development on the issues of financing will be some of the more important to take place at a conference full of important issues.

Economic valuation of environmental services

This response is an extension of benefit-cost calculations that have been a part of economic analysis for many years. The difference is the extension of such calculations to the many services provided by ecosystem structure and function. What is new is not the adjustments being made in economic analysis. Rather, it is the pioneering work of a number of ecologists who elucidated ecosystem functioning and then showed the value of this functioning in satisfying human demands (Gosselink and others 1973; Lugo and Brinsom 1979). At the global level, the concept was championed by the World Conservation Organization in 1980 (International Union for the Conservation of Nature and Natural Resources [IUCN] and others 1980).

Instead, what is new, innovative, and of great significance to conservation resides not only in the long-awaited adjustments being made in economic valuation but also in the fundamental difference in the way we view natural resources. The classical view of natural resources—consisting of forests and other vegetation, water, atmosphere, soils, wildlife, metallic and nonmetallic materials, petroleum, fish, and perhaps scenery—has now been superseded. Replacing these dozen or so natural resources is a perception of the thousands of goods and services made available to us by the natural structure and function of ecosystems.

The list of real and potential services is growing, and economists are making helpful efforts to valuate specific examples of these. The advantages are, of course, that the list of potential externalities is decreasing and, since we can now be much more specific in what we want to conserve, the justification for conservation becomes much more valid. There are also disadvantages, however, and these relate to the concern that conservationists have always had in their dealings with economists: there are some things that can only be valued, not valuated (Tolba 1991b).

Environmental accounting and sectoral policy reform

Pressure for sectoral policy reform has come about as an extension of the interest in economists in conservation. Sectoral policy reform involves studies, often based on the valuation of services as mentioned above, which hold that tax, credit, and other economic policies of government not only have resulted in large economic and fiscal losses but that they have resulted in the deterioration or loss of natural resources as well (Organization of American States 1991). Consequently, natural resource use policies of governments, which include collection of resource rents, design and enforcement of revenue systems, protection for resource processing industries, and subsidies to competing land uses, are looked into in order to find imbalances and identify the offenders (World Resources Institute 1988).

And there are many offenders around, the number being equal to the number of suggestions offered to solve anything seen by someone as a problem. From the point of view of many, but not all, conservationists, these involve the elimination of all subsidies of any kind on the use of natural resources. Better would be the rehabilitation of existing infrastructure rather than the proposition of new projects; reduction of fertilizer and pesticide use, and subsidies and reallocation of development efforts toward sustainable small farmer technologies; the reformation of forest revenue systems to discourage short-run profiteering; and reduction of excessive protection to forest-based industries and investment of greater resources in forest management.

Although few people would contradict such ideas, there are several things here that must be remembered. Sectoral policies are always generated first to protect or enhance individual sectors and their interests—even if those interests are conservationist. As a consequence, sectoral policies will generally be at the expense of other sectors in terms of budget and additional forms of support. Competition for space, professional slots, and agenda time, as well as for budget, can be very stiff in times of austerity.

Sectoral activities always change the quality and quantity of the environmental services mentioned above that are available to other sectors. There is no doubt that taxes, credits, incentives, and subsidies favor the target sectors and that these may do harm to the interests of others. To the target group, whether it be dairy farmers or wildland conservationists, however, the incentives in question are neither poor, excessive, nor inappropriate.

Given the varying needs and wants of humans, it is no surprise that differences in opinion will surface over taxes, subsidies, incentives, and disincentives. It is always the case that individuals approve of subsidies when they are in their own interests and disagree with subsidies if they get little or nothing in return. Despite the absolute certainty with which interests are defended in today's world, no one interest group can be seen to have a corner on the truth. Sectoral policy reform is a viable measure that can help solve the problems of wildland conservation. It cannot, however, solve the problems alone.

Conservation as a development activity

In framing the concept of system services at a popular level, the World Conservation Organization made the very important link between conservation and development. Further elaboration of this theme has been accomplished through a number of publications (World Commission on Environment and Development 1987; Jacobs and Munroe 1987). Based on the concept of system services, the idea that conservation of these services in general and the natural services in particular is as valid a development activity as is building infrastructure and providing human-made services. It is also important to consider the human-made services provided by the relatively more human-dominated systems. Carrying capacity and thresholds, as they concern system services, show that the classical breakdown between "human-made" and "natural" systems is somewhat artificial and that what we really have is a continuum of systems where structure and function go from relatively more natural to the relatively more human-made and that *all* systems have both. The result, as we all know, is that conservation activities have a place in urbanized and industrial systems as well. An investigation into the services provided by systems and their use, improvement, and/or conservation by humans will show that a conservation activity is, indeed, a development activity. At their most basic, both activities are efforts to improve or maintain the quality of life. Further, conservation, being a development activity, also requires well-stated objectives, an adequate budget, trained staff, and sufficient political support.

Sustainable development

The "flavor" of the term *sustainable development*, if not its substance, is now familiar to all. But despite the popularity of the term and its common use for at least 10 years, including it here as an "emerging response" remains difficult. All too often we condemn "sustainable development" for what it is not meant to do and praise it for what it cannot be. The most telling statement on the subject is that of Buzzelli: "If we'd been paid 50 cents for every word that's been written on sustainable development today, we'd be wealthy. If we'd been paid 50 cents for every action taken, we'd be paupers" (Lesh and Lowrie 1990).

Perhaps the best example of where the debate is now whirling is between the "growth" and the "no-growth" interpretations given by opposing groups "within" the environmental movement. The United Nations Centre on Transnational Corporation (1991) is representative of a group that adheres to a "growth" interpretation when it suggests that the first corporate step to a sustainable development policy is to make a statement "emphasizing sustainable growth, environmental protection, resource use, worker safety and accident prevention." An example of a "no-growth" interpretation is the recent world conservation strategy, *Caring for the Earth*, which says that although "sustainable development" and "sustainable growth" are often used interchangeably, they are not the same, since the latter is a contradiction in terms (IUCN and others 1991). A third, perhaps middle ground, statement comes from the previously mentioned *Human Development Report 1991* (United Nations Development Programme 1991): "A realistic view is that growth in income and an expansion of economic opportunities are necessary preconditions of human development. Without growth, the social agenda…cannot be carried out. Although growth is not the end of development, the absence of growth often is."

Despite the polemic, the term can be useful if interpreted as the "capacity to continue over the long term any activity that is satisfying the demands of a population." Here, "long term," "capacity to continue," and "demand satisfaction" are necessarily defined by *all* the parties affected by the activity and not just by those who propose, or who oppose, the activity. The discussion as to whether the term *sustainable development* implies growth appears at this point to be immaterial.

The report of the World Commission on Environment and Development (1987), for example, correctly identifies two major prerequisites to making development sustainable: (a) that conservation is a necessary part of development; and (b) that development is required if conservation is to be possible.

The commission's definition of the term *sustainable development* leaves open the questions of which resources are to be considered and what the priority of the needs to be satisfied will be. A valid interpretation of the commission's definition, of course, is that resource conservation is of high priority and that this is most often interpreted to mean that the conservation of natural resources is important for sustainable development to be realized. Development, however, depends on the conservation of many kinds of resources, and it is also important for the future to provide children with opportunities for education and adults with opportunities for useful and respected employment. These goals also, therefore, are part and parcel of any solid response and support for conservation.

Resolution of disputes

The emerging responses mentioned so far are interrelated. They are, after all, responses to different perceptions of similar problems. An emerging response that recognizes the complexity within which we must work is that of dispute resolution, a response that unfortunately generally occurs after considerable damage has been done. Everyone wants to participate in decisions that affect their lives, and a large part of the big picture is that fewer people now want to accept "decisions dictated by someone else" (Fisher and Ury 1981).

The resolution of disputes involves several parts of an ongoing response. The first step in the response, as indicated above, is that we understand the existence of the different and continually changing needs of billions of people. Though in the past we may have believed that needs other than ours were seldom legitimate, we no longer have that luxury. As we become aware of the big picture, such a position is less and less tenable. We of course do not have to accept all needs as our own needs; we do, however, have to accept all needs as legitimate until they are proved otherwise. If they are legitimate, we must, then, consider their satisfaction, as well as the satisfaction of our needs, when we make our interventions in shared systems. Even if not legitimate, they must be considered "real" and included in our deliberations.

Second is the concept of holism—of the interrelatedness of our world. It is a concept that conservationists not only understand but one that they claim as their own. Consequently, more and

more nongovernmental organizations and consulting firms are becoming involved in this aspect of conservation. Positive efforts at the resolution of disputes must now be undertaken by conservationists both as participants and as arbiters. If conservationists do not care to participate in such ventures, conservation will lose out.

Landscape planning and management

Integration, as a concept, has been around for a good while, occasionally appearing to share the spotlight for a time but receiving only lukewarm reviews when it does. A logical response to integrated systems, where "everything is related to everything else," the concept is usually tossed overboard on the grounds that one cannot work with everything. Or, just as likely, the term becomes jargon—highlighting the phenomenon of a term becoming the property of everyone, including those who know neither the meaning of the word nor the rationale behind the concept.

Now, however, the concept is making a comeback. Several reasons are involved. One is that, again through the work of ecologists, we more fully understand the nature of system interaction and, through the efforts of the environmental movement, we understand that integration is the only proper response to the fact that we live and work in integrated systems. Unfortunately, those who criticize integrated planning remain. We submit, however, that what many call "integrated planning" has little to do with "integration," which by common definition means "to unify" as well as "to join together."

Within this context, landscape planning and its emphasis on integration is mentioned more and more frequently as a viable process for improving the scope and success of conservation efforts. As proof of this fact, one need look no further than the agenda of this conference, where several plenary sessions, workshops, and symposia are dedicated to the topic. Elsewhere, it is receiving attention as a major component of AGENDA 21 of the United Nations Conference on Environment and Development, which calls for "development of a more responsive and appropriate planning and management system" (United Nations Conference on Environment and Development Secretariat 1991).

Landscape management planning is similar to what we call *integrated regional development planning*—perhaps the only relevant entry into the "project cycle" at a time and in a way that does any good: previous to the identification of projects. Rather than to establish sectoral plans, full-blown projects, and environmental impact assessments, it first helps to define a development strategy, and then it identifies projects—before investments of time, energy, funds, and political support are made.

Although scale is important in landscape planning, a region can be any piece of space defined by those who wish to have the study made and who have in mind the objectives they wish to achieve. Generally, these are governments, because requests from other groups are usually sectoral or represent fairly fixed ideas of what is wanted. Thus a region can be an area within one country or an area formed by parts of neighboring countries. It can also be an entire country. In all these cases, the goals and methods remain the same: formulation of development strategies over a well-defined space, identification of priority areas and activities, and identification of project ideas that are compatible with one another and with the socioeconomic and cultural characteristics of the region. The concept of integration is of utmost importance, and its application provides for both early identification of potential conflicts, as well as their satisfactory resolution or management.

This integrated, multisectoral overview undertaken early in the development planning process is the trademark of integrated regional development planning. The attempt is to create and/or to organize projects into a "unified" development strategy over a piece of landscape. The objectives are to take what is given in terms of needs and resources and to formulate a development strategy and ideas for projects and programs that are compatible with one another, as well as with the needs of the affected populations; that are suitable for the reality of that place in terms of its history, culture, and economics; and that fit within the limitations of available time, funding, and information.

Development and development planning are continuing processes that are both the objects and the instruments of change. Integrated regional development planning seeks to make this change positive and palatable by using methods that are interdisciplinary, iterative, and rapid enough so as not to lose the battle before it is joined. The attempt is to improve the quality of life for a target population and to do it in such a way that the conflicts inherent in the overall process are reduced to a minimum. As for any planning, the objective of integrated regional development planning is not to make things perfect. It is only to make them better.

Conclusion

It would be difficult to conclude anything other than that the big picture is yet another need requiring attention, multiplying demands on resources, and involving more complexity than ever. As a result, no project, regardless of mandate, financing, or need, can long endure if consensus is not ensured. Any strategy to solve the problems perceived by individual groups that do not consider this complexity are destined to fail and thus become a part of the problem rather than a part of the solution. This is as true for the successful conservation of wildlands as it is for the successful development of any of the resources such areas contain. The sponsors and organizers of the IVth World Congress on National Parks and Protected Areas, in their selection of theme and in their elaboration of the program, have demonstrated their understanding of the importance of this issue. The discussions to take place over the next few days will be instructive to all of us.

Table 4–1. Developing World and Industrial World Development Comparisons

Category	*Developing world*	*Industrial world*
GNP per capita ($)	710	12,510
Life expectancy (years)	62.8	74.5
Mortality rate per 1,000 for those under 5 years of age	116	18
Maternal mortality rate per 1,000	290	24
Adult literacy rate (percentage of those over 15 years of age)	60	—
Scientists and technicians per 1,000	9.5	139.3
Annual population growth rate	2.3	0.8
Annual urban population growth rate	4.0	1.4
Military expenditure as % of spending on health and education	109.0	38.0
Population below poverty line (%)	32	2

Bibliography

Anonymous. 1991. “Popular Debt-for-Nature Swaps Spark Controversy.” *NGO Networker* 21 (Summer). World Resources Institute, Washington, D.C.

Fisher, R., and W. Ury. 1981. *Getting to Yes: Negotiating Agreement without Giving In*. New York: Penguin Books.

Goodland, R. 1991. “Tropical Deforestation: Solutions, Ethics and Religion.” The World Bank Environmental Department Working Paper 43. Washington, D.C.

Gosselink, J. G., E. P. Odum, and R. M. Pope. 1973. *The Value of the Tidal Marsh*. Center for Wetland Resources, Louisiana State University. Baton Rouge. Publication number: LSU-SG-74-03.

National Space Research Institute of Brazil 1989. *Alternação da Cobertura Florestal na Amazonia Legal Utilizando Sensoriamento Remoto Orbital*. São José dos Campos: Cachoeira Paulista.

International Union for the Conservation of Nature and Natural Resources (IUCN) 1980. *World Conservation Strategy: Living Resource Conservation for Sustainable Development*. IUCN, United Nations Environment Programme, World Wildlife Fund, Food and Agriculture Organization of the United Nations, and United Nations Educational, Scientific, and Cultural Organization. Gland, Switzerland.

————. 1991. *Caring for the Earth: A Strategy for Sustainability*. IUCN—World Wildlife Fund—United Nations Environment Programme.

Jacobs, P., and D. A. Munroe, eds., 1987. *Conservation with Equity: Strategies for Sustainable Development*. Proceedings of the Conference on Conservation and Development: Implementing the World Conservation Strategy. Ottawa, Canada, 31 May—5 June 1986. IUCN. Gland, Switzerland.

Kaufmann, L., and K. Mallory. 1986. *The Last Extinction*. Cambridge, Mass.: Massachusetts Institute of Technology.

Lesh, D. R., and D. G. Lowrie. 1990. *Sustainable Development: A New Path for Progress*. The Global Tomorrow Coalition. Washington, D.C.

Lugo, A., and M. M. Brinsom. 1979. “Primary Productivity in Saltwater Wetlands and Its Value.” National Symposium on Wetlands. Fourteenth American Water Resources Conference.

Mann, C. C. 1991. “Extinction: Are Ecologists Crying Wolf?” *Science* 253(16).

Organization of American States 1991. *Estudio Ambiental Nacional*. Government of Uruguay. Organization of American States/Inter-American Development Bank. General Secretariat of the Organization of American States. Washington, D.C.

Tolba, M. 1991a. “The Repairing Lease.” Speech to the Intergovernmental Negotiating Committee for the Convention on Biological Diversity. United Nations Environment Programme. Nairobi.

Tolba, M. 1991b. Speech to the Economic Commission for Latin America and the Caribbean Regional Conference for the United Nations Conference on Environment and Development. Mexico City.

United Nations Centre on Transnational Corporations 1991. *Criteria for Sustainable Development Management*. United Nations Center on Transnational Corporations.

United Nations Conference on Environment and Development Secretariat 1991. Report of the Secretary General of the Conference. A/CONF.151/PC/42/add.2. 2 July.

United Nations Development Programme 1991. *Human Development Report 91*. United Nations Development Programme. New York.

World Commission on Environment and Development 1987. *Our Common Future*. World Commission on Environment and Development. Oxford University Press.

World Resources Institute 1988. “International Conservation Financing Project: Maintaining Biodiversity and Critical Ecosystems in Support of Sustainable Development.” Preliminary Paper on Financing Mechanisms. World Resources Institute. Washington, D.C.

World Resources Institute 1989. *Natural Endowments: Financing Resource Conservation for Development*. World Resources Institute. Washington D.C.

5 Socioeconomic and Ecological Prospects for Multiple Use of Protected Areas in Africa

Walter J. Lusigi

CONSERVATION LITERATURE OVER THE LAST DECADE has seen increasing realization of man’s responsibility in ensuring survival of the world’s protected areas. In African terms, there have been an overwhelming number of pilot projects that have the “people” label. While this trend has been encouraging, the overall conservation picture has not been very bright—as the wildlife resources have continued to dwindle under mounting human pressure. The problem does not seem to be awareness of the necessity for protected areas any more but rather whether they are feasible under the present circumstances.

In my address to this Conference 10 years ago in Bali, I raised several concerns that in my view were a prerequisite to making any meaningful progress in ensuring survival of the network of our protected areas in Africa. Today those concerns have not showed much improvement. We are poorer in Africa today than we were ten years ago; we are more in number than we were ten years ago; we are still fighting among ourselves across the continent; the legitimacy of governments and the territorial integrity of states, regions, and tribes is still violently under question; famine is still rampant; land reforms have not taken place; AIDS has added to the already gloomy health situation; and natural catastrophes like drought are still with us. These issues are not new and they are not the agenda of many well-meaning organizations that are involved in finding a solution to the so-called African crisis. A critical element in trying to address these issues is the scarcity of the resources available to adequately face up to the problems. This means that Africa must set its priorities very carefully in order to determine what measures will yield the most benefit for the most people in “good time.”

In my judgment, one of the most important items on that priority agenda will have to be how we use our land. We will not move forward until this issue is resolved. The point I address in this chapter is that amid competing land uses, especially for food production, protected areas have never been in a bigger threat than before. In order to survive the pressure to convert protected areas to other uses, we must have a compatibility of the use of protected areas with the surrounding lands. For most parts of Africa this means that protected areas will have to accept other activities that do not compromise the integrity of these protected areas. For example, one of the most important activities or uses is that

of grazing of livestock, which affects the welfare of the most vulnerable groups of people in Africa today—the pastoralists. There is no point in trying to prove that all species of wildlife are incompatible with the production of beef for local sale when there is hardly a functioning ranch in Africa today that does not also support wildlife. It is equally quite pointless, except in unoccupied areas, to extol the ecological virtues of wildlife and expect biomass data to lead to decisions to eliminate livestock, or to have the pastoralist relinquish his land rights. Protected areas should be able to contribute substantively to the welfare of the surrounding populations, and the surrounding populations should be able to assure the survival of the protected areas in the long run. The state, however, will have to assure survival of the two interests, which will contribute to the national economy and welfare.

Conservation Trends in West Africa

Most of the problems facing protected areas have been known to us, and conservationists have been writing about them for many decades. We should concentrate our attention on looking at a few real examples of present threats to protected areas and what is happening to them, and consider what we can do to secure a lasting future for our protected areas. I had intended to reflect on the situations as we have observed them in East Africa, but after a recent visit to the West African nation of Mali, on a World Bank appraisal mission on the natural resources management project, I decided that I would use Mali to illustrate the concerns for our protected areas while at the same time demonstrating the similarity of the situation across Africa.

Mali makes a significant contribution to the planet's biodiversity, despite the negative impact of many years of drought during the 1970s and early 1980s. It is particularly rich in birds and mammal fauna, with estimates of over 640 bird species for which the Niger inner delta is a unique habitat. Official attempts at wildlife protection in Mali date back to 1938, when the present reserves network was created. It consists of several forest reserves, including an elephant and giraffe reserve. The most important conservation area in Mali is the Baoule complex, which consists of the Baoule National Park (3,500 square kilometers), the Kaugossambougou fauna reserve (920 square kilometers), Baduko fauna reserve (1,930 square kilometers), and Fina fauna reserve (1,360 square kilometers). Although these reserves were created as early as 1938, the park administration for the Baoule complex was not established until 1972 and the whole complex of 7.10 square kilometers was declared a biosphere reserve in 1982.

The commitment of the government of Mali to the conservation of its fauna and flora has been intensified and accorded priority in government plans, especially in response to recent droughts. The institutional and functional mechanisms for achieving this have been weak, however, leading to expansions of settlements, agriculture, and pastoralism in protected areas. There are also increased incidences of illegal hunting and wood harvesting. Despite all of these difficulties, the Baoule complex has, largely because of its inaccessibility due to poor communication, retained its ecological stability and biological diversity unique to this zone in West Africa. Will Baoule survive the human pressure and can the government of Mali afford to set aside Baoule as a conservation area? How can the conservation of Baoule be assured both in the short and long term despite the above considerations? In order to adequately respond to these questions, we must understand the socioeconomic setting of the Baoule region and Mali.

The Economy of Mali

With a per capita income of $260 (1989), Mali is one of the poorest countries in the world. Landlocked and covering an area of 1,241 thousand square kilometers, it occupies a large band of Africa extending from the Saharan area to the Guinean zone. In 1990, there were 8.5 million inhabitants and annual population growth was 2.5 percent. This implies a doubling of the population before 2020. The population is ethnically very varied, and 80 percent of the inhabitants live in rural areas. The statistics for average population density (6 inhabitants per square kilometer) conceal considerable regional differences, with 22 inhabitants per square kilometer in Segou, and 1 inhabitant per square kilometer in the Tombouctou and Gao regions. A vast area (140,000 square kilometers) that was previously affected by onchocerciasis has been partly cleared of this disease by a campaign launched in 1974, and is now being intensively developed for cotton production.

Obstacles to economic development are the meagerness of resources, the poor condition of infrastructure, and a generally unfavorable climate. The poor enrollment rate for primary education (one of the lowest in the world) is also a constraint on long-term development.

Land Use and Agriculture

Agroecological picture

Mali's agroclimatic zones range from Saharan to Guinean. Except for the inland delta area of the Niger, rainfall distribution shapes the landscape and establishes the patterns of human activities. Climatic factors rather than soil types account for the extreme ecological diversity characterizing the country's vegetation and agricultural potential. Most of the agricultural areas lie between the Sahelian north and the Sudanian south. The Saharan zone covers about half of Mali's total surface; most of this area receives less than 150 millimeters of rain, and supplies in a normal year less than 10 percent of the total herbage biomass. The Sahelian zone covers about 25 percent of Mali and receives between 200 and 600 millimeters of rain; outside the Delta area, rainfed crop production concentrates on grain: sorgho and millet. The Sudanian savannah covers 15 percent of Mali and receives good rainfall (600–1,200 millimeters per year); it has the most productive pasture and cropland of the country and a higher population density.

Production systems

In Mali, the main production systems are either principally pastoral or principally agropastoral. It is rare, even in irrigated areas, to find a purely agricultural production system. Livestock forms an essential part of most systems and therefore must be carefully considered in the context of an overall land management plan. Because of this, the "terroir" (meaning the area covered by the production system of a given community, including distant grazing zones in the case of transhumance) is of such importance as it includes the community's agricultural and pastoral zones, it integrates the needs and potentials of both, and it provides a system for allocating intersectoral priorities. Furthermore, the complex, heterogeneous character of production systems reinforces the need to have local planning systems which ensure that the specific production constraints, potentials, and priorities of each particular terroir are taken into consideration.

Degradation of natural resources

Over the last 30 years, rainfall in Mali and the Sahelian region as a whole has considerably declined, although there is no evidence that this is a long-term trend rather than just a cyclic phenomenon. The result has been that the isohyets have shifted southward by about 110 kilometers, with a consequent change in vegetation and a similar shift southward of the climatic conditions suitable for various types of agriculture. Areas that were once marginal have become uncultivable, plant and animal species are disappearing from their former ecological habitats, and most of the country's livestock is being moved into the south. At the same time, a large population increase and a weakening of those cultural traditions that had served to protect natural resources in the past, have led to an accelerated trend of degradation of the natural resource base.

The Baoule Region

The Baoule region has largely survived in its present state because of its isolation. Despite the difficult access to the area, however, there have been considerable changes in the ecological and economic setting of the region in the last two decades. Diminishing biodiversity in the region has been documented by a variety of studies. The IUCN—World Conservation Union Sahel Studies (1989) list a total of 136 mammals for Mali and indicate that nine species are threatened. A study in 1981 by a Dutch project estimates that no significant large mammal population will be left within Mali in five to ten years. Two antelope species, the scimitar-horned oryx and Korrigum, were found to be already extinct, hippo were termed to be near extinction, and extinction of the giant eland might still occur. The picture of the flora seems brighter, as certain core areas are uninhabited.

Human activities in the Baoule area have been on the increase. In 1981 there were about 4 villages in the present park boundaries, with a population of 4,000 to 5,000 people. Today there are about 10 villages, with an estimated population of about 10,000 to 15,000 people. These are Mbambara agropastoralists who practice subsistence agriculture and also keep livestock. Their fields have expanded considerably and so has the number of livestock. Because of the shift of the rainfall isohyets to the south, transhumance use of the Baoule area by the Fulani pastoralists has also increased. There has also been an increase in conflicts between the Fulani pastoralists and the settled Mbambara, where in some incidences the Mbambara pastoralists have complained about crop

damage by Fulanis. For the most part, however, the relationship seems symbiotic, where there is a healthy exchange of milk from Fulanis for grain from the Mbambara and Mbambaras are employing Fulani pastoralists to look after their livestock.

The infrastructure in this area is poorly developed, as there are no all-weather roads and bridges. The area is completely cut off from the rest of the country for half of the year during the rain season. There were no schools and hospitals in the area. The hunting camps which had been functioning during the French Colonial period are closed.

The Conservation Situation

The Baoule National Park authorities do not have the capacity or the political will to enforce the conventional park protection rules. In order to meet international park protection criteria, the people would have to be removed from the park boundaries and relocated elsewhere. The government of Mali has been hesitant over the years to make a decision on this issue because of its political sensitivity. Although it might have been possible to relocate the people ten years ago, the government acknowledges the fact it is not possible to do that now. Likewise, the Fulani pastoralists who have also increased in number with their livestock are demanding increased use of the area. When asked about their welfare needs, the people in this area indicate that they want development in terms of the modern world—roads, water, schools, health, and markets for their goods. The government of Mali acknowledges its responsibility in providing for the welfare of its people, while at the same time realizing the dependence of that development on the natural life renewal systems that are provided by the Baoule conservation area and national park. What choices should be made? The answer lies in making realistic compromises of resource use and development, both inside and outside the park boundaries, that will be acceptable to the surrounding populations.

The basic philosophy

Details of the underlying philosophy in the planning and management of this component are contained in Lusigi 1978 and 1981. Over the last decade, ecologists have been testing some new approaches to conservation through ideas like the biosphere reserve concept, based on the conservation of sites representative of major ecosystem types like the Sudano Sahelian zone in the Baoule. These sites are protected for the role they play in research, monitoring of change, and education and training, as well as long-term *in situ* conservation of genetic material. An essential underlying theme views the development of resources as an important prerequisite for future conservation. With a rising population, increasing demands on land, and tightening economic constraints, intensifying agricultural production on one piece of land can be the means of ensuring conservation of another. Only rarely can a wildlife park be established to include an entire ecosystem, especially the year-round needs of migratory species. Park management must be coordinated with management of the surrounding lands, but it must also be culturally and economically valuable to the local people if it is to be a permanent institution capable of surviving changes in political regimes and periods of financial stress.

For Baoule, like many other parts of Africa now, a broader concept of wildlife park development is necessary. It is suggested here that a coordinated management system be developed, consisting of various categories of land use in addition to the national park itself. This would include one or more ecosystems, but would also consider tribal and political boundaries, thus making the ecological management of the area coincide with the political administration. This is the essence of the natural resources management program that has been designed by M. Jeffrey Lewis and others at the World Bank and that is being applied to Mali and the Baoule area.

Resolving resources-use conflicts

The Baoule area presents a typical example of the predicament confronting many protected area systems in Africa and indeed around the world. Although the park and reserve boundaries have existed on the map for the last 50 years, there has been really no management in place that has assured or guaranteed their protection and survival as protected area systems in the long run. First, the governments in Mali have been in a continuous evolution such that there was no strong political support for the protection of the Baoule area. Governments changed from colonialism, to nationalism to military. In such a situation the governments have been preoccupied with State administration rather than with conservation, and in the case of Mali it is the droughts and famines that brought the attention of the State to natural resource issues. Indeed up to today the conservation of the Baoule

area is seen by the political authorities to be justified because it acts as a buffer against the encroaching desert from the north, and conservation of flora and fauna are not at all the key words at that level.

Secondly, the people living in the Baoule conservation area and park have continued their normal way of life, trying to survive through the best way traditionally known to them—subsistence farming, livestock keeping, and occasional hunting for meat. The Fulani pastoralists continue to pass through the area in their transhumance to the south. The existence of the conservation reserves and park have not been adequately brought to the attention of the people, and the presence of the conservation authorities has been weak and almost unnoticeable. In one village in the park, the chief and the elders were aware of the existence of the forest department in the area and even wanted more forest guards to come to the area. However, they did not want the forest guards to protect the forest but rather to help them keep away Fulani pastoralist intruders whose livestock destroy their crops.

Realignment of Boundaries

In order to even begin to address the interests and conflicts regarding land use in the Baoule area, there must be a clear definition of boundaries of the conservation areas, agricultural settlement areas, and pastoral areas. Because of the historical situation, it is unlikely that the present populations in the park and reserve boundaries can be made to move elsewhere. It will be locally unacceptable, resources are not available to do it, and the government seems not to be ready to consider such an alternative. In order to move forward, it seems the most logical thing to do at the present moment is to adjust the boundaries to accommodate the three uses of the area. This can be achieved by moving the park boundaries to exclude the settlement area and to bring into the park area some of the fauna reserve area that presently is not inhabited by people. The interests of the pastoralists can be taken care of by introducing livestock corridors and working out some kind of grazing quarter system for some part of the reserves. Elsewhere in the settled areas, normal development activities should be pursued.

Local Management of Community Land: L'Approache Terroir

After the redemarcation of the boundaries has been achieved, priority for management of the area should be given to the development of the people residing there, who will in turn assist in the management of the conservation area. The government of Mali and the donors participating in the PNGRN are aware that past attempts at resource management in the Sahel have generally met with only limited durable success. Although there have been many and varied reasons for this, two are outstanding: first, the lack of an effective multisectoral approach, and second, the lack of effective, authoritative participation by the target population. In the management of community lands, it is suggested that the Terroir approach being used by the Bank in its natural resources projects be used. This approach holds much promise for the future of protected areas in Africa to be pursued in the next decade.

Conceptual framework

L'Approache Terroir is innovative: it is a holistic and decentralized approach introducing the concept of community land ("terroir"), managed by a responsible group whose objective is a more rational utilization of the natural resources in view of achieving sustainability and promoting the overall development of the group under land security conditions.

Holistic approach implies the integration of all agricultural, livestock, forestry, fishery, and other natural resource-based activities into a single system.

Responsibility of the community is essential, as the community is best able to define its own needs and resources and to identify its own capabilities and limits. Since the community must be the center of decisionmaking, adequate delegation of authority to the community and the improvement of existing land tenure systems are required. These actions must be accompanied by the *decentralization* of government services at a level a government can deal with directly, and on a partnership basis with those communities involved. These decentralized services must also collaborate closely with each other in order to facilitate intersectoral integration, essential to the success of the process.

Sustainability implies securing agricultural production for today without jeopardizing tomorrow's. For that purpose, the scarce renewable natural resources available that are needed for direct consumption or for agricultural production must be utilized in a nonwasteful way in order to ensure their timely replenishment. A better understanding of the dynamics of the overall environmental system by the communities, the government, and the nongovernment services is necessary to ensure their full commitment to taking the corrective measure required. Appropriate resource-saving techniques must be selected and disseminated as part of the "terroir approach" package.

Land security implies agreeing to invest for the future and thereby sacrificing part of the present. This implies a guarantee for those who invest/sacrifice today, that they will get tomorrow the benefits of that investment. Communities will take the responsibility and the risk for long-term investments, at the cost of immediate sacrifices, only if they have a guarantee that the land and resources they have invested in will not be taken away. This implies also a good understanding of the communities' social structures and various forms of authority and power, to ensure that all interests are taken into consideration and that those who make commitments or speak on behalf of a community are its legitimate representatives.

Methodology

Several major steps have been identified in the development of a Terroir Management Plan: (a) awareness, (b) diagnosis, (c) social organization of the community, (d) design of the management plan, (e) community—government agreement, (f) implementation, and (g) monitoring and evaluation.

Awareness

In this first step, the project team (a) reinforces the community's awareness about the general process of natural resource depletion, land degradation, and productivity declines, and (b) identifies with the community the main causes of these problems and the main constraints, that is, population pressure, production increases (crop and livestock), inadequate management practices, land tenure problems, etc. The team then explains the intent of the program; its benefits to the community; the approach and methodologies proposed; the roles to be played by the community, by government, and by the other agencies involved; and the type of mutual commitment to be made. Finally, the team seeks an agreement in principle for the subsequent steps to be taken together with the community and proposes a workplan.

Diagnosis

The awareness phase would be followed by a diagnosis, involving most of the team members. The purpose of the diagnosis is to assess, with the community, the extent of their resources, their needs and their constraints, and the problems they are facing. The following tasks would be carried out:

- Thorough analysis and definition of the social and geographical limits of the community's "terroir."
- In-depth study of the community: its size, the different social groups living on or using the terroir, the land tenure system, the dynamics and conflicts within and between groups, their organization, and the role of women.
- Socioeconomic condition of the community and infrastructure.
- Definition of community needs, expectations, and priorities.
- Analysis of the ecological conditions at the micro level.
- Inventory of lands and other natural resources to which the community holds property rights.
- Analysis and evaluation of land use and production systems, and their impact on the resources, degradation processes, and corrective measures.
- Positive impact on the quality or quantity of natural resources and the environment, such as reducing erosion, increasing rainwater infiltration, improving soil fertility, etc.
- Positive (or at least non-negative) impact on agricultural production and income.
- Social acceptability.

- Technical simplicity for easy management and maintenance by the community.

The above list may be reviewed from time to time but the criteria must remain objective, easy to assess, and small in number.

The management plan may also include investments that are not related to natural resource management or agricultural production. Some social investments, for example, might be considered a necessity and perceived by the community as a priority. This is often the case for health centers, drinking water, schools, and roads. While these investments fall beyond the scope of this project and cannot be financed through it, the project would help the community identify a source of support. Similarly, investments such as small rural industries or other profitable investments might be an opportunity for which the project could help the community find institutions that can support them.

The design of a management plan is prepared and discussed with the whole community to ensure that all understand it and agree with it. Once adopted by the community, the plan is submitted to the government for technical and financial support. If accepted, a contract is passed between the two parties, whereby the government commits itself to providing technical and financial support and recognizes the community's rights to the resources. In return, the community commits itself to implementing the actions and respecting the clauses prescribed in the plan. A financing plan would be agreed upon. Financing would be a mix of community contribution (cash or kind, or both) and grants.

Implementation

Decentralized government and nongovernment services will help the communities implement their management plans. In addition to funds, those services will provide extension and training services, and technical support, including administrative and legal matters. The community will contribute with manpower, some funds, and a commitment to respect the management rules jointly agreed upon. For each investment the contribution of each party would have been laid out in the contract. For tasks to be executed by specialized private or public enterprises, a contract would be signed between the funding party and the enterprise under the supervision of the technical services and the community.

Monitoring and evaluation

There are two main focus points in monitoring and evaluation: (a) project implementation and its physical impact on the terroir; (b) socioeconomic impact. The monitoring and evaluation of project implementation and physical impact would be done by measuring the interventions at the terroir level (inputs) and assessing the impact on the land, the natural resources, and the agricultural productivity and production (output). These outputs are:

- an increase in soil resources, soil fertility, vegetative cover, fodder production, agricultural productivity and production, seedling production, tree planting, organic fertilizer use; and
- a decrease in soil erosion, bush fires, and uncontrolled grazing.

The monitoring and evaluation of the socioeconomic impact implies measuring how the social organization of the community has changed through project implementation in terms of

- effective establishment of terroir management committees;
- representation of all social groups in the committees;
- better awareness and greater commitment of the communities;
- effectiveness of the committees in solving internal conflicts and in dealing with community partners; and
- successfully establishing the limits of the terroir, finalizing the land use plan (zoning), redistributing land, negotiating the contract, and mobilizing people for the implementation phase of the management plan.

On the economic side, some of the inputs such as water-harvesting measures are expected to bear results on a short-term basis (two to three years) by improving soil fertility and generating additional incomes for the community. These benefits can be measured directly, and cost benefit analysis is possible. Other investments have long-term, often indirect, benefits that are difficult to measure. Qualitative measurement methods should be employed in the latter cases—such as shorter

distances to travel for women and children to collect fuelwood and transport water and, therefore, more time spent on other activities, including schooling.

Management of the Conservation Areas

The national park should be the core of this land use system and should be managed strictly in accordance with normal criteria, which should include manned gates, antipoaching activities, tourism, park interpretation, education, training, and research.

The reserves should be part of the terroir but managed for conservation with limited grazing, Safari hunting, bee keeping, medicinal plant collection, etc. Proceeds for economic activities should go toward building of community services.

Conclusion

Time is running out for conservation and protected areas in Africa. Since natural systems cannot be reconstructed once destroyed, certainly the only way to make progress will be by acting now and putting to work strategies that we have known for some time. These will only work if some essential preconditions are fulfilled at the national, regional, and local levels. At the national level there needs to be strong, visible, high-level support for natural resources management—especially the decentralization of authority, the participation of the communities, and the use of a multisectoral approach to local development. Included in this is the need for civil servants to be recognized and rewarded for effective multisectoral teamwork, and a change of their mode of operation so that it puts them more “at the service” of the population.

At regional and local levels, effective institutions must exist with the capacity—mandate, manpower, training, and resources—to implement the program.

There also needs to be a legal and policy framework that empowers local communities to assure responsibility and authority for natural resources management and land management contracts with representatives of the government. Finally, the local populations in affected areas must go through a period of awareness-building and training to prepare them for planning and implementation of the natural resources management program under the prevailing circumstances.

Bibliography

Lusigi, Walter J. 1978. *Planning Human Activities on Protected Natural Ecological Systems*. J. C. Cramer. FL. 9490 YAAZ.

Lusigi, Walter J. 1981. “New Approaches to Wildlife Conservation in Kenya.” *Ambio* 10(2–3).

Lusigi, Walter J. 1982. “Future Directions for the Afro-Tropical Realm.” In *National Parks Conservation and Development*. Washington, D.C.: Smithsonian Institute Press.

World Bank. 1989. “Mali Country Environment Strategy Paper.” Africa Regional Office, Country Department V, Washington, D.C.

6 Making Investment (Aid) Work to Develop Institutionally Sustainable Programs

Simon C. Metcalfe

An African Land Ethic

THE ENVIRONMENTAL CENTRALIST POLICIES of Africa this century negated many rural people’s community interests, alienating them from the natural resources on which their cultures depended (Bell 1991). Traditional social and resource use boundaries have been frustrated through the imposition of modern geopolitical units with statutory representative and administrative structures. The label of *rural person* today covers a wide range of people, from a tribal person to those acculturated to larger society, to rural peasant, and on to fully fledged profitmaking farmers and local entrepreneurs (West 1991).

The possibility for establishing integrated resource management depends, in part, on linking people to an authority that is functional and linked reciprocally to a spatial and temporal system of authority from household, villages, districts, regions, and beyond (Knuth 1991).

This goal can be achieved by uniting the local authority for natural resources to other authorities in specific use and access zones (Berkes 1989). Centralized governance systems are challenged by the Communal Area Management Programme For Indigenous Resources (CAMPFIRE) to link the authority, management, benefits, and costs in the community. Negative incentive and sanction based approaches must be replaced, in the main, by real, positive incentives.

Cultural diversity has often been perceived by political elites as threatening when it comes in the form of tribalism and patronage. With a high proportion of the populace living in rural settings, Dasmann's (1988) contrast of "ecosystem" to "biosphere" people is significant in the African setting, where urban and bureaucratic elites are usually more challenged by national economic growth and political unity than by the needs of local peoples and their immediate ecosystems.

Zimbabwean authorities desire to incorporate wildlife into local land use planning. The practice promoted by the agricultural extension agency has been to emphasize farming and grazing systems to the neglect of the natural resource base. The environmental agency had previously been planning for the protection of natural resources to the exclusion of community participation. To achieve a holistic goal, a choice has been made to opt instead for a collaborative approach which links people, resources, and authority in a nest of proprietary relations that have the possibility of creating social, economic and ecological connectedness from the village and stream to the regional community and watershed. The revolution inherent in the CAMPFIRE policy and program is not merely in the clear adoption of a sustainable resource use policy but in the empowerment of local people to discover the need for a local land ethic themselves (Leopold 1948; Dasmann 1968).

The Institutional Challenge

The challenge of CAMPFIRE is to remove the conflict between center and periphery in society and also between people and natural resources. It strives also to create a system of management based on a unifying authority that links people, government, and the environment. The role of the Department of National Parks and Wildlife Management is thus to encourage the wise use of resources and to ensure the establishment of management institutions resting on community proprietorship and comanagement with itself.

The first phase in the implementation of CAMPFIRE was promotional. During this phase the Department of National Parks and Wildlife Management developed a working relationship with three Zimbabwean-managed agencies. These agencies were tasked to help initiate links with communities and district local authorities that were to be granted wildlife management rights. Over 26 project areas had been identified in the country by the Department of National Parks and Wildlife Management and the Centre For Applied Social Sciences. The Centre for Applied Social Science had become an early recruit to CAMPFIRE, as a social science perspective was needed to supplement the ecological roots of the policy initiation and estimation phase. Neither the Department of National Parks and Wildlife Management nor The Centre for Applied Social Science had nearly enough in their budget to contemplate implementing a national CAMPFIRE program.

The development rhetoric of self determination enunciated in Africa has generally not been put into action at the grass roots level. Instead, communities have been administratively mobilized into "participatory" development schemes for national growth goals. The basic access of local people to the immediate natural resource base has been managed through state property strategies for wildlife, forest and minerals or by open access systems for the grazing of livestock. The concept of sustainability is not discoverable for most rural Africans, as a system of dependency has been established between center and periphery. Many local people have become Robin Hood characters, robbing natural resource capital from the "rich" State to survive.

The Collaborative Group

The Collaborative Group of Nongovernmental Organizations entered the CAMPFIRE implementation phase with quite a fanfare, as they promoted a popular policy supporting local appropriation and proprietorship of wildlife by communities (CASS and others 1989). The Department of National Parks and Wildlife Management had never been a development extension agency and was largely excluded from the development process in rural communities where other agencies (agricultural, educational, cooperative, health) had been active. Thus the Department of National Parks and Wildlife Management was relatively powerless in terms of its participation in rural land use planning outside protected areas.

In an attempt to gain more power in these areas, the Department of National Parks and Wildlife Management supported the development and the collaboration between itself and a set of independent agencies interested in the implementation of the CAMPFIRE program. Recognizing its lack of expertise in the area of applied socioeconomic analysis, the Department of National Parks and Wildlife Management forged an understanding with the Centre For Applied Social Science at the University of Zimbabwe. It was agreed that The Centre for Applied Social Science would participate in the identification of CAMPFIRE projects, providing base line studies, advice, ongoing monitoring of CAMPFIRE, and the training of Zimbabweans in the social science component of community-based natural resource management systems.

Realizing its lack of capacity in providing ecological extension services to a large communal rural development program, the Department of National Parks and Wildlife Management encouraged the development of the World Wide Fund for Nature—International Multispecies Production Systems Project. The Multispecies Project was to assist in identifying potential CAMPFIRE projects, provide baseline ecological data, monitor projects, provide supportive technical extension services, and supervise the learning of future Zimbabwean wildlife ecologists. The Department of National Parks and Wildlife Management thus directly facilitated the establishment of two technical agencies to support the research and management investment necessary for the implementation of CAMPFIRE.

The Department of National Parks and Wildlife Management also supported the Zimbabwe Trust, or ZimTrust, a local nongovernmental organization, to become the key implementation agency. The ZimTrust was to promote, facilitate, and assist local communities in the process of institution building for community wildlife management. The ZimTrust has specialized in making specific investments that work toward making CAMPFIRE a reality. The ZimTrust needed to establish the program, personnel, and resources to midwife the devolution of authority to a set of district and subdistrict projects. It identified training for institutional development as the key service that it could provide. However, it has also made significant capital investments into the projects as well. The ZimTrust, like The Centre for Applied Social Science and the World Wide Fund for Nature—International, has had to enhance its own capacity to meet its obligations and has done so with support from bilateral agencies.

The Department of National Parks and Wildlife Management has encouraged donors, particularly bilateral donors, to work with and for the development of the above set of nongovernmental organizations, with the intent of establishing the capacity to implement a countrywide program. One of the most significant aspects of the CAMPFIRE program has been the evolution of the Collaborative Group of Nongovernmental Organizations and the fact that a national government department can foster such a process. Zimbabwe is probably unique in Africa in having its own set of agencies supported by the government specifically to assist the process of implementing a national policy of decentralization.

Investing in Communal Wildlife Management

It was impossible for the Department of National Parks and Wildlife Management to merely delegate “appropriate authority” to local authorities on behalf of local communities administered in wards and villages, without painstaking preparatory work regarding the intent and capacity of the lower authorities to manage. As the national authority responsible for wildlife, the Department of National Parks and Wildlife Management desired to facilitate an improvement in wildlife management and develop a positive relationship between itself and local people. The Collaborative Group of Nongovernmental Organizations developed its strategy in 1988 and began work with two districts. Each agency developed core plans, staff, and budgets in joint consultation and secured assistance from various funding sources. It has been important for the implementation of CAMPFIRE that the Collaborative Group, along with the Department of National Parks and Wildlife Management, has maintained both close coordination with each other and flexibility. Both are often lost when too many agencies are involved or when the agencies cannot be held accountable.

Sovereign governments can feel extremely threatened by the dependency built into donor relations and the sometimes awkward accountability to foreign nongovernmental organizations. Developing countries can be deeply threatened by having to rely on finance, science, project management, and supervision from outside the country. There can be no hiding the asymmetrical relations in this arrangement. Consequently, a development strategy that begins with the need to develop the capacity of local agencies of a country to implement its own projects and programs is investing in institutional sustainability. Such an approach assists in building a pluralistic cooperation of

government and nongovernment agencies needed in an Africa of overstretched and centralized governance systems.

The pay-off in terms of trust, flexibility, and efficacy has been striking, and indicates a future direction for international nongovernmental agencies, which should not necessarily attempt to implement projects in Africa directly but rather support the evolution of local agencies as part of a global to local cooperative management structure. The responsibility of the Collaborative Group, supported by international agencies, is to develop comanagement relations further down the line at the community, local authority, and ecosystem levels.

Integrated Policy for Holistic Natural Resource Management

A vital difference between the CAMPFIRE program and other community based approaches in Africa concerns the difference between a project and a program. CAMPFIRE is a national policy supported by legislation that applies to all rural districts. Each district comprises a project within the CAMPFIRE program, and within each district can exist a number of coordinated subprojects. By establishing the policy and legislation first, Zimbabwe does not face the problem commonly found in development of how to replicate a project, as the national framework is in place.

It should not be thought from the above that Zimbabwe has a perfect policy climate, for although CAMPFIRE as a concept addresses natural resources in a holistic way, the initiating legislation of the Parks and Wildlife Act (1975) incorporates only the wildlife resource. Forests are still under the control of the Forestry Commission, soils under the Natural Resources Department, grazing issues the responsibility of the Agriculture Department, and land as a whole under local government through local authorities. Thus the Parks Department, which has launched CAMPFIRE by the devolution of rights over wildlife, has not been able to present local communities with a holistic perspective of their resource base. This can be extremely confusing for communities who might be excused for believing that the left hand of government knows what the right hand is doing. In fact virtually every resource in the local ecosystem (water, trees, soil, minerals, wildlife) is under the authority, plan, and budget of a different sector agency. This disaggregated vertical and mechanical approach to management and development does not augur well for adaptive, community-based environmental management programs. In sum, CAMPFIRE needs the support from a number of government agencies to put the resources under their control into comanagement relations with communities and to provide the necessary technical support and regulations to facilitate local stewardship approaches.

Zimbabwe, Africa, and the nonwestern world in general is littered with the remnants of traditional communal natural resource management systems and the dysfunctional new systems imposed by nation states. Government and private enterprise gains have often been at the expense of local people and local resources. A full documentation of the social impacts on local peoples of policy in the last one hundred years would give insight into the problems and possible solutions for park and wider ecosystem management.

Implementation Issues

The Collaborative Group is using aid funds to provide a specific set of service inputs to targeted CAMPFIRE project communities. In this process it is understood that the assistance is to be geared toward supporting and fostering rather than compromising local institutional integrity and capacity. The objective of the support agencies is not to achieve any particular set of “targets” through the expenditure of funds but rather to strengthen local capacities to meet “targets” on a sustained basis, relying as much as possible on local resources (Uphoff 1986). Uphoff states that “outside assistance can be given in ways that offer inducements to local effort if the amounts are manageable, the procedures supportive, the kinds appropriate, the pace of expansion flexible, the approach experimental, and the expectations reasonable.”

The appropriate administration of external resources is imperative, particularly to avoid unnecessary dependency in the local institution-building process. The strategy is one of encouraging self-reliance in the formation of local forums for policy, decisionmaking, and management. The community wildlife management institution must be able to manage common property, including establishing, monitoring, and regulating access to the resource base, as well as distributing benefits flowing from it.

The case of the Masoka community in the Dande District of the Zambezi Valley illustrates the approach of the Collaborative Group of Nongovernmental Organizations. The Centre for Applied Social Science made first contact with the community and provided services that enabled the community to understand both the CAMPFIRE concept and policy and the need for community organization to capture the benefits of wildlife and meet the management costs and responsibilities. The Centre for Applied Social Science also administered a socioeconomic survey as a base-line for ongoing monitoring. The World Wide Fund for Nature-International Multispecies Project enabled the community to develop a land use plan as the basis for an adaptive management approach. The ZimTrust helped Uasoka realize the value of its wildlife through a safari and provided training services to enable the Masoka Wildlife Management Committee to begin the process of establishing a community membership and management structure that would function and respond to its own needs. Masoka was able to pass on a significant cash dividend to all households in the first year, in addition to benefits of meat and community social welfare projects. The importance of an early direct incentive to the community in order to foster motivation in the institution building process was recognized. CAMPFIRE believes that positive incentives at the lowest possible community level, preferably the household or individual, are critical for the evolution of local stewardship values.

The mode of support provided was primitive at first, with The Collaborative Group of Nongovernmental Organizations acting as intermediary agencies between communities, local authorities, and government. The principles of the learning process approach to development consistent with adaptive management, rather than a blueprint approach, are being applied as far as possible. The nongovernmental organizations are often perceived as allies of community authority in relation to local and central government.

As the local institutional development process proceeds, the mode of support provided can move from promotive to facilitative. At this point, dependency is shared between the nongovernmental organizations and the producer community groups. The CAMPFIRE program is, at present, typically between the primitive and facilitative modes. It has not yet moved to the final mode of providing assistance to producer communities that function adequately as wildlife management institutions able to seek, request, and ensure the specific investments of training, advice, and finance that they require (Uphoff 1986).

As the CAMPFIRE program expanded from the first two pilot projects in 1989 to a set of 12 districts in 1990, the scale of development assistance required grew rapidly. In the process, the tendency to move toward a more blueprint approach was strong and in one case was followed. The Collaborative Group of Nongovernmental Organizations is vulnerable to this through being held accountable to bilateral funding agencies which tend to be intransigent on precise details of objectives, systematic planning, management, and control. This has a tendency to break up what is a local socioeconomic movement down to an elaborate set of contrived targets and time frames.

The Collaborative Group of Nongovernmental Organizations and the Department of National Parks and Wildlife Management are taking stock of this tendency, and the present thinking is to avoid a further evolution of the project management approach, which has been felt to depress local motivation and foster dependency. Concern is felt that CAMPFIRE must avoid being either bureaucratized or becoming another dependent development project. Instead, a more economically dynamic approach, capable of sufficient entrepreneurial flair, is vital if the program is to form genuine and sustainable resource management institutions.

To that end, the Collaborative Group of Nongovernmental Organizations has supported the evolution of the CAMPFIRE Association as a communal wildlife producers membership group. The function of the Association is to represent the interests and meet the needs of the producer communities. The Collaborative Group of Nongovernmental Organizations has incorporated the Association into all its deliberations.

The Association is presently deliberating with its membership on the issue of a levy to finance its own overhead costs. At an early stage, the issue of long term institutional sustainability is being addressed. The possibility of the Association’s becoming a marketing as well as representative and coordinating national agency exists. At all levels, The Collaborative Group of Nongovernmental Organizations is attempting to use aid funds to make investments into the institution-building process for sustainable natural resource management.

Rather than proceed on a project basis, it is felt that a general investment fund should be established and that the CAMPFIRE Association should see aid as investment into a communal

wildlife industry. The nongovernmental organizations see their input as a conservation subsidy necessary after years of communal management neglect and to facilitate sustainable community institutions.

Conclusion

The Department of National Parks and Wildlife Management has moved from being a small, elite, and protectionist agency to one intent on implementing a radical national policy that is changing rural perceptions of land use and natural resource management. The Department of National Parks and Wildlife Management has actively supported the evolution of a set of local nongovernmental organizations and avoided dependency on foreign agencies for implementation. In the process of developing sustainable wildlife management institutions at the community level, it has deemed it prudent to begin with the establishment of a set of independent and accountable national agencies. As a result, the CAMPFIRE program has fostered two technical agencies, one development agency and a membership association, in the process of setting up district and community-level institutions.

The combination of wise policy and approach has allowed Zimbabwe to maximize the effectiveness of donor aid through an institutional development approach to conservation and sustainable development of communally-based wildlife. The Department of National Parks and Wildlife Management has been able to set about transforming rural perceptions of wildlife and of national parks and protected areas.

Bibliography

Bell, R. H. V. 1991. “Trial and Error in Wildlife Management.” In *Wildlife Research for Sustainable Development: Proceedings of an International Conference* (April 1990: Nairobi, Kenya). Ed. J. Grootenhuis, S. G. Njuguna, P. W. Kat. Published by KARI, KWS, NMK.

Berkes, Firket, ed. 1989. *Common Property Resources. Ecology and Community Based Sustainable Development*. London: Belhaven Press.

CASS, World Wildlife Fund, ZimTrust. 1989. *Wildlife Utilization in Zimbabwe’s Communal Lands: Collaborative Programme Activities*. Harare, Zimbabwe: CASS/World Wildlife Fund/ZimTrust.

Dasmann R. 1988. “National Parks, Nature Conservation, and `Future Primitive’.” In *Tribal Peoples and Development Issues: A Global Overview*. Ed. John. H. Bodley. Mountain View, California: Hayfield Publishing Company.

Dassman R. 1968. *A Different Kind of Country*. New York: Macmillan.

Knuth, B. A. and L. A. Nielson. 1991. *People, Patches, and Politics: Considering the Human Dimension in Landscape Management*. In *Challenges in the Conservation of Biological Resources: A Practitioners Guide*. Ed D. J. Decker and others Boulder: West View Press.

Leopold, A. 1949. *A Sand County Almanac*. OUP.

Uphoff, N. 1986. *Local Institutional Development. An analytical source book with cases*. Rural Development Committee Cornell University. Kumarian Press.

Note: General References were taken from the several Zimbabwean reports of the Department of National Parks and Wildlife Management, CASS/World Wildlife Fund/ZIMTRUST, Campfire Association and Local Government records.

7 The Economic Contribution of Women and Protected Areas: Ghana and the Bushmeat Trade

Florence A. Addo, Emmanuel O. A. Asibey, Kate B. Quist, and Mary B. Dyson

“The special relationship that exists between women and the environment is gradually being recognized as a powerful but largely untapped resource that holds tremendous potential for ensuring a sound environment.”

—Lt.-Col. Rtd. Debrah, Former Executive Chairman, Ghana Environmental Protection Council Ref. *Women in Development Conference* (Ghana) Nov. 30–Dec. 8, 1988

The authors would like to thank several World Bank staff members for help with this presentation: for comments, Robert Goodland; for secretarial assistance, Luz Rivera, Olivia McNeal, and Connie Rector; and for the map, Hugh Fisher.

Action 26 of the Global Biodiversity Strategy urges us to strengthen the role of women in the sustainable use of biological resources (World Conservation Union, United Nations Environment Programme, World Resources Institute 1992). Where poverty and malnutrition persist, as in Sub-Saharan Africa, there is strong reason to focus on provision of protein by, and for, "the primary sustainers" and providers, that is, women. Particularly in developing countries, rural people who neighbor protected areas stand to benefit from a further review of the potential of wildlife resources in the context of the conservation of biodiversity (West and Brechin 1991; Wells and others 1992).

Botanical nontimber forest products have lately become visible to foresters and economists. The value of nontimber forest products to local communities, particularly in relation to energy but increasingly in relation to food and medicine, is better recognized in scientific and development literature (de Beer and McDermott 1989; Asibey 1986; and Asibey and Child 1990). The role of women as forest gatherers and custodians of and users of nontimber forest producers has manifestly also gained in recognition. However, the recognition of women's roles in connection with wildlife resources is less evident, however.

Wildlife resources have gained attention as large mammal species (elephants, antelopes, lions) in savanna ecosystems, and have more often been cited for their touristic value than for their consumptive use, which has largely been seen as a threat (Kiss 1990). However, in West Africa and in Ghana in particular, bushmeat is considered an important forest product, although it is not clear whether the most commonly consumed species, referred to as nonforest timber products, are dependent on the forest (Martin 1983; Asibey and Child 1990). The bushmeat trade in Ghana has long been noted for its large volume (cited by The International Union for the Conservation of Nature and Natural Resources (IUCN) 1988, for example, as $160,000 turnover over an 18-month survey of Accra market) [Asibey 1974; see also Ntiamoa—Baidu 1987], but its importance has only recently been recognized by conservationists, developers, and investors. More recently, the estimated annual value of the bushmeat trade in Kumasi was reported to be about $367,000 or 160,00 kilograms of bushmeat (Falconer 1991). This chapter explores the significance of women's roles in this trade.

Wildlife resources have so far received little attention as a small-scale, sustainable source of nutrition and income for local communities, although in Ghana, Nigeria, Cote d'Ivoire, and Benin, there have been some experiments to introduce captive-breeding of grasscutter and giant rat (Ajayi 1975; Baptist and Mensah 1986). More study is needed of the potential link between the nutritional value of bushmeat, the role of women in the chain of activities linking hunting and trading, and the conservation of biodiversity. Although bushmeat has been recognized as an important food resource for generations, by linking nutritional and wildlife studies conducted in Ghana over the last 20 years (Beckett 1944; Asibey 1979), in this chapter we seek to publicize the nutritional value of wildlife resources and to draw attention to traditional divisions of labor in which women have prominent roles as household managers and as entrepreneurs. These traditional responsibilities argue for the development of further creative roles in those capacities as rearers and traders of captive breeds of preferred species for consumption. The chapter is an effort to relate urban and rural sources of nutrition to conservation of protected areas, where wildlife has sanctuary.

Malnutrition

Nearly 30 percent of preschool children in Africa are underweight, and this proportion has grown since the 1960s. A malnourished child has greater morbidity, mortality, and physical developmental problems than a well-nourished child. A person malnourished in utero and in early childhood has a reduced chance of being able to take advantage of health, education, and employment opportunities. Nearly every African country has a significant nutrition problem. A protein calorie malnutrition problem is primarily a rural problem, although the peri-urban slums often harbor severe undernutrition. Inadequate food intake, excessive disease, maternal malnutrition, and poor eating habits, and health problems undermine nutritional status (Abosede and McGuire 1991). Protein energy malnutrition is highly prevalent among preschool children in Ghana. The 1986 baseline survey supported by the United Nations Children's Fund (UNICEF) and the Ghana Living Standards Survey (1987–88) quoted by Alderman (1990) indicated that between 30 percent and 50 percent of preschool children in Ghana are malnourished, although Alderman notes that though malnutrition has declined since 1986, it remains above levels reported for the 1950s.

Malnutrition in developing countries is essentially a problem of poverty and ignorance. Abosede and McGuire's (1991) review of innovative approaches to address nutrition problems in Tanzania, Zimbabwe, and Zaire showed success where women were trained to produce nutritious food. In the case of Tanzania, a new flour, "Flourpower," was developed; in Zimbabwe local foods were produced on communal plots; in Zaire the transition from weaning food only partially made from local ingredients to weaning food made from only locally grown ingredients is under way. Community involvement in program development, growth monitoring, and nutrition education, as well as close supervision, were factors in program success. Africa's nutrition problems require many of the same solutions as elsewhere—the solutions just mentioned, as well as targeted feeding and food fortification. Africa shares the universal need for good training, management, communication, and information systems (Abosede and McGuire 1991). However, not only are innovative institutional mechanisms needed, but research on improved food sources must continue.

Women as "Primary Sustainers"

In most developing countries, and certainly in Africa, women are responsible for supplying the family food requirements either through home production or from their own earnings (Peluso 1991; J. Price Gittinger and others 1990). This means, therefore, that the nutritional status of preschool children who are vulnerable to changes in the quality and quantity of food supply, as well as the entire family, depends to a large extent on the ability of women to provide sufficient and well-balanced meals for the family.

In Ghana, although there are areas of food scarcity and although several of the favored bushmeat species (primates and most large mammals) are considered of "conservation concern" (IUCN 1989), small mammals (i.e., rodents) and some duikers are plentiful in most rural areas. For most rural households, bushmeat is one of the most valued products of the forest. The potential increase of bushmeat as a protein source is our concern. Wildlife as the primary source of animal protein for about 60 percent of Ghana's population was established in 1974 (Asibey 1974). The contribution of bushmeat to the annual animal protein intake is estimated to be about 12 percent, and for rural communities considerably higher, around 60–70 percent (World Bank 1988). The remainder comes from sources such as fish, beef, mutton, pork, and chicken.

Women, especially in Ghana, as confirmed by this study, are the principal processors and distributors of bushmeat. In terms of organization, there are women in the villages who purchase the animals from the hunters, usually men, smoke them and then either sell them in bulk to middlewomen who come from the urban center or send them to markets, both urban and rural. The urban middlewomen, in turn, sell the smoked bushmeat to market women who retail to the consumers, or to chopbar (restaurant) owners, who cook and serve the meat to their customers.

The findings we describe here are from a study designed by Ghana's Ministry of Health and the Forestry Commission. The first part, a baseline nutrition survey (March/April 1989), part of the Weaning Food Project (UNICEF/Government of Ghana). The second part was conducted to obtain information on women's participation in the bushmeat trade in terms of their source of supply, distribution outlets, and consumer preferences (Annex 7—A and Tables 7–1 – 7–7). This was then linked to a rapid reevaluation (December 1991, Tables 7–8 – 7–13) of women and trade in Accra and Kumasi (Tables 7–8 – 7–13).

The results were tabulated to do the following:

- Summarize the gender and regional distribution of the respondents who consume bushmeat (Table 7–1)
- Give the number and percentage of respondents who consume bushmeat regularly (Table 7–2)
- Give sources of bushmeat (Table 7–3)
- Give occupation of respondents (Table 7–4)
- Give the composition by gender and by region of respondents who are willing to rear wild animals
- Show the type of bushmeat preferred for consumption (Table 7–6) and rearing (Table 7–7)

Analysis of the tables shows that 96 percent of households interviewed consumed bushmeat regularly, defined as once daily (Table 7–1). Of the respondents, 76 percent were female (Table 7–2) and 74 percent were farmers. Most households obtain bushmeat from markets (Table 7–3). A consumer preference question revealed that bushmeat is primarily consumed as a delicacy, while nutritious value and availability ranked next in priority. The preferred species were grasscutter *Thiyonomys swinderianus* (45 percent), royal antelope *Neotragus pygmaeus* (35 percent), bushbuck *Tregelophus scripts* (20 percent) (Table 7–6). Of the households interviewed, 50 percent expressed willingness to raise wildlife for bushmeat and 50 percent expressed willingness to buy bushmeat from domestic sources. Of those who responded that they did not wish to raise wildlife, most gave the difficulty of obtaining live wild animals as the reason (44 percent), while lack of time (29 percent), financial problems (15 percent), and insufficient space (12 percent) were other reasons.

In the Accra market survey (Makola and Kantamanto), women were identified as the dominant retailers of smoked bushmeat, purchased weekly from middlewomen, who buy the meat, brought in from considerable distances, already smoked at the source. At the Kantamanto market, chopbar managers, again predominantly women, were also interviewed. Their sources of supply were Wineba and Apam and, if the meat was smoked, from the Upper East, Upper West, and Northern Regions (Wa, Fumbisi, Bole; Map 7–1).

A further focus of investigation was the Bushmeat Sellers Association in Kumasi. This association has 60 members. The executive members are women and comprise the president, deputy, secretary, and treasurer. Fresh bushmeat is sold to the association by the hunters or their wives or by middlewomen. The survey recorded that bushmeat comes mostly from Amantia, about 60 kilometers from Kumasi, and from two small villages about 25 kilometers from Kumasi. The association also gets smoked bushmeat supplies from Wa, Bole, Fumbisi, Buipe, and the Afram Plains (see Table 7–14). In addition to the association, there are smoked bushmeat traders in the Kumasi central market. This group too gets supplies from Upper East, Upper West, Brong—Ahafo, and Afram Plains and used to get supplies from as far away as Burkina Faso. Kumasi is a trading hub, a redistribution center, the crossroads for north—south trade, the largest market in the region, and possibly the largest market in Ghana.

The survey in 1989 was stimulated by earlier work by Asibey (1974, 1978, and 1982) in studies which established that the demand for bushmeat arises at all social, educational, and income levels and has long been a large-scale economic activity. Data collected over the last 10 years in Kumasi suggest that bushmeat sales have not diminished. Falconer (1991) reports more than 50 full-time bushmeat traders in its central market and a further 15 wholesale traders at Atwemonom (Kumasi Bushmeat Sellers Association). Similarly, sales monitored in Accra by the Department of Wildlife since 1970 appear unchanged.

In a series of snapshot surveys of bushmeat trade in Accra and Kumasi (December 1991), in the context of the 1989 survey, Asibey obtained further findings on gender in the bushmeat trade. Earlier findings on generational groups of trading in Kumasi were confirmed; of these groups, nearly 2 percent were fourth generation, 13 percent third, 56 percent second, and 29 percent first (Table 7–8). A sample of the same population was found to be predominantly female (67 out of 68; Table 7–9), and employees of bushmeat chopbars were also predominantly female (Sunyani 81 percent; Accra and Kumasi 1991 were 77 percent; Table 7–10). Ownership and management of the chopbars was also predominantly female, 81 percent and 93 percent, respectively (Tables 7–11 and 7–12).

Although not so highly dominated by women (54 percent), women are actively involved in the supply and transportation of bushmeat from production centers in the field to traders in urban markets, as evidenced in Kumasi Central Market (Table 7–13).

Trade as a Threat to Biodiversity

The bushmeat trade thrives, but species hitherto unimportant (e.g., grasscutter and giant rat) have gained prominence, indicating endangerment of large mammal species. Wildlife populations, particularly of large mammals, have been observed to diminish over time. Increased land clearance, increased hunting pressure, and improved hunting equipment are the most obvious causes. Elders interviewed by Falconer also cited bushfires as another factor for the decreasing number of large mammals. The elders also blamed the *akyampong* weed *Chromolaena odorata* as being impenetrable and for not providing them with the camouflage they need. Currently, most preferred species in the bushmeat trade (Table 7–6) are caught on farmlands rather than in forests (Table 7–3), and most common bushmeat species are “crop pests” (Falconer 1991). The grasscutter, the most popular

bushmeat (Table 7–7), is a crop pest and is the only animal not protected at any time. Over 60 percent of the grasscutter female population is pregnant all year round. Subsistence hunting of grasscutters thereby provides year-round good meat, income, and employment, and reduces crop damage.

Consideration of the map (Map 7–1) shows Ghana's present protected areas to be roughly sited so as to safeguard the most threatened large mammal sources of protein. As a policy, hunting outside protected areas is not considered a threat to protected areas. A recent review of Ghana's protected area system recommended an expansion of the system to include habitats not sufficiently protected—for example, a larger forest tract to the north of Cape Coast has been called for.

People and Parks

Ghana is renowned for "an unusually enlightened conservation policy [initiated in the early 1960s and adopted in 1974] and there has been a great deal of research into forest management and, most unusually, management of the wildlife resource" (IUCN 1988). With the signing of the African Convention on the Conservation of Nature and Natural Resources ("The African Convention") in 1968, which made provision for parties to introduce special protected areas of their local concern, Ghana reclassified its game reserves into strict nature reserves, national parks, and wildlife sanctuaries, and introduced game production reserves into the system of protected areas. The three game production reserves Bia, Ankasa, and Shai were areas set aside primarily for the conservation of wildlife But management objectives, however, allow compatible forms of land use, such as subsistence hunting, based on previously set quotas (population control), logging, based on approved yield set within allowable cut, and the introduction of other species whose populations can be controlled, through subsistence hunting, to provide bushmeat. The Shai Game Production Reserve has been fenced to allow kob and baboon to increase; the reserve then culls populations to supply bushmeat to Accra. Ghanaian conservation policy has always sought to "put people first," taking into account the users of protected areas in the vicinity as much, if not more, than tourists. Subsistence hunting is legal in Ghana; other than the period of the closed hunting season, hunting and trapping (Table 7–3) are legal. Veterinary laws are consistent with bushmeat production and consumption practices.

If, as Falconer reports, the vast majority of hunters (83 percent of her sample) never take their catch to Kumasi or other markets, but either consume it or sell it locally themselves, then the quantities deduced from the trade surveys cited above certainly "reflect only a small fraction of trade and do not capture the value of this resource for the majority of people."

Women and Nutrition

As has been noted, in Ghana women must bear more responsibilities than those of traditional mothers who ensure the welfare of their families as cooks for the household. They are also predominantly the farmers and, as we have seen, in the urban context they have a monopoly on the bushmeat trade and its outlets in chopbars. There has been enough study of the social structure of Asante women traders in Kumasi (Clark 1984, 1989, and 1989a) and difficulties with Eurocentric assumptions about decisionmaking and resource allocation processes related to them to make us cautious about our proposals which, on our part, are very much a matter of deduction and belief in human adaptability. Well-developed trade networks on which the thriving bushmeat trade rely may not be easy to enter. However, we are intuitively suspicious of the theory that there is "a socially determined inability of contemporary African farmers and urbanites to accumulate capital or generate technological progress" (Hyden 1980, quoted in Clark 1989). Two recent authorities are more encouraging, although neither appears to have seen the opportunities in the bushmeat trade and the chopbar outlets for which we argue. Increasing women's income and control over it, increasing women's efficiency in production of goods and services for household consumption, and improving women's health and nutrition are three out of the four areas for intervention currently recommended to help women improve nutrition in the developing world: "To make a positive sum game in nutrition, women need to be able to increase their access to food, reduce the nutritional costs of their role conflicts, and enhance their control over nutrition-related resources" (McGuire and Popkin 1990).

Levinson (1991), in a review of low-cost program opportunities to address malnutrition, recommends project designs for localized community—or nongovernmental organization—initiated activities and components of larger integrated programs which could continue both our synergistic benefits. Credit programs are recommended as levers "to generate community participation in core

nutrition activities and, in turn, of these core activities to facilitate the translation of income-generation into improved nutritional status of the family" (Levinson 1991).

The forceful combination of circumstances—the bushmeat trade, the nutritious value of bushmeat, the established female roles as farmers, traders, and mothers—make it advisable that economists and conservationists consult these women, not only in Ghana, but starting with Ghana, as to how they might extend their roles by developing a further source of nutrition for their families and a source of income for themselves. We should build on the inspirational environmental initiatives led by, among others, Ghanaian women at the pre-UNCED Global Assembly of Women and the Environment in Miami, November 1991, where criteria for their "success stories" were replicability, affordability, sustainability, and demonstrated women's leadership and community organizing abilities (United Nations Environment Programme 1992). One Ghanaian example consisted of 19 groups of women farmers with 3,400 participating in implementation of an agroforestry project. It is evident from the study which we have described that a similarity very likely exists, particularly among women, which could be harnessed to raise select species for improved nutrition.

Earlier efforts at captive breeding conducted by Ghana's Wildlife Department stopped at the point of easy multiplication in about 1980. The grasscutter is the only species so far piloted by Ghana's Department of Game and Wildlife. The pilot project started in 1970 covered about 50 households in Accra, Koforidua, and Nsawam that were provided with stock. Some of the households have continued to raise and trade their surplus animals for others to breed, and there is need for a large-scale breeding center from which to promote the practice in the context of women's initiatives. To promote this, the next step should be a national survey of households with breeding stock. More than 10 years later, with persistent malnutrition, increased threats to animal populations and protected areas, it is surely time to readdress the case for captive breeding and wildlife ranching or farming.

We see in the future a much improved relationship between people in the vicinity of protected areas if the value of the protected areas can be better understood as fulfilling or safeguarding such a basic social need as the sustainable source of protein. Our case for captive-breeding fits directly in the model of involving local people in conservation of protected areas, which is being promoted and piloted in many protected area plans all over the world. To link the bushmeat network in Ghana to the conservation of Ghana's protected areas would also afford an environmental lesson, which young and old, rich and poor, and male and female, could better appreciate on a full stomach.

Table 7–1. Sex Distribution by Region of Respondents who Consume Bushmeat

	Respondents			
Region	*Males*	*Females*	*Total*	*% Females*
Central	12	44	56	79
Volta	68	43	111	39
Brong Ahafo	102	152	254	60
TOTAL	182	239	421	57

Table 7–2. Number of Respondents Who Consume Bushmeat Regularly

	Response		
Region	*Yes*	*No*	*% Yes*
Central	57	5	91
Volta	99	12	89
Brong Ahafo	254	2	97
TOTAL	410	19	96

Table 7–3. Sources of Bushmeat

	Region			
Source	*Central*	*Volta*	*Brong Ahafo*	*Total*
Trapping	8	21	92	121
Hunting	4	14	10	28
Raising	—	—	2	2

	Region			
Source	*Central*	*Volta*	*Brong Ahafo*	*Total*
Market	49	71	154	274
TOTAL	61	106	258	425

Table 7–4. Occupation of Respondents

	Region			
Occupation	*Central*	*Volta*	*Brong Ahafo*	*Total*
Farming	26	54	137	217
Teaching	3	6	8	17
Trading	8	9	6	23
Food vendor	5	4	5	14
Dress making	—	—	4	4
Driving	1	—	4	5
Health worker	1	—	5	6
Fitting mechanic	—	—	4	4
Unemployed	5	4	10	19
TOTAL	49	77	183	309

Table 7–5. Distribution of Respondents' Willingness to Raise Wild Animals

Region	*Yes*	*No*	*Total*
Central	25	26	51
Volta	70	29	99
Brong Ahafo	118	119	237
TOTAL	213	164	377

Table 7–6. Type of Bushmeat Preferred to That Consumed by Respondents

	Region			
Type	*Central*	*Volta*	*Brong Ahafo*	*Total*
Grasscutter (*Thryonomys swinderianus*)	10	42	104	156
Royal antelope (*Neotragus pygmaeus*)	16	22	62	100
Bushbuck (*Tragelaphus scriptus*)	18	12	18	48
Red river hog (*Potamochoerus porcus*)	1	9	—	10
Giant rat (*Cricetomys gambianus*)	—	19	33	52
TOTAL	45	104	217	366

Table 7–7. Types of Animals which Respondents Prefer to Raise

	Region			
Type of animals	*Central*	*Volta*	*Brong Ahafo*	*Total*
Grasscutter	12	26	47	85
Royal antelope	6	26	28	60
Giant rat	4	12	22	38
Bushbuck	1	3	8	12
TOTAL	23	67	105	195

Table 7–8. Number of Traders in Generational Groups of Bushmeat Traders in Kumasi Central Market as of December 14, 1991

	Type of bushmeat traded		
	Smoked	*Fresh*	*Total*

	Type of bushmeat traded					
	Smoked		Fresh		Total	
Generational group	No.	%	No.	%	No.	%
First	30	34.1	15	22.4	45	29.0
Second	40*	45.4	47	70.1	87	56.1
Third	16	18.2	4	6.0	20	12.9
Fourth	2	2.3	1	1.5	3	1.9
TOTAL	88	100.0	67	100.0	155**	99.9

Table 7–9. Sex Composition of Smoked Bushmeat Traders in Kumasi Central Market Smoked Bushmeat Stalls on December 14, 1991

Number of stalls checked	30
Range of number of staff per stall	1–5
Average number of staff per stall	2
Total number of females employed	67
Total number of males employed	1

Table 7–10. Staff Strength and Sex Composition of Some Bushmeat Chop Bars in Ghana

Location	Male	Female	Total	% Female
Accra (Dec. 1991)	2	7	9	78
	2	7	9	78
	1	7	8	88
	3	6	9	67
	1	7	8	88
	1	6	7	86
	2	6	8	75
Kumasi (Dec. 1991)	3	8	11	73
	3	9	12	75
	2	12	14	86
	3	8	11	73
	2	8	10	80
	2	12	14	86
	2	9	11	82
	1	6	7	86
Sunyani (Dec. 1978)	2	7	9	78
TOTAL	32	125	157	80

Table 7–11. Sex Composition of Bushmeat Chop Bar Owners in Some Centers in Ghana

Center	Men	Women	Total	% Women
Accra (Dec. 1991)				
Kantamanto	2	5	7	71
Kumansi (Dec. 1991)				
Mmoromu	1	2	3	67
Kejetia	—	4	4	100
Asafo Market	—	1	1	100
Sunyanai (Dec. 1977)				
Central Market	—	1	1	100
TOTAL	3	13	16	81

Table 7–12a. Sex Composition of Bushmeat Restaurant (Chop Bar) Staff in Mmoromu, Kejetia, and Asafo Market, Kumasi, as on December 14, 1991

* Each includes six learners who are understudying their parents. They will form the third generation traders in their families.

** There was only one male in this group, and he was a second generation trader.

Position/role	*Males*	*Females*	*Total*
Restaurant	1	7	8
Owner managed (staff)	—	5	5
Employee managed (staff)	—	3	3
Staff* on various assignments	18	64	82
TOTAL	18	72	90

Table 7–12b. Sex Composition of Bushmeat Restaurant (Chop Bar) Staff in Kantamanto Market, Accra, as on December 22, 1991

Position/Role	*Males*	*Females*	*Total*
Restaurant	2	5	7
Owner managed (staff)	1	4	5
Employee Managed (staff)	—	2	2
Staff* on various assignments	11	40	51
TOTAL**	12	46	58

Table 7–13. Sex Composition of Smoked Bushmeat Suppliers/Transporters to the Kumasi Central Market as on December 14, 1991

Wholesaling		*Wholesaling & Retailing*		*Total*	
Males	*Females*	*Males*	*Females*	*Males*	*Females*
13	11	—	4	13	15

Annex 7—A Bushmeat Survey

Methods Used for Survey

The main survey was conducted in three parts over March and April 1989.

A structured questionnaire was used to elicit information in 12 communities in three regions of Ghana (Map 7–1). A total of 421 households, constituting 10 percent of the regional population, those who responded to the questionnaire, were interviewed on the following:

- Popularity of consumption of bushmeat
- Sources of bushmeat
- Reasons for preferring bushmeat to other meat
- Interest in raising wildlife

A market survey was conducted among retailers of bushmeat and chopbar keepers in Accra at Makola and Kantamanto markets, respectively.

A focus group discussion was held with the executive members (chairman/president, deputy, secretary and treasurer) of the Bushmeat Sellers Association in Kumasi (Atwemonom).

Bibliography

Abosede, O., and J. S. McGuire. 1991. “Improving Women’s and Children’s Nutrition in Sub-Saharan Africa: An Issues Paper.” World Bank Working Paper Series 723, Washington, D.C.

Ajayi, S. S. 1976. An Approach to the Domestication of African Rodents. Food and Agriculture Organization (FAO). Paper presented at the fifth session of the Working Party on Wildlife Management and National Parks. FAO, Rome, Italy.

————. 1975. *Domestication of the African Giant Rat*. Publication of the Department for Resource Management, University of Ibadan, Ibadan, Nigeria.

* Additional to manageresses of the establishments.

* Additional to manageresses of the establishments.

** Excluding owners who do not work in the establishment (one a male whose wife manages the establishment and two mothers whose daughters—second generation manageresses—manage the establishment).

Alderman, H. 1990. “Nutritional Status in Ghana and Its Determinants.” SDA Working Paper 3. World Bank, Washington, D.C.

Asibey, Emmanuel O. A. 1966. “Wild Animals and Ghana’s Economy: Investigations into Bushmeat as a Source of Protein.” Ghana Game and Wildlife Department.

————. 1969. “Grass-cutter (*Thyronomys swinderianus*) as a Source of Bushmeat in Ghana.” Department of Game and Wildlife, Accra.

————. 1971. “The Present Status of Wildlife Conservation in Ghana.” In D. C. D. Happold, ed., *Wildlife Conservation in West Africa*. IUCN Publications New Series no. 22:15–21.

————. 1972. “Wildlife as a Source of Protein in Africa South of the Sahara: African Forestry Commission.” Ad hoc working party on Wildlife Management, FAO, Rome.

————. 1974a. “Wildlife as a Source of Protein in Africa South of the Sahara.” *Biol. Conservation* 6:32–39.

————. 1974b. “The Grasscutter *Thryoronrys swinnderinnus* Temmincky in Ghana.” London: Symposium of the Zoological Society 34:161–70.

————. 1976. “The Effects of Land Use Patterns on Future Supply of Bushmeat in Africa South of the Sahara.” Working Party on Wildlife Management and National parks, 5th Session.

————. 1978. “Wildlife Production as a Means of Protein Supply in West Africa with Particular Reference to Ghana.” Proceedings of the 8th World Forestry Congress, Vol. II:869–81.

————. 1979. “Sources of Animal Protein to Lactatina Women in Rural and Urban Ghana.” Paper presented at the 11th Biennial Conference of the Ghana Science Association, Kumas, 1979. Department of Game and Wildlife.

————. 1982. “Social and Economic Importance of Protected Areas in West Africa.” Working Document, World National Parks Congress, Bali, Indonesia, 1982.

————. 1986. “Wildlife and Food Security.” Paper prepared for the Forestry Department, FAO, Rome.

————. 1990. “Status and Potential of Wildlife and Other Non-Timber Products in Tropical Forestry in Africa.” Paper for the International Timber Trade Organization’s International Seminar on Status and Potential of Non-Timber Products: The Sustainable Development of Tropical Forests. Kamajura, Japan.

————. 1991. “Forest Wildlife Management.” Paper for Tenth World Forestry Congress, Paris.

Asibey, Emmanuel O. A., and K. K. Eyesen. 1975. “Additional Information on the Importance of Wild Animals as a Food Source in Africa South of the Sahara.” *Journal of the Ghana Wildlife Society* 1(2):13–17.

Asibey, Emmanuel O. A., and G. S. Child. 1990. “Wildlife Management for Rural Development in Sub-Sahara Africa.” *Chiasylva* 161(41):3–10.

Baptist, R., and G. A. Mansah. 1988. “Benin and West Africa: The Cane Rat—Farm Animal of the Future.” *World Animal Review*. FAO, Rome.

Beckett, W. E. 1944. “Akokoaso: A Survey of a Gold Coast Village.” London: London School of Economics: Monographs on Social Anthropology, No. 10.

Blaxter, K. L. 1975. “Protein from Non-Domesticated Herbivores.” In N. W. Pirie, ed., *Food Protein Sources*. London: Cambridge University Press:147–56.

Clark, G., “Separation Between Trading and Home for Asante Women in Kumasi Central Market.” Ghana. In Wilknson 1989.

de Beer, J. H., and M. J. McDermott. 1989. *The Economic Value of Non-Timber Forest Products in Southeast Asia*. Netherlands Committee for the IUCN, Amsterdam.

Falconer, J. and C. Koppel. 1990. “The Major Significance of `Minor’ Forest Products: The Local Use and Value of Forests in the West-African Humid Forest Zone. FAO, Community Forests Note 6. Rome.

————————. 1991. “The Significance of Forest Resources in Rural Economies of Southern Ghana: Summary of a Study on Non-Timber Forest Projects.” Paper prepared for the Forestry Department, Government of Ghana, and Overseas Development Administration, U.K.

International Union for the Conservation of Nature and Natural Resources (IUCN). 1988. *Ghana: Forest Conservation Issues*. The IUCN Tropical Forest Programme. IUCN Conservation Monitoring Center Document No. 10385. Cambridge, U.K.

Kiss, A. 1990. *Living with Wildlife: Wildlife Resource Management with Local Participation in Africa*. World Bank Technical Paper 130. Washington, D.C.

Levinson, F. J. 1991. “Addressing Malnutrition in Africa: Low-Cost Program Possibilities for Government Agencies and Donors.” World Bank Social Dimensions of Adjustment Working Paper 13. Washington, D.C.

Martin, L. H. G. 1983. “Bushmeat in Nigeria as a Natural Resource with Environmental Implications. *Environmental Conservation* 10(2):125–32.

McGuire, J. S., and B. M. Popkin. 1990. *Helping Women Improve Nutrition in the Developing World Beating the Zero Sum Game*. World Bank Technical Paper 114. Washington, D.C.

Montoliu, M. 1987. “Proposal for Research on Minor Forest Products and Environmental Costs of Deforestation.” World Bank Working Paper 4. Washington, D.C.

Ntiamoa—Baidu, Y. 1986. “Research Priorities for Sustainable Utilization of Wildlife Reserves in West Africa.” Proceedings of the 18th International Union of Forestry Research Organizations World Congress, Vol. 11:687–98.

Ntiamoa—Baidu, Y. 1987. “West African Wildlife: A Resource in Jeopardy.” *Unasylva* 39(156).

Peluso, N. L., ed. 1991. ”Women and Natural Resources in Developing Countries.” *Society and Natural Resources* 4:1–3.

Price Gittinger, J., and others 1990. *Household Food Security, and the Role of Women*. World Bank Discussion Paper 96. Washington, D.C.

United Nations Children’s Fund (UNICEF). 1990. *Children and Women in Ghana: A Situational Analysis*.

United Nations Environment Programme and World Wide Network, Inc. 1992. Proceedings of the Global Assembly “Women and the Environment: Partners in Life.” Washington, D.C.

Wells, M., and Brandon, K. 1992. *People and Parks: Linking Protected Areas Management with Local Communities*. World Bank, World Wildlife Fund, and U.S. Agency for International Development. Washington, D.C.

West, R., and S. R. Brechin, eds. 1991. *Resident People and National Parks*. University of Arizona Press.

Wilk, R. R., ed. 1989. *The Household Economy: Reconsidering the Domestic Mode of Production*. Boulder: Westview Press.

Woodford, M. H. 1983. “Wild Animal Meat and Products Utilization at Subsistence Level in Africa.” Working Paper Presented at the 7th Session of the African Forestry on Wildlife Management and National Parks. FAO paper AFC/WL:83/6.5.

World Bank. 1987. *Ghana Forestry Sector Review Report No. 6817-GH*. Washington, D.C.

World Bank. 1988. *Ghana Forest Resource Management*. Project Report No. 7295-GH. See especially Working Paper 4, “Proposal for Research on Minor Forest Products and Environmental Costs of Deforestation,” by Marisela Montoliu, Washington, D.C.

World Resources Institute, International Union for the Conservation of Nature and Natural Resources (IUCN), and United Nations Environment Programme. 1992. *Global Biodiversity Strategy*. Washington, D.C.

8 America’s Self-Funding Park System: The New Hampshire Model

W. F. LaPage

Our Parks Deserve Dedicated Funding

THE PHILOSOPHY OF THE GENERAL FUND, that enormous pool of tax revenue from which we fund the majority of society's needs, is inimical to the protection of our park lands and nature reserves. Distribution of General Funds is overwhelmingly responsive to the urgency of today's needs. The result is anything but the so-called "level playing field" of agency competition for dollars. Our needs for biological diversity, or even simply for playgrounds, cannot compete with the immediacy of hunger, illiteracy, and medical care for children.

The persuasiveness of addressing these concerns over the long range by also preserving our parks and natural areas does little more than draw the line at "closing the doors" and selling our assets. Because the benefits of our parks are perceived to be deferable, we continue to go through long cycles of park and natural area degradation, interspersed with brief and infrequent periods of public embarrassment and short-term atonement. The level of vision which created these public lands deserves to be matched by funding sources which assure their benefits now and in the future. And those funding sources must be protected from raids with tenacity equal to the protection of the lands themselves.

User Fees: The Dedicated Fund Base

The search for funding begins (and too often ends) with park visitors. Their willingness to pay for the use of these lands has been the subject of numerous studies and agency "experiments" in fee setting. The range in cost recovery from users runs from well under ten percent (U.S. National Park Service) to well over 100 percent (New Hampshire state parks). While it is clear that users should (and want to) pay a portion of the costs, the jury is still out on whether total self-funding is either attainable or desirable. What is clear is that some degree of self-funding is prerequisite to securing a supplemental dedicated revenue source. A variety of supplemental sources are currently favored, generally in the form of a percentage of another tax, for example, on real estate transfers, cigarettes, sales, gasoline, or a portion of lottery proceeds. These other taxes may or may not have a direct relationship to the use or future availability of these resources; however, the more direct that relationship is, the stronger the case will be for dedicating a portion of the receipts to parks. Similarly, the higher the rate of self-sufficiency, the stronger the case for a dedicated income source to fill the gap between income and operational expense.

It has been demonstrated, time and time again, that Americans want their public lands to be protected. And there is ample evidence that they are very willing to pay for this protection. What has been missing from this winning combination is wide-spread understanding that protection means much more than acquisition. America's commitment to parks is unlikely to falter if their operations have to be funded from user fees. In fact both park advocacy and stewardship may very well increase with the stronger sense of ownership that comes from paying directly for direct benefits.

The Ideal Experimental Setting

In many respects, the New Hampshire state park system provides an ideal setting for a self support feasibility test. Its small size (137,000 acres) and diversity of properties (72 recreational, historical, and natural sites) has had a legislative mandate to earn as much of its budget as possible for 55 years of its 56-year history. This legacy has resulted in a very small overhead and a staff committed to an experimental approach to management. (It was the first state park system to experiment with differential pricing of its campsites, visitor satisfaction monitoring, and carrying capacity limits.) Its several "world class attractions" are located within a two-hour drive of the Boston metropolitan area. Its natural areas have attracted national attention, with several having attained placement on the National Natural Landmark Register.

Similarly, most of its historic sites are either National Historic Landmarks or on the National Register of Historic Places. Three of its major park attractions, totaling over 14,000 acres, are totally surrounded by the added attraction and protection of a three-quarter million acre National Forest. The people of New Hampshire are proud of their park system, rallying to its support with nearly two dozen different "friends of parks" volunteer groups. During 1991, volunteers contributed $1.25 million in labor and private funds in support of its park system. Volunteer effort clearly is a major component of "self support," even though many volunteer programs are often "extras." Volunteers have opened parks early, kept them open late, provided interpretive services, hosted special events, raised funds, and provided all added degree of park protection that is invaluable.

In describing this system as “ideal” for experimentation, it is clear that if self funding cannot succeed in these circumstances, it probably can not be considered feasible in any major way elsewhere. However, it is just as obvious that this exact combination of favorable characteristics is unlikely to be replicated elsewhere. Nevertheless, the elements of success that work for New Hampshire will probably be individually successful in any setting.

The Limits of Success

Facing a growing General Fund budget crisis, the New Hampshire state legislature, in April of 1991, passed an act which required the state park system to earn its own funds. In doing so, the legislature recognized the park system’s income record over the previous three years as a sound basis for funding its operations. In addition to payments of all direct operating costs, that record included annual payments on over $10 million of capital development projects. What made the legislation experimental was the addition of non-operational costs in its mandate. Charges for park system planning, recreation extension, and division overhead were added to the operational costs. (The park system is one bureau within the division of parks and recreation.) Conversely, the costs of park promotion and capital development are not charged to the parks bureau.

The 1991 legislation created a non-lapsing park fund into which all park income flows. Income in excess of budgeted expenses may be spent on any park project or program, including staffing and promotion, with the approval of the legislature’s fiscal committee and the Governor and Executive Council. It is noteworthy that while the state park system includes two major downhill ski resorts, they are managed separately and cannot contribute to or draw from the non-lapsing Park Fund. Up until 1989, these two sites, representing one-half of the division’s budget, were a consistent drain on any excess revenue generated by the rest of the park system.

Although initially conceived as the system’s “money makers,” the two ski areas instead both directly and indirectly (through their continuing needs for capital improvement) drained money and legislative attention away from the other parks for over two decades. Capital improvements languished throughout the parks, and the deferred maintenance bill climbed, as the two ski areas battled to compete with snow making, lodge improvements, and new ski lifts, including a new $4 million aerial tramway. It is also important to note that the separation of the two ski areas drained $850,000 from summer park income, that is, income from revenues other than skiing.

By the summer of 1991, the stage was set to see if the parks could not only survive on their own, but generate sufficient income beyond expenses to begin to address their deferred maintenance needs. With all of the success factors outlined above, two critical factors were working against them: a depressed regional economy and summer weather which was both wetter and colder than normal. The combined effects of weather and a sluggish economy resulted in an income pattern which started out at 24 percent ahead of 1990 and ended the season barely 7 percent ahead. But still the year was a success and brought a new record income.

In at least one respect, the sluggish economy may have been an asset. New Hampshire state parks are ideally positioned to offer alternative low-cost day outings or camping trips. And people seemed to use the parks for exactly these purposes in 1991. Camping, which had shown a steady decline during the previous decade, suddenly recorded a ten percent increase. Ocean beaches showed a 14 percent increase, while inland beaches declined three percent from their 1990 level. The bottom line for the 1991 season was a surplus of $660,000 for park improvements—in a year in which general fund budget cuts would probably have closed several parks.

The Next Step: A Fund for the Future

Any comprehensive system of parks has three income classes of properties: (a) those that can never generate income in excess of costs, (b) those with a profit potential, and (c) those with a profit history. It is tempting to use the 1991 profits to propel us into an even more successful 1992 season by expanding those park facilities which are already profitable, or are being used to capacity. Two considerations speak against drawing down the parks fund in this way. The first is the obvious need to maintain a reserve for an even wetter summer in 1992. The second concern is that of maintaining the integrity of the park system for the future, and this has no easy solution. Should the fund immediately be pro-rated in its first year, between enhanced income production and deferred maintenance and between income-producing and non-income-producing parks? Or should it be totally reinvested to expand the income base so that more money might be available for maintenance needs and

nonproducers in future years? The total reinvestment option is very attractive for a park system which is marginally successful. It also has a very strong personal appeal for success. On the other hand, the pro-rated approach has a better chance for increasing public support, maintaining a viable volunteer corps, and emphasizing the nonmonetary benefits of park lands. Fortunately, a middle ground can be found, at least for the first year. One half of the "profit" is reserved for a rainy season. If not needed at the end of the second season, these funds are used for needed improvements at historic sites, natural areas, and low-income producers. The second half of the fund is immediately used to address deferred maintenance needs at income producing parks, with the hope of payback in the second and third years.

A number of other steps are being taken to assure continued success—increased promotion, merchandising, and cost monitoring. The New Hampshire state park system currently has vigorous programs of (a) locating corporate underwriting for all of its promotion, information, and education programs, (b) expanding its in-park and off-park merchandising, and (c) reducing operating costs through expanded computerization and cooperative management. Without resorting to fee increase, the opportunities for income enhancement are limited only by our own imagination.

Our parks, natural areas, and historic sites are very "saleable" to potential cooperators. The images, mission, history, and popularity of parklands provide an endless array of benefits to our cooperators, from the good will of community involvement to the increased sales of integrity identification. And the financial benefits to the park system are dwarfed by the impact of a broadened constituency and a wider understanding of park philosophy.

It's too early to signal "success." However, the significance of New Hampshire's experiment in self-funded state parks extends well beyond its borders. The general funding of our public parks has tended to trivialize them by artificially lowering their cost to the user. If public parklands are important enough to acquire, they are important enough to warrant completing the job of perpetual stewardship. Acquisition without management simply protects those lands from one threat while exposing them to another. The park movement itself is threatened by the increasingly common refrain of "they can't take care of what they have now!"

If stewardship is the key to restarting the public parks movement, and if stewardship is limited by funding, then we can no longer afford to let our parklands wither under general fund tokenism. Our parks, historic sites, and natural areas are essential parts of our lives and our economies. They deserve to be funded as such, not as wards of the state. Getting parks off the dole and onto a stable funding base will not be easy. But it is essential. As we introduce the next generation of school children to their parkland heritage, let's not teach them that these places are so special that we have chosen to let the buildings rot, the lands be eroded, the vegetation be destroyed, and the waters be polluted because we had no funds.

9 Economic Contributions of Venezuelan Protected Areas: The Tragedy of the Commons and Perspectives

Aldemaro Romero Dias

VENEZUELA IS ONE OF THE WORLD'S most biologically diverse countries. It is a country of the Andes and the Amazon; it is bordered partly by the Caribbean Sea and partly by the Atlantic Ocean; and it contains wide ranges of savanna. Legal efforts to preserve it are no less impressive: by December 1991, Venezuela had set aside 39 national parks, 40 natural monuments, 7 faunal refuges, 2 faunal reserves, 10 forest reserves, and many other forms of legally protected areas of various types and sizes. National parks alone account for 9.27 percent of the country (Romero 1992).

Despite its vast biodiversity, legal protection, political stability, and relative economic well-being, Venezuela has failed to effectively manage these protected areas. Virtually all of Venezuela's national parks exhibit some problems: 55 percent of them are illegally occupied; illegal hunting occurs in 77 percent of them; and 66 percent have shown significant loss of vegetation and biodiversity (Romero 1982). Furthermore, a lack of infrastructure, trained staff, and management plans is also common. Thus, these and many other protected areas, with very few exceptions, have failed to generate wealth for anybody, except for those engaged in illegal activities. Even many of the forest reserves, originally designed as productive units, are today virtually destroyed (Romero 1992).

This chapter analyzes the opportunities lost and proposes the changes needed in order to turn the preservation of this natural heritage into a source of wealth.

The Sources of the Problem

Political circumstances

Venezuela environmental policy, especially in the last 20 years, has been characterized by an emphasis on the legal apparatus rather than by specific actions. One clear sign of this is not only the complexity and number of environmental regulations in the country, but also the use of those regulations as a political tool. From 1973 through 1989, out of 25 national parks, 17 of them—that is—68 percent—were decreed during election campaigns. Furthermore, during those same election years, protected areas were usually occupied by peasants and others, better off, who were directed by alleged "peasant leaders" (actually local politicians) in order to offer political favors in exchange for votes. These types of favors are generally accepted by officials of the governing party, and they generally encounter little opposition from government authorities. The basic reasoning is that "since it is government land, it is everyone's land," that is, common property.

Technical reasons

As we said before, the environmental emphasis of the Venezuelan government has been traditionally more on legal instruments than on actions. Very few of the protected areas have adequate means available for their effective protection. The Avila National Park, for example, has nearly 300,000 people living illegally within its boundaries; the Canaima National Park, Venezuela's largest, with a total area of some 3,000,000 hectares and representing a great tourist attraction and an even greater potential as a source of revenue, had by 1991 only four people from the National Institute de Parks taking care of it, while the Ministry of the Environment employed nearly 11,000 people. We could easily go on with further examples such as these.

Economic shortsightedness

Until recently, Venezuela had a typical Third World country economy in the sense that it was highly subsidized, and it placed an extremely low value on natural goods such as water and energy, a fact which encouraged their exploitation and waste.

In addition, there has never been a serious attempt by the government to take into account the social benefits of preserving species and ecosystems. In fact, there has been a traditional clash between local communities and governmental representatives when the latter intended to curtail traditional means of economic subsistence for the local populations by trying to enforce laws that revealed a total misunderstanding of the significance of these activities for local populations. In other words, there has never been an appropriate cost-benefit analysis of preserving biodiversity, either at the national or at the local level.

Thirdly, since those who overexploit natural resources in Venezuela do it illegally, they rarely pay for the economic costs of that overexploitation, encouraged by the notion that their activities are carried out within government protected areas, making the areas seem like "common property." Very rarely does the government take appropriate action against these individuals, thus reinforcing the concept of the tragedy of the commons (Hardin 1968).

Fourth, there is a very weak sense of ownership toward land in Venezuela. Because it is a country that, during most of its history, was underpopulated, there was no real need for a strong land tenure system, especially since most land is government-owned. Here is how typically confusion arises over the issue of land ownership in Venezuela. Occasionally, when land is designated as a protected area, the Venezuelan government takes the necessary steps to expropriate such land. The government usually argues that it lacks the necessary funds; however, designating land as a protected area is also sometimes a way of meeting political agendas. Areas such as the Bolivar peak, the highest Venezuelan mountain, which is in the middle of a national park, is still privately owned, despite the fact that park was designated as a protected area in 1952. Why? Often, as soon as an area is decreed as legally protected, it is subject to immediate invasions by people who claimed to have some legal rights over them. This author witnessed how, right after the Santos Luzardo National Park was designated a protected area in 1988, it was subjected to hordes of people who claimed ownership over parts of it. One of the perverse economic incentives that contributes to this much confusion in land ownership is the Venezuelan land law which establishes that any one who takes over land, private or public, and is not evicted during the first 15 days is entitled to be paid by the rightful owner for whatever infrastructure the squatter develops, whether a house, a farm or something

else. Some environmentalists say that the worst thing that can happen to a natural area in Venezuela is to be designated as legally protected.

Fifth, discount rates applied by current economic planning encourage depletion of biological resources. Governmental economic plans in Venezuela are always designed for a five-year period, so the impact of deforestation over damns are never taken into consideration until it is too late. In addition, even the terminology used by the Venezuelan government encourages a faulty idea of development. According to the statistics produced by the Ministry of Agriculture, natural areas that are deforested are declared “improved lands,” implying that natural vegetation is a nuisance.

Sixth, the measures of national income and living standards still follow the classical approach used by governments—that is, GNP—which does not take into account factors such as the loss of natural wealth and therefore of quality of life.

Solutions Proposed

Institutional changes

One of the most important transformations needed is to change the government “corporate culture” of legal decrees so that they are ends and not tools. To reach that goal, environmental authorities must devise systems based on current managerial practices of achieving tangible results in specific periods of time.

Also, the whole system of control over these areas must be decentralized and democratized. Currently, even minor decisions depend upon authorities in Caracas—hundreds, even thousands of kilometers away from the protected areas. Although some attempts have been made to share the responsibility for the creation of “Exclusive Authorities Committees,” such as the Los Roques National Park, those attempts concentrate more on coordinating actions among governmental officials than really integrating all the players. Thus, a democratization of the system by which local populations (living inside and nearby the protected areas), nongovernmental and nonenvironmental organizations, as well as commercial corporations which have ongoing activities within these protected areas, must be made at least in the discussion and consultation process. This process must also be open to public scrutiny, which would be unusual in Venezuela, where even environmental impact assessments are usually considered “secret.”

In addition, there must be a shift in emphasis from where and how to spend the limited governmental resources to reducing governmental bureaucracy and opening many of the activities currently carried out (or at least intended to be carried out) to other areas of the society (both commercial and nonprofit organizations) by contracting out or leasing lang grants (for example, timber concessions). Governmental authorities must concentrate on planning, coordinating and, above all, on law enforcement and follow-up activities.

Economic changes

The incorporation of a whole different scheme of measuring economic performance that takes into account the situation and use of natural resources is essential, both in terms of quantifying the economic value of natural resources and in safeguarding against resource overexploitation.

Also, it is essential to create economic incentives of different kinds that promote activities which encourage biodiversity conservation. Incredibly, agricultural activities are tax-exempt, but there are no specific tax incentives for conservation activities such as the creation of private nature preserves. Other economic incentives proposed in general terms elsewhere (McNeely 1988), would also be fully applicable for Venezuela,

Legal changes

All laws that encourage squatting must be deleted from current legislation; not only are they environmentally unsound, but they are also totally unnecessary in a country with a relatively low population density and a high concentration of people in urban areas.

Also, the government must provide incentives for the development of private nature preserves, either within already existing private property in which part of or all of the land is set aside for as a

nature preserve or through a system of land acquisition or leasing in order to create such private protected areas.

Bibliography

BIOMA. 1991. *I Cumbre Hemisférica de Economía y Ambiente. Documento Final*. BIOMA: Caracas.

Hardin, G. 1968. "The Tragedy of the Commons." *Science* 162 (3859):1243–48.

McNeely, Jeffrey A. 1988. *Economic and Biological Diversity: Developing and Using Economic Incentives to Conserve Biological Resources*. Gland, Switzerland: International Union for the Conservation of Nature and Natural Resources (IUCN).

Romero, Aldemaro. 1992. *Auditoría ambiental de Venezuela 1991*. Caracas: BIOMA.

10 Rattan Management for Sustainable Livelihoods and Forest Conservation: The Case of Kerinci-Seblat National Park, Indonesia

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TROPICAL FORESTS IN SOUTHEAST ASIA are rapidly disappearing under the combined pressure of timber harvesting and forest conversion by landless poor.

This research was made possible by grants from the Rainforest Alliance and UNESCO.

A network of national parks and protected areas has been established in Southeast Asia (Collins 1990), but the viability of many protected areas is threatened by resident peoples who for generations have collected forest products and cultivated land now designated as preserves. Not surprisingly, conflicts between protected areas management and local economic development are intensifying. As West and Brechin (1991) have noted, simultaneously protecting biodiversity and the rights of people who live in and around protected areas is the paramount conservation challenge throughout the world.

Rattans are a large group of climbing palms that comprise one of the most important forest products in Southeast Asia. Rattans have been used for centuries in binding, basketry, and weaving, and are now a major source of cash income (DeBeer and McDermott 1989). Managed rattan harvesting is an attractive candidate in forest conservation and local development efforts because these plants have a wide range of traditional uses, are an important source of cash income, have little or no effect on other forest flora and fauna when harvested, and because without management, wild supplies are likely to be exhausted.

This chapter evaluates the potential that managed harvesting of one economically-important rattan species might play in fostering economic development among resident people, while simultaneously contributing to forest conservation objectives.

Research Site and Methodology

Site

One of the preeminent protected areas in Southeast Asia is Kerinci-Seblat National Park in Sumatra, Indonesia. Kerinci-Seblat National Park is a 1.5 million hectare preserve that ranges from 100 to 3,800 meters elevation and includes extremely diverse flora and fauna. As is the case in all Indonesian national parks, farming, forest product collecting, and hunting are strictly prohibited. In the center of Kerinci-Seblat National Park is a 10 by 80 kilometer long settlement, Kabupaten Kerinci, which has been the traditional home of a distinct cultural group for many generations. Approximately 280,000 people inhabit the Kerinci enclave. The Kerinci economy is agriculturally-based, with irrigated rice grown in the central valley and both annual food crops and perennial cash crops, particularly cinnamon (*Cinnamomum burmanii*) and coffee (*Coffea robusta*), cultivated on surrounding hill slopes that have been cleared from forests.

Kerinci-Seblat National Park has been designated by the International Union for the Conservation of Nature and Natural Resources (IUCN) (1984) as one of the most important and critically threatened protected areas in the humid tropics; thousands of hectares in the park have already been converted to cinnamon and coffee farms, threatening both the integrity and long-term viability of the park. Those involved in forest farming inside Kerinci-Seblat National Park are primarily

young, resource-poor households that originate from three villages in the Kerinci enclave. These three villages are characterized by a shortage of irrigated rice land, degraded uplands, and lack of alternative wage labor opportunities (Siebert 1989).

One of the principal villages involved in forest farming in Kerinci-Seblat National Park is Sungai Tutung, the traditional center of rattan basket making in Kerinci and more recently home to a vigorous rattan handicraft industry for the domestic Indonesian market. The rattan cottage industries in Sungai Tutung rely primarily upon one species of cane, *Calamus exilis*, which is illegally collected from wild populations inside Kerinci-Seblat National Park.

Calamus exilis is a small clustering rattan that is capable of both sexual and vegetative reproduction (that is, it sprouts new canes after being harvested). It grows throughout peninsular Malaysia and Sumatra, but is most abundant on ridges in hill and lower montane forests (Dransfield 1979).

Methodology

Research on the abundance, site preferences, value, and management potential of *Calamus exilis* was conducted 25 kilometers inside Kerinci-Seblat National Park in the principal rattan collection are (Figure 10–1). Demographic characteristics of *C. exilis* were determined by sampling plant and cane abundance, and environmental factors in forty 0.05-hectare plots selected at random intervals along transects (a total of 2 hectares were sampled) in primary forests. The sampling plots were located between 1,200 and 1,400 meters in elevation and were dominated by steep slopes (20–100 percent), lower montane hill dipterocarp forests, and Tropohumult soils.

In each plot, the following data were collected:

- The number of juvenile and mature rattans
- The number and length of canes per plant
- The predominant light regime, qualitatively scored on a scale of 1 to 4 (1 = complete shade)
- Competition from understory vegetation, qualitatively scored on a scale of 1 to 4 (1 = little understory vegetation; 4 = severe competition from complete cover of understory growth)
- Soil drainage characteristics, classified on a scale of 1 to 3 (1 = well drained; 3 = water-logged soils)

One soil sample, comprised of five subsamples, was collected at between 0 and 15 centimeters in depth in each plot. Samples were analyzed for pH balance, available phosphorus, potassium, calcium, magnesium, exchange acidity, and organic matter using standard analytical techniques by the Cornell Nutrient Analysis Laboratories in Ithaca, New York.

Rattan abundance was summarized using descriptive statistics. Site preferences were evaluated with regression analysis. The value of rattan harvesting was estimated using 1990 prices paid to collectors upon delivery of canes to local markets. Local perceptions of forest farming and interest in rattan livelihoods were assessed by informally interviewing forest farmers and rattan collectors inside Kerinci-Seblat National Park and interviewing rattan artisans in Sungai Tutung.

Results and Discussion

Demographic characteristics of Calamus exilis

An average of 283 *C. exilis* plants with 65 mature plants and 191 harvestable canes were observed per hectare in the principal rattan collecting area of Kerinci-Seblat National Park (Table 10–1). Cane lengths averaged approximately 10 meters. Thus, the forests of Kerinci-Seblat National Park produced about 1,910 meters of cane per hectare.

Populations of *C. exilis* showed a strong negative relationship with light intensity and competition from understory vegetation. Sites with high light intensities were negatively related to the number of mature plants (R-squared 0.60; $F<0.001$), number of canes (R-squared 0.64; $F< 0.001$) and number of canes of harvestable length (R-squared 0.49; $F<0.001$). Similarly, sites with dense understory vegetation were negatively correlated with the number of mature plants (R-squared 0.57;

F<0.001), total number of canes (R-squared 0.59; F<0.001) and number of canes of harvestable length (R-squared 0.44; F<0.001). No significant relationships were observed between *C. exilis* populations and edaphic conditions, with the exception of soil drainage. *C. exilis* was confined to sites with moist, but well-drained, A-horizons and was absent in areas where there were poorly drained soils.

Economics of managed rattan harvesting

The forests of Kerinci-Seblat National Park contained approximately $15.80 worth of unprocessed *C. exilis* per hectare (assuming 1990 market prices of Rp 4,500 per one-hundred 3-meter length canes). Rattan collectors reported that *C. exilis* can be harvested approximately three years after cutting and that subsequent production is comparable to initial yields. Marked plants were to be resurveyed in June 1992 to determine actual resprouting and cane growth rates.

Assuming plants can be harvested every three years, the value of sustained-yield harvesting of *C. exilis* is about $5 per hectare per year. That is, each hectare of lower montane forest produces about $5 worth of unprocessed rattan cane per year. The profitability of sustained-yield rattan harvesting is very low, on a per unit area basis, in comparison to clearing forests and cultivating perennial cash crops; cinnamon and coffee cultivation earns farmers an average of about $1,100 per hectare per year (Siebert 1991).

In contrast, the profitability of rattan collecting, on a daily wage labor basis, is very attractive in comparison to alternative wage labor opportunities (for example, agricultural field work). Rattan collectors earn an average of $1.50 per day compared with $1.00 per day for local agricultural labor, regardless of whether the cane is harvested on a sustainable or unsustainable basis.

The profitability of rattan to local communities could be increased by improving cane processing techniques (for example, the use of simple, inexpensive machinery to remove silica cane sheaths) and enhancing product marketing. At present, over 70 Sungai Tutung families rely on rattan handicraft or basket making as their primary source of cash income (these benefits were not included in estimating the value of rattan), and all products are marketed either locally or in nearby Sumatran cities. The development of market outlets in Java, Europe, and North America could potentially increase economic benefits to Kerinci rattan artisans.

Implications for forest conservation and management

At present, forest conversion to perennial cash crops is widespread and uncontrolled throughout Kerinci-Seblat National Park. Informal interviews with forest farmers from Sungai Tutung revealed that most would prefer to remain rattan artisans. However, because of a shortage of rattan supplies and a strong international market demand (that is, high prices) for cinnamon and coffee, many see little or no alternative but to cultivate cash crops.

The shortage of *C. exilis* canes results, in part, from a government prohibition against collecting forest products within Kerinci-Seblat National Park. The cultivation of perennial crops is also prohibited in Kerinci-Seblat National Park; however, forest guards rarely patrol within the park, and once cinnamon and coffee reach local markets, it is impossible to determine their point of origin. In contrast, rattan is available only from within the park and collectors can be apprehended when they attempt to transport or sell rattan in local markets. The development of sustained-yield harvesting guidelines for rattan could supply a continuous source of income for collectors, supply raw materials for the local rattan industry, and provide residents of Sungai Tutung with an incentive to conserve forests.

The area required to support sustained-yield *C. exilis* harvesting is difficult to estimate because no records of rattan consumption exist. Presently about 75–100 full—and part-time rattan collectors gather an average of about two-hundred 3-meter-long canes per day. Collectors harvest only 2–3 days per week, since cane cleaning and transport to market require additional time. In addition, rattan gathering is seasonal work for some collectors; many prefer not to gather canes during rainy months (November to April), while others engage in seasonal agricultural work as farmers and wage laborers. If one assumes that 80 collectors harvest two-hundred 3-meter canes two days per week for 30 weeks each year, a total of 2,880,000 meters of *C. exilis* are harvested from Kerinci-Seblat National Park on an annual basis. Based upon the abundance data cited above, this represents approximately 1,500 hectares of forest harvested each year. If *C. exilis* were harvested every three years, at least

4,500 hectares of forest would be required to support the Sungai Tutung rattan industry at current cane consumption levels.

The actual area required to support sustained-yield *C. exilis* harvesting may be greater than 4,500 hectares due to the crude harvesting estimates employed here and because the demand for cane is increasing. Nevertheless, *C. exilis* is found over tens of thousands of hectares in Kerinci-Seblat National Park, and vast areas of the park have not been harvested at all.

Indonesian park officials and conservation nongovernmental organizations should evaluate the feasibility of establishing extractive reserve areas for managed harvesting of *C. exilis* canes in certain zones within Kerinci-Seblat National Park. One means of managing rattan harvesting would be to demarcate management units (that is, mini-watersheds) in the principal collecting areas and open these sites to *C. exilis* harvesting once every three or four years. This approach will require park personnel to patrol inside Kerinci-Seblat National Park, rather than remain in the buffer zones around the enclave, but more rigorous enforcement efforts are essential, given the current practice of clearing forests for farms. Rattan collectors could be enlisted in park patrol efforts while collecting cane and perhaps provided with a supplemental income for patrolling efforts.

Conclusion

Rattan gathering and cottage industries are an important, traditional livelihood source for some who live adjacent to Kerinci-Seblat National Park. Managed rattan harvesting has the potential to foster economic development and forest conservation because it can provide local people with a viable livelihood, thereby reducing pressure to convert forest to agricultural uses, and because canes can be harvested on a sustainable basis with little or no effect on other forest flora and fauna. The long-term viability of Kerinci-Seblat National Park and other national parks in Indonesia will be determined, in part, by the extent to which conservation benefits rural populations, particularly those who have few alternatives but to clear forests for immediate food and cash income needs.

Managed rattan harvesting will not solve forest conversion pressures in Kerinci-Seblat National Park. Alternative income-producing activities must be developed for the hundreds of households that currently farm inside the park, but are not engaged in rattan gathering or cottage industries. This will require improving agricultural productivity and reclaiming degraded lands adjacent to Kerinci-Seblat National Park and developing off-farm livelihood alternatives. While managed rattan harvesting cannot insure the conservation of tropical forests alone, it represents an important component in forest conservation strategies, and warrants greater research and development consideration.

Table 10–1. The Number of Calamus exilis *Plants and Canes in Lower Montane Forests of Kerinci-Seblat National Park (n = 40)*

	Mean number per plot (standard deviation)		*Mean number per hectare*
C. exilis plants			
Total	14.2	(10.0)	283.6
Seedlings	7.2	(7.4)	143.0
Juvenile	3.8	(3.4)	75.0
Mature	3.3	(3.3)	65.4
C. exilis canes			
Total	57.1	(50.6)	1,147.4
Harvestable	9.6	(12.9)	191.0

Mean cane length: 10 meters.

Figure 10–1. The Kerinci Enclave Region of Kerinci - Seblat National Park

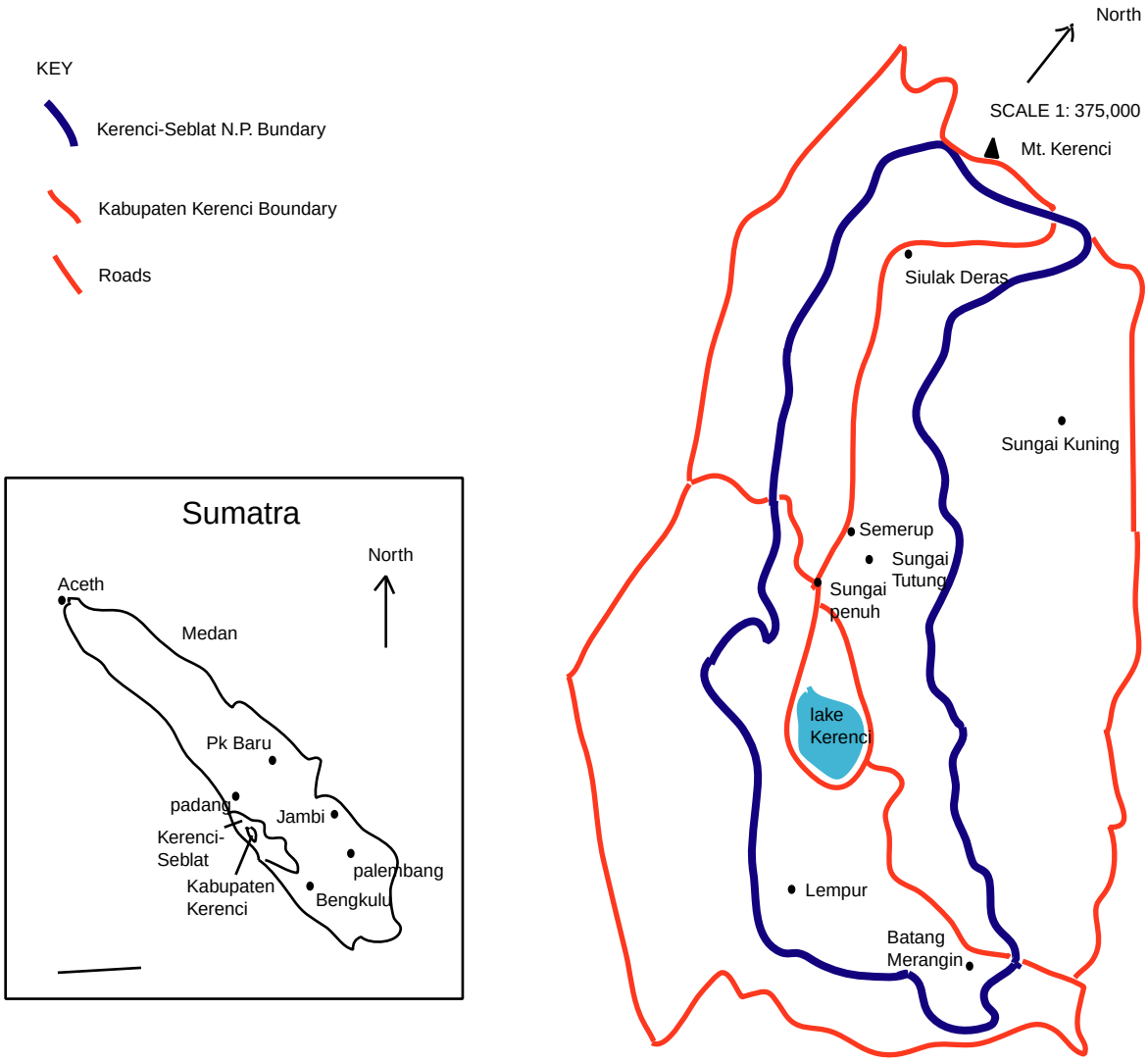
Bibliography

Collins, M., ed. 1990. *The Last Rain Forests*. New York: Oxford University Press.

de Beer, J., and M. McDermott. 1989. *The Economic Value of Non-Timber Forest Products in Southeast Asia*. Netherlands Committee for the International Union for the Conservation of Nature and Natural Resources (IUCN), Amsterdam.

Dransfield, J. 1979. *A Manual of the Rattans of the Malay Peninsula*. Forest Department, West Malaysia.

Figure 10-1. The Kerinci Enclave Region of Kerinci - Seblat National Park



Siebert, S. F. 1991. “Rattan Management for Forest Conservation in an Indonesian National Park.” Paper presented at the 17th Pacific Science Congress, Honolulu, Hawaii, May 27—June 2.

Siebert, S. 1989. “The Dilemma of a Dwindling Resource: Rattan in Kerinci, Sumatra.” *Principles* 33:79–87.

West, P. C., and S. R. Brechin. 1991. *Resident Peoples and National Parks*. Tucson: University of Arizona Press.

11 Ecological bricks for Europe: Integration of Conservation and Sustainable Development Along the Former East-West Border

Alexander Zinke

Concern and vision

EUROPE IS CHANGING. The semi-continent which split into two different, in some cases hostile, parts after World War II is presently at the beginning of a new phase in its history. The old order is being totally transformed- at least in the former Eastern bloc countries.

This applies as much to politics, societies, and culture as to economics and environment. Revolutionary people felt that separatism, hostility, and ignorance were leading to a dead end, especially in view of the growing environment and health problems that will affect future generations even more.

The iron curtain, the depopulated and forbidden death zones along the border between “East” and “West,” was the crucial symbol of this division. Its opening was the strongest sign that people wanted to get rid of the old structures and see their wishes for a total change and development be quickly fulfilled. The Cold War is being replaced by mutual understanding, peace, and reconciliation among people as well as with nature, which has been so badly treated under the industry-oriented planning system.

On the other hand, the prognosis that the forgotten border regions will soon see an impressive economic development frightens many conservationists. They know of the virgin character of these border zones, which “peacefully” grew under the protection of military forces and today contain almost undisturbed habitats and abundant wildlife—unique not only in Central Europe. Vast low moor plains, huge undissected forests and pristine rivers still host large numbers of rare species, like European bison and elk, white-tailed eagle, river otter, spoonbill, or pelican. Many responsible people do not want these jewels to fall prey to short-term exploitation or destruction by timber companies, new supermarkets, or tourist facilities. The radical reconstruction of Eastern Europe should not be composed of imitations of Western “achievements,” for example, the complete eradication of intact landscapes through the introduction of roads, housing, industrial areas, and intensive agri- or silviculture. With the spirit of revolution in mind, it should be possible to stop political opportunism and belief in growth and progress, which has so often led to the irreversible destruction of the bases of our existence, including our own identity.

Thoughtful people in the East and West hope that the necessary political, social, and economic conversion will lead to a more future-oriented life on the basis of a new understanding of nature, of multiculturalism, regionalism, and an ecologically sound economy. With the border zones having been the former “no-man’s land” whose landlords—the military forces—are now leaving, a unique opportunity is arising to save real treasures and at the same time to set examples and new standards expressing this consciousness. Thus, concerned environmentalists and economists developed the vision of the “Ecological Bricks for Our Common House of Europe,” a network of border regions ranging from Finland to the Bosporus (Turkey) and integrating the conservation of the most valuable fauna and flora with a sustainable, economic development that allows traditional values to revive.

This could be realized through the necessary decisions of the new governments in the former Eastern bloc countries, where now constitutions, laws, property structures, and plans must and will rapidly change. Many persons now heading state institutions were the leading personalities during the revolution and are keen to introduce new forms and measures. If they accept and support this view, the “Ecological Bricks” could be realized and serve

- as a **model of reconciliation** between two hitherto hostile but now surmounted systems and between people who once lived together;
- as a **model for the rescue of the European environmental heritage**, that is, of the biological treasures and natural diversity that still exist here and which can become a basis for existence, for the present generation as well as for subsequent generations;
- as a **model of an ecologically-oriented economic system** to safeguard the economic resources and the cultural values of Europe on a long-term basis.

Documentation of Ecological Brick Areas

Originally the question was how to make some progress and with whom to form alliance. On March 24, 1990, a group of environmentalists and economists from East and West met in Bonn, Germany, by invitation of the Brick's initiator, Hans Langer (Global Challenges Network), and decided to found an alliance of independent nongovernmental organizations, the Initiative "Ecological Bricks for Our Common House of Europe." It was agreed to invite other organizations in Eastern and Western Europe to join the Initiative in order to build up a European Ecological Movement that promotes the idea of "ecological bricks" and helps to get the necessary political and financial decisions in the relevant countries. It was agreed to produce a document describing the most important regions along the iron curtain in order to explain and illustrate the need for action. The main criteria for the selection of the areas were

- ecologically intact ecosystem(s), of European importance in size and biological interest;
- location near a border, hitherto neither subject to intensive economic exploitation nor effectively protected;
- an area threatened in its substance by severe man-made interference, whether acute or long-term.

With the support of experts from member nongovernmental organizations in many countries, this document could be finished within a few months and would describe 24 Brick areas from the Finnish—Russian border to the Danube delta in three languages, English, German, and Czech (Langer, Zinke, Golub, and Hahn 1990) (Figure 11–1). Its first presentations were possible at the founding congress of the Helsinki Citizens Assembly on October 20, 1990, in Prague (CSFR) at the Pan-European Parliamentary Conference on the Protection of East—West Environment, organized by the Council of Europe in Vienna (October 23–26, 1990), at the General Assembly of the Federation of Nature and National Parks of Europe, May 9–13, 1991, in Kecskemet (Hungary) and later at the European Parliament (Conference Europe 2000 Conservation, September 25–26, 1991, in Brussels and special MEP presentation on November 21, 1991 in Strasbourg), among many other occasions.

Promotion and Support

In order to become more effective, the Initiative decided to establish a coordination office whose location is presently at the World Wide Fund for Nature—International in Vienna, Austria. Its main task is to handle the communication within the Initiative and with potentially interested persons and institutions, that is, nongovernmental organizations, media, governments, international organizations, and financing institutions. Another task of the coordinators is to search for financial and institutional support. The first success was the decision of the Commission of the European Community in Brussels in May 1991 to sponsor the office and, especially, the European Ecological Movement.

Other important contacts could be made with presidents and ministers of Central and Eastern European countries (for example, the CSFR, Germany, Hungary, Bulgaria, and Austria) as well as with some bankers from Western countries (like Germany, Austria, the Netherlands, and the United States. They expressed their appreciation of and real interest in becoming involved in the support and realization of the Bricks. The discussions included the present negotiations of debt conversions between Eastern debtor states and Western creditors. Beside "debt for nature swaps," some of the newly negotiated debt releases already include environmental protection measures. It is now proposed to add Brick areas to debt agreements and debt conversion programs in order to limit closely the exploitation of existing resources and to extend nature conservation in the specific areas. The dialogues with directors from private and state banks have made clear that there are opportunities to support Brick projects, providing the general conditions in the countries are favorable.

One major result of the recent activities was the establishment of the umbrella organization for the future Brick network, the European Trust for Natural and Cultural Wealth, on October 7, 1991, in Prague (CSFR). The preparation of its registration and of the Trust's statutes was mainly done by the Czech ministry for environment. Both the German President Weizsäcker and the CSFR President Havel took on the patronage for its establishment on the day of the signing of the German-Czecho-Slovakian Friendship Treaty, the purpose of which is to express the wish of both countries for reconciliation across their borders.

Following Initiative meetings and numerous contacts with interested groups, more and more nongovernmental organizations decided to join the network. By the end of 1991, 72 organizations from 13 countries, the majority being in the East, had already become members (Figure 11–2). These nongovernmental organizations met at five Initiative meetings in order to discuss and decide on activities and concepts at regional and European levels. The members help to promote the idea of Bricks to the public and to relevant authorities, and they provide contact with experts for regional planning, and for ecological, economic and social questions. As nongovernmental organizations are very familiar, for the most part, both with the real situation in the field and in local, regional, and national politics, they are important partners. They can also provide qualified proposals for conservation, management, rehabilitation, and sustainable use of the most valuable biotopes and ecosystems. In consequence, the relevant experts of these groups are to be integrated in the appraisal and implementation process, as well as in the later monitoring and stewardship of the Brick areas (for example, in Trust committees) (Figure 11–2).

Europeans as Trustees

The European Trust as an umbrella organization is to become the major independent Brick supervisor. Its board and committees are to be composed of representatives from nongovernmental organizations, governments, and international organizations, as well as from personalities from science and culture who can also serve the Trust as popular promoters. This institution is to negotiate with the relevant states on debt agreements, the symbolic transfer of areas into the Trust, and specific development conditions for Brick areas. The institution is responsible for communication and fundraising activities at the European level, as well as for the establishment of national trusts, with its regional supervising committees. Finally, it can strengthen conservation management and economic processes, as well as defining "Brick standards."

The name *Ecological Brick* should also be understood as a characteristic quality label which is awarded to an area in order to recognize its importance for the European natural and cultural heritage. If necessary, the Trust can criticize the situation in Brick areas or insist that areas adhere to certain regulations, for example, to exploitation limits, and it can also withdraw the label *Ecological Brick*. In this sense, Europeans get the unique chance to become the trustees of their heritage. Furthermore, this institution helps to guarantee a distinct quality level of Brick areas and the credibility of the whole concept.

First Brick Examples

Even though the work of the Initiative members was started only two years ago and the major work has been done by very few people and with very limited financial means, the concept of Ecological Bricks has already been adopted in some regions.

Biodiversity program of the World Bank

At the beginning of 1991, the World Bank expressed its interest in financing within its Global Environment Facility's biodiversity program a project in the CSFR. The proposed objective is to assist in the planning and management of five internationally significant areas, to develop integrated programs in biodiversity conservation, and to support a network of such areas throughout Central and Eastern Europe. A specific component will be directed to increase the economic benefits of natural areas (for example, through ecotourism, biological agriculture, and moderate forestry) in order to ensure long-term sustainability of the project.

Part of the intended support is to be directed to the European Trust for Natural and Cultural Wealth in Prague. The World Bank expects the Trust to assist in negotiating debt agreements, to foster communications about the Initiative (through public education and cooperation with other organizations), and to enhance other biodiversity projects in and outside the CSFR.

The five selected areas in the CSFR are the Bricks Sumava (Bohemian Forest), Karkonosze (Giant Mountains), Tatra Mountains, Bieszczady (Eastern Carpathians) and the Palava area (part of the Danube—Morava—Dyje floodplains). All together, they cover 230,000 hectares (all of them except the Eastern Carpathians are already national parks, biosphere reserves, or both), plus several hundred thousand hectares of transition zones or parts in the neighboring countries.

So far, most progress has been made in the Sumava Brick (Bohemian forests), where the Czech ministry for environment wants to realize a sustainable concept in this most valuable forest region of Central Europe. After the demolition of military facilities (iron fences, watch towers, roads, and camps), the depopulated region will not be opened for tourists, hunters, or logging companies. Instead, in May 1991, a 120,000 hectares new biosphere reserve, including a national park, has been established. In June 1991, an interdisciplinary team of local experts, together with a World Wide Fund for Nature—International specialist, presented a management plan that will provide both large-scale protection of the forest biotopes and long-term economies (including moderate forestry, tourism, agriculture, and revived handcraft).

There are also other Bricks in Eastern Europe, for which new Global Environment Facility projects are proposed and, in part, approved: in the Danube delta (Romania), the Rhodope mountains (Bulgaria), and the Bialowieza Forest (Poland). The CSFR projects were approved in December 1991 and were to be appraised and started by summer 1992.

Environment education projects

In January 1991, a teacher and the graduate class from the Horticultural High School in Vienna, Austria, began a trilateral environment education project in the border area near Bratislava. They decided to make their field studies in the Brick area near the Danube and the borders to Hungary and the CSFR. By contacting similar schools across the borders, they could initiate mutual visits, joint studies, and a trilateral partnership. On Earth Day 1991, the pupils planted trees in a joint ceremony in order to reestablish a former “linden tree alley,” which, until World War II, linked the three countries. Together with speeches of invited politicians and folklore groups, former cultural and ecological links were commemorated and revived. In the meantime, school authorities decided to support these efforts and to even extend this program.

Another, bigger educational project is currently under preparation in Southern Poland. Members of the Workshop for All Beings want to increase ecological knowledge and environmental awareness by means of a newly created Centre for Ecological Education. It is located near Bielsko-Biala, a city south of Katowice, which is close to one of the most polluted industrial regions of Europe. Its main purpose is special training of teachers, as well as young people and other interested persons. Furthermore, the Workshop seeks to build up a network of eco-education centers in Poland and to strengthen its contacts across the CSFR border and with other European educational centers. In the last two years, the environmentalists convinced the city and the regional authorities to support this idea and to turn the still-intact Wapienica Valley, a 1,500 hectares mountainous forest area with a drinking water reservoir near the CSFR border, into an “ecological park” and to restrict its use to recreation and education. IEB is currently looking for a sponsor for this project.

Sustainable regional planning

There are currently a number of regions in Central Europe where sustainable development is to be achieved. Especially in Eastern Germany (for example, the states of Brandenburg and Saxony), this economic concept is being supported by state authorities. IEB is specially connected with nine districts in the Upper Ore mountain region at the border to Northern Bohemia (CSFR). IEB-related economists help to conceptualize and carry out the different planning steps. This includes establishing transfrontier contacts and enhancing similar regional planning in the Czech Republic, the environmental ministry of which is very supportive of this endeavor.

Outlook: Who Wins?

With the recent developments, the chance to turn a vision into reality looks very promising. It seems that the Ecological Bricks could become a major innovation in Europe. The whole chain of Bricks between Finland and the Bosporus could become the ecological backbone of the new house of Europe. And in the near future, “ribs” could grow towards East and West, promoting this concept all over Europe.

Nevertheless, competition between many lobbying groups, consultants, and selfless investors today is very strong. One cannot mistrust everybody when help is urgently needed. But which help is the best? Quite often, egoism and the peremptory demand for Western consumption standards overrules careful thinking. Even within the Bricks concept, there are some serious threats and risks that could weaken or even stop the whole development:

- **The "I—know—better" risk**. Since this is a movement of independent groups and persons, it is clear that discussions and criticisms are needed and helpful, but they can also become counterproductive. Conservation-oriented economists do not necessarily have the same views as conservationists, whose happiness lies in the purest wilderness. Should small and unexperienced nongovernmental organizations have the same influence as internationally working organizations? On the contrary, it is quite unthinkable that state authorities should share their decisionmaking power with nongovernmental organizations.
- **The development risk**. The threat of exploitation and overuse, a well-known problem in all protected areas, is not really solved with this concept. The permission of human activities, the definition of management and zone systems, is a difficult task. For example, for cultural—historical or even biological reasons, it could be that traditional uses have priority over strict preservation. The question is, who can decide and how can equal standards be kept in the wide variety of European ecosystems and states?
- **The political risk**. Presently, realization of the Brick concept seems to be much easier in Eastern countries. However, the political instability in these states could mean that even tomorrow, a serious and trusted personality will be exchanged for another, cleverer personality that will possibly have very different interests. Furthermore, the risk of Brick development on only one side of the border could entail problems for the whole region.

It is clear that the starting of a Brick will often not happen at the same time on both sides of the border. Presently, many regions are facing arbitrary development, which is also unacceptable. Thus, the decision to begin also has positive sides and outlooks:

- The arbitrary startup of Bricks could force a neighbor to follow and catch up with the "modern development." No politician wants to develop the reputation of being old-fashioned and having missed out on the chance to do something.
- The Brick's concept is very attractive: ecology, reconciliation, ethical values, and reviving of traditions are positive demands nobody can refuse.
- After four decades of separatism and alienation, people are now curious and interested in learning more about "the other" and the region that previously united them.
- The present vacuum in the "no-man's-land" is certainly a situation that has to be changed. Knowing that not all regions are equally valuable, it is necessary to concentrate efforts on the most important areas, even though the idea of establishing a whole green belt might also be very attractive.
- The possibility of gaining practical experience in Brick areas is also very important. The need to change obsolete practices is still not obvious for many people, or they do not believe in alternatives. With living models, persuasion comes without effort.

It can be concluded that the presented model for the integration of conservation and sustainable economy, especially along the former iron curtain, is a widely accepted and realistic concept. It has made important progress and is now at the point of no return. If the expected projects continue and if scientists, planners, and the decisionmaking bodies start their work, the first practical experiences will soon be available. Thus, Ecological Bricks could become a solid foundation for the new European House.

Figure 11–1. Ecological Bricks

Figure 11–2. Initiative "Ecological Bricks for Our Common House of Europe"

Bibliography

Langer, H., A. Zinke, V. Golub, and C. Hahn, eds. 1990. *Ecological Bricks for Our Common House of Europe*. Special booklet no. 2, Verlag für Politische Ökologie, Munich.

Figure 11-1. Ecological Brics

1. Finnish-Russian Woodland Area
2. Biebrza Marsches
3. Bialowieza Virgin Forest
4. Schorfheide / Chorin Area
5. Spreewald
6. Sächsische Schweiz
7. Karkonosze Area
8. Tatra Area
9. Pienini Area
10. Bieszczady Region
11. Slovakian Karst
12. Floodplain Areas of the Danube, Thaya and March
13. Thaya Valley
14. Trebonsko Pond Region
15. Bavarian Forest, Bohemian Forest Area
16. Lake Neusiedel
17. Mur Floodplain
18. International Karst Park
19. Lower Reaches of the Drau and Kopacki-Rit
20. Sava Floodplain
21. The Danube Delta
22. Lake Scutari
23. Prespa Area
24. Rhodope Mountains, Nestos Delta and Adjoining Areas

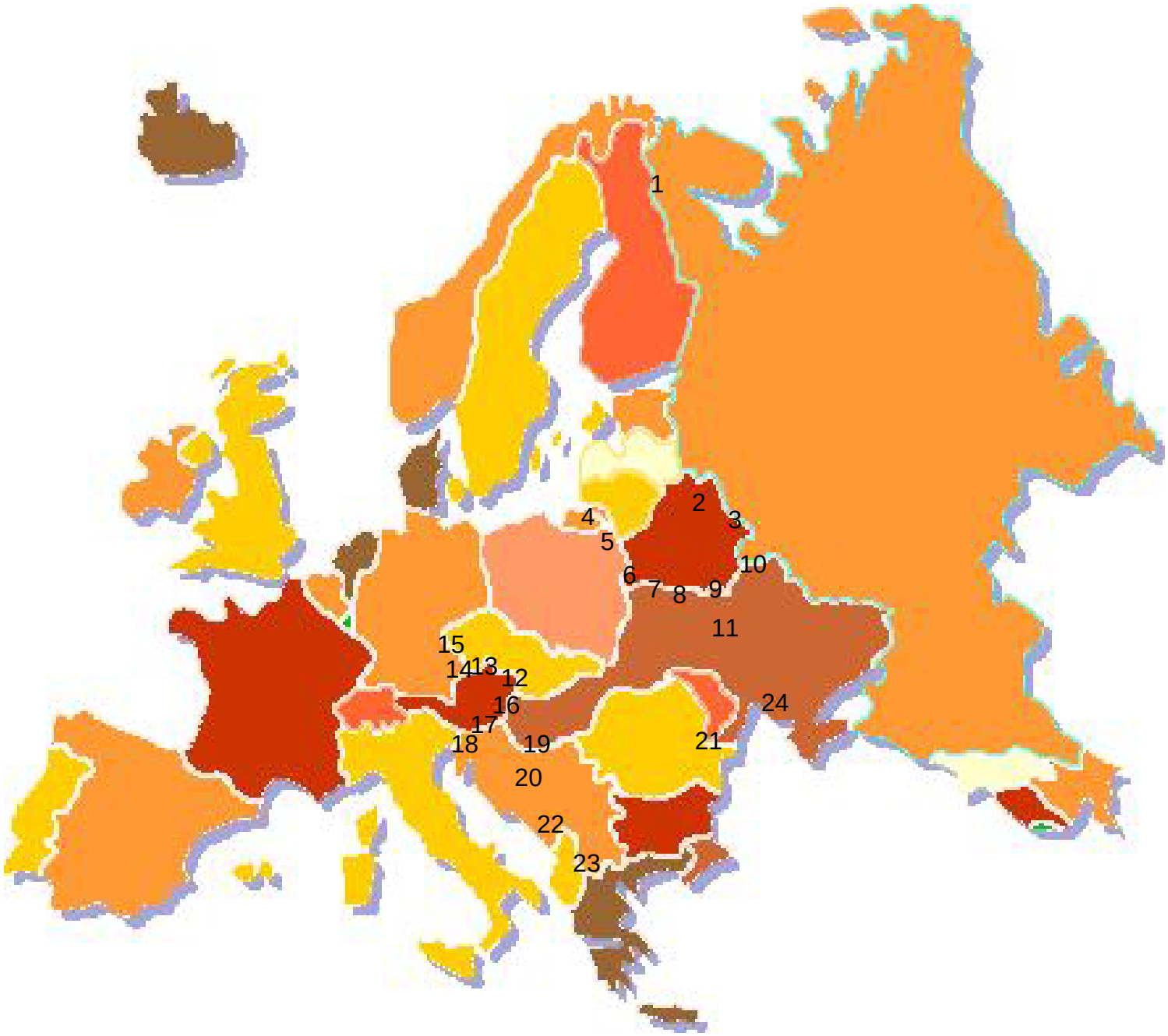


Figure 11-2. Initiative « Ecological Bricks for Our Common House of Europe »

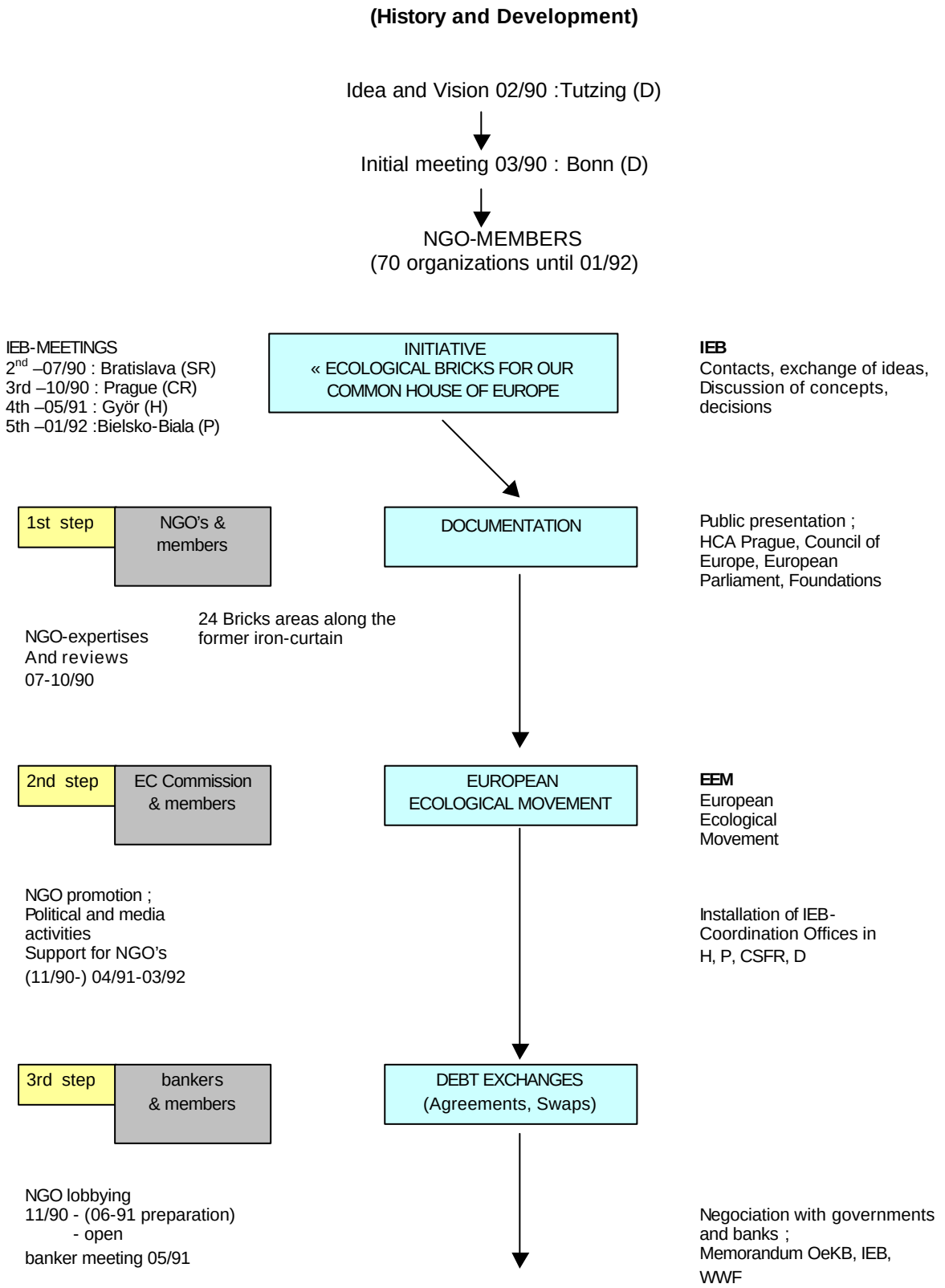
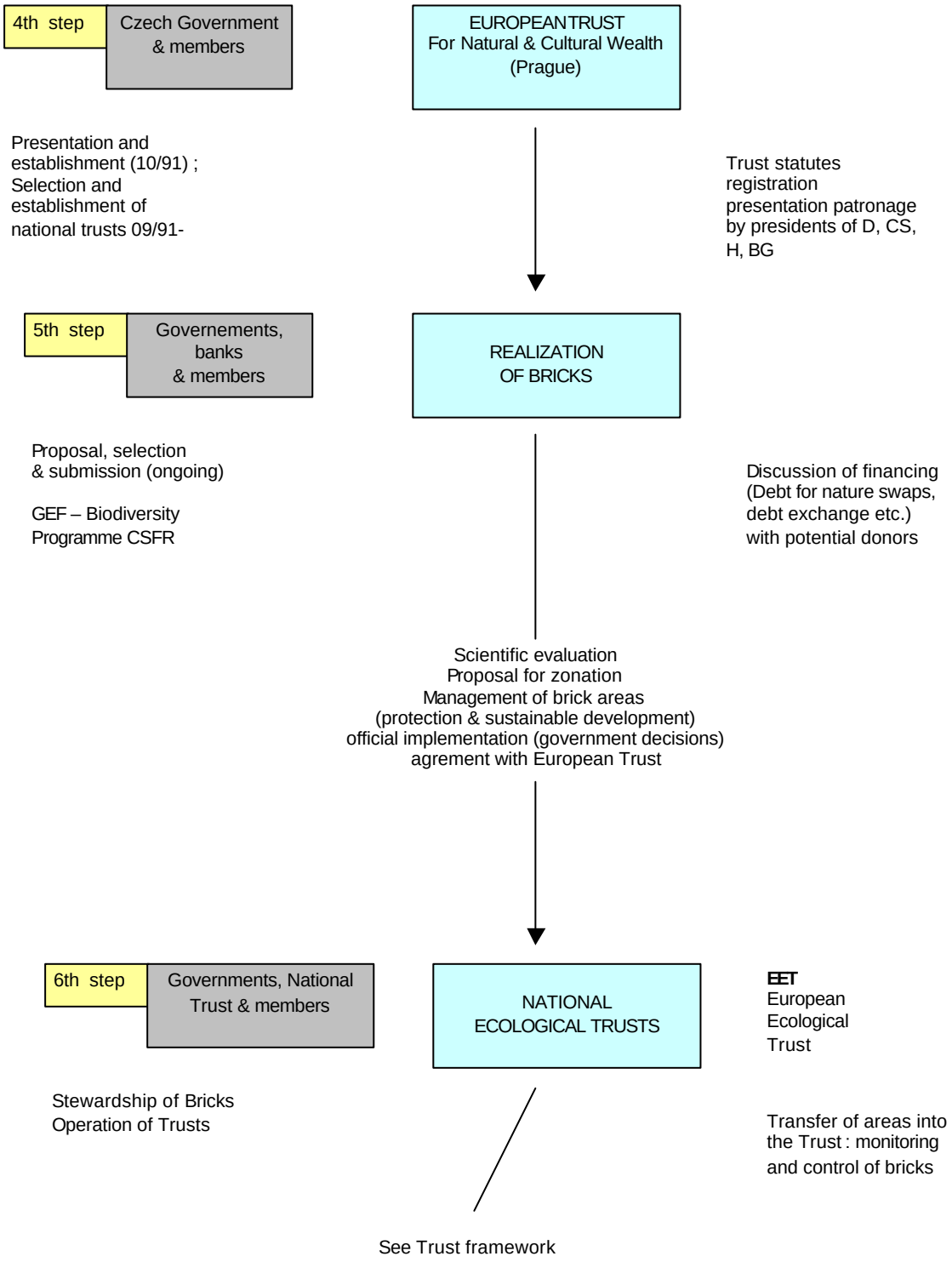


Figure 11-2 (Continued)



Zinke A. 1991. “Mittel- und Osteuropa: Europas Wilder Osten.” *Panda Magazine* 2/91, World Wide Fund for Nature—International, Zurich, Switzerland.

12 The Influence of the Reprivatization of Land on Nature Protection and Protected Areas

Marija Zupancic-Vicar

IN THE FORMER SOCIALIST COUNTRIES of eastern and central Europe, among which one can also count the young Republic of Slovenia, social and economic relations are being reregulated. Questions concerning ownership seem to be among the most important ones, especially in the case of agricultural grounds and forests that were nationalized after the Second World War. Until very recently, they belonged to the State or were, as in the case of Slovenia, listed as items of so-called public ownership. Now they are being rapidly given back to the original owners, a process we call reprivatization.

These positive changes are already being felt in terms of the general democratization of the society, the free market, and in human rights. But some unwelcome side effects are feared, too, side effects which would lead to a decrease in the role of State as an agent of public interest in such areas as the protection of forests. This, alas, can already be seen in Slovenia, where the right of pre-emption in the protection of nature, so common in the modern world, is ignored. The existing legal system of Slovenia does not provide modern solutions to the problem of people’s relation to the State on the one hand and natural resources on the other. The fact is that sometimes the people’s right to the use of land is being applied too widely, for example, in allowing the picking of mushrooms and other side products of the forest. Such problems compel us to take swift yet complex action to preserve nature itself and her natural resources more efficiently and to secure the already existing protected areas.

Protection of Nature

Lacking a complex body of regulations regarding the protection of nature, we strive to initiate an act on the laws affecting the protection of the nature passed by the Parliament of Slovenia. Some improvements to the present legislation regarding the protection of water, forests, and other natural resources should also be made. The new act should set up principles that should be followed when regional authorities make decisions, for example, regarding regional planning. The new act for the protection of nature should not concern only the most valuable and untouched parts of nature, but also the natural resources and nature in general. The starting point in the regulation of our relations with nature should be ecocentric and based on the “right of nature,” on the protection of nature on her own behalf. Natural resources do not exist only for man. The legal system must also take into consideration other creatures in nature and the basic principles of co-influence and balance. Natural resources are not a product of man; they are bound up with the universe, with nature. It is much more than necessary for us to abandon our anthropocentric point of view regarding nature and the way we treat her.

Natural Resources and the Right of Ownership

A very important problem in the present body of legislation concerning the protection of nature is the handling of natural resources. Under the term “natural resources” we understand nature with all her elements, energy, links, changes and principles that form a base of life to all living beings and are, at the same time, a part of them. The complex relationship between the organisms, their biotops, and their habitats should prevent us from acting one-sidedly without researching the possible consequences to the remaining living beings. To prevent unpredictable consequences, the exploitation of natural resources should be regulated by numerous restrictions. A number of resources should be accessible to the public, but the law must say precisely which resources (for example water, air, minerals, sea shores and river banks) are goods of public interest. Public exploitation of a certain natural resource very often causes conflicts with its private owner. Therefore, it is very essential that the act in question limits the power of the private owner. The right of ownership cannot be absolute, but relative protection of ownership must be guaranteed by the state, given its social functions. Legislation, theory, and the legal practice must be based on the principle that ownership cannot hinder social justice. This is one of the principles of the social state. The positive results achieved through international cooperation and numerous conventions and agreements concerning nature protection give us a reason to strive to work even closer with other countries on legislation

concerning the protection of nature and areas already designated as *protected*. The traditional laws set on the territorial boundaries are no longer useful.

Some Suggestions and Conclusions

Given the situation in Slovenia, I urge legislation in the following areas:

- International adjustment of legal issues to achieve a uniform and compulsory universal system of nature protection and an obligatory transfer of the achievements that gave best results in nature protection.
- Passing an act on nature protection (a law on the state level); taking into consideration internationally accepted norms, conventions and agreements.
- Putting into force the right of pre-emption of the state (or municipality) at selling off the grounds inside national parks and protected areas as the new act on reprivatization requires, or in case when this grounds are offered on the market and systematic purchase by the state of all the privately owned lands in such areas.
- A reasonable regulation of public interest on natural resources, especially inside the protected areas.
- Protection of natural resources in its widest sense to prevent one-sided interventions of people and a legal system of rules and regulations regarding the use of natural resources, especially on the protected areas.
- The acceptance of the directions and recommendations of the IVth World Congress on National Parks and Protected Areas for efficient nature protection.

Please excuse me if some views and solutions were quoted which are more than clear to the participants of this congress or might be in use in their countries for many years. I wanted to stress the fact that all this is still not something widely understood in our country and that a larger circle of scientists and politicians have still to be found to fight for more efficient nature and natural heritage protection in the existing protected areas.

In addition, all of the points mentioned above were stressed expecting your support and acknowledging our need for a closer connection to international governmental and nongovernmental institutions. I am sure that the recommendations of this congress will provide us with very essential support with our efforts.

B Economic Valuation of Protected Areas

13 Starting Resource Accounting in Protected Areas

Maria Dulce M. Cacha

AMONG THE WEAKNESSES of the national income accounts, one that gets more attention particularly from environmentalists is the failure to account for the use or depletion of natural resources and expenditures for environmental protection. The growing acceptance and advocacy of the concept of sustainable development has focused even more attention on this deficiency. It has also led to more serious efforts toward developing alternative approaches for accounting for natural resources and environment.

Natural resource accounting aims to provide a true measurement of the national income by properly accounting for the depletion of natural resources and integrating that information into the national income accounts. Just as there are problems in using national income (or gross national product, GNP) as the measure of economic growth, there are even more problems in incorporating natural resources and environmental information into the economic income accounts or System of National Accounts. Notwithstanding these problems, the management of protected areas, which is still in its infancy in the Philippines, will benefit greatly in pursuing national resource accounting at this early stage. This chapter discusses national resource accounting, some of the approaches and current efforts toward its development, and some of the basic issues in its implementation. The chapter also discusses how national resource accounting can be applied in protected area management. Some of the important operational considerations are presented in the discussion of the

operational requirements in starting national resource accounting. The main reason for adopting it is reiterated in the conclusion.

Natural Resource Accounting

The main objective of national resource accounting is to adjust national income to reflect the true income for the period, that is, to consider the ability of natural resources and environment to sustain economic production or growth. As the measure of growth, national income or GNP gives policymakers and the general public the wrong notion of well-being by not accounting for the depletion of resources in generating the increased production. This has very serious implications for resource-based economies, especially in the case of developing countries.

As an accounting system, national resource accounting aims to (a) prepare a "balance sheet" giving a profile of what stocks of resources are available at a given point in time; (b) prepare an account of what uses are made of these stocks, what sources they are derived from, and how they are added to or transformed over time; and (c) ensure that the stock accounts and the flow accounts are consistent, so that the balance in any given year can be derived from the balance sheet of the previous year plus the flow accounts of that year (Pearce, Markandya, and Barbier 1989).

As an accounting system and as an information system, national resource accounting provides a snapshot of the natural resource at a given point in time, the balance sheet. It also provides the continuous collection of consistent data or information useful in the management and policy assessment and formulation. For practical purposes, the information collected in the process of accounting is useful to resource managers and policymakers alike. For some users, this can be the very reason for adopting national resource accounting.

The various national resource accounting approaches and efforts on national resource accounting

The worldwide alarm regarding the evident deterioration of the environment demands a more definite adjustment in the national income account rather than mere footnotes or warning statements on its failure to account for the costs of natural resource utilization and environmental protection. Over the years, various approaches have been developed to remedy this particular deficiency of the national income account. These have been classified in several ways. Some classify the strategies into (a) cost accounting, (b) physical accounting, (c) depreciation accounting, and (d) input-output accounting (Michaels, Grambsh, and Peskin 1991). Others would simply group them according to the values used: the "single-value" and the "use-value." The single-value requires that all environmental externalities and resource depletion be converted into money-value such that integration with the national account is immediately possible. The use-value, on the other hand, goes through the physical accounting of material and energy use, the physical stock and flow of natural resources, and state-of-the-environment indicators. These approaches are by no means strict alternatives but rather complementary. Indeed, determining money values requires physical accounting of resources or environmental goods and services first (Friend 1991).

Falling under one or more of these classifications, other efforts to integrate the environment and natural resource parameters into the national accounting framework are: (a) Material-Energy Balance Statistical System (MEBSS), the framework used for the development of the United Nations (UN) environmental statistics, providing a detailed stock or flow accounting of materials and energy in production and consumption processes; (b) Norwegian resource accounting, which is really physical accounting of resources; (c) French patrimony accounts, which is more comprehensive than the Norwegian and includes valuation; (d) Indonesian or Repetto's forest resource accounting, which combines the physical and valuation/monetary accounting for selected forest resources; (e) Netherlands National Accounting Matrix with Environmental Accounts (NAMEA), through satellites modular accounts, environmental externalities/costs (not resource depletion) are integrated into the National Income through accounting matrices; and, (f) UN Statistical Office's (UNSO) System of Integrated Environmental-Economic Accounting (SEEA), where the environmental costs of "quantitative" depletion of natural resources and "qualitative" environmental degradation (from pollution) are introduced into the national income accounting. A project on forest resource accounting in the Philippines has been started last year and will soon be completed.

Basic issues on national resource accounting

While national resource accounting is already being adopted by some countries, many issues remain unsettled and unresolved because of the theoretical and basic assumptions of the System of National Accounts. Nonetheless, experiences reveal that with full understanding of its limitations and under certain conditions, national resource accounting is useful in policy formulation and assessment. Some of the basic issues and arguments that should be noted and understood in implementation of national resource accounting are:

- Full integration of the natural resource and environment into the System of National Accounts is not possible because of the basic assumption of the neoclassical economics (the atomistic-mechanical world view) that resources are divisible and can be owned. Rather, natural resources are not divisible, they cannot be owned, and changes are irreversible, such that the market mechanism fails to perform its allocation function for environmental goods and services (Redclift 1988). Many of the natural resources and environmental goods and services are nonmarketable and are considered public goods.
- Valuation using money values and market prices, while probably the most practical approach, will result in distorted resource values as they reflect the distorted or imperfect market (Norgaard, 1989). In developing economies, market prices are even more distorted with the extremely uneven distribution of wealth and access to resources. Also, the irreversible losses due to use or misuse of resources are difficult to value in money terms.
- The problem of valuation is aggravated by the lack of, or limited, knowledge of the interrelationships of the various biological elements among themselves within and with the ecosystem and how economies interact with the environmental system (Norgaard 1989). An ecologically important resource may not be considered for valuation because little is known on its nature. Furthermore, valuation of a resource will change, not only with its additional application or use (whether brought about by advances in technology or not), but also with new knowledge and appreciation of its ecological services.
- Another issue is whether to treat resources, particularly depletable ones, as capital assets or as inventories. Treating depletable resources as capital will provide an accurate balance sheet but misleading income figure. This is evident in cases where new discoveries are recognized in the accounts such that income is increased because its value exceeds the amount used during the period (El Serafy 1991).
- The SNA System of National Accounts deals with national aggregates; national resource accounting, on the other hand, will necessarily entail more detailed and more geographic specific data, if it is to fairly reflect its values. Different species from different places command varying market prices or values. Also, different places or regions are affected differently by resource degradation or pollution.
- Institutions responsible for the implementation of a System of National Accounts and those responsible for the generation of information used for national resource accounting are different and separate from each other. Also, the background and level of expertise of people making analysis of national resource data are different from those who are doing the accounting. Close coordination among the all these institutions and persons would be required at the stage of designing the national resource accounting system.
- The depreciation that is deducted from the gross income to produce net income is the economic depreciation or the reduction in economic value of the resources (Peskin 1991). This is not the same or equal to the physical deterioration of the resources. Ecological value of the resource is not the same as its economic value. The System of National Accounts is an economic measure and this should not be forgotten in integrating national resource accounting and in interpreting the resulting indicator-income. The reduced capacity of the environment to sustain development is very difficult to measure in terms of economic value in imperfect markets, which all economies are.
- The diverse nature and uses of resources and the many ways environmental costs are incurred justify plurality of methodologies both in their valuation and in integration of national resource accounting with a System of National Accounts.

- The incomplete, inconsistent, or total absence of data or information on a resource makes accounting difficult or impossible.

National Resource Accounting and Protected Areas

The main difficulty in applying national resource accounting on protected areas is the identification of the resources that should be included in the system and the method of valuation that should be adopted for each of the included resources. Considering the diversity of the biotic elements (known and unknown) composing the ecosystem and the still undetermined relationships of many of them with the environment and the economy, accounting for the protected areas would seem to be an enigmatic job. But the fact that an area is designated protected and is being managed means that national resource accounting can and should be applied.

An area is protected to preserve genes, species, and habitat and to maintain various ecological processes of importance to humanity. Protected areas are legally established areas, under either public or private ownership, where the habitat is managed to maintain a natural or seminatural state, the primary reservoir of the world's biodiversity. Protected areas are among the valuable management tools to conserve biodiversity. Biodiversity conservation is the management of human interactions with the variety of life forms and ecosystems so as to maximize the benefits they provide today and maintain their potential to meet future generations' needs and aspirations (International Union for the Conservation of Nature and Natural Resources [IUCN] definition). Biodiversity, the elements of life, and ecological processes, interaction among species and between species and their environment, are linked to each other and to the goods and services they provide. Among the direct uses of biodiversity are breeding stocks, foods, and medicines. Ecological processes such as production, decomposition, nutrient and water cycling, soil generation, erosion control, pest control, and climate regulation provide important services to human survival. There exist many more species which have not been identified and whose uses and services are still unknown. Indeed, the combined potential of plants, animals, and microorganisms in solving human problems such as hunger, disease, and economic stagnation is only beginning to be tapped. It is for this reason that development strategies being put forward as local, national, and international priorities are for the maintenance, study, and sustainable use of biological resources (Reid 1989).

Applying national resource accounting in protected areas

Adjusting the national income to take into account the losses in biodiversity is not immediately possible nor can it be expected in the near future. However, adopting the accounting framework in gathering, storing, and processing data on the protected areas will eventually make valuation and income adjustment possible. Initially, physical accounting of resources can be adopted. Adopting national resource accounting will necessitate the determination or study of the interrelationships of valuable species with their habitats and ecological processes. This type of study is important in the management of protected areas and will have to be undertaken with or without national resource accounting. Using a system of national resource accounting will provide consistent sets of data that will be useful in studying and managing the resources in the protected areas and in assessing and formulating related policies since it requires a systematic recording of data.

Establishment and management of protected areas are conscious and focused efforts to conserve biodiversity in areas of biological importance. These efforts require the delineation of boundaries; identification, inventory, and monitoring of resources or species; undertaking of controlled interventions to achieve given objectives; and periodic assessment of impacts or results of these efforts. The work can be greatly facilitated and supported by an information system. Using the accounting framework for the information system for the protected areas will effectively serve management objectives as well as national resource accounting objectives for those areas. Thus, without disregarding other management requirements, adopting national resource accounting (physical accounting) for protected areas will entail the following:

- Identification of the valuable resources or species in the protected area. This is an exercise done during the selection of sites and further verified in the initial stages of management of the protected area. Species or resources can be considered valuable because of the economic value of their goods and services, of their endemism or rareness, or their being threatened or endangered.

- Identification of elements or factors affecting, positively or negatively, the existence of these resources or species. These are generally determined by the biological characteristics and habitat patterns of the species. Many of these are already known, but further observation and studies will improve and expand existing knowledge.
- Monitoring the movement or changes in the valuable species and the identified elements and factors affecting them. This is actually being done in the conduct of resource assessment and monitoring; national resource accounting, however, will require a more regular monitoring.
- Determination of the relationships, possibly quantified, of these elements or factors with the valuable species. These are of interest to scientists for scientific and management reasons and are the subject of many studies.
- Development of a data base and a system for the processing or manipulation of data (recording, filing, and retrieval system) on the valuable species and other related elements or factors. The data base or information system is useful not only for national resource accounting but for other management and research purposes.
- Development of a system for and the generation of reports on the beginning stock, flow, or changes and ending stock of the resource or species. This will include the application of the estimated impact of the identified elements or factors on the resource or species.

The resulting report on the resource or species flow/changes for the period will not show what actually took place during the period but will show the best estimate on: (a) the status or behavior of a particular species or resource, or, if that information is not available, then (b) on the limitation of the existing knowledge on the selected species and related elements, and (c) the state of the information technology being used.

Operational requirements for starting national resource accounting in protected areas

Although the management actions for protected areas are made at specific sites, the considerations for management of a protected area are determined in the context of the regional, national, and even the global environmental situation. As such, even with the site specificity of the protected area activities, management strategies should be integrated and the operational systems standard in all the protected areas. This will be particularly beneficial if protected area management will make use or at least get into the mainstream of information technology (like the geographic information system or Geographical Information System) in adopting national resource accounting.

The uniform methods and standards are very important in the establishment of data bases for national resource accounting or for the information system for protected areas. Standard and uniform data structure, definition, and coding systems should be adopted to facilitate the regional or national processing of information. But even before the data processing, standard procedures should be prescribed for data gathering for all the protected areas. This is to ensure the comparability and consistency of data. Therefore, the most opportune time to implement national resource accounting is at the start of the development and management of protected areas, when management plans are being designed. Implementation of national resource accounting need not be a separate project but rather a consideration, with its framework as a major basis, for the design and development of the information system for protected areas. Its other requirements can be the subject of research projects under the research program. Be that as it may, establishment of the information system would require the already mentioned uniform or standard procedures for activities related to data or information gathering and processing. Adoption or development of these standards should be made before any related activity is undertaken. Some of these requirements are:

- Standard criteria for determining valuable resources and species.
- Standard survey, inventory, census, and resource assessment methods.
- Uniform or standard indicators and units of measure.
- Uniform names or coding system, data structures, and data elements to be gathered.
- Common-source or uniform base maps.
- Standard system of recording data (standard forms).
- Standard or compatible computer systems and data bases.

- Complementary rather than redundant research activities, particularly those related to the studies of patterns of behavior of species and resources.

Conclusion

Accounting for biological resources in protected areas, even without the benefit of accurate valuation and full integration into the System of National Accounts, will provide a framework for an information system that will facilitate management and development of protected areas. The consistent set of data it will generate will be useful in making operational and management decisions, as well as in the formulation and evaluation of related policies. If it is implemented at the start of protected area development, national resource accounting need not be a separate activity but a major consideration in the design and development of the information system and in the choice of related research projects. Such consideration is not inconsistent but rather supportive of management objectives for protected areas.

Bibliography

El Serafy, Salah. 1991. “Depletable Resources: Fixed Capital or Inventories?” Paper prepared for the Special IARIW Conference on Environmental Accounting, Baden, Austria, May 27–29.

Friend, A. M. 1991. “Pluralism in National Accounting.” Paper prepared for the Special International Association for Research in Income and Wealth (IARIW) Conference on Environmental Accounting, Baden, Austria, May 27–29.

MacKinnon, John, and Kathy MacKinnon, and others. 1986. *Managing Protected Areas in the Tropics*. International Union for the Conservation of Nature and Natural Resources (IUCN), Gland, Switzerland.

Michaels, Gregory R., Anne E. Grambsh, and Henry M. Peskin. 1991. “Neither Fish nor Fowl? Can Environment Accounts Guide Economic Policy, Environmental Policy, Both or Neither? Conclusions from a United States Case Study.” Paper presented to the Special IARIW Conference on Environmental Accounting, Baden, Austria, May 27–29.

Norgaard, Richard B. 1989. “Three Dilemmas of Environmental Accounting.” *Ecological Economics* Vol. 1, No. 4 (December).

Pearce, David, Anil Markandya, and Edward Barbier. 1989. *Blueprint for Green Economy*. London: Earthscan Publications Limited.

Peskin, Henry M. 1991. “National Accounting for Resource and Environmental Degradation: Alternative Approaches and Concepts.” Paper prepared for the Special IARIW Conference on Environmental Accounting, Baden, Austria, May 27–29.

Redclift, Michael. 1988. “Economic Models and Environmental Values: A Discourse on Theory.” In R. Kerry Turner, ed., *Sustainable Environmental Management, Principles and Practice*. Boulder, Colorado: Westview Press.

Reid, Walter V., and Kenton R. Miller. 1989. *Keeping Options Alive: Scientific Basis For Conserving Biodiversity*. Washington, D.C.: World Resources Institute, October.

14 Functions and Values of Protected Areas: A Comprehensive Framework for Assessing the Benefits of Protected Areas to Human Society

Rudolf S. de Groot

A Comprehensive Method to Evaluate Functions and Values of Protected Areas

HUMAN WELFARE AND THE QUALITY OF LIFE depend in many ways, directly or indirectly, on the availability of environmental goods and services. To obtain better insight into the multitude of functions (goods and services) provided by natural ecosystems, a so-called function-evaluation system was developed by the author (de Groot 1992).

The following functional categories are distinguished:

- **Regulation functions**: This group of functions relates to the capacity of natural and seminatural environments to contribute to the maintenance of a healthy living

environment by providing clean air, water, and soil and by regulating essential ecological processes and life support systems

- **Carrier functions**: Natural and seminatural environments provide space and a suitable substrate or medium for many human activities such as habitation, cultivation, and recreation, provided the use of these functions remains within the carrying capacity of the ecosystem involved.
- **Production functions**: Nature may provide many resources on a sustainable basis, ranging from food and raw materials for construction and energy-conversion to medicines and genetic material.
- **Information functions**: Natural environments contribute to the maintenance of mental health by providing opportunities for reflection, spiritual enrichment, cognitive development and aesthetic experience.

In addition, it must be understood that there are many hitherto unknown goods and services with potential benefits to human society.

The capacity of a given natural or seminatural ecosystem to provide certain goods and services depends on its environmental characteristics, that is, its natural processes and components. Just as the environmental characteristics of most ecosystems vary substantially, so too are the functions of different ecosystems quite different. To develop a general checklist of parameters that may be used to assess the contribution of a given ecosystem to certain environmental functions, several case studies have been carried out by the author on various ecosystem complexes (de Groot 1986, 1988a, 1988b, 1991). Based on these case studies, and on additional information from literature, a checklist of 37 functions that can be attributed to natural ecosystems was designed (see the section on Functions and Values in this chapter).

Once the many functions provided by natural and seminatural ecosystems have been identified and described, the contribution of these goods and services to human welfare can be analyzed in more detail. For each case study, a standardized matrix was used to assess the functions and associated socioeconomic values in a systematic and comparable way (Table 14–1).

For several types of functions and values, notably those which are of direct economic importance, it is possible to calculate monetary values. Assessing monetary values of environmental functions is a rather complicated, and somewhat controversial, procedure, and Table 14–2 shows the different methods available to calculate monetary values for environmental goods and services which broadly fall into two categories: market pricing and shadow pricing.

Discussing these methods in detail is beyond the scope of this chapter. A review of the methods is given in de Groot (1992), while further details can be found in existing literature in the field of environmental and resource economics and accounting (e.g., Dixon and Hufschmidt [eds.] 1986, Folke and Kaberger 1991, Folmer and van Ierland 1989, Hueting 1990, McNeely 1988, Pearce and Turner 1990, Repetto and Magrath 1988, Winpenny 1991). It should be stressed here that socioeconomic evaluation of environmental functions does not necessarily mean placing dollar values on nature and wildlife. As Tables 14–1 and 14–2 show, the total value of environmental goods and services to human society consists of many different values which are described and quantified by different parameters, of which monetary units are but one element. Furthermore, quantification of the socioeconomic benefits of natural areas and wildlife in monetary units must be seen as an addition to, and not a replacement of, their many intrinsic and intangible values.

Functions and Values of Protected Areas: A Checklist and Some Examples

Because of their ecological diversity, the natural ecosystems in protected areas fulfill many different functions (Table 14–3). Preferably, the functions listed in Table 14–3 should be described for each type of ecosystem separately. In order to avoid lengthy descriptions, however, the functions are described here for protected areas in general based upon three case studies carried out by the author, including a case study on the Dutch part of the Wadden Sea, an estuarine environment (de Groot 1986), a case study on the Galapagos National Park, Ecuador, a volcanic, oceanic island ecosystem including 4,300 square kilometers of coastal and marine protected area (de Groot 1998a), and a case study on the Darien National Park, Panama, a tropical moist rainforest (de Groot 1988b).

Which functions are most relevant for a given protected area depends on the ecological characteristics, the cultural and socioeconomic setting, and the management objectives of the area in

question. Many of the functions (goods and services) listed in Table 14–3 are provided by all natural ecosystems regardless of their management status; that is, these functions can be attributed to both protected and unprotected areas, provided these areas are in a largely natural state. This is especially true of the regulation functions. The other functions (carrier, production, and information) are more strongly related to specific human needs and activities and, thus, to the management objectives. In protected areas which allow certain kinds of human use, such as national parks, these latter functions seem more important in terms of the direct economic benefits they provide (e.g., from aquaculture, recreation, harvestable resources, and research). Nevertheless, the maintenance of regulation functions is essential to the proper functioning of all natural systems and should always be taken into account when assessing the economic benefits of protected areas.

In addition to assessing the ecological importance of the many functions of protected areas, it is possible to determine their socioeconomic, and sometimes monetary, value. It is not possible here to elaborate on each of these functions, and below only the four main function-categories are briefly explained. More detailed information on these 29 functions, with examples of their socioeconomic importance and monetary value, can be found in de Groot (1992).

Regulation functions

Natural ecosystems play an essential role in the maintenance of ecological processes and life support systems. Protected areas safeguard the continued proper functioning of these regulation processes, and thereby environmental quality in general. Most other functions of protected areas, such as recreational use, the opportunity to harvest resources, and scientific and educational use, depend on these regulation processes. Often, the importance of protected areas to regulation functions becomes apparent only after these functions have been disturbed. Recognizing the value of protected areas to the maintenance of environmental regulation functions is therefore essential when assessing their full socioeconomic importance.

Carrier functions

This group of functions relates to the capacity of natural ecosystems to provide space and a suitable substrate or medium for human activities which require a permanent infrastructure, for example, habitation, crop growing (including aquaculture), certain types of recreation, and nature conservation. Because of the constraints placed on natural ecosystems with respect to the management objectives of protected areas, only those carrier functions which depend mainly on the natural biological characteristics and which can be utilized and managed in a sustainable manner are considered in this chapter.

Production functions

Natural and seminatural ecosystems provide many resources, ranging from oxygen, water, food, medicine, and genetic resources to sources of energy and materials for clothing and construction. In this chapter, production functions are limited to those goods or resources which are produced naturally and for which humans merely need to invest some time and energy to harvest them. Since natural ecosystems support many other organisms besides man, and perform many functions simultaneously, the capacity of protected areas to provide resources on a sustainable-yield basis is often very limited. Special use zones could be designated within protected areas to allow for extraction of these resources for the subsistence of local people, provided harvesting is restricted to sustainable use levels.

Information functions

Nature is a source of inspiration for culture and art, and provides many opportunities for environmental education and research. As with regulation functions, information functions are usually best performed when nature is left untouched as much as possible. In fact, maintenance of the information value of natural areas was, and often still is, the main reason for establishing protected areas.

Total Socioeconomic and Capital Value of Protected Areas, with Special Reference to the Galapagos National Park

From the previous pages, one can conclude that protected areas fulfill a multitude of functions with many different values to human society. In order to incorporate better all the information on goods and services of protected areas into the planning and decisionmaking process, a matrix has been designed to give an overview of the most important functions and to summarize the associated socioeconomic values (see Table 14–4). Since protected areas may provide these functions in perpetuity, if utilized in a sustainable manner, annual returns should be considered interest on the natural capital and should therefore be translated into a capital or *Net Present Value* (see the section, "The total monetary and capital value of the Galapagos National Park" below). Based on this information, it is possible to estimate the benefit-cost ratio of protected areas, which is usually highly positive if all factors are taken into account (see the section, "Some conclusions concerning the benefit-to-cost ratio of protected areas" below).

Total socioeconomic value of the Galapagos National Park

As an example of how to determine the total socioeconomic value of protected areas, some information obtained on the Galapagos National Park is shown here, based on a more elaborate case study report (de Groot 1988a). As was explained in the first section (Table 14–2), the total socioeconomic value consists of a number of different values which can be attached to environmental functions, some of which may be translated into a monetary value. For functions which have direct economic importance, such as tourism and harvesting of resources, it is possible to estimate a monetary value based on market prices. Monetary quantification of so-called "non-use" functions is more complicated and sometimes impossible or undesirable (e.g., for the intrinsic values attached to nature). Yet, for a few of these "non-use" functions, it is possible to arrive at an estimated monetary value by using shadow pricing techniques (see, for example, column 1 in Table 14–4). The total socioeconomic value of a given natural area or ecosystem is the sum of the different values listed in Table 14–4. Within one value category, the benefits of all functions can be added to arrive at a sum total for the conservation value, use value, or the contribution to employment of a particular natural area. Since the seven types of values in Table 14–4 are not comparable, it is impossible to determine one total "end value" for a given function or natural area, and each type of value must therefore be used independently in the decisionmaking process.

A brief description of the various types of socioeconomic values (columns 1–7 of Table 14–4) is given on the following pages.

Conservation value of the Galapagos National Park

One can rightly argued that most functions provided by the Galapagos national park depend on the conservation of the biological diversity and natural processes occurring in the islands. Although the importance of the environmental functions which maintain the natural integrity of the National Park are usually not reflected in conventional economic accounting procedures, it is possible to assess the indirect economic value of these functions and to calculate a crude shadow price. In the case of the Galapagos National Park, this shadow price was estimated at an average $64 per hectare per year (see column 1 in Table 14–4).

The conservation value mainly relates to regulation functions, whereby two functions (climate regulation and coastal protection) have been left out of the analysis since their economic importance is negligible in this particular study area.

Existence value of the Galapagos National Park

The mere existence of natural areas presents an important factor in the feeling of well-being to many people. They attach great ethical, intrinsic value to nature, and are therefore willing to devote time, energy, and money to organizations which strive for their conservation. In principle it would be possible, through questionnaires or other shadow-pricing techniques, to arrive at a monetary indication for this value. However, it is difficult to distinguish between money donated to conservational measures from money donated for ethical reasons. There are also emotional objections to attempting to quantify the existence value of nature; therefore, this value is only included qualitatively in Table 14–4. A qualitative indication can be obtained by estimating the importance of a given area for certain conservation parameters (e.g., uniqueness or naturalness).

Contribution of the Galapagos National Park to human health

Many environmental functions provided by the Galapagos National Park contribute directly or indirectly to the maintenance of human health, such as the regulation of the local and regional climate, storage and recycling of human waste, providing food and opportunities for recreation, education, and research. The consciousness of the importance of these functions to human health is only slowly emerging, and the economic benefits are partly reflected by some of the calculations made for the other value-categories, notably the conservation and productive use values. The importance of certain environmental functions to human health is therefore only indicated in qualitative terms in Table 14–4, yet human health impacts are important factors that should be taken into account on their own merits in the planning and decisionmaking processes.

Option value of the Galapagos National Park

This value deals with the importance placed on maintaining the option to benefit from known and as yet unknown functions of natural processes and components in the future. For this reason, the conservation of natural areas, such as the Galapagos Islands, represents an important contribution to human welfare by satisfying the need for a safe future for both present and future generations. The monetary value is therefore at least equal to the total value of the estimated future benefits of the conservation and productive use values combined, which today amounts to $120 per hectare per year. To avoid counting this value twice, it is not included as a separate entry in Table 14–4.

Consumptive use value of the Galapagos National Park

The consumptive use value relates to goods and services which are harvested and used directly by the local population without passing through the market. Harvesting natural resources for direct consumption in the Galapagos Islands is rather limited and mainly relates to catching fish and crustaceans (lobster) by local people and smaller tour boats. Possibly some local inhabitants also collect firewood and construction material for personal use. Also the direct “consumption” of information functions such as the aesthetic quality and historic value of natural ecosystems, should be mentioned here. Monetary quantification of these consumptive use values is rather difficult and has not been attempted within the scope of this case study.

Productive use value of the Galapagos National Park

The productive use value of environmental functions in the Galapagos Islands mainly relates to recreation, harvesting of natural resources, and income from scientific expeditions. As Table 14–4 shows, the potential direct economic benefits of the functions with the productive use value provided by the Galapagos National Park (column 6) amount to $56 per hectare per year, or about $64 million per year for the entire study area.

Contribution of the Galapagos National Park to employment

An important indicator for the socioeconomic value of environmental functions is their contribution to employment. The total work force in Galapagos in 1983 was 2,444 persons; from the case study (de Groot 1988a) it was concluded that most people (almost 60 percent of the work force) in Galapagos are, directly or indirectly, dependent on the conservation and sustainable use of environmental functions provided by the national park. From an economic perspective, the most important activity is tourism, with a yearly contribution to the local economy of $26.8 million, which is 75 percent of the total local economic production.

The total monetary and capital value of the Galapagos National Park

In the case of the Galapagos National Park, the total monetary return from environmental functions amounts to about $120 per hectare per year (see Table 14–4). This value must be considered a minimum estimate, since for many functions no monetary value could be calculated, even though they provide significant benefits and their indirect or potential contribution to the economy is considerable.

Since environmental functions provide goods and services to human society indefinitely when utilized in a sustainable manner, the monetary value of environmental functions must be seen as the interest of the capital stock of the natural processes and components that provide these functions. At

an interest rate of 5 percent, this amounts to a capitalized value or Net Present Value (NPV) of about $2,400 per hectare, or almost $2.8 billion for the entire study area. In addition to their great ecological and intrinsic value, the Galapagos Islands—in their present, largely natural state—thus represent a considerable economic value as well.

Some Conclusions Concerning the Benefit-Cost Ratio of Protected Areas

As the section above entitled “The total monetary and capital value of the Galapagos National Park” shows, the combined economic value of the sustainable use of environmental functions is often considerable and usually far exceeds the short-term returns from nonsustainable use of only some of the functions of a given natural ecosystem or protected area. Two case study examples are given below.

U.S. Virgin Islands

In 1980–81, the Island Resources Foundation conducted a major study for the U.S. National Park Service on the economic benefits of the Virgin Islands National Park (VINP), St. John. The VINP occupies 55 percent of all the land of St. John. Approximately one third of the total park is sea. In its analysis of costs and benefits, the study distinguishes between direct and indirect costs and benefits. Operation and maintenance of the VINP are the direct costs, and interest on federal investment in VINP properties and taxes lost on property removed from local government rolls are the indirect costs considered in the study. Direct benefits are the outlays of VINP concessionaires in the local economy, and the indirect benefits are the imputed benefits from VINP impact on tourism, on boat industry, and on increased land values on St. John (as an indicator of increased economic growth on St. John). The dollar values for each of these costs and benefits have been calculated and reduced to benefit-to-cost ratios. The benefit-to-cost ratio of the existence of the VINP on the local economy, based on direct costs and benefits only is 2.7 to 1. Based on indirect costs and benefits only, it is 23.7 to 1, and based on all costs and benefits (direct and indirect), it is 11.1 to 1. The study concludes that the VINP plays a significant role in the economy of St. John and that this role should be increasingly important in view of the aesthetic and cultural benefits provided by the park (Posner and others 1981).

Cahuita National Park, Costa Rica

Cahuita was the first national marine park established in Costa Rica. Its objective is to preserve the unique fringing reef of this area. The park occupies 1,100 hectares on land and approximately 600 hectares in the sea (van’t Hof 1985). The park also features a historically interesting shipwreck. In determining the benefits of the park, the study follows a method whereby the satisfaction or benefit of a visit to the park is expressed in terms of the salary that someone could have earned if he had spent his leisure time working instead of visiting the park. An average salary of park visitors was calculated from interviews with visitors. A net benefit per visitor was further calculated by subtracting the average costs of transportation to get to the park. The costs of the park were calculated from the investment made to create park facilities (with a 20 percent annual depreciation), operating and maintenance costs, and interest. The resulting benefit-to-cost ratio for the Cahuita National Park is 9.54. The study concludes that the park is economically beneficial and that the calculated benefit-to-cost ratio is high. The benefit-to-cost ratio is attributed to the large number of visitors, the low costs of transportation, the relatively low cost of investment and operation, and to the fact that no land acquisition was involved (Marcondes 1981).

In addition to these specific case studies, there are many other examples of the economic benefit-cost ratio of sustainable use of natural ecosystems. Peters, Gentry and Mendelsohn (1989), for example, showed that the sustainable use of only some of the functions of a tract of Amazonian rainforest (notably “minor” forest products, such as fruits and latex) was already after two years economically more beneficial than clear-cut and agricultural profits combined.

Thus, when all factors are taken into account, most natural ecosystems and protected areas have a highly positive benefit-to-cost ratio. It is therefore recommended here to increase efforts on investigating the full economic value of protected areas. Better information on the economic value of protected areas will most likely provide an important incentive to allocate sufficient funds for their continued conservation and to stimulate sustainable utilization of the important functions of these areas.

Table 14–1. Functions and Values of Natural Ecosystems

	Ecological values		*Social values*		*Economic values*		
Environmental functions	*Conservation value*	*Existence value*	*Health*	*Option value*	*Consumptive use value*	*Productive use value*	*Employment*
Regulation							
Carrier							
Production							
Information							
TOTAL for ecosystem or natural area							

Table 14–2. Types of Socioeconomic Values and Methods to Determine Their Monetary Value

	Monetary valuation methods						
		Shadow price					
Types of socioeconomic value	*Market Price*	*Cost of environmental damage*	*Maintenance costs*	*Mitigation costs*	*Willingness to pay/accept*	*Property pricing*	*Travel cost*
Conservation value		x	x	x	x		
Existence value			(x)[a]		(x) [a]		
Health			x		x		
Option value			x		x		
Consumptive use value	x[b]						
Productive use value	x					x	x
Employment	x						

Table 14–3. Checklist of Functions of Protected Areas

1. Regulation functions	
1. Regulation of the chemical composition of the atmosphere and oceans	a
2. Climate regulation	a
3. Watershed protection	a
4. Water catchment	a
5. Coastal protection	a
6. Erosion prevention and sediment control	a
7. Fixation of solar energy/biomass prod.	a
8. Storage and recycling of organic matter, nutrients, and human waste	a
9. Biological control	a
10. Nursery function and migration habitat	b
11. Maintenance of biological diversity	b
2. Carrier functions	
1. Habitation (indigenous people)	c
2. Cultivation (sustainable)	c
3. Energy conversion	c
4. Recreation and tourism	c
5. Nature protection	b

[a] The existence value could be quantified by these techniques, but it is argued that it is principally wrong to put a monetary price on this value.

[a] The existence value could be quantified by these techniques, but it is argued that it is principally wrong to put a monetary price on this value.

[b] Often only possible with surrogate market pricing techniques.

3. Production functions	
1. Food/nutrition	c
2. Genetic resources	c
3. Medicinal resources	c
4. Raw materials for clothing, etc.	c
5. Raw materials for manufacturing, etc.	c
6. Biochemicals	c
7. Fuel and energy	c
8. Ornamental resources	c
4. Information functions	
1. Aesthetic information	b
2. Spiritual/religious information	b
3. Historic information	b
4. Cultural/artistic inspiration	b
5. Education/scientific information	c

a The existence value could be quantified by these techniques, but it is argued that it is principally wrong to put a monetary price on this value.

b Main objective of protected areas; in principle compatible with conservation objectives and national park management.

c Secondary objective, only to be utilized when this is possible in a sustainable manner (i.e., without interference with primary objectives), preferably in special use zones.

Table 14–4. Socioeconomic Value of the Functions of the Galapagos National Park Based on Sustainable Use Levels

	Types of values (for explanation, see text)					
	1	*2*	*3 + 4*	*5*	*6*	*7*
Environmental functions	*Conservation value*	*Existence value*	*Social values*[c]	*Consumptive use value*	*Productive use value*	*Value to employment (no. of people)*
Regulation functions	*> 63*	++	++		++	
Water catchment or erosion prevention	0.3[a]		+		*	
Bio-energy fixation	(1,200)[d]	+			*	
Storage/rec. human waste	58[b]		+		*	

[c] Social values consist of the importance of environmental functions to human health and the option value placed on a safe future.

[a] This function applies to the terrestrial area only (720,000 ha).

[*] These functions do contribute to economic productivity, either directly or indirectly, but no market or shadow price could be determined due to lack of information and/or shortcomings of the market mechanism.

Note: Values are expressed qualitatively (++) or in US$/ha/year (total for study area = 1,150,000 ha).

[d] If a figure is given between brackets, it was not used in calculating the total value because the calculation is too speculative.

[*] These functions do contribute to economic productivity, either directly or indirectly, but no market or shadow price could be determined due to lack of information and/or shortcomings of the market mechanism.

Note: Values are expressed qualitatively (++) or in US$/ha/year (total for study area = 1,150,000 ha).

[b] This function applies to the marine area only (430,000 ha of which 4,100 intertidal zone).

[*] These functions do contribute to economic productivity, either directly or indirectly, but no market or shadow price could be determined due to lack of information and/or shortcomings of the market mechanism.

Note: Values are expressed qualitatively (++) or in US$/ha/year (total for study area = 1,150,000 ha).

	Types of values (for explanation, see text)					
	1	*2*	*3 + 4*	*5*	*6*	*7*
Biological control	++	+	+		*	
Nursery f./migration hab.	0.07[b]	++	++		*	
Maintenance of biol. div.	4.9	++	++		*	
Carrier functions	*0.5*	++	+		*> 45*	*> 833*
Aquaculture				0.02 [b]	+	
Recreation		+	+		45	772
Nature protection	0.55	++	++		*	61
Production functions			++	+	*> 8*	*> 160*
Food/nutrition			++	+	0.7	156
Genetic resources					+	+
Raw materials for constr.					5.2	4
Biochemicals					++	+
Energy resources					1.5[a]	+
Ornamental resources					0.4	+
Information functions	*0.5*		++	++	*> 3*	*> 67*
Aesthetic information			+	++	+	
Spiritual information	*0.52*		++	++	*	
Historic information			+	++	*	
Cultural/artistic insp.			+	+	0.2	+

* These functions do contribute to economic productivity, either directly or indirectly, but no market or shadow price could be determined due to lack of information and/or shortcomings of the market mechanism.

Note: Values are expressed qualitatively (++) or in US$/ha/year (total for study area = 1,150,000 ha).

[b] This function applies to the marine area only (430,000 ha of which 4,100 intertidal zone).

* These functions do contribute to economic productivity, either directly or indirectly, but no market or shadow price could be determined due to lack of information and/or shortcomings of the market mechanism.

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Note: Values are expressed qualitatively (++) or in US$/ha/year (total for study area = 1,150,000 ha).

[a] This function applies to the terrestrial area only (720,000 ha).

* These functions do contribute to economic productivity, either directly or indirectly, but no market or shadow price could be determined due to lack of information and/or shortcomings of the market mechanism.

Note: Values are expressed qualitatively (++) or in US$/ha/year (total for study area = 1,150,000 ha).

* These functions do contribute to economic productivity, either directly or indirectly, but no market or shadow price could be determined due to lack of information and/or shortcomings of the market mechanism.

Note: Values are expressed qualitatively (++) or in US$/ha/year (total for study area = 1,150,000 ha).

	Types of values (for explanation, see text)					
	1	*2*	*3 + 4*	*5*	*6*	*7*
Educ. & scientific inf.				+	2.7	67
TOTAL annual return	>64	++	++	++	> 56	(1,060)

Bibliography

Costanza, R., and H. E. Daly. 1990. *Natural Capital and Sustainable Development. Workshop on Natural Capital, March 15–16*. Vancouver: Canadian Environmental Assessment Research Council.

de Groot, R. S. 1986. "Functions and Socioeconomic Importance of the Dutch Wadden Sea." Case study report, Nature Conservation Department, Agricultural University, Wageningen.

——. 1988a. "Functions and Socioeconomic Importance of the Natural Environment in the Galapagos Islands, Ecuador." Case study report, Nature Conservation Department, Agricultural University, Wageningen.

——. 1988b. "Functions and Socioeconomic Value of Tropical Moist Forests." Paper prepared for ad hoc expert meeting on compensation mechanisms for conservation of tropical forests, organized by the United Nations Environment Programme in Nairobi, Kenya, 28–30 March.

——. 1991. "Functions and Socioeconomic Values of Coastal/Marine Protected Areas: A Methodology for Assessing the Benefits of Protected Areas to Human Society, with Special Reference to Coastal/Marine Ecosystems in the Mediterranean Area." Paper prepared for the thematic meeting on "Economical Impact of Protected Areas" of the Mediterranean Protected Areas Network (MEDPAN) in Ajaccio, Corsica, September 27.

——. 1992. *Functions of Nature: Evaluation of Nature in Environmental Planning, Management and Decision-Making*. Groningen, the Netherlands: Wolters Noordhoff BV.

Dixon, J. A., and M. M. Hufschmidt, eds. 1986. *Economic Valuation Techniques for the Environment: A Case Study Workbook*. Baltimore: Johns Hopkins University Press.

Folke, C., and T. Kaberger, eds. 1991. *Linking the Natural Environment and the Economy: Essays from the Eco-Eco Group*. Boston: Kluwer Academic Publishers.

Folmer, H., and E. van Ierland, eds. 1989. *Valuation Methods and Policy Making in Environmental Economics. Studies in Environmental Science*. No. 36. Amsterdam: Elsevier.

Hueting, R. 1991. "Correcting National Income for Environmental Losses: A Practical Solution for a Theoretical Dilemma." In *Ecological Economics: The Science of Management of Sustainability*. New York: Columbia University Press.

Marcondes, M. A. P. 1981. "Adaptación de una metodologia de evaluación económica, aplicada al Parque Nacional Cahuita, Costa Rica." Centro Agronómico Tropical de Investigacion. y Enseñanza (CATIE). Serie Técnica no. 9.

McNeely, J. A. 1988. *Economics and Biological Diversity: Developing and Using Economic Incentives to Conserve Biological Resources*. Gland, Switzerland: International Union for the Conservation of Nature and Natural Resources (IUCN).

Pearce, D., and R. K. Turner. 1990. *Economics of Natural Resources and the Environment*. New York: Harvester Wheatsheaf.

Peters, C. M., A. H. Gentry, and R. O. Mendelsohn. 1989. "Valuation of an Amazonian Rainforest." *Nature* 339 (June 29):655–56.

Posner, B., E. C. Cuthbertson, E. Towle, and C. Reeder. 1981. *Economic Impact Analysis for the Virgin Island National Park*. St. Thomas, U.S. Virgin Islands: Island Resources Foundation.

Repetto, R., and W. B. Magrath. 1988. *Natural Resources Accounting*. Washington, D.C.: World Resources Institute.

van't Hof, T. 1985. "The Economic Benefits of Marine Parks and Protected Areas in the Caribbean Region." Paper presented at 5th International Coral Reef Congress, Tahiti. Prepared for the National

Oceanic and Atmospheric Administration, Sanctuary Programs Division, U.S. Department of Commerce, Washington, D.C.

Winpenny, J. T., 1991. *Values for the Environment: A Guide to Economic Appraisal*. London: Overseas Development Institute, HMSO.

15 The Marginal Costs of Endangered Species Management

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THE COSTS OF ENDANGERED SPECIES MANAGEMENT are best described in terms of the value of alternative opportunities foregone. This chapter calculates such costs for the red-cockaded woodpecker (RCW), an endangered bird species, on the Croatan National Forest in the United States. It finds that the important variation in costs depends on where and how RCW management proceeds. In all cases, however, the costs are small.

It may be useful to consider whether either endangered plants or endangered big game species pose different problems than our RCW example. Birds, and other small game, may occupy either small habitats or have small impacts on a larger habitat. Endangered plants usually occupy even smaller habitats, but big game, generally occupying larger habitats, may create larger impacts. We reflect on an endangered plant in Malawi and an endangered big game species in Nepal in order to gain insight on the potential differences in management costs for the three cases.

Our chapter begins by accepting the normative decision to preserve, and then searches for the least-cost management alternative for preserving any population level, implicitly including the level of the safe minimum standard (Bishop 1978, Miller 1978). It discusses how managers can use this strategy to make cost-effective decisions at the margin, and how researchers can use this strategy to determine the new questions most important to managers. Finally, we reflect on the likely difficulties in evaluating these same costs for Combretum molle in Malawi and rhinoceros in Nepal.

Biological Background

The red-cockaded woodpecker inhabits mature pine forests (50 to 150 years old) in the U.S. South. It lives in clans composed of a mated pair and up to seven helpers. Clans excavate cavities in mature live pines. Clans roost in colonies, and mated pairs nest in cavity trees within these colonies. Apparently, woodpeckers select and excavate trees that contain a substantial amount of heartwood, which is positively correlated with tree age.

Colony sites must include a replacement stock of cavity trees because woodpeckers abandon nests in live trees when the hardwood and sapling pine undergrowth reaches the height of the cavity (Hooper and others 1980, Ligon 1970). Each clan inhabits a colony site ranging from 7 to 90 acres. Clans defend territories ranging from 100 to 250 acres, and they forage on live pines of all ages within their territory.

Economic Analysis

A public decision to require protection of known species of endangered plants and animals imposes the demand for RCW management. Our analysis is composed of the search among management alternatives for the alternative that satisfies this demand at the least marginal cost. The most important costs for RCW management are the implicit costs of foregone timber opportunities. There are no incremental direct RCW management costs.

The cost management unit is the clan. Therefore, the marginal cost function (Figure 15–1) measures the timber opportunity cost per clan or per colony site. Timber management does not conflict with foraging. Therefore, changes in timber management are unnecessary in RCW foraging territories.

The Croatan National Forest manages its important timber species, loblolly and longleaf pine, on 70-year rotations. RCW biologists recommend average ages of 95 years for longleaf and 75 years for loblolly, although there are woodpeckers nesting in Croatan stands as young as 46 years. The costs of delayed harvests imposed by these biological recommendations are not constraining everywhere in the Croatan because not all timberstands in this forest are commercially productive. Noncommercial stands tend to be biologically mature. RCW preservation can occur on these mature

noncommercial stands without conflict with timber management. The marginal cost function, in this case, runs along the horizontal axis in Figure 15–1 to include C_x clans or H_x acres.

Where the timberstand is commercial, managers must consider either of two alternate strategies to extend timber rotations to meet the woodpecker's needs: (a) permanent cessation of all timber harvests on currently occupied colony sites, or (b) extended rotations and harvests on a sequence of timberstands recruited when needed as colony sites. Neither alternative is a perfect preservation solution. The first fails to account for the 4.9 percent annual mortality among occupied cavity trees and makes no provision for their replacement. The understory is unlikely to provide replacement trees because pines tend to grow in even-aged stands with large gaps between older age classes. The second alternative assumes that clans easily relocate when colony sites are harvested, although there is no empirical evidence supporting this assumption.

Alternative A: preserving existing colonies in perpetuity

Foregone net timber receipts V_1 are calculated according to the familiar Faustmann equation modified to include revenues from a sequence of harvests Q(t) (including both commercial thinnings and final harvests) that vary in diameter and therefore in value, increasing relative stumpage prices p(t), costs c(t) from a sequence of inputs, and the number of acres A comprising the colony site.

$$V_1=A\left(\sum_{t=0}^{T}c(t)Q(t)e^{-rt}-\sum_{t=0}^{T}c(t)e^{-rt}-\right)/(1-e^{-rt}) \quad \textbf{(1)}$$

$$V_1=A\left(\sum_{t=0}^{T-a}c(t)Q(t)e^{-rt}-\sum_{t=0}^{T-a}c(t)e^{-rt}-\right) \quad \textbf{(2)}$$

V_1 is the present value of an infinite series of rotations beginning now. V_2 is the present value of the current stand of timber where revenues and costs are calculated from the present (t=0) to the time of their final harvest (t=T-a). T is 70 years and a is the current stand age.

The combined value of the standing timber V_2 plus the value of all future rotations V_1 equals the total value of the colony site.

Alternative B: rotating recruitment stands

The cost of implementing alternative B is the difference between net timber revenues from 70-year timber management rotations and net revenues from the extended rotations necessary for recruitment stands of potential cavity trees. Its calculation depends on two important assumptions, one having to do with the length of RCW habitation in recruitment stands and the other having to do with stand age structures and harvest scheduling.

Woodpeckers tend to mate in their second year and inhabit colony sites until their eighth year, when they die. Colony sites then can be harvested, and descendants of the mated pairs may relocate to adjacent recruitment stands. This assumption, together with the recommendation for stands averaging 75 years for loblolly and 95 years for longleaf, suggests sequences of 13 loblolly sites (the oldest between 72 and 78 years—78 years divided by 6 years per mated pair occupancy equals 13 sites) and 17 longleaf sites. In addition, we might assume that each colony site is 11.7 acres, the average size of current RCW colonies in the Croatan. Conversion from 70-year rotations to extended rotations poses no immediate stand age problem because the Croatan has an excess of mature and noncommercial timberstands to fill the RCW management gap until current commercial stands attain the ages 75 or 95.

Finally, we can assume that all recruitment stands grow from currently unmanaged timber. The existence of unmanaged standing timber raises net timber values and depreciates the economic justification for RCW management. This is a conservative assumption with respect to promoting RCW management.

The present value of the perpetual net revenue stream from one colony site is

$$V_3=V_1(t)-V_1(T_r) \quad \textbf{(3)}$$

where T is the 70-year timber rotation and T_R is the RCW rotation. For a sequence of 6-year inhabited sites, opportunity costs totalling V_3 occur every 6 years on each 200-acre RCW habitat.

The discounted total costs for maintaining one RCW clan in perpetuity are

$$V_4 = V_3(e^{-6r} + e^{-12r} + \ldots + e^{-T_R r}) \quad \textbf{(4)}$$

The present value of the perpetual net revenue stream from 11.7 acres of loblolly pine on a 70-year rotation is

$$V_1(T) = [11.7/(1 - e^{-70r})][p(70)Q(70) - c(70) + (p(30)Q(30) - c(30))e^{-30r} + (p(50)Q(50) - c(50))e^{-50r}$$

(5)

for stands currently 70 years old. Initial-year site preparation and fertilization costs enter as final harvest costs for the previous rotation. [This U.S. Forest Service accounting practice is poor economics. See Hyde (1980). It has the effect of reducing discounted timber management costs and increasing net timber values. It adds to the conservative nature of our RCW management conclusions.] Annual management costs are compounded, summed, and entered at years 30 and 50, the ages of thinning under current practice on the Croatan National Forest.

Similarly, the present value of the perpetual net revenue stream from 11.7 acres of loblolly on a 78-year rotation is

$$V_1(T_R) = [11.7/(1 - e^{-78r})][p(78)Q(78) - c(78)e^{-8r} + (p(30)Q(30) - c(30))e^{-38r} + (p(50)Q(50) - c(50))e^{-58r}$$

(6)

Subtracting equation 15–6 from equation 15–5 produces the loblolly opportunity cost for a single RCW colony site.

Incorporating the six-year sequence of 13 sites yields the discounted total loblolly opportunity costs for maintaining an RCW clan in perpetuity.

$$V_4 = V(70)(1 + e^{-6r} + e^{-12r} + \ldots + e^{-72r}) - V(78)(1 + e^{-8r} + e^{-14r} + \ldots + e - 80r) \quad \textbf{(7)}$$

Analogous expressions describe the longleaf opportunity costs.

Empirical Results

The Asheville office of the U.S. Forest Service furnished the management cost and return information for these calculations. Tables 15–1 and 15–2 show the range of timber opportunity costs for management alternatives A and B, respectively. These results are inversely proportional to changes in the discount rate and directly proportional to changes in rates of sawtimber and cordwood price increase. The range of costs in the cells of the two tables varies directly with acreage in the colony site, site productivity, species (loblolly sites tend to be higher valued), and the age and stocking of standing timber.

The tables show unsurprising conclusions. Alternative B is a land intensive means of preservation requiring almost 20 times more land than alternative A. Although timber harvest revenues are permanently foregone under alternative A, the loss amounts to little more than the value of the current timber stand. Revenues from future rotations are so highly discounted as to make them of little significance. Under alternative B, 70-year harvest revenues are foregone every 6 years on 13 loblolly and 17 longleaf land units, each 11.7 acres in size. While this loss is partially relieved by revenues from the 78-year or 98-year harvests, the discounted compensation cannot offset the large difference in the required acreage.

This is not the full story, however. Some RCW colony sites are on land that is not now fully managed for timber. Therefore, some RCW protection occurs at no loss of timber opportunity. Thus, RCW management costs are not even as great as Table 15–1 and Table 15–2 indicate. (A partial explanation is that the costs of access to timber management sites—including road building costs—were not included in our management costs.)

For example, in 1982 the Croatan harvested only 2.8 million board feet, or 14 percent of the mature timber in the forest. If these harvest decisions were financially rational, then only this 14 percent was commercial and the remaining 86 percent, in fact, had no timber opportunity value. The 86 percent was available for RCW management at no cost.

Consider how this alters our cost estimates for preserving 52 RCW habitat sites under either management alternative. Under alternative A the best 22 timber sites fall on longleaf site indices 70

and 80 and loblolly site indices 100 and 110. These sites furnish nearly 3 million board feet annually, or more than a sufficient volume to satisfy the 1982 harvest level. There are no foregone timber opportunities on the remaining 30 RCW colony sites. The large number of low quality timber sites with RCW colonies suggests that low quality sites were left undisturbed by timber managers before RCW protection became an issue and that timber managers displayed the economically rational tendency to harvest good sites first. Of the 22 sites with valuable timber opportunities, 6 have timberstands currently over age 85. Managers apparently found these sites unprofitable for timber even before recent discoveries of the woodpecker and requirements for its protection. Subtracting these 6 sites leaves 16 RCW sites on which the Croatan must forego a viable timber option. Table 15–3 shows the marginal cost schedule for these remaining 16 sites under each price and discount rate scenario. It leads to the observation that the total perpetuity cost for preserving the 52 existing sites (at a 4 percent discount rate and a zero rate of stumpage price increase) is $220,422. The annual payment associated with this level of protection is $8,817. (More than one-fourth of this payment is for one highly productive loblolly site that is near harvest age now.)

There are 54 200-acre preservation units on longleaf site index 50 and loblolly site index 70. They each satisfy the alternative B requirement for rotating recruitment stands in perpetuity. They are the poorest sites and the least likely ever to become commercially viable for timber. None are currently viable for commercial timber production and preserving 52 of them, one on each existing colony, causes no foregone timber opportunity.

Conclusions and Extensions

The cost of preserving the 52 existing RCW colonies is relatively small. There is no cost for the 52 recruitment colonies. Indeed, the costs of timber opportunities foregone are probably lesser problems for RCW management than are the uncertainties clouding the efficiency of either preservation alternative. These uncertainties are the reasonable focus of further biological research.

But is this RCW case generalizable?

We might anticipate small social costs for protection of endangered species because, as a general rule, either (a) species adapt to humans and are, therefore, compatible with high land use values, or (b) they do not adapt but they inhabit remote areas where adaptation to humans and human land uses are less important. Put another way, the nonadaptive species inhabiting areas of high human use are already extinct. In conclusion, the costs of protecting the remaining endangered species are probably generally small.

Consider this conclusion another way. The RCW is a small animal, in a developed country. Consider plants and large animals, and consider developing countries. Consider, for example, Combretum molle in Malawi and rhinoceroses in Nepal.

Combretum molle grows sparsely but in widely distributed lowland woodlands and wooded grasslands in southern Malawi. It has several native medicinal uses, including the use of its roots as a snake bite remedy. It is also commonly used for fence posts and it suffers from losses due to forest clearing for agricultural production. Combretum molle is protected in at least four forest reserves and national parks. Its protection is a minor cost, however, to this public land management.

Indeed, this is probably the general case for the protection of endangered plants—in industrial and in developing countries. We only need to protect a few isolated sites and generally small adjacent habitats in order to preserve most endangered plants. This can generally be done at small cost and little loss of other potential land use opportunities.

The one-horned rhinoceros may be another story. Presently, there are about 400 of these large mammals remaining, most in the neighborhood of Chitwan National Park, a 932-square kilometer reserve in Nepal's terai bordering India. Rhinoceroses are herbivores. They are not generally troublesome to the small local human population and they are not destructive of agricultural crops. Local hunters kill them for their horns—which are valuable in trade (reputably as an aphrodisiac) with Chinese populations around the world.

Thus, while the rhinoceros imposes little foregone land use opportunity, it ranges over more than 200 square kilometers of wildland and its protection requires a large budget for police effort. Even in this case, however, the net social costs of protection may be small because rhinoceros protection also brings economic rewards in the form of tourism from industrial Western countries. In the 1990–91 fiscal year, 44,897 tourists to Chitwan returned 13.8 million Nepalese rupees (NRs.) to

the government and 1.7 million Nepalese rupees to the King Mahendra Trust Fund for conservation. (US$1 is approximately 25 NRs.) They paid unknown additional fees traveling within Nepal to Chitwan and to the hotels and guide services in Chitwan. The largest share of these expenditures, no doubt, are due to the attraction of the rhinoceroses, tigers, and other wildlife in the Park. This case for large wildlife is also probably general for both industrial and developing countries. Endangered large animals are unlike most plants and small animals in their tourist attraction.

Thus, we know that RCW protection is a small cost item. We can anticipate that the protection of other endangered species—plants, small animals, and probably large animals—occurs at a small net cost to society. Perhaps more importantly, we can anticipate that the greater importance of our analysis is that it demonstrates a mechanism for arraying costs and management choices in a manner that makes resource trade-offs clear. This procedure can be repeated wherever there are doubts about the costs of endangered species management.

Table 15–1. Costs of Preserving Existing Colony Sites

Price changes[1]	Discount rate		
	4 percent	7 percent	10 percent
		Dollars per colony	
0, 0:			
Present value	255-56,529	81-35,798	24-24,015
Annual rent	10-2,261	6-2,505	2-2,402
0.015, 0.0075:			
Present value	722-74,453	303-44,762	224-29,828
Annual rent	29-2,978	21-3,133	22-2,984
0.03, 0.015:			
Present value	1,537-100,862	512-56,025	349-36,912
Annual rent	61-4,034	36-3,922	35-3,691

Table 15–2. Costs of Rotating Recruitment Sites of Extended Ages

Price changes[1]	Discount rate		
	4 percent	7 percent	10 percent
		Dollars per colony	
0, 0:			
Present value	11,824-118,349	13,632-98,193	12,553-93,769
Annual rent	473-4,734	954-6,874	1,255-9,377
0.015, 0.0075:			
Present value	8,966-131,342	14,249-107,895	13,607-94,600
Annual rent	359-5,254	997-7,553	1,361-9,460
0.03, 0.015:			
Present value	1,076-145,404	13,972-118,519	14,598-99,666
Annual rent	43-5,816	978-8,296	1,460-9,967

Table 15–3. Marginal Costs of Preserving Individual Existing Colony Sites Where Timber Management Is a Viable Option

Case number	Species	Site index	Area	Age (years)	Discount rate and rate of price change scenarios[1]								
					r = 4 percent			r = 7 percent			r = 10 percent		
					0	0.015	0.03	0	0.015	0.03	0	0.015	0.03
					0	0.0075	0.015	0	0.0075	0.015	0	0.0075	0.015
47	Longleaf	70	7	52	$ 3,264	5,218	8,374	1,598	2,346	3,363	884	1,294	1,831
16	Longleaf	70	7	59	4,434	6,355	9,545	2,739	3,482	4,434	1,930	2,410	2,983
31	Longleaf	70	7	64	5,495	7,309	10,531	3,974	4,585	5,373	3,277	3,699	4,173
52	Longleaf	80	7	52	5,566	8,405	13,187	2,812	3,979	5,561	1,583	2,226	3,070
15	Longleaf	70	7	67	6,241	7,947	11,194	4,951	5,375	6,015	4,475	4,762	5,080
49	Longleaf	70	7	69	6,791	8,403	11,670	5,726	6,008	6,478	5,498	5,627	5,780
30	Longleaf	70	15	64	11,776	15,662	22,566	8,515	9,824	11,513	7,021	9,927	8,942

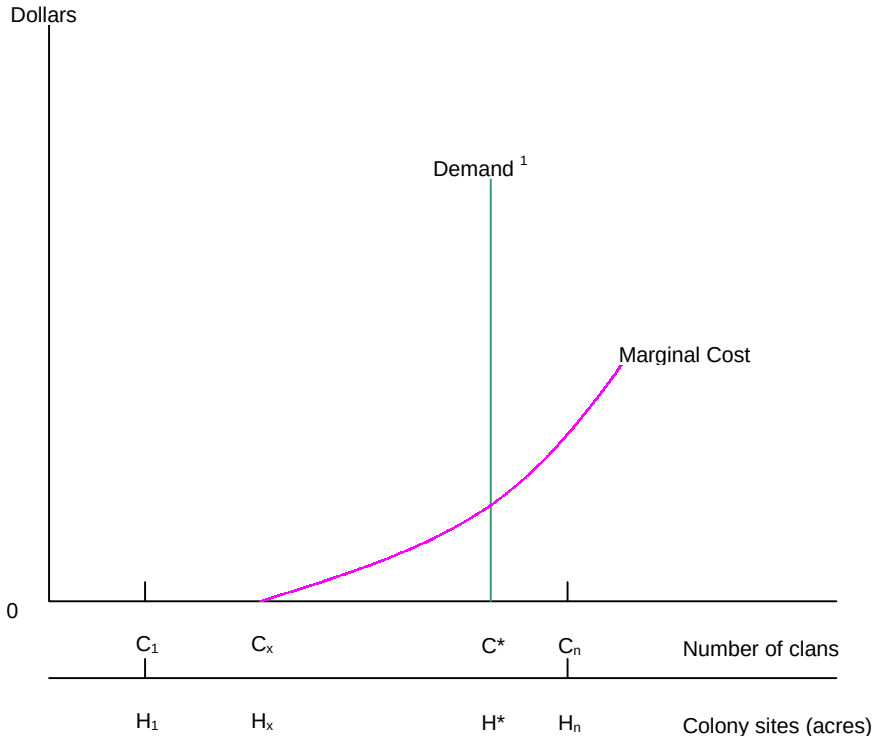
[1] The first number is the rate of sawtimber stumpage price change and the second is the rate of cordwood price change.

[1] he first number is the rate of sawtimber stumpage price change, and the second is the rate of cordwood price change.

[1] Rate of price change: First entry for sawtimber, second entry for cordwood.

Case number	Species	Site index	Area	Age (years)	Discount rate and rate of price change scenarios[1]								
					r = 4 percent			r = 7 percent			r = 10 percent		
6	Loblolly	100	7	52	12,906	18,770	27,785	6,816	9,350	12,761	3,896	5,311	7,170
10	Longleaf	80	15	54	12,985	19,263	29,274	6,998	9,538	12,908	4,213	5,687	7,568
8	Longleaf	80	15	56	14,130	20,360	30,347	8,116	10,662	13,975	5,215	6,769	8,697
11	Longleaf	70	15	74	15,177	18,515	25,539	13,192	13,853	14,403	13,053	13,102	13,203
12	Longleaf	70	15	74	15,177	18,515	25,539	13,192	13,853	14,403	13,053	13,102	13,203
13	Longleaf	70	15	74	15,177	18,515	25,539	13,192	13,853	14,403	13,053	13,102	13,203
50	Longleaf	70	15	74	15,177	18,515	25,539	13,192	13,853	14,403	13,053	13,102	13,203
9	Longleaf	90	15	52	19,597	28,920	43,420	10,221	14,150	19,446	5,818	8,004	10,875
46	Loblolly	110	15	57	56,529	74,452	100,862	35,798	44,762	56,025	24,015	29,823	36,912
Total cost					220,422	295,124	420,911	151,032	179,473	215,464	120,037	135,947	155,893

Figure 15–1. Endangered Species Modeling



1. demand is externally set by a public decision requiring protection of known populations of the endangered species

Bibliography

Bishop, R. C. 1978. “Endangered species and uncertainty: the economics of the safe minimum standard.” *American Journal of Agricultural Economics* 60:10–18.

Boyd, R. G., and W. F. Hyde. 1989. *Forestry Sector Intervention*. Ames: Iowa State University Press.

Hooper, R. G., A. F. Robinson, Jr., and J. A. Jackson. 1980. “The red-cockaded woodpecker: notes on life history and management.” *USDA Forest Service General Technical Report SE-GR7*.

Hyde, W. F. 1980. *Timber Supply, Land Allocation, and Economic Efficiency*. Baltimore: Johns Hopkins University Press for Resources for the Future.

——. 1989. “Marginal costs of managing endangered species: the case of the red-cockaded woodpecker.” *Journal of Agricultural Economics Research* 41:12–19.

Ligon, J. D. 1970. “Behavior and breeding biology of the red-cockaded woodpecker.” *The Auk* 87:255–78.

Miller, J. R. 1978. “A simple model of endangered species preservation in the United States.” *Journal of Environmental Economics and Management* 5:292–300.

16 Estimating the Nonmarket Conservation Values of Protected Landscapes in Australia

Terry de Lacy and Michael Lockwood

THE 1960S SAW THE EMERGENCE of land use conflicts. While some wanted to use certain areas for nature conservation, others wanted these same areas for various other uses, such as farming, mining, forestry, water storage, urban development, and tourism. These land use conflicts, which have persisted through the last two decades, are exemplified in Australia by issues such as sand mining on Fraser Island, uranium mining at Kakadu, dams in southwest Tasmania, logging in the wet tropics of Queensland, and woodchipping in the southeast forests.

Australia's political, legal, and administrative structures have changed in response to the need to deal effectively with and resolve these conflicts. New green political parties have evolved, major state and federal environmental control and planning laws have been enacted, and new environmental management bureaucracies and protected area systems have been established. For example, legislation enacted includes the Commonwealth Environmental Protection (Impact of Proposals) Act 1974 and the New South Wales State Government Environmental Planning and Assessment Act 1979. Features of these acts are the development of rural land use zoning schemes incorporating environmental protection zones, requirement for environmental impact assessments of development projects, and the provision for public inquiries into controversial projects.

In addition, state and federal governments have established a range of expert, advisory, and consultative bodies to assist government in relation to resource allocation decisions. The Victorian State government established the Land Conservation Council under the Land Conservation Act 1970 to make recommendations for the balanced use of all public land. The Resource Assessment Commission was established by the Commonwealth government under the Resource Assessment Commission Act 1990. The Resource Assessment Commission's charter under the act is to hold inquiries and make reports to the Prime Minister to assist the government to resolve competing claims for the use of resources. To date, the Resource Assessment Commission has had references to undertake inquiries in relation to mining in the Kakadu Conservation Zone, the management of Australia's forests, and the use of Australia's coastal shoreline.

The 1980s and early 1990s have also seen the emergence in Australia of economic rationalism as the guiding principle behind many government policy decisions. The role of government in relation to the economy has been seen by many policymakers to be one of support for the market mechanism. This view has resulted in widespread modeling of public sector management on private sector practices. There has also been a growing public demand for a reappraisal of public investment decisions. The processes for determining land use decisions have naturally been influenced by this increased policy emphasis on economic efficiency.

Although the legislation noted above generally provides for consideration of economic issues, the current practice in Environmental Impact Statement procedures is to concentrate on physical and biological factors, not to produce and assess economic and social data (Hundloe 1990). The need to justify land use decisions in economic terms, or at least to know the economic implications of a decision, has therefore led to the application of various economic assessment techniques to nature conservation resources. The most widely used of these is benefit-cost analysis.

Benefit-cost analysis and nonmarket valuation techniques

Benefit-cost analysis assesses the economic worth of a project by determining if its benefits exceed its costs, where benefits and costs are defined to include any welfare gain or loss which occurs as a result of the project. Cost is often thought of as an "opportunity cost" (the benefits foregone by proceeding with a project), and the benefits are measured by the consumer surplus arising from the project (Sugden and Williams 1978). Absence of a direct market does not mean that economic preferences are not expressed. Goods and services that do not have market prices, because dollars are not directly exchanged in transactions involving those goods and services, may still have economic value. To procure them, consumers must give up something else of value, and therefore an opportunity cost is involved (Pearce 1983).

Market value can be quantified in dollars by well-established market evaluation procedures. Recently, attempts have also been made to assign dollar values to nonmarket economic values of natural areas. A benefit cost analysis which includes consideration of nonmarket values is sometimes

referred to as an extended benefit cost analysis. Nonmarket valuation techniques include dose-response, hedonic pricing, travel cost method, and contingent valuation.

Dose-response method

The dose-response method considers, for example, the effects of changes to the physical characteristics of water (temperature, suspended solids concentration, flow rate) on fish populations and thus on commercial fishing. The economic value of observed impacts, such as the reduced productivity of commercial fishing, can then be estimated using regular market prices. It is recognized as being of limited use for the measurement of nonmarket nature conservation values (Mitchell and Carson 1989).

Hedonic pricing

Hedonic pricing uses the price of a market good to establish the economic value of a nonmarket attribute possessed by that good. For example, analysis of the housing market and the contribution a quiet neighborhood makes to the price of a house can give an indication of the willingness to pay for peace and quiet. However, a review of the current literature suggests that hedonic pricing is of limited practical use for valuing natural areas (Streeting 1990, Mitchell and Carson 1989, Pearce and others 1989).

Travel cost method

The travel cost method is used for estimating the recreational demand for a particular site when market prices are not available (Clawson and Knetsch 1966). Concentric zones around the recreation area are defined and the number of visitors from each zone established through visitor surveys. Travel distances are then converted to costs. By measuring a range of travel costs relative to the number of people visiting the area from each cost zone, and correcting for the total population of that zone, an economic demand curve for the area can be constructed (Walsh 1986).

Contingent valuation

Contingent valuation involves the creation of a hypothetical market to enable quantification of the community's willingness to pay for receiving specified benefits from a particular resource. The technique was developed by resource economists in an attempt to measure nonmarket values, especially those associated with public or semipublic goods such as natural areas (Cummings and others 1986).

Valuation Examples

Attempts to estimate the nonmarket conservation values of protected landscapes in Australia have occurred only recently and are few in number. Wilks (1990) lists a total of 16 contingent valuation surveys undertaken. Of these, only a few estimate the value of nature conservation resources. More recent examples include contingent valuation surveys of wetland conservation, old growth preservation, and dune maintenance (Lockwood and de Lacy 1992). In addition, several travel cost method studies have been used to estimate the value of nonmarket conservation and recreation resources. A brief discussion of some of the studies which either directly or indirectly have estimated the nonmarket conservation values of protected areas in Australia follows.

Warrumbungle National Park, New South Wales

Ulph and Reynolds (1980) carried out a study of the economic valuation of national parks. They developed key economic indicators for use in predicting the economic benefits and costs of the establishment and operation of nature conservation areas in relation to national efficiency of resource use and the regional impact of park projects. This was done in the context of a case study of Warrumbungle National Park in the central north of New South Wales. Recreation benefits of the park were estimated using the travel cost method. They estimated the annual consumers' surplus in 1978 to be A$8,497,516. They did not attempt to estimate any nonuse values. The study concluded that

> considering only the recreation benefits of Warrumbungle National Park…a national park was the best use of the land concerned since benefits of park use were several times the costs imposed on society. (Ulph and Reynolds 1980)

Gordon-Below-Franklin Dam, Southwest Tasmania

In the early 1980s, the proposal by the Tasmanian Hydro Electricity Commission to construct a dam on the Gordon River in the southwest Tasmanian wilderness, and the resulting protests against the proposal, received international publicity. Saddler and others (1980) used a benefit-cost analysis to measure the project's benefits (the value to consumers of the electricity produced) against the costs relating to the loss of wilderness.

The benefits of the Tasmanian wilderness were divided into four broad categories: participatory, vicarious, scientific, and time-related. Participatory benefits were considered to include those derived from recreational use of the area, as well as health, aesthetic and educational benefits. Vicarious benefits included those obtained from viewing films or photographs of the area as well as an existence benefit—the value of "knowing it is there." Scientific benefits related to the actual and potential use of species living in the area, as well as research and educational benefits. Time related option values stemmed from people's willingness to pay for the option to use the area in the future or to maintain the opportunity for future generations to do so.

The researchers constructed a formula to evaluate these benefits, and they determined the present value of A$1 of preservation benefits over the life of the dam (assumed to be 100 years) to be A$259. Dividing this value into the estimate of consumer surplus gained by constructing the dam yields a threshold value of between A$500,000 and A$1 million (at a discount rate of 5 percent). The initial year's preservation values must rise above these values before preservation will be a better option than hydro development. The study therefore avoided the problem of placing an absolute monetary value on preservation values. The best estimate of the participatory value alone exceeded this "threshold" (Saddler and others 1980), and so it is probably economically efficient to preserve the wilderness rather than to build the dam. In 1983 the Federal government overrode the Tasmanian State government and prevented the construction of the dam, although again the influence of Saddler's benefit-cost analysis on this decision is unknown to us.

Nadgee Nature Reserve, New South Wales

Bennett (1984) measured the magnitude of the existence value enjoyed by Canberra residents for the continued preservation of Nadgee Nature Reserve on the south coast of New South Wales. During direct interviews, a sample of Canberra residents were asked about their willingness to pay to protect the reserve from development. A hypothetical scenario was constructed in an attempt to eliminate from a respondent's consideration everything but nonparticipatory benefits. Bennett found a mean willingness to pay of A$27.08, where payment was to be obtained either through an increase in taxes or through a donation to a conservation group. Theoretically, this value could be compared with the costs associated with managing the reserve to determine whether preservation of Nadgee was of economic benefit to the people of New South Wales, but to our knowledge this additional work has not been undertaken.

Great Barrier Reef, Queensland

A team of researchers investigated the economic and socioeconomic impacts of the Crown of Thorns starfish on the Great Barrier Reef (Carter and others 1987, Hundloe 1990). The travel cost method was used to derive a consumer surplus for visitors to the reef region. This was estimated at A$117.5 million per annum for all Australian visitors and A$26.7 million for international visitors. These figures were used to estimate net present value figures at different discount rates over varying periods. The data indicated that "tourism in the reef region is valued on net present value terms, over and above the current expenditure levels, at more than one billion dollars" (Hundloe 1990). Contingent valuation estimates were also calculated for visits to coral sites and the value of coral sites to vicarious users.

Fraser Island, Queensland

In 1990 the Queensland State government established a commission of inquiry into the conservation, management, and use of Fraser Island. In this context, the Queensland Department of Environment and Heritage commissioned a project to gain information on the nonextractive use of the region (Hundloe and others 1990). One of the important aspects of the investigation was to undertake an assessment of the value of nonextractive resource uses, including recreation, tourism, and preservation values of the region.

Contingent valuation studies were carried out on users of Fraser Island as well as on a national sample of nonusers to estimate the willingness to pay to preserve forests from logging. These surveys estimated a median payment per year for users of A$316 and for the total Australian population of A$205. A travel cost estimate was done of visitors which estimates a consumer surplus of A$3.6 million per annum. As a result, the Queensland State government decided to terminate logging on Fraser Island, though it is uncertain whether, and to what extent, the information of Hundloe and others (1990) influenced the decision.

Kakadu Conservation Zone, Northern Territory

The first major issue referred to the Resource Assessment Commission was a dispute over mining in the Kakadu Conservation Zone, an area which had been proposed as an addition to Kakadu National Park. Section 8 of the Resource Assessment Commission Act requires the commission to assess the values of resources and ensure the losses and benefits associated with alternative uses. Policy principles in Schedule 1 of the act state:

> Resource use decisions should seek to optimize the net benefits to the community from the nation's resources, having regard to efficiency of resource use….

In carrying out these efficiency components of its inquiries, the Resource Assessment Commission has computed several extended benefit-cost analyses. It has been concerned to find the means to identify and assess environmental values

> …for use in cost-benefit decisions where a criterion of economic efficiency determines the allocation of resources. (Wilks 1990:34)

One of the major tools the Resource Assessment Commission has investigated to estimate environmental values has been contingent valuation. Wilks (1990), in her review of the method for the Resource Assessment Commission, concludes that contingent valuation studies will, under certain conditions, produce sound estimates of the economic values of the environmental resources which are being investigated by the Resource Assessment Commission.

The Resource Assessment Commission, as part of its inquiry into the Kakadu Conservation Zone, undertook a contingent valuation study of its preservation value (Imber and others 1991). The study was carried out to provide information on environmental values for the Resource Assessment Commission inquiry and to provide a practical test of the usefulness of contingent valuation for commission inquiries in general. A nationwide inperson survey was conducted to elicit people's willingness to pay to prevent mining in the Kakadu Conservation Zone. Two samples of respondents were presented with different scenarios, one indicating that the impact of mining would be major and the other describing only minor impacts from the mine. The results show that Australians were willing to pay an average of A$123.80 per year for 10 years to avoid the impacts of the major scenario and A$52.80 to avoid the minor scenario.

The survey created considerable controversy in political and policy evaluation circles in Australia (Resource Assessment Commission 1991, Australian Bureau of Agricultural and Resource Economics 1991). The criticisms were varied, with probably the most significant relating to the so-called *embedding effect*. Embedding may occur if respondents relate to the amenity being valued as a symbol of some larger amenity. For example, stated willingness to pay to prevent mining in the conservation zone could be inflated by respondents' perceptual connection between Kakadu Conservation Zone and Kakadu National Park as a whole, and possibly with a range of other developments versus conservation issues as well (Brunton in Resource Assessment Commission 1991). It is therefore possible that if respondents were asked their willingness to pay with respect to a whole series of issues (Kakadu, logging of native forests, Barrier Reef, and so on), then the valuations may well have been very different.

Carson (in Resource Assessment Commission 1991) points out that part of this criticism relates to the fact that no "good" has a unique value which is independent of the context in which the valuation takes place. Hence if we are estimating people's nonmarket value of a resource in the context of a particular development, as is generally the case in most benefit-cost analyses, then using this value in different contexts, or using it to estimate the value of more or less of the resource, is difficult.

Other issues raised in the discussions on the Kakadu contingent valuation related to budget framing and an argument that mining in the Kakadu Conservation Zone would have positive unpriced

externalities that were not measured—in other words, there is a positive existence value for mining that should be estimated and included in the total valuation exercise. We have measured such a positive unpriced economic value in relation to timber harvesting, and shown that its magnitude is insignificant relative to the corresponding preservation value (Lockwood and others 1993a).

As a postscript, the government finally decided to prohibit mining in the Kakadu Conservation Zone and include it in Kakadu National Park, primarily because of the wishes of the Jawoyn aboriginal traditional owners. The issue continues to generate controversy.

Southeast Australian forests

The Resource Assessment Commission, as part of its forest inquiry, conducted a benefit-cost analysis to assess the comparative worth of reserving more southeast Australian forests in national parks or harvesting them according to a number of alternative silvicultural regimes (Streeting and Hamilton 1991). Particular attention was given to those forest areas registered on the national estate but which were outside national parks. This benefit-cost analysis provided a financial assessment of the forests only in terms of logging them for wood and wood products, and separate contingent valuation and travel cost method studies were conducted to estimate nonmarket values.

The travel cost method revealed an average value for visitation to all the national estate areas of the southeast forests of approximately A$950,000 per year, or A$8.90 per visitor per year. The contingent valuation survey estimated a median willingness to pay for the preservation of all the national estate areas in the southeast to be A$43.50 per household (A$22 per person) per year (Carter 1992). The contingent valuation result is approximately three times that of the travel cost method analysis—an outcome consistent with results obtained in other countries where studies have included both travel cost method and contingent valuation analyses. Existence and other nonuse values appear to exceed, by a considerable margin, direct use values associated with recreation and other use activities (Carter 1992).

Due to, among other things, problems with the statistical form of the contingent valuation results, Carter (1992) deemed it inappropriate to extrapolate the median willingness to pay to the whole population to derive an estimate of the community's total willingness to pay for preservation. Carter also deemed it inappropriate to compare directly the per person median willingness to pay derived from the contingent valuation study with the per person value of logging benefits as estimated by Streeting and Hamilton (1991). In addition, while the travel cost method derived value of A$8.90 per visitor per year can be compared with logging benefits of A$0.86 per person per year as estimated in the benefit-cost analysis, it is unlikely that logging and recreation are mutually exclusive land use alternatives. Logging and recreation could occur to varying degrees within the same areas over time, and the travel cost method does not provide an estimate of the difference in the value of the experience with and without logging operations (Carter 1992).

In a separate study, Lockwood and others (1993b) conducted a contingent valuation survey to determine Victorians' willingness to pay to reserve unprotected national estate forests in national parks. Such reservation would preclude utilization of these forests for timber production. Attitudinal questions included in the survey revealed that Victorians consider the nonmarket values associated with these forests more important than market values. Many people feel strongly about the preservation of these forests, primarily because of their existence and bequest values. Present and future use values are less significant. The median willingness to pay per respondent's household for reserving the forests was A$52, which corresponds to an annual aggregate nonmarket value to the people of Victoria of A$41 million. Using our contingent valuation result together with data from the Resource Assessment Commission (Streeting and Hamilton 1991), we calculated a positive net present value of A$543 million for preserving the forests.

In addition, we examined the significance of the embedding effect (Loomis and others 1993) in three independent versions of surveys which determined respondents' willingness to pay for reserving successively smaller areas and subareas of forest: southeast Australia, East Gippsland, and Errinundra Plateau. The embedding effect poses potentially serious problems for the interpretation of contingent valuation data, because if willingness to pay for the same good can vary over a wide range, depending on whether the good is assessed on its own or embedded as a part of a more inclusive bundle, then the "correct" value is not readily apparent. Our results suggest that respondents do recognize Errinundra and East Gippsland as different goods. As might be expected, the smaller but significant Errinundra Plateau is valued half as much as East Gippsland as a whole. Therefore the embedding effect is not occurring at this level. However, the southeast Australian forests are not

accorded a higher value than those in East Gippsland, and while several explanations for this result are possible, an embedding effect may be occurring.

Conclusion

All governments are being forced to respond to the fundamental shifts in community opinion which place a much greater value on conservation of our natural environment. As the quantity and quality of natural areas are reduced, consequent on population and economic growth, each new development becomes more controversial. Coincident with these pressures are increasing demands for economic efficiency. In Australia particularly, there is a growing perception that we are not using our resources as efficiently as possible; our standard of living is declining relative to others, and we are not competing effectively in export markets.

These twin movements for greater economic efficiency and conservation of the environment have led to increasing demand on decisionmakers for greater efficiency-based analysis that at the same time takes more account of nature conservation values. Hence the interest in estimating nonmarket conservation values of protected landscapes in Australia. The field is new, many of the methods need still to be widely tested in the Australian context, and there is a considerable amount of skepticism regarding the capacity of the methods to measure accurately the nonmarket economic values of nature conservation resources.

Nevertheless, many valuation studies are planned. For example, the Victorian State Department of Conservation and Environment is undertaking or planning studies related to wetland conservation, damage from oil slicks, and the effect of different silvicultural practices on forest conservation. The federal department responsible for conservation matters will need to consider using broad nonmarket valuation studies as part of its United Nations Environment Programme initiated study of the costs and benefits of maintaining biological diversity.

The last decade has seen the beginning of attempts to estimate nonmarket values of natural resources. Over the next decade, it should become evident whether or not nonmarket valuation techniques will become an integral part of developing nature conservation policy in Australia.

Bibliography

Australian Bureau of Agricultural and Resource Economics. 1991. “Valuing Conservation in the Kakadu Conservation Zone.” Unpublished submission to the Resource Assessment Commission, Australian Bureau of Agricultural and Resource Economics, Canberra.

Bennett, J. 1984. “Using Direct Questioning to Value the Existence Benefits of Preserved Natural Areas.” *Australian Journal of Agricultural Economics* 28:136.

Carter, M. 1992. “The Use of Contingent Valuation in the Valuation of National Estate Forests in Southeast Australia.” In M. Lockwood and T. de Lacy, eds., *Valuing Natural Areas: Applications and Problems of the Contingent Valuation Method*. Albury: Johnstone Centre.

Carter, M., F. Vanclay, and T. Hundloe. 1987. “Economic and Socio-economic Impacts of the Crown of Thorns Starfish on the Great Barrier Reef.” A report to the Great Barrier Reef Marine Park Authority, Institute of Applied Environmental Research, Griffith University, Brisbane.

Clawson, M., and J. L. Knetsch. 1966. *Economics of Outdoor Recreation*. Baltimore: Johns Hopkins University Press.

Cummings, R. G., D. S. Brookshire, and W. D. Schulze, eds. 1986. *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method*. Totowa: Rowman and Allenheld.

Hundloe, T. 1990. “Measuring the Value of the Great Barrier Reef.” *Australian Parks and Recreation* 26:11.

Hundloe, T., G. McDonald, R. Blamey, B. Wilson, and M. Carter. 1990. “Socio-economic Analysis of Nonextractive Natural Resource Use in the Great Sandy Region.” A report to the Queensland Department of Environment and Heritage, Institute of Applied Environmental Research, Griffith University, Brisbane.

Imber, D., G. Stevenson, and L. Wilks. 1991. “A Contingent Valuation Survey of the Kakadu Conservation Zone.” Resource Assessment Commission Research Paper no. 3. Australian Government Publishing Service, Canberra.

Lockwood, M., and T. de Lacy, eds. 1992. *Valuing Natural Areas: Applications and Problems of the Contingent Valuation Method*. Alburty: Johnstone Centre.

Lockwood, M., J. B. Loomis, and T. de Lacy. 1993a. "The Relative Insignificance of a Nonmarket Willingness to Pay for Timber Harvesting." Forthcoming in *Ecological Economics*.

——. 1993b. "A Contingent Valuation Survey and Benefit-Cost Analysis of Forest Preservation in East Gippsland, Australia." *Journal of Environmental Management* 24:45–55.

Loomis, J. B., M. Lockwood, and T. de Lacy. 1993. "Some Empirical Evidence on Embedding Effects in Contingent Valuation of Forest Protection." Forthcoming in *Journal of Environmental Economics and Management*.

Mitchell, R. C., and R. T. Carson. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington, D.C.: Resources for the Future.

Pearce, D. W. 1983. *Cost-Benefit Analysis*. London: Macmillan.

Pearce, D., A. Markandya, and E. B. Barbier. 1989. *Blueprint for a Green Economy*. London: Earthscan.

Resource Assessment Commission. 1991. *Commentaries on the Resource Assessment Commission's Contingent Valuation Survey of the Kakadu Conservation Zone*. Resource Assessment Commission, Canberra.

Saddler, H., J. Bennett, I. Reynolds, and B. Smith. 1980. *Public Choice in Tasmania*. Australian National University, Canberra.

Streeting, M. C. 1990. "A Survey of the Hedonic Price Technique." Resource Assessment Commission Research Paper No. 1. Australian Government Publishing Service, Canberra.

Streeting, M. C., and C. Hamilton. 1991. "An Economic Analysis of the Forests of Southeastern Australia." Resource Assessment Commission Research Paper no. 5. Australian Government Publishing Service, Canberra.

Sugden, R., and A. Williams. 1978. *The Principles of Practical Cost-Benefit Analysis*. Oxford: Oxford University Press.

Ulph, A., and I. Reynolds. 1980. "An Economic Evaluation of National Parks." Centre for Resource and Environmental Studies Report R/R4, Australian National University, Canberra.

Walsh, R. G. 1986. *Recreation Economic Decisions: Comparing Benefits and Costs*. State College: Venture Publishing.

Wilks, L. 1990. "A Survey of the Contingent Value Method." Resource Assessment Commission Research Paper no 2. Australian Government Publishing Service, Canberra.

17 Valuing a Protected Tropical Forest: A Case Study in Madagascar

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IT HAS LONG BEEN RECOGNIZED that the increasing demand for forestland in developing countries obliges governments and donor agencies to provide economic as well as environmental justifications for creating national parks (Myers 1972). This is necessary because there are competing demands for scarce land, including extraction of forest products, clearing forests for farming, and preserving forests for conservation of biodiversity. In addition, such justifications are necessary for governments to allocate scarce capital resources to development programs (such as poverty alleviation and food production) and conservation of natural resources.

Economic analysis can provide useful information for these difficult decisions. Of course, economic analysis should only constitute one component of the process of deciding whether to create a national park (other components would include sociopolitical and ecological considerations). Traditional economic cost—benefit analysis for national parks, however, is problematic, since most of the benefits from park creation are not traded in formal markets, creating a potential policy bias in favor of competing land uses. We address this by examining the use of economic valuation techniques for evaluating the nonmarket benefits and costs of creating national parks in developing countries.

Over the past two decades, environmental and resource economists in industrialized countries have developed a number of methods for valuing nonmarket environmental benefits and have successfully applied them in the United States and other developed countries (Smith 1990). However, nonmarket valuation techniques have been applied less often in developing countries, where the ecological urgency for and economic constraints to national park creation are typically much greater (Dixon and Shermann 1990, Munasinghe 1993). In this chapter, we report on two components of some work in progress to evaluate the use of these techniques in a developing country, using the creation of the Mantadia National Park in Madagascar as a case study. The two components are: (a) valuing the impacts of establishing the park on nearby villages and (b) valuing the new park as an international tourism destination. Two additional components of the overall research effort are briefly described in Annex A.

This type of valuation study can shed light on questions such as, Is the value of a park with a buffer zone greater than one without? What is the appropriate level of compensation for local people unable to continue their forest extraction activities because of the park? How much are foreign tourists willing to pay to visit national parks in developing countries? and How might developing countries capture this willingness to pay and improve park management?

We focus on Madagascar because of the importance of its biodiversity. Madagascar, one of the economically poorest and ecologically richest countries in the world, has been designated by the international environmental community as a prime spot for biodiversity, where ecosystems are at great risk. Madagascar is on the IUCN—World Conservation Union's list of megadiversity countries because of its extraordinarily high numbers of endemic species.[1] As a result of Madagascar's important biodiversity, the international donor community is providing large amounts of money in an effort to save as much of the island's biological diversity as possible.[2] In addition, the government of Madagascar itself is taking a number of actions to control forest degradation and to protect biodiversity.

Methodology

It is difficult to attach economic values to many of the benefits of environmental projects because there are no corresponding market price data available. Although public goods such as biodiversity, wildlife reserves, and national parks are often available to consumers at no cost and may not affect private goods markets in a measurable way, many people are willing to pay significant sums to insure their continued availability. Environmental economists have devised ways to measure this existing, but not directly observable, willingness to pay for such environmental assets (Kramer and others 1992). The three main methods for empirically measuring the willingness to pay for nonmarket goods include (a) contingent valuation method, (b) travel cost method, and (c) hedonic land price method. Two of these, the contingent valuation method and the travel cost method, are applied in this study. We also use opportunity cost analysis to estimate the park-related change in the marketable agricultural and forest outputs that are produced.

The creation of a new national park generates a number of economic impacts involving both direct and indirect costs and benefits. Costs arise from land acquisition (unless the land is already under government ownership, as is the case for Mantadia), hiring park personnel, and the development of roads, visitors' facilities, and other infrastructure. The opportunity costs associated with foregone uses of park land are another important set of costs that are often ignored.

Benefits include both use values and nonuse values. Since most parks, including Mantadia, do not allow exploitation of forest resources, the primary use values of a park are for tourism and research. In fact, park tourism can generate considerable revenues from both local and foreign tourists in the form of entrance fees and travel expenditures. National parks also generate a number of nonuse benefits. One of the most important of these is existence value, which economists define as the willingness to pay to preserve a resource by individuals who never plan to use the resource. Given the importance of Mantadia National Park for biodiversity protection, many people outside of Madagascar may have significant positive existence values for the park. Another important nonuse

[1] More than 80 percent of Madagascar's plant species, 90 percent of its reptiles, nearly all its mammals, and more than half of its bird species are endemic to Madagascar (World Bank 1988).

[2] For example, U.S. donor organizations invested $2.87 million or $49 per 1,000 hectares for biodiversity protection in Madagascar in 1989. This exceeded all other countries in Africa and Asia (Abramowitz 1991).

value has been referred to as option value. Residents of Madagascar (as well as foreigners) may be willing to pay to maintain the option to use the park in the future. Other benefits associated with the park may include reduced deforestation, watershed protection, and climate regulation.

Given the large array of benefits and costs associated with the creation of a park, performing a complete accounting job in a benefit—cost framework is a monumental task (Munasinghe 1992). Our study is focused on measuring some of the more important and more difficult-to-measure economic impacts. In this chapter, we discuss ongoing efforts to measure the economic impact of the park on villagers and the benefits of the new park to foreign tourists.

Opportunity cost analysis

The opportunity cost approach uses standard economic analysis of market values to determine the net economic benefits associated with the alternative uses of one or more resources. In this study, opportunity costs of interest are those associated with alternative land uses by people living in and near the park. Our initial understanding of the dependence of the villagers on the forests suggested that creating a national park out of a large tract of forests and imposing restrictions over future use was imposing a considerable economic burden on local villagers. By determining recent land use in and around the park and projecting future land use changes in the absence of the park, we can estimate the cost to villagers from losing the opportunity to exploit the park area for agricultural or forest products.

Although there are no human settlements within the Mantadia National Park boundaries, several villages lie in close proximity. These villages depend on the forests within and immediately around the park for forest products and agriculture. The method of agriculture production practiced in eastern Madagascar is critically important as a mechanism of deforestation. For several hundred years, the eastern Malagasy have practiced a form of shifting cultivation known as *Tavy*. About 200,000 hectares of land is cleared every year because of shifting cultivation in Madagascar (Andriamampianina 1985). While shifting cultivation is clearly an important factor in deforesting eastern Madagascar, it is also the only means of livelihood known to many of the inhabitants of this region.

Villagers in this area are also dependent on the forests for a number of other reasons. Fuelwood is collected from the forests on a regular basis, a wide variety of fish and animals are foraged for consumption, and a number of different types of grass are harvested and used for assorted purposes. Forest plants and herbs also serve as important sources of medicine.

In order to estimate the opportunity costs associated with foregoing these economic activities on park land, a survey was conducted of 351 households in 17 villages. These villages lie within a 7.5-kilometer radius around the park boundary. A local nongovernmental organization, well versed in rural survey techniques, assisted in administering the survey. The survey was undertaken following a reconnaissance visit to the villages, several focus group interviews, conversations with various people who were well acquainted with the area, and a pre-test that covered about 25 households. The survey was administered in Malagasy, the national language.

The questionnaire focused principally on (a) establishing the extent of dependence of the local villagers on forests near their villages, and on forests within the park boundaries, for obtaining a variety of forest products; (b) establishing the extent to which villagers used the forests within and immediately around the park for shifting cultivation; and (c) assessing local attitudes toward conservation of forests. Questions related to socioeconomic variables, land use, time allocation, and household production activities were also asked. The final section used the contingent valuation method discussed below.

A separate questionnaire was administered to the village leaders. It focused on issues pertaining to general agricultural patterns, markets and prices of goods sold, village history and migration patterns, forest related cultural issues, and details on shifting cultivation practices.

Contingent valuation method

The contingent valuation method uses survey techniques to establish the value of goods and services that are not exchanged in markets and that, therefore, have no prices associated with them. Within this framework, demand for nonmarket goods is established by first describing a simulated market to the respondents and then asking them directly to reveal their preferences in terms of some

common denominator. The advantage of using the contingent valuation method is that it is suitable for valuing a wide range of nonpriced environmental goods and services. However, it is still a relatively new technique and requires additional empirical verification and development, particularly in the context of a developing country.

In this study, contingent valuation method was used in both the village survey and the tourist survey. The exercise of formulating the contingent valuation questions for the village survey threw considerable light on local perceptions about the desirability of the park. For example, in the pre-test of the questionnaire, a number of villagers indicated that they were willing to sacrifice labor time to walk an additional distance in order to obtain forest products or to shift cultivation, if this meant that the park would be established. This seemed to indicate that the villagers were willing to pay to protect the forest. However, we soon discovered that the villagers' responses did not stem from perceived nonuse benefits related to the park, but apparently emerged from a sense of coercion by local authorities, who had made several arrests for incursions into the park area. We thus reformulated the questions in terms of willingness-to-accept compensation for having lost access to the forest contained in the park. The wording of the village contingent valuation question is given in Annex B.

In the village survey, the contingent valuation method questions required respondents to provide "yes" or "no" responses (a discrete choice format). The questions themselves referred to compensations which would make the household as well of with the park as they would have been if they continued to have access to the forests in the park. The measure used for the compensation mechanism was units of rice.

In the tourism survey, the contingent valuation method was used (as an alternative method to the travel cost method) for estimating the total value of the park to tourists. These questions were phrased in terms of how much more the foreign tourists would have been willing to pay for their trips if the new park were available for them to visit. The contingent valuation method questions administered to the tourists are found in Annex B. These questions were also pretested and revised prior to the implementation of the tourist survey.

Travel cost method

Travel cost models use the amounts of time and money visitors spend traveling to a site as price proxies, together with participation rates and visitor attributes, to estimate the recreational value of the site. Most travel cost studies portray the problem in terms of a single-purpose, single-destination day trip to a site that affords some particular recreation experience of typical quality, which can be substituted for those available at many similar sites. Recreation in Madagascar's national parks contrasts sharply with these assumptions. Recreators in Madagascar can be divided into two groups, consuming distinct goods: local recreators who make day trips to national parks to view the local natural environment, and international nature tourists who undertake lengthy trips to experience unusual natural settings and cultures.

Standard travel cost models can be directly applied to estimate the demand of local recreators. Demand by international tourists, however, requires a reformulation of the traditional models. Our study focuses on international tourists. The full international nature tourism travel cost model used in this study is presented in a paper by Mercer and Kramer (1992). It is based on the assumption that individuals travel to a single country, such as Madagascar, and engage in a variety of activities. The activities consist of traveling to specific natural areas for recreation and travel enjoyment. Estimating this model requires specific data on how each household distributes its time across activities during the time horizon of the model, and a specification of the features of the activities. Ideally, this implies collecting full trip itinerary data, as well as travel cost data, for foreign visitors. The itinerary data includes the distribution of time between activities for each individual, the costs of pursuing the activities, and the features of the various activities that lead to differences across individuals in their ability to produce them.

Based on the theoretical model, questionnaires were prepared and translated into French and administered to visitors to the small Perinet Forest Reserve, adjacent to the Mantadia National Park. The questionnaires consisted of a series of questions on the costs of the current trip to Madagascar, details on previous international nature tourism related trips, the process for deciding on trip destinations, contingent valuation questions for willingness to pay for visiting the Mantadia National Park, and a series of socioeconomic and demographic questions. The questionnaires were tested in the United States in May 1991 with a focus group of previous visitors to Madagascar through the Wildlife Preservation Trust in Philadelphia. In Madagascar, the questionnaires were revised following

pretests with a small sample of visitors to the Perinet Reserve and discussions with our local Malagasy collaborators.[3]

Initial data collection efforts were successful, with a total of 94 tourists completing the surveys. Unfortunately, political unrest and a resulting general strike caused a drastic reduction in the numbers of tourists coming to Madagascar from mid-July through the fall of 1991. As a result of the almost complete reduction in tourist traffic, we called a halt to further efforts to collect data in late October 1991. The data collected in Madagascar have been supplemented with additional data from an expert opinion survey administered to U.S. and European tour operators who specialize in nature oriented tourism.

Empirical Results

In this section, some preliminary results of the village component and the tourism component of the study are presented. While estimation of the total values of the park for these two groups is still under way, we report here some of the key results.

Village component

The survey covered a total population of 1,598, with an average household size of 4.6 persons (Table 17-1). The average annual per capita income in Madagascar in 1988 was $190 (World Bank 1989), and the households covered in our survey may well have income levels below this average. Many of the villages do not have access to any medical facilities, running tap water, electricity, or primary schooling. Several of the villages are very isolated; in fact, it takes over half a day to walk from the nearest road to some of the villages.

The survey included several indicators of wealth. Approximately 95 percent of the households control some land. However, the average amount of land is only 1.9 hectares per household (Table 17-2). Other proxies for wealth relate to ownership of watches, radios, and oil lamps. In our sample, 36 percent of the households surveyed own a watch, while 33 percent own radios, and 97 percent of the households have a kerosene lamp to light their huts.

The average household produces 487 kilograms of paddy rice per year, worth about $128. Most households also engage in shifting cultivation. Eighty percent of the households surveyed said that they would add to existing land for cultivation. Ninety-nine percent of these respondents acknowledged that they planned to cut forests to add to their land. The average household expected to cut 1.7 hectares of forested land in the coming year to undertake shifting cultivation. Further details on land use are presented in Table 17-2.

As expected, our tabulation of the data on forest products suggests that fuelwood is the most important forest product collected. Annually, the average household collects about 6,164 kilograms of fuelwood. The total value of the firewood collected is $13,289 or about $38 per household per year. Ranking next to fuelwood in terms frequency of harvesting are fish, crabs, wood for other purposes, and a variety of grasses. Grasses are used as material for house construction, for weaving mats, and for making clothing and hats. Values of some of the forest products are given in Table 17-3.

To estimate the opportunity cost to villagers of establishing the Mantadia National Park, cash flow analysis was used. Income from agricultural and forestry activities was estimated for three different groups of villages. Then, depending on the extent to which land in the park had been used by villagers for gathering forest products and practicing swidden agriculture (based on analysis of aerial photographs of the park), estimates were made of the income losses associated with the loss of access to park land. The mean value of losses was $91 per household per year. Aggregating over all households living in the vicinity of the park and using a 10 percent discount rate and 20-year time horizon, the net present value of the opportunity costs was estimated to be $566,010.

In order to assess local views about conservation and to set the stage for the contingent valuation exercise, the questionnaire included a number of questions which specifically probed villagers' perceptions of forests. Although 65 percent agreed that floods occur less frequently with forests, 40 percent seemed to think that forests did not help soil protection. Interestingly, 91 percent of

[3] Two local Malagasy research consultants (trilingual in English, French, and Malagasy) were hired to administer the questionnaires to visitors to the Perinet Reserve.

the respondents agreed that primary forests were “more fun” than secondary forests. This suggests that recreation may be an important forest use. Another surprising result was that 77 percent of the villagers interviewed seemed to think that preserving forests in order to protect ancestral graves was not very important. This is a surprising result because conventional wisdom suggests that one of the most important uses of the forests to the Malagasy is as a resting place for their ancestors.[4] Finally, 68 percent of the villagers seemed to think that it is advantageous to clear forests as a form of pest management.

The responses to the contingent valuation questions indicate that on average, a compensation of rice equivalent in value to $108 per year per household would make households as well off with the park as without. Aggregating over the population in the park area, this implies a necessary one-time compensation of approximately $673,078, assuming a 10 percent discount rate and 20-year time horizon.

Tourism component

In this section, we provide some information from the tourist questionnaires. Table 17-4 presents summary statistics for the complete sample of tourists. Income for the visitors ranged from $3,000–$300,000, with a mean of $59,156. The average tourist was 39 years old and had completed 15 years of education. Visitors came from 13 countries (primarily from Europe). Trips ranged from 3 to 100 days in length (mean of 27 days), with 1–8 days spent at Perinet (mean of 2 days). Expenditures for their trips to Madagascar ranged from $335 to $6,363, with an average trip costing $2,874.

Using data from the tourist survey supplemented by data from the travel experts survey, an econometric analysis was conducted to apply the travel cost approach. The econometric model used is referred to in the literature as a random utility model. The model examines the allocation of trip choices to Madagascar and other international nature tourism destinations as a function of travel costs, socioeconomic characteristics, and quality variables. The model was then used to predict the project benefits to tourists, assuming that the Mantadia National Park will result in a 10 percent increase in the quality of local guides, educational materials, and facilities for interpreting natural areas in Madagascar. The average increase in willingness to pay per trip was estimated to be $24 per tourist. Based on the conservative assumption that the same number of foreign tourists (3,900) would visit the new park as currently visit the Perinet Reserve, there would be an annual benefit to foreign tourists of $93,600. At a 10 percent discount rate and a 20-year project life, this would generate a net present value of $796,870 of benefits associated with the park.

In addition to the travel cost method, the contingent valuation method was used to directly value the park for foreign tourists. Visitors were provided with information about the new park and then asked how much *more* they would have been willing to pay for their trip to Madagascar to visit the new national park (a) if they saw twice as many lemurs, and (b) if they saw the same number of lemurs as they saw on the current visit to the Perinet Reserve (which we believe to be the more realistic scenario). A discrete choice format was utilized for the contingent valuation questions. The mean bid for their additional willingness to pay to for their trip if the park had been available (conditional on seeing the same number of lemurs) was $65. Assuming current visitation patterns continue, the total additional willingness to pay to visit the new park would be $253,500 annually. This amounts to $2.16 million as the present value for the stream of benefits over 20 years—assuming a 10 percent discount rate.

Conclusions

Several tentative conclusions can be drawn from this study. Based on our experiences in the field and on the results thus far, nonmarket valuation techniques can provide useful information for economic evaluation of national parks. A major strength of this study is the opportunity to compare valuation techniques (see Table 17-5). For the village component, the estimated welfare estimates based on two entirely different methods, opportunity cost analysis and contingent valuation method, were remarkably similar ($91 and $108 per household per year). The estimates of tourist benefits based on the travel cost method and contingent valuation method were somewhat more disparate ($24 versus $65 per trip), but it is noteworthy that the benefit estimates are of the same order of

[4] In fact, there is a Malagasy term which refers to the forests as the “robe of the ancestors” (Olson 1984).

magnitude. Furthermore, the travel cost estimate is for use values only, while the higher contingent valuation estimate may reflect some nonuse values in addition to use values.

The results from such valuation efforts can be incorporated more fully in benefit cost analysis of projects, including conservation components, to determine their economic viability. Further research of this type has implications for policies, investment decisions, resource mobilization, and project design and management. Such information can help governments decide how (a) to allocate scarce capital resources among competing land use activities, and (b) to choose and implement investments for natural resource conservation and development. Results can also be used in determining, or influencing, pricing, land use, and incentive policies. At the local level, the findings can be used to determine compensation for local villagers for foregone access to forest areas designated as national parks. In addition, the research findings can show the value of a park as a global environmental asset to foreigners, thus influencing external assistance for conservation programs at the local level.

At the same time, the findings indicate future issues that need further exploration. Reliance on willingness to pay is fundamental to the economic approach to valuation, but tends to overemphasize the importance of value ascribed to richer foreign visitors (because ability to pay is also a key element). If conflicting claims to park access were to be determined purely on this basis, Malagasies (especially the poor local villagers) are more likely to be excluded. Therefore, other aspects of sustainable development, especially social goals like distributional equity (see Munasinghe, this volume), would need to be invoked to protect the basic rights and needs of local residents.

Table 17–1. Socioeconomic Characteristics of Surveyed Households

Variable	*Number of observations*	*Range*	*Mean*
Number of household members	351	1 – 13	4.55
Number of males per household	335	1 – 8	2.38
Number of females per household	339	1 – 7	2.35
Age (years)	2,012	.5 – 100	17
Education (years)	1,542	0 – 14	2.35
Nonfarm labor days per year per household	115	8 – 504	107
Nonfarm income per year per household ($)	106	8 – 789	108

Table 17–2. Land Use Information for Villages

Variable	*Number of observations*	*Range*	*Mean*
Total quantity of farmland per household (hectares)	311	0 – 9	1.89
Planned increase in cultivated land per household (hectares)	256	0 – 10	1.7
Annual quantity of farmland planted with rice per house-hold (hectares)	289	0.04 – 5	1.04
Total annual rice yield per household (kilograms)	296	2 – 3,600	487
Total annual quantity of rice marketed per household (kilograms)	249	0 – 990	41.8
Total annual value of rice yield per household ($)	296	$0.5 – 1,101	$128

Table 17–3. Value of Forest Products Collected by Villagers

Forest products	*Number of observations*	*Total annual value for all villages (US$)*	*Mean annual value per household (US$)*
Fuelwood	316	$13,289	$38
Crayfish	19	$220	$12
Crab	110	$402	$3.7
Tenreck	21	$125	$6
Frog	11	$71	$6.5

Table 17–4. Summary Statistics for Complete Sample of Tourists

Variable	*Number of observations*	*Range*	*Mean*
Income	71	$3,040 – $296,400	$59,156

Variable	*Number of observations*	*Range*	*Mean*
Education (years)	86	10 – 18 years	15 years
Age	87	16 – 71 years	38.5 years
Number of days in Madagascar	83	3 – 100 days	26.6 days
Number of days in Perinet	80	1 – 8 days	2 days
Total cost of trip to Madagascar	78	$335 – $6,363	$2,874
Transport cost to Madagascar	47	$352 – 5,000	$1,388
Transport cost in Madagascar	43	$8 – 2,000	$588

Table 17–5. Summary of Economic Analysis of Mantadia National Park

Estimates of welfare losses to local villagers from establishment of park		
Method used	*Annual mean value per household*	*Aggregate net present value*
Opportunity cost	$91	$566,070
Contingent valuation	$108	$673,078
Estimates of welfare gains to foreign tourists from establishment of park		
Method used	Annual mean value per trip	Aggregate net present value
Travel cost	$24	$796,870
Contingent valuation	$65	$2,160,000

Annex 17—A Additional Components of Research Study

Flooding—Deforestation Component

By means of a productivity analysis, we are also measuring the benefits to villagers of reduced flooding from reduced deforestation resulting from the establishment of the park and buffer zone. Productivity analysis is a valuation method suitable for examining the effects of environmental quality on products which enter into market transactions. This approach has been used in the past to value the effects of various types of environmental change on agriculture, forests, and fisheries (Freeman 1979). The basic notion is that changes in environmental quality reduce (or increase) the quantity and quality of products being marketed. Once those physical changes are identified and estimated with the help of physical and biological scientists, the productivity changes can be valued through economic analysis.

The effect of deforestation on flooding is a continued source of concern on the eastern half of the island of Madagascar due to regular flooding caused by monsoon rains. Anecdotal evidence suggests that the incidence and magnitude of flooding has increased in recent years as deforestation expanded. In addition, research conducted in the Mantadia area shows evidence of increased runoff in watersheds cleared for swiden agriculture.

The analysis is proceeding, starting with the estimation of deforestation rates in the Mantadia area using remote sensing. Deforestation rates for the future are projected with and without the park. These land use changes are then used to project effects on flooding. Finally, to the extent that flooding is reduced by the park and buffer zone, the reduced crop losses caused by flooding will be estimated and valued in economic terms.

U.S. Rainforest Survey Component

Many of the benefits of biodiversity protection efforts accrue outside the country where the project is implemented. While some of these benefits are due to future pharmaceutical and other products developed from protected species, some benefits are more intrinsic in nature (Van Schaik and others 1992). Many people value tropical forests and the biodiversity they contain, even if they have no planned direct use of the forests or their products. Economists refer to this as existence value and point to contributions to organizations such as the World Wildlife Fund as evidence of the importance of these economic values. Our research uses the contingent valuation method to estimate the benefits to U.S. residents of protecting tropical forests.

A mail survey was administered to a random sample of 1,200 U.S. residents in June 1992. The purpose of the survey was (a) to measure the willingness to pay of U.S. residents for preserving

tropical forests, and (b) to determine the attitudes toward issues concerning tropical rainforest preservation and management (such as compensation). Of course, many of the benefits of biodiversity protection occur in places other than the United States, especially Europe, so this will serve as a pilot study to see if the contingent valuation method is workable for valuing a global good of this nature.

Annex 17—B Contingent Valuation Questions

A. Village Component

Suppose you are asked to use only the buffer zone, set aside for collecting forest products and for growing crops and are asked not to use the rest of the forests any more. Suppose in order to make up for asking you not to use the forests in the park, you are given _____ *vatas* of rice every year from now on. Would this make you as content as before when you could use the forest in the national park?

If YES, would _____ *vatas* of rice make you as content?

If NO, would _____ *vatas* of rice make you as content?

B. Tourism Component

The government of Madagascar is establishing a 10,000 hectare national park near the 800 hectare Perinet Reserve. The main purpose of the park is to preserve and protect the rainforest in its natural state. I will now ask you a few questions concerning your potential use of this new park. In answering these questions, assume the new park will have:

- ten times as many nature and hiking trails as the current reserve
- an educational center

Now imagine that you were able to see twice as many lemurs and birds at this new national park than at the current Perinet Reserve. Would you have been willing to pay $_____ more than you paid for your trip to Madagascar to visit the new national park?

_____ Yes

_____ No

Would you have been willing to pay $_____ more than you paid for your current trip to Madagascar to visit the new National Park if you still saw the same number of lemurs and birds as you do now when you visit the current Perinet Reserve?

_____ Yes

_____ No

Bibliography

Abramowitz, J. 1991. *Investing in Biodiversity: U.S. Research and Conservation Efforts in Developing Countries*. Washington, D.C.: World Resources Institute.

Andriamampianina, J. 1985. “Traditional Land Use and Nature Conservation in Madagascar.” In J. McNeely and D. Pitt, eds., *Culture and Conservation: the Human Dimension in Environmental Planning*. London: Croom Helm.

Dixon, John A., and Paul B. Shermann. 1990. *Economics of Protected Areas*. Washington, D.C.: Island Press.

Freeman, A. Myrick. 1979. *The Benefits of Environmental Improvement: Theory and Practice*. Baltimore: Johns Hopkins University Press.

Kramer, R. A., R. Healy, and R. Mendelsohn. 1992. “Forest Valuation.” In Narendra Sharma, ed., *Managing the World’s Forests*. World Bank Natural Resources Development Series, Arlington, Virginia: Kendall Hunt.

Mercer, D. E., and R. A. Kramer. 1992. “An International Nature Tourism Travel Cost Model: Estimating the Recreational Use Value of a Proposed National Park in Madagascar.” Presented at the Allied Social Science Associations Annual Meeting. January 5, New Orleans, Louisiana.

Munasinghe, Mohan. 1992. “Biodiversity Protection Policy: Environmental Valuation and Distribution Issues.” *Ambio* 21(3)227–36.

Munasinghe, Mohan. 1993. *Environmental Economics and Sustainable Development*. Washington D.C.: The World Bank.

Myers, N. 1972. “National Parks in Savannah Africa.” *Science* 178:1255–63.

Olson, S. 1984. “The Role of the Ancestors: Forests in the History of Madagascar.” *Journal of Forest History* (October 1984):174–86.

Smith, V. K. 1990. “Can We Measure the Economic Values of Environmental Amenities?” *Southern Economic Journal* 56(4):19–32.

van Schaik, Carel, R. A. Kramer, N. Salafsky, and P. Shyamsundar. 1992. “Biodiversity of Tropical Rainforests: Ecology and Economics of an Elusive Resource.” Draft manuscript. Durham: Duke University Center for Tropical Conservation.

World Bank. 1988. “Madagascar Forest Management and Protection Project.” Staff Appraisal Report. Washington, D.C.

World Bank. 1989. “Madagascar: Adjustment in the Industrial Sector and an Agenda for Future Reforms.” Report No. 7784—MAG. Washington, D.C.

18 Elements for Calculating the Value of Biological Diversity Losses: The Case of Oil Exploitation at Cuyabeno Reserve in the Ecuadoran Amazonian Region

Jorge Acosta Arias

Historical Context

ENVIRONMENTAL HISTORY IN LATIN AMERICA is closely related to its economic history. Since the international division of labor took place at the end of the 19th century, a developed capitalism has been existing together with an underdeveloped one.

Countries under the first type of capitalism experienced an original accumulation of capital that supported the implementation of an industrialized development model, as well as their specialization in manufacturing production.

Since the colonial period, the rest of the countries were constituted as peripheral supplier countries of raw materials and food for the industrial world. A primarily agro-export development model was consolidated in the developing economies.

The incorporation of dependent countries into the world market reinforced the exports sector, which since then has become the core of those economies. In most of the cases, this process led to the development of a monoculture-based agriculture.

The developing countries have largely been affected by the permanent deterioration of the exchange terms. Actually, while prices of primary products have been experiencing a constant fall, the prices of the industrialized goods from the central countries have tended to stabilize. This process sparked a debate about Latin America’s development which concluded that there is a need to promote the internal accumulation of resources so as to strengthen an economic growth based on industrialization.

A particular economic situation supported this statement. The surplus obtained from the international financial capital could not be invested in the sites where it commonly originated because the reinvestment of these funds would have meant a drop in the profit rate. For this reason, credits were offered to those nations with payment capability.

By that time, Latin America was experiencing an important growth of its exports; Ecuador, in particular, was obtaining an increased amount of resources (greater than in any other historical period of the nation) from oil exploitation. The oil surplus allowed the country to become subject to credit and to finally initiate the external debt increase process.

Due to the drop of the international prices of major commodity exports, external credits became essential to Ecuador. This generated a chronic deficit in the balance of payments, mostly when the amounts requested for paying the external debt services deprived our economy of scarce capital.

The central economies have not only received resources from the developing countries by means of the detrimental terms of exchange and external debt service payments, but also through foreign investment earnings, patents, and royalties. It is estimated that until 1987, Ecuador had paid $6,500 million as interest payments for the external debt alone, without, however, taking into consideration the additional amounts for amortization of capital.

The oil exploitation is a strategic economic activity for Ecuador, as it generates about 40 percent of the nation's total volume of exports. Nevertheless, this activity has caused serious damage to the country's natural environment, such as the Cuyabeno Fauna Production Reserve. The Reserve's areas have been threatened by the pollution generated from poison gases and heavy metals discharged into the environment without treatment and the deforestation needed to install the execution of such activities. The oil exploitation has also brought about the spontaneous colonization and the simultaneous conversion of the forest into agricultural parcels and pasturelands. All these factors have resulted in biodiversity losses and in the lack of an economic rationale for generating alternative sustainable uses of the tropical rainforest's resources. To further complicate the situation, no development policy exists to promote alternatives of such nature.

Throughout this chapter the thesis is related to the economic valuation of the natural resources as an essential mechanism for maintaining, in the long term, the optimum productive option that links income generation and distribution with the conservation of the natural environment. These natural areas fulfill an ecological function that must be economically valuated; they cover scientific and commercial resources not yet discovered or exploited and, in addition, the living space of Indian peoples whose existence increasingly is being threatened.

The economic crisis that Ecuador has faced since 1982 has periled the country's natural integrity. The conflict over land rights and social tensions has strongly deepened within the protected areas. The agricultural crisis that gave rise to migration and colonization processes is one of the determinant factors of this situation.

On a worldwide level, the problem concerning the destruction of natural resources in general, and the reserve areas in particular, is potentially aggravated due to the confluence of the neoliberal economic strategy based upon the economic growth. Economic policies such as the opening of our economies to foreign capital and the implementation of structural adjustment programs, provoke the increase of natural resources exploitation (for export) and have affected the standards of living of the society's most impoverished sectors.

Considering the environmental deterioration of the country and of the world, an immediate and necessary measure seems to be the valuation of natural capital and its inclusion in the national accounts. This process would allow a calculation of the biodiversity losses generated by the production activities, and the formation of policies that detain the irrational exploitation of the natural resources. Furthermore, with respect to profits, the inclusion of natural capital costs and benefits in the national accounts would justify the availability of sustainable production projects. This means that, contrary to what happens with the oil exploitation, the generated product could be internally distributed.

The Ecuadorean oil sector has acted with evident disregard for the economic losses associated with an activity that results in strong environmental impacts and the destruction of biological resources. Pollution of the water resources (lakes, rivers, tidelands) and of the air has not been quantified yet; nor has the important deforestation of the sites where it takes place by the operation of the oil companies been evaluated. When quantifying the generation of the gross national product, the national accounts do not reflect the natural capital depreciation. However, there are resources that incorporate more than just a potential value; they have traditionally been utilized by local populations, who face the deterioration of their standards of living and the weakening of the possibilities to utilize the natural resources, which at the present time are increasingly in danger and expensive.

Characteristics of the Reserve

General statements

The Cuyabeno Fauna Production Reserve is among the 15 protected areas of Ecuador and is one of the 6 areas situated in the Amazonian region; it is located in the northwestern limit of the Ecuadorean Amazonia, in the Cantones of Lago Agrio and Cuyabeno in the Province of Sucumbíos. Originally it consisted of 254,760 hectares of land covered by tropical rainforest, and it was extended to 655,781 hectares in September 1991. This additional territory makes the Cuyabeno Reserve one of the most extensive areas of the Ecuadorean Amazonian region and of the country in its "continental section."

The Reserve has two large interconnected systems of lakes in which a variety of ecological formations such as perennial and temporal flood zones and swamps are found. To maintain their level of water, the rivers and lakes of Cuyabeno depend upon the local rain level; during the year, an average of 3,300 millimeters of rain has been registered and temperatures can vary between 20° and 30° Centigrade.

There is a great diversity among the Reserve's relief and topography: there are well-drained high hills and low plain and swampy zones covered by significant extensions of palm trees. These zones are located 200 meters above sea level. In the majority of cases, the soil of the Reserve is acidic, compact, and insufficiently drained, making it inappropriate for agricultural activities.

From an ecological and evolutionary standpoint, in the Reserve a great variety of fauna and flora species can be found, among which can be identified 4 species of alligators, 2 of dolphins, more than 450 birds, 10 species of primates, 98 species of lianas and at least 24 genuses of palms; this constitutes a genetic resource of substantial importance and of great scientific interest.

Human population

In 1990, the human population of the area was estimated at 8,334 inhabitants; these settlements are the result of a rapid colonizing process initiated in 1972 right after the construction of roads for oil exploitation. At the present, human settlements occupy an important portion of the Reserve's northwestern boundary.

The effects of the colonization have been largely harmful. In addition, the living conditions of the migrant population have remained as precarious as in their original homes.

The environmental integrity of the area has been seriously damaged because of the production activities that are carried out that are incompatible with the ecological characteristics of the region. In addition, a permanent tension continues to exist between the State and the grassroots organizations (provoked by the irregular conditions in which the population settled in the area). More than 26,000 hectares of tropical rainforest have been converted into pasturelands, cultivations, or oil exploitation fields.

Furthermore, within the Cuyabeno Reserve live two ethnic groups that belong to the linguistic Tucano Occidental group: the Cofanes and the Siona-Secoya. These peoples' livelihood depends mainly on subsistence agricultural activities in accordance with traditional production systems used. Additionally they survive with selective hunting of wild animals, fishing, and tourism. The Siona Indian population combine these activities with temporary work at the oil companies.

Oil activity

In the Reserve, oil production activities were initiated in 1972, along with the construction of roads, which stimulated human settlement. At the present, 35 productive wells are distributed throughout the Reserve. Most of the wells are administered by the City company, an American enterprise, while Petroecuador, the country's public oil company, is in charge of a small quantity.

Although oil production activity is executed inside a protected area, the technological characteristics with regards to precautions and preventive measures against the negative environmental impacts of oil exploitation have been destructive. In the same way, the production methods have been damaging from the perspective of the socioeconomic and cultural life of the Indian populations.

The pools' leakages, the breaking of pipes, and the permanent filtrations have resulted from the obsolete technologies used, the lack of maintenance and control in the installations, and the serious engineering problems that have been detected. Between 1985 and 1991, three to four serious leakages were registered annually in the area, due to technicians' negligence and maintenance problems. In 1991 alone, four significant leakages occurred. These accidents meant more than disasters from just the ecological point of view. The Siona population incurred health problems and the contamination of their subsistence sources.

Eight months after the last leakage, Cuyabeno's lakes and vegetation were still covered by oil spills, and the local population declared that they had extreme difficulty in finding fish and other aquatic resources. This verifies the levels of ecological deterioration the area has experienced.

Siona Indians face deep acculturation and social disintegration effects, produced not only by the oil exploitation, but also to a number of other factors, one of which is misguided touristic activity, activity that has generated several internal quarrels.

With regard to the oil exploitation activity, in addition to the alteration of basic living resources and the deterioration of the population's nourishment and health status, two main aspects must be mentioned:

- Employing an Indian labor force in the oil operation stimulates the constant mobilization of the men, causing the temporary or permanent negligence of traditional subsistence activities, even greater dependence upon foreign products, and a modification of consumption patterns, going against social cohesion and community life.
- Enlargement of market relations with the Siona Indians, promoted by the oil exploitation activities, has been contrary to the native population. It has accelerated the process of adopting another culture, by associating these populations with the national society and diminishing their opportunities for consolidating their own identity. Indians have been shoved into this new culture without understanding the codes and functions of the dominating society, and forgetting the establishment of more respectful and horizontal forms of interaction and relation.

In short, at the Cuyabeno Fauna Production Reserve the oil exploitation activities have harmed both the human community groups and the natural resources. This activity has contributed to intensification of the pressure on the land and in breaking the area's ecological equilibrium, while not improving the local population's living conditions.

Because of the complexity of this issue, the ecological, social, and cultural costs cannot easily be established in economic terms.

Production Activity Within the Reserve (1982–1990)

In the Cuyabeno Fauna Production Reserve, a conflict between different interests exists over the development space for oil exploitation activities: on the one hand, the State and the enterprises that promote and execute the oil exploitation; on the other hand, the Indian, private, and community organizations that, beyond their different focuses, have formed a consensus regarding the area's conservation. While political and legal issues have usually been discussed in each conflict, little importance has been given to the economic aspects. In justifying the oil exploitation, the State emphasizes the strategic character of petroleum and its essential economic role for the country's development.

To approach this problem, new paths have been opened by the field of economics. Traditionally, the biological diversity was considered as a "free" and plentiful good as well as an externality. At the present time, however, by means of economics it is possible to estimate the value of the biodiversity losses, often incurred due to the exploitation activities of the natural resources which, indeed, are commonly valuated by the world market. In the case of the Cuyabeno Reserve, these activities are the oil exploitation and the conversion of the tropical rainforest into agricultural parcels and pasturelands that represent an economic advantage due to their profitability. In calculating the benefits obtained from this production, the new path of economics has not yet been taken: the costs that represent the biodiversity losses are not taken into account. In other words, the natural capital destruction caused by the production activities is not integrated into the cost structure. In addition, development priorities restrain the analysis of production alternatives that could be implemented in the region and that could eventually show to be advantageous if variables such as the

environmental services of the protected areas and the dynamics of the local population are to be included.

Through the oil exploitation, the Cuyabeno Fauna Production Reserve was incorporated into the national economy and, simultaneously, different land uses were registered, crops were introduced, and new activities addressed to the market were developed.

This chapter discusses and reflects on the need for assigning value to biological diversity losses; also, it presents a simple and approximate analysis of the relationship between the net benefit obtained from the oil exploitation, the agricultural cultivations for the market, and the cattle raising, with the benefit that could be obtained by the potential utilization of the tropical rainforest products.

The temporal analysis takes into account three successive periods: (a) 1982–1991; (b) the following 14 years, during which the proved oil deposits will be consumed completely; and (c) the next 10 years, where oil will not produce net benefits to market production.

For the first 10 years (1982–1991), there are estimates about the amount of resources generated from the oil exploitation, and from the agricultural and cattle raising activities. Within the latter two industries, the coffee cultivation and the cattle raising for beef production are the most important activities. Coffee was selected as the most important agricultural product of the zone because it represents about 75 percent of the cultivated surface and it is totally destined to the market. In spite of the several kinds of cattle throughout the area, the cattle raising for beef production is the only one that includes market strategies. According to the region's statistical data, the production rates of the other types of beef, milk, and even coffee products are not significant in comparison to the production rates obtained from the beef cattle for the market, which grows larger each year. This happens although the capacity for animals in the Reserve's lands is significantly under the national average. Two factors explain this: the first one is related to profit levels, which tend to increase after considering the greater risks that face the other activities such as the cultivation of coffee; the second one deals with the increasing costs needed to fight against plagues, especially in coffee.

An estimation of the resources generated from the commercialization of the forest's sustainable production has been performed. This estimation considers two levels. The first one takes into account the production of nonwooden resources such as fiber, latex, resins, oils, fruits, and medicines. The second level is related to the sustainable production of wooden resources when an exploitation rate of 5 percent is applied. This estimation is based upon the data obtained by Peters and others (1989) in their study about the resources generated in one hectare of the tropical rainforest at the Iquitos zone, in Peru. The amount of resources produced by one hectare (expressed in dollars) is applied to the deforested area in response to the first production alternative.

The following results appear from the analysis of this period: the first production combination, that is, oil, cultivation of coffee, and beef production, generates a net benefit of $316,344,662 (Figure 18–6); while the second alternative that relates to the forest's nonwooden and wooden resources, could generate a net benefit of $122,762,156 (Figure 18–7). This figure represents about 39 percent of the benefit obtained by means of the first production alternative.

Within the total net benefit generated by the oil, agricultural, and cattle raising activities during the period 1982–1991, the participation rate of the first production alternative reached 97.7 percent (Figure 18–6). The same analysis has to be made including the end of the oil deposits, estimated to happen in 14 years, and the calculation of the forest's production.

Results obtained from this analysis show that the second production combination now represents 41.38 percent of the first one and a net benefit of $171,867,019 (Figure 18–10).

Finally, the third part of the analysis corresponds to a 10-year period during which it is assumed the oil deposits would have been consumed completely. This modifies the two situations discussed before. Sustainable production of the forest's wooden resources exceeds by about 168.38 percent the cattle and coffee production (Figure 18–11).

Conclusion

The analysis presented here expresses the idea that within a long-term development vision, the sustainable exploitation of the tropical rainforest, represented in this case by the Cuyabeno Fauna Production Reserve, could be considered as an available production alternative. It also reflects the magnitude of the biodiversity loss which, until this moment, has only been qualified as an externality

by the economic agents. The natural resource losses have an economic value whereby their destruction represents a decrease of the natural capital that has not been registered in any account; neither has the natural capital gone deeply into the activities that destroy it.

By leaving out natural capital losses as a cost that has to be considered in the calculations of the benefits, the country's most important activities are receiving a perverse subsidy, since it is necessary to understand that the destruction actually carried out harms the resources that we will need in the future and that belong to all the people. An urgent measure toward correcting this problem is the structuring of an environmental accounting that could register the changes that occur in the natural capital. This information should be incorporated within the country's national accounts so as to show the real situation with regard to the generation of the national product and to allow the implementation of politics that protect the natural resources and encourage their rational utilization.

Table 18-1. National Revenues for Oil Production ($)

Year	*Exports revenues*	*Revenues for internal sales*	*Total national revenues*
1982	794,613,905.2	132,798,004.0	927,411,909.2
1983	1,089,344,211.1	158,934,854.0	1,248,279,065.1
1984	1,230,366,990.6	243,896,158.0	1,474,263,148.6
1985	1,215,201,123.9	279,256,437.0	1,494,457,560.9
1986	613,418,892.3	349,196,084.0	962,614,976.3
1987	529,571,483.7	317,068,609.0	846,640,092.7
1988	585,838,609.6	467,807,235.0	1,053,645,844.6
1989	834,513,716.6	350,360,390.0	1,184,874,106.6
1990	991,797,872.1	208,453,311.0	1,200,251,183.1
1991*	713,537,254.6	380,791,700.0	1,094,328,954.6

Note: Total national revenues for the period: 11,498,160,719.6. Total revenues for oil exploitation in the Cuyabeno Reserve during the period: 700,768,679.7. Participation percentage of oil revenues from Cuyabeno Reserve in the national oil revenues: 6.0.

Source: PETROECUADOR (1982–1990).

Elaboration: The author.

Table 18-2. Net Benefits from Revenues Obtained from the Oil Exploitation of the Wells Located Inside the Cuyabeno Reserve ($)

Year	*Production (barrels)*	*Weighed average price*	*Total revenues*	*Weighed unitary cost (barrel)*	*Total production cost*	*Net benefit*
1982	1,241,156	32.8	40,764,403.5	25.0	31,028,900.0	9,735,503.5
1983	1,375,074	28.1	38.606.990.1	17.9	24,572,572.4	14,034,417.8
1984	3,222,785	27.5	88,513,790.0	8.6	27,798,874.2	60,714,915.8
1985	4,439,153	25.9	114,968,735.7	12.5	55,552,724.7	59,416,011.0
1986	5,036,600	12.7	63,963,812.7	12.7	63,922,999.6	40,813.1
1987	3,191,846	16.3	52,170,722.9	12.3	39,236,249.4	12,934,473.5
1988	5,573,590	12.5	69,644,793.8	11.4	63,644,927.8	5,999,866.0
1989	5,087,916	16.2	82,525,997.5	8.5	43,493,383.2	39,032,614.3
1990	4,835,957	20.3	98,256,974.3	4.1	19,610,429.5	78,646,544.8

Year	Production (barrels)	Weighed average price	Total revenues	Weighed unitary cost (barrel)	Total production cost	Net benefit
1991*	3,726,864	13.8	51,352,459.1	6.1	22,853,689.1	28,498,770.0
TOTAL	37,730,941		700,768,679.7		TOTAL	309,053,929.8

Source: PETROECUADOR (1982–1990).

Elaboration: The author.

Table 18-3. Average Prices of Commercial Products in U.S. Dollars by Kilogram

Year	Coffee	Beef
1982	0.114707	1.017822
1983	0.162277	0.663306
1984	0.272472	0.874297
1985	0.289475	1.644083
1986	0.337070	1.276112
1987	0.310013	1.003966
1988	0.550760	1.179814
1989	0.118485	1.240991
1990	0.133810	0.948690
1991	0.114841	0.938753
Per. av. price	0.240391	1.078783

Source: Ministry of Agriculture (1982–1990).

Elaboration: The author.

Table 18-4. Land Use in the Cuyabeno Reserve (hectares)

Cultivations	15,271.0
Pasturelands	10,612.0
Oil*	402.5
Subtotal	26,285.5
Forest	228,474.5
Total	254,760.0

Source: Fundación Natura (1991).

Elaboration: The author.

Table 18-5. Net Benefit of the Agricultural Market Production ($)

1. Beef				
Pasturelands maximum extension (ha)	*Yield (kg/ha in 10 years)*	*Average price ($ by kg.)*	*Gross revenue*	*Net benefit (20 % gR)*

* Estimated value.

* Partial figure (1990).

1. Beef				
10,612	170	1.07878344	1,946,168.48	389,233.695
2. Coffee				
Cultivation maximum extension (ha)	*Yield (kg/ha. in 10 years)*	*Average price ($ by kg.)*	*Gross revenue*	*Net benefit (20 % gR)*
15,271	9,400	0.24039094	34,507,494.4	6,901,498.88

Source: Fundación Natura (1987 and 1991).

Elaboration: The author.

Table 18-6. Total Net Benefit of the Production Activities, 1982–91 ($)

		Participation %
Oil production	309,053,929.77	97.695319870
Coffee production	6,901,498.88	2.181639110
Beef production	389,233.70	0.123041018
TOTAL	316,344,662.35	100

Source: PETROECUADOR (1982–1990) and Fundación Natura (1991).

Table 18-7. Estimated Benefit Obtained from the Sustainable Exploitation of Resources in the Deforested Area ($)

Resources	*Deforested hectares*	*Annual rev. by*	*Annual cost per hectare*	*Annual ben. per hectare*	*Exploited period*	*Total period*
						110,924,810.0
Wood	26285.5	697.7900	275.80000	422	10	0
Nonwood	26285.5	50.0375	5.00375	45.03375	10	11,837,346.36
General total						122,762,156.3
in 10 years						6

Source: Fundación Natura (1991) and Peters et al. (1989).

Elaboration: The author.

Table 18-8. Relation Between Benefits

		% 1/2
Wood and nonwood exploitation (1)	122,762,156.36	38.8064573
Oil and agricultural exploitation (2)		316,344,662.35

Source: PETROECUADOR (1982–1990) and Fundación Natura (1991).

Table 18-9. Calculation of Barrel Averages for the Oil Activity during the Period 1985–91 ($)

Year	*Sale price*	*Production cost*
1985	25.90	12.51
1986	12.70	12.69
1987	16.35	12.29
1988	12.50	11.42
1989	16.22	8.55

1990	20.32	4.06
1991	13.76	6.13
Averages	16.824142857	9.664592857

Source: PETROECUADOR (1982–1990).

Elaboration: The author.

Table 18–10. Projection of Benefits According to the 14 Years of Oil Deposits in the Cuyabeno Reserve, 1992–2004

I. Oil and agricultural production					
Production	*Unit*	*Volume*	*Average price ($)*	*Average cost ($)*	*Net benefit ($)*
Oil	barrel	43,750,000	16.82414229	9.66459286	313,230,287.5056
Agriculture	kg	2,009,663,600	0.24039094	0.19231275	96,620,984.3776
Beef	kg	25,256,560	1.07878344	0.86302675	5,449,271.7359
TOTAL period					415,300,543.6191

II. Sustainable production of wood and nonwood resources				
	Deforested hectares	*Annual benefits per hectare*	*Exploited period (years)*	*Total benefits*
Wood	26,285.5	422	14	155,294,734
Nonwood	26,285.5	45.03375	14	16,572,284.8987
TOTAL period				171,867,018.8987

III. Relation of benefits		
	Total net benefits ($)	*% 1/2*
Wood and nonwood sustainable exploitation (1)	171,867,018.8988	41.383769306
Agricultural and oil exploitation (2)	415,300,543.6191	

Source: Fundación Natura (1991) and Peters et al. (1989).

Elaboration: The author.

Table 18–11. Projection of Benefits When the Oil Deposits in the Reserve Consume Completely, 2005–2015

I. Agricultural production					
	Unit	*Volume*	*Average price ($)*	*Average cost ($)*	*Net benefit ($)*
Agriculture	kg	1,579,021,400	0.240390940	0.19231275	75,916,487.725220
Beef	kg	19,844,440	1.078783440	0.86302675	4,281,570.649615
TOTAL period					80,198,058.374840

II. Sustainable production of wood and nonwood resources				
	Deforested hectares	*Annual benefits per hectare*	*Exploited period (years)*	*Total benefits*
Wood	26,285.5	422.00000	11	122,017,291.00000

I. Agricultural production					
	Unit	*Volume*	*Average price ($)*	*Average cost ($)*	*Net benefit ($)*
Nonwood		26,285.5	45.03375	11	13,021,080.99188
TOTAL period					135,038,371.99190

III. Relation of benefits		
	Total net benefits	*% 1/2*
Wood and nonwood sustainable exploitation (1)	135,038,371.99190	168.3810989048
Agricultural and oil exploitation (2)	80,198,058.37484	

Source: Fundación Natura (1991) and Peters et al. (1989).

Elaboration: The author.

Bibliography

Fundación Natura. 1987. *Study for the Establishment of a Foundation for the Amazonia Biotical Resources Conservation*. Diagnostic. Quito.

———. 1991. *Socio-economic situation and management conditions of the Cuyabeno Reserve*. Quito.

Ministry of Agriculture. 1982–1990. Prices received by the agricultural producer at farm level. Bulletins 8-16. Quito.

Peters, Charles, Alwyn Gentry, and Robert Mendelsohn. 1989. "Valuation of an Amazonian Rainforest." *Nature* 339.

PETROECUADOR. 1982–1990. Statistical reports on oil activity. Planning Unit, Quito.

19 Mersey Barrage Feasibility Study: A Practical Application of Environmental Economics

Catherine J. Bickmore and Anne Williams

IN THE UNITED KINGDOM THE GOVERNMENT is encouraging the development of renewable energy sources. Various schemes are being put forward, including those using biofuels, wind, and tidal energy. The Mersey Barrage is a tidal energy scheme being promoted by the Mersey Barrage Company. The feasibility study for the Barrage encompassed technical, economic, and environmental considerations. The cost benefit assessment was undertaken by the consultants Travers Morgan Environment.

The Mersey Estuary, located in the northwest of England near Liverpool, is of international importance as a wetland for wintering waders and wildfowl, in particular pintail (*Anas acuta*), teal (*Anas crecca*), shelduck (*Tadorna tadorna*), wigeon (*Anas penelope*), dunlin (*Calidris alpina*), and redshank (*Trinqa totanus*). The Inner Estuary has been nationally designated as a Site of Special Scientific Interest (SSSI) and satisfies the criteria for Ramsar and protects its (the European) Special Protection Area status.

The aim of the cost-benefit assessment was to establish if, in aggregate, all benefits exceed all costs, and thus whether the project is desirable in economic terms. An important component of the nonenergy related costs and benefits was an evaluation of the waders and wildfowl that use the Mersey Estuary. Other subject areas covered in the assessment included reduction in acid rain and global warming, the effects of imposing a carbon tax, amenity and blight, flood control, and leisure and tourism.

The Barrage would alter the tidal regime of the estuary with attendant implications for the wader and wildfowl habitats. In broad terms, some intertidal feeding areas would be lost completely while

others would be exposed for a shorter period of time than at present. The cost-benefit study required Travers Morgan to place a value on the site, as well as consider a range of protective measures that might be undertaken, and the costs which these would entail.

Placing a Value on the Site

In an attempt to place a value on the site, Travers Morgan utilized the contingent valuation method, in which members of the public are questioned directly on the values they ascribe to sites of environmental importance. Pearce (1989) defines total economic value as follows:

Total Economic Value = Actual Use Value + Option Value + Existence Value.

> **Use Value** relates to the actual use of the environment. In the Mersey Barrage study the users were the bird-watchers and wildfowlers who use the environment of the Mersey Estuary and derive benefit from it.
>
> **Option Value** is a value ascribed by people who might wish to visit the Mersey Estuary in the future, and thus are willing to pay an "insurance" premium to retain the option of possible future use, visits, or utility.
>
> **Existence Value** is unrelated to use, and reflects an individual's concern for the rights and welfare of other life forms. A great many people value the existence of sites such as the Amazon rainforest, but this existence value has nothing to do with preserving options for future use or paying to delay use until more information is available.

The contingent valuation method asks individuals what they would be willing to pay for a benefit preservation, or what they willing to accept in compensation to tolerate a loss. The aim is to elicit valuations, or "bids." As Winpenny (1991) points out, willingness to accept produces figures that are typically three to four times as high as willingness to pay, suggesting that people value more highly something they already own. In willingness to pay, different methods of obtaining bids can be used, including "open" formats and "closed" formats. An alternative approach is to use an iterative bidding technique. Once the bids from the sample population have been collected, the sample average willingness to pay or willingness to accept is calculated and subsequently aggregated to produce a value for the relevant population.

Strategic bias is an important potential source of bias which takes two forms. If respondents believe that their bids will actually be collected, they tend to understate their willingness to pay on the grounds that if the good is provided for one, it is provided for all. The incentive for this form of behavior can be reduced by telling respondents that all will pay the average bid. Strategic bias also occurs when respondents believe that the bids will not be collected. They are then more likely to overstate their true values. Thus, it is important to explain that the responses could influence policy and to say what the cost-sharing procedure will be.

User values: estimating actual use value

To capture the economic value of the estuary to bird-watchers, a telephone interview of a sample of these users was proposed. Travers Morgan decided that the most effective way to target Estuary bird-watchers would be to approach members of the Royal Society for the Protection of Birds, a British wildlife conservation charity with a membership of over 860,000 members. Potential interviewees were drawn, at random, on the basis of post codes, from one of the Royal Society for the Protection of Birds' membership lists for the Merseyside area.

A total of 53 members (18 percent of those approached) agreed to participate. This response rate was disappointing, but not surprising, since for legal and technical reasons the onus was on the members of the Royal Society for the Protection of Birds to contact the Society if they wished to participate.

Twenty-one bird-watchers were able to place a monetary value on their total annual visits to the estuary. The values ranged from £5 ($9) to £2,500 ($4,500) per annum with a mean value of £225 ($405). However, if one excludes the two outlying values of £1,000 ($1,800) and £2,500 ($4,500) respectively, the mean falls to £65 ($117).

All but one respondent was willing to contribute to a hypothetical trust fund each year to preserve the wader and wildfowl habitats in their existing form. The dissenting respondent favored clean electricity generation. The high proportion (96 percent) who would contribute to a trust fund

supported Travers Morgan's view of survey bias. One would anticipate that those who place a value on the wader and wildfowl habitats would make a positive effort to ensure that they contributed to the survey. The mean bid to the trust fund was £27.72 ($49.90). Thus, there is a considerable difference between the mean values that bird-watchers placed on their annual visits to the estuary and the amounts they would be willing to pay to preserve the habitats in their existing form.

Sixty percent of the members of the Royal Society for the Protection of Birds whom Travers Morgan contacted watched birds on the estuary. However, due to difficulties in gaining access to the site, Travers Morgan believed this proportion to be higher than that for all Royal Society for the Protection of Birds members in Liverpool and its environs. Thus, they did not consider it meaningful to aggregate Travers Morgan's results.

Nonuser values: estimating option value and existence value

To capture nonuser values, Travers Morgan interviewed a random sampling of individuals located in two study areas, namely Bristol and Sheffield. These areas were chosen on the basis that, because of their respective distances from the Mersey Estuary, it would be unlikely that the interviewees would have visited the site. Hence, the researchers would be ensured that they were capturing either option values or existence values.

The proximity of the Bristol study area to the proposed Severn Barrage meant that, generally, individuals in this sample were well informed about the concept of a barrage to generate "clean" electricity and the implications of this form of development for the feeding areas of waders and wildfowl.

A pilot survey indicated that Travers Morgan could expect a response rate on the order of 40 percent. To achieve a sample size of 300, a total of 700 letters were dispatched to the combined study areas (350 to each). Households were randomly sampled from the telephone directory. An introductory letter and a nontechnical description of the Mersey Estuary were sent to each household. The letter was followed up within a few days by a telephone call. A response rate of 41 percent was achieved; this is higher than those reported in many published studies. More importantly, Travers Morgan felt that the respondents dealt seriously with the tradeoff between a barrage, which would generate clean electricity, and the loss of the wader and wildfowl habitats.

The most important questions in the Travers Morgan survey related to whether the individual would be willing to contribute to a hypothetical trust fund to preserve the wader and wildfowl habitats of the Mersey Estuary in their existing form. A preservation value was sought because of the uncertainty regarding the precise effects of the Barrage and the difficulty in presenting a range of scenarios which the respondents would be able to appreciate. If the response was affirmative, the interviewees were subsequently asked how much they would be willing to pay into the trust fund each year, while if the response was negative, the interviewees were asked why they would not be willing to contribute.

Ninety-two individuals stated that they would be willing to contribute to a trust fund and, of these, 90 gave a price that they would be willing to pay to preserve the habitats. In the analysis, the values offered in the bidding process were included in a regression equation. The sample included one "outlying" bid of £200 ($360) per annum. This was over three times larger than the next highest bid of £60 ($108). Frequently in contingent valuation method studies, outliers are excluded from analysis. This is the approach that was adopted here.

Analysis was also undertaken to see whether the characteristics of the interviewees in the two areas differed to any great extent. While the socioeconomic characteristics were found to be broadly comparable, there was a difference in the response to the willingness to pay questions as illustrated in Table 19-1.

To derive a willingness to pay equation for the sample which could then be aggregated to estimate a population total, Travers Morgan employed a technique called the Weighted Least Squares approach.

The characteristics of the sample were found to be close to those of the population of the United Kingdom. As the regression revealed that household income was positively related to willingness to pay, Travers Morgan weighted the sample according to household income. Where individuals had been unwilling or unable to answer this question, their questionnaires were excluded from this analysis.

From the above, the following equation was derived:

WTP = 0.0169 HINC + 2.709 VISIT

T Values (2.666) (2.152)

R^2 Adjusted = 0.187

No. of observations used = 245

F = 30.2

Where WTP_i = individual willingness to pay

HINC = gross weekly household income

VISIT = visits to outdoor recreation sites.

Willingness to pay is thus related positively and significantly to income and visits to outdoor recreation sites.

Substitution of the sample mean value for household income (£164 or $295) and the proportion of the sampling who visit outdoor recreation sites (0.72) into the willingness to pay equation derived above gave an average annual willingness to pay for the sample of £4.72 ($8.50). When this was aggregated to the forecast number of households in the UK in 1991 (22 million), the resulting annual willingness to pay to preserve the habitats of the estuary in their existing form was £104 million ($187.2 million).

Although Travers Morgan's analysis produced an annual willingness to pay value of £104 million ($187.2 million), they suggest that this figure needs to be treated with great caution. First, although interviewees were asked for an annual willingness to pay figure, it was suspected that they had difficulty in differentiating between an annual payment, which would be made for the duration of their lifetime, and a once-and-for-all payment. Secondly, although the survey was site specific, they query whether the interviewees' valuations would be affected if they were subsequently telephoned and asked how much they would be willing to pay for other environmental resources in the United Kingdom.

It appeared to us that respondents gave serious consideration to the tradeoff between the site and purchases of goods and services in the private market. One husband actually phoned up concerned that his wife had suggested too large a willingness to pay!

General Conclusions Regarding Evaluation Techniques

Most researchers agree that a number of methodological and theoretical issues must be overcome before reliable and valid estimates of environmental values can be made. Nevertheless, Travers Morgan felt that, given the increasing attention and efforts devoted toward this line of analysis, they would explore its application with regards to the Mersey Barrage proposal.

A real problem revolves around the fact that many people found it difficult to respond to a question which asks them whether they would be willing to contribute to a hypothetical trust fund and, if so, what amount they would be willing to contribute. In a real life situation, people have time and experience to decide whether to purchase a good or service, and at what price. In this respect Travers Morgan suggest that a close-ended format "take it or leave it approach" would be more appropriate. However, this approach requires considerably larger samples than Travers Morgan's and would be more expensive to implement.

Also, it was felt that the structure of the willingness to pay approach implies an intention to pay. Further, individuals apparently do not wish to seem mean and therefore tend to round up their bids. A number of respondents actually stated that they did not wish to appear mean, but that they had limited funds.

In Travers Morgan's view, the contingent valuation method probably has a greater validity when a use value for a site is sought, particularly because the interviewer has more knowledge of the individuals' motivations for valuing the site in question. The difficulties encountered in applying the contingent valuation method to bird-watchers on the Mersey Estuary were largely of an operational nature. It was not possible to engineer a random sample, and for this reason it was considered

inappropriate to aggregate the results. For a future survey, the close-ended format was considered to be more amenable because it comes closer to approaching a market situation.

With regard to the application of contingent valuation method to derive option and existence (nonuser) values, Travers Morgan's main criticism of, and concern with, applying the method is that there are many possible nonuser values and that these too ought to be included in the analysis. However, this would render the exercise impossibly complex. Travers Morgan would suggest that the value attached to the Mersey Estuary habitats might be a proxy for their interviewees' general conservation budget rather than a site-specific sum. The task of translating such general values into site-specific values is very complex. Further research is needed on this particular issue before the contingent valuation method can deal effectively with competing nonuser values.

Protective measures: some options

Replacement cost provides an alternative method for estimating the value of the wader and wildfowl habitats displaced by the Barrage. This method was applied to estimate the cost of protective measures, sometimes known as creative conservation or habitat reconstruction. The application of creative conservation for predicted habitat losses has also been used for the Cardiff Bay Barrage, United Kingdom. There are numerous examples to indicate that creative conservation and various "unplanned" events have been successful in attracting populations of wintering waders and wildfowl, often in large numbers. However, it is recognized that while such measures are beneficial, they may not fully replace that which was lost, or they may interfere with the unknown complexities of the estuary.

With these factors in mind, the study considered the potential for creative conservation for four possible areas within the vicinity of the estuary. Each area was examined in terms of its present land use, ornithological interest, and planning background. Creative conservation at each site would aim at attracting waders and wildfowl, in particular those species predicted to be detrimentally affected by the Barrage. The scope for creative conservation was therefore considered in relation to factors such as the potential for winter flooding, increasing the water table, lagoon and scrape creation, brackish inundation, existing and adjacent ornithological interest, openness, size, lack of human disturbance, and ease of acquisition.

The four areas examined totaled 2,400 hectares of which about 1,000 hectares were considered to have some potential for creative conservation. This area is in excess of the habitat directly affected by the Barrage, but at the feasibility stage it illustrates the scope of the area. Some of the areas had a higher potential than others, chiefly because of their relative location to the estuary and to other forms of development. The land with most potential had a high water table, was poorly drained, and was in low productive agricultural use. It was predicted that the Mersey Barrage would increase flooding in some areas, and a sum was allocated to reinstate the agricultural drainage. Most of this sum would not be required if areas were developed for nature conservation objectives. Some other areas were found to be already attractive to large numbers of waders and wildfowl, but without additional works being undertaken, such a use would be unlikely to continue in the long term. Such areas provide a positive example that creative conservation has a reasonable probability of attracting the desired species.

The Cost of Creative Conservation

Broad estimates of capital and annual maintenance costs were put forward for the various creative conservation schemes. All proposals would affect the accommodation works associated with the Barrage and would also broaden their objectives—for example, from maintaining the *status quo* for agriculture to attracting wintering waders and wildfowl.

With respect to the acquisition of agricultural land, it might be necessary to acquire entire farms even if only part of the farms were affected. In such cases, the land not required for creative conservation purposes could then be subdivided and put back onto the open market. Some land could be subject to management agreements or leased instead of being purchased. However, security of tenure would be beneficial for ensuring the long-term success of creative conservation.

The capital cost estimates included land acquisition, fencing, earthworks, and pumping, as well as some equipment and visitor facilities. For each area, cost savings would accrue to the Barrage scheme as a whole due to the requirement for fewer accommodation works. Land acquisition was generally the greatest cost element for any one area.

Annual maintenance costs included grazing payments, salaries of wardens, and labor, together with their overheads. Rent received from grazing and hay production was offset against costs of undertaking occasional drainage works, depending on the arrangements. A small sum was allocated for the administration of a management committee. The costing of each area was not straightforward, since, in reality, it would depend on the ratio of land acquired to the land leased or managed. However, Travers Morgan's investigations provided an indication of the possible cost range. A more detailed study could produce more reliable figures.

Net present values were derived for the areas identified as suitable for creative conservation. (Net present values are the discounted flow of costs and benefits over the life of the project, which, in this instance, is 120 years. Costs and benefits are discounted to reflect the time preference for money now as opposed to some future date.) The calculations assumed that the capital costs of creative conservation would be incurred in one year (1991). The capital value of land acquisition was assumed to represent the value of the land in its current use. The annual operating costs were assumed to be incurred from 1992 and subsequently for the duration of the operation of the Barrage. The resource savings, in the form of accommodation works, were allocated to the benefit stream over a period of two years (1991 and 1992). Based on the above, a net present value of £7.8m ($14.04m) was derived.

The Value of Environmental Economics in This Case

Although Travers Morgan was able to derive a value for an environmental resource using the contingent valuation method, because of the uncertainties surrounding the technique and their results, as outlined above, they decided that the values should not be submitted as part of the cost-benefit analysis of the Mersey Barrage proposal. They did, however, submit the results derived from the replacement cost and creative conservation exercise.

The findings of the cost-benefit analysis were submitted to a Ministerial Committee, comprising eight governmental departments, in 1991. A decision is pending.

Table 19-1. Willingness-to-Pay Results for Bristol and Sheffield

	Bristol	*Sheffield*
% who would contribute to a trust fund	41%	30%
Mean willingness to pay	£5.45 ($9.81)	£2.72 ($4.90)
Standard Deviation	10.98	7.93

Figure 19-1. Monetary value Placed on Visits to the Estuary

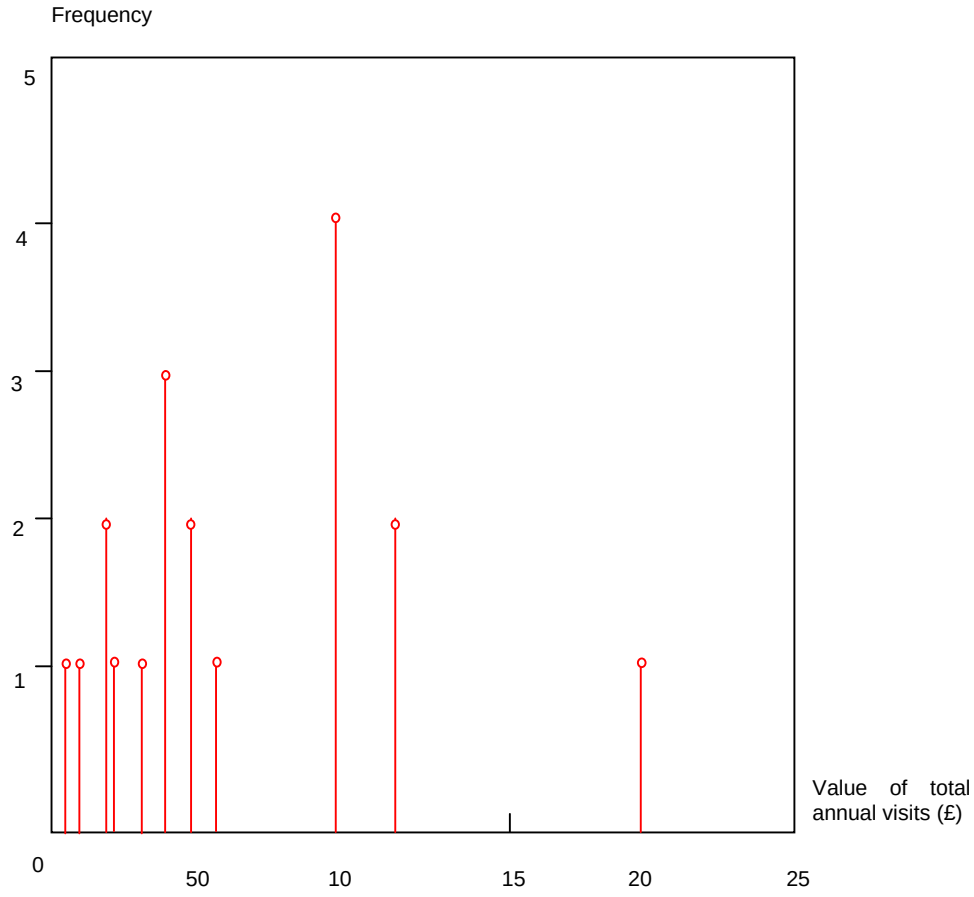


Figure 19-2. Bid Distribution for birdwatchers

TME Survey

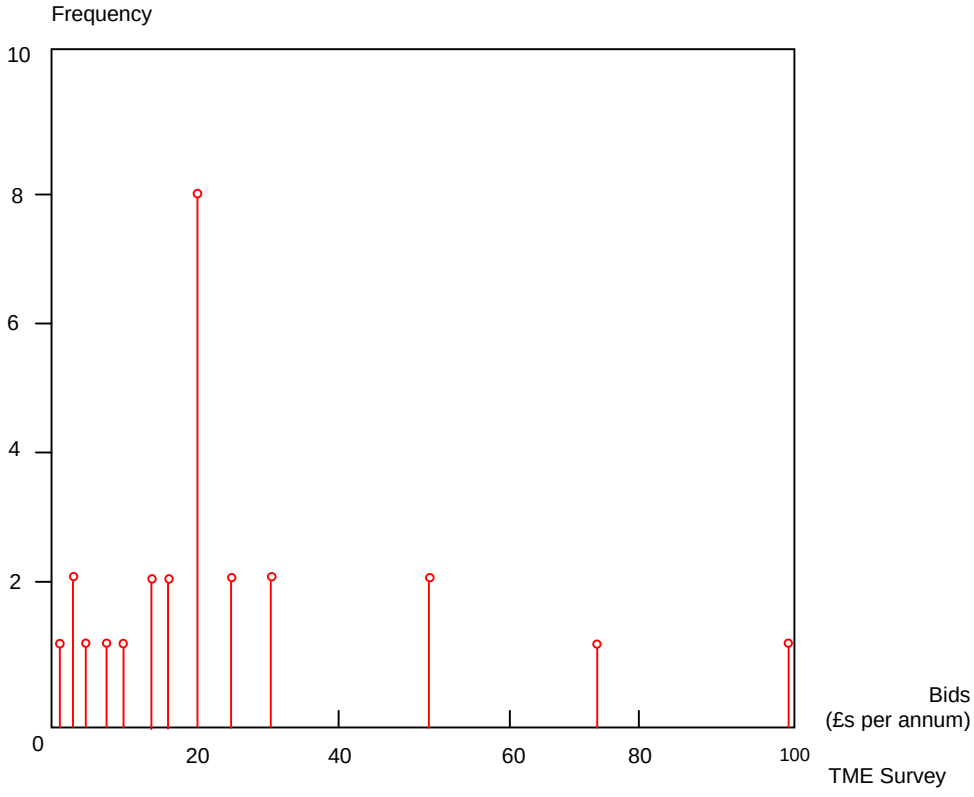
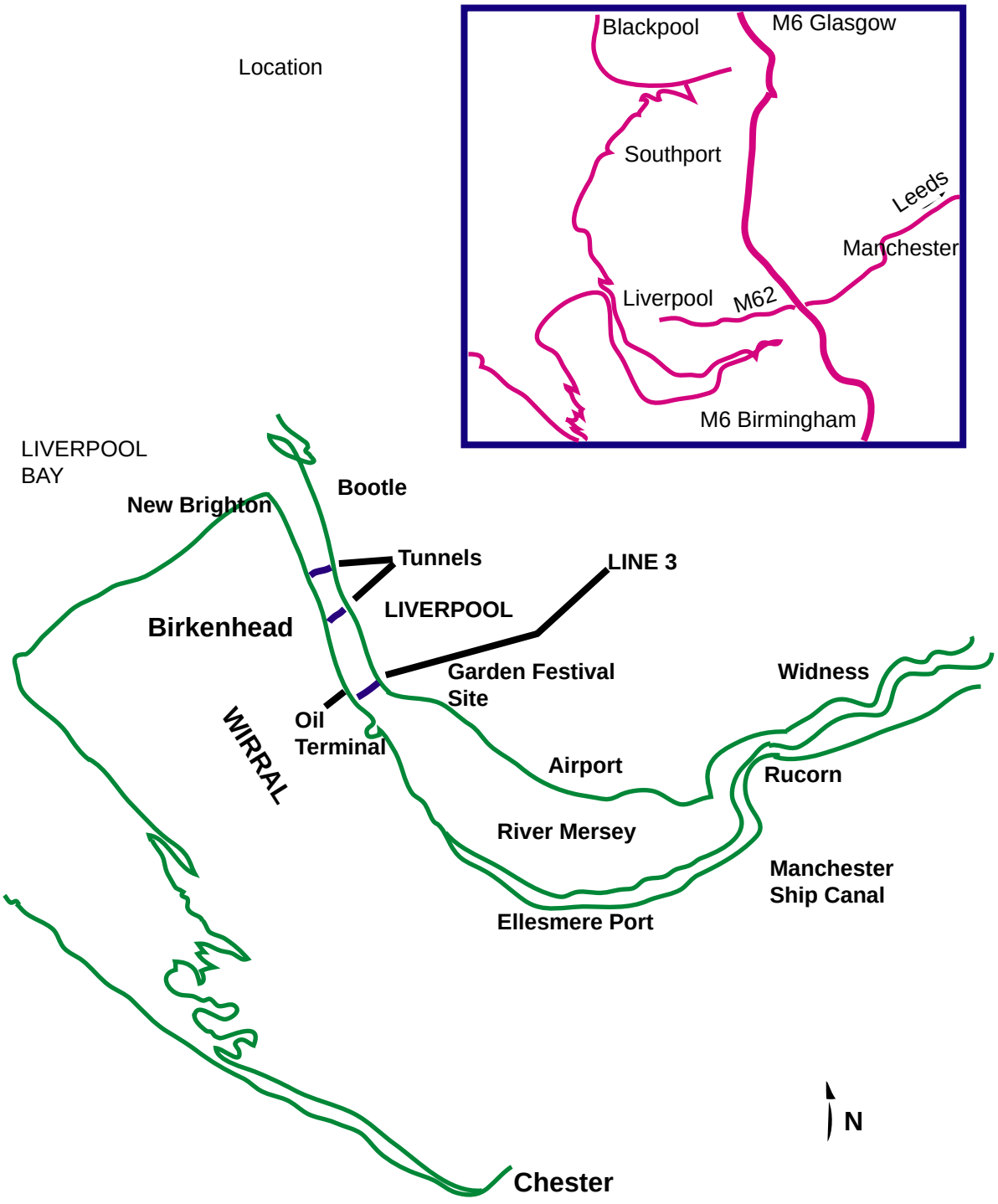


Figure 19-3. Mersey Barrage



Scale, 1mm:250 meters

Bibliography

Council Directive on the Conservation of Wild Birds (79/409/EEC). *Official Journal of the European Communities* (25 April 1979) No. L103/1.

Pearce, D., A. Markandya, and E. B. Barbier. 1989. *Blueprint for a Green Economy*. London: Earthscan Publications Ltd.

Winpenny, J. T. 1991. *Values for the Environment. A Guide to Economic Appraisal*. London: Overseas Development Institute, Her Majesty's Stationary Office.

C Ecotourism and Funding Mechanisms

20 The Economics of Global Ecotourism

Fern L. Filion, James P. Foley, and André J. Jacquemot

Why Study Ecotourism?

THE CANADIAN WILDLIFE SERVICE is interested in the promising role of ecotourism as a potential tool for protecting wildlife habitat. We are therefore delighted to be invited to present some of our thoughts and groundwork on the ecotourism phenomenon at this Congress. It is encouraging to see the level of interest in the subject as indicated by the number of related papers at the Plenary Sessions and Symposia, as well as the workshops on ecotourism.

Many are surprised to discover the incredible magnitude of the tourism industry and learn that it is the fastest growing industry in the world, according to the U.S. Department of Commerce (1990). Interest in ecotourism is an offshoot of the wave of environmental awareness that has been sweeping industrialized societies over the past decade. We believe this interest presents us with excellent opportunities to make use of tourism as a tool for the protection of natural ecosystems by giving them a socioeconomic value in their original state. In other words, we wish to see a form of development which is sustainable in contrast to other forms which are not.

What We Mean by Ecotourism

The terms tourism and tourist have accepted definitions on which research and data collected by groups such as the United Nations—World Tourism Organization are based. However, this is not the case for ecotourism. The term ecotourism was originally coined in 1987 by Hector Ceballos-Lascurain of Mexico and, because of its appeal, has gained wide usage since its introduction. He originally defined ecotourism as "*traveling* to relatively undisturbed or uncontaminated natural areas *with the specific objective of studying, admiring, and enjoying the scenery and its wild plants and animals*, as well as any existing cultural manifestations" (Butler 1991).

A number of related terms have appeared in the literature in recent years. These include such terms as "nature-oriented tourists," "green tourists," "alternative tourists," "adventure tourists," "rural tourists," and even "anti-tourists." However, none of these expressions has proved to be as catchy as the terms ecotourism and ecotourist.

Some recent definitions of ecotourism have expanded the concept to include the actual environmental and sociocultural consequences of the activity. For example, the Ecotourism Society (1991) defines the term as "*responsible* travel that *conserves* natural environments and *sustains* the well-being of local people."

We agree philosophically that ecotourism, when managed properly, should conserve the environment and benefit local people. However, linking nature travel to the idea of responsible behavior in the definition creates difficulties in terms of allowing for the measurement of the ecotourism phenomenon from *existing* data. For example, a well-intentioned bird-watcher may have been driving in a highly polluting vehicle, staying in lodges with no septic system, and visiting parks where the level of visitation is negatively affecting the wildlife. Further, this traveler may have arrived via an international airline and stayed in a hotel owned by a large chain. The tourist therefore may provide very little benefit to the local economy.

Existing nature tourism data do not allow empirical quantification according to the expanded definition. Following discussions with United Nations—World Tourism Organization officials in Madrid,

we elected, for the purpose of this chapter, to stay close to the original definition. Hence, we defined "ecotourism" as "*travel to enjoy and appreciate nature*."

Examples of Ecotourism

The manner in which we have defined ecotourism involves a broad spectrum of activities related to nature. At one end of this spectrum, some market segments are relatively small and well defined, such as highly specialized and dedicated ornithologists or those who seek out rare species. At the other end, we might have people who casually observe and enjoy scenic beauty while on trips taken primarily for another purpose.

This wide range of ecotourism can be illustrated by an example from Canada. National surveys conducted by Statistics Canada (Filion and others 1989) reveal that 20 percent of the population take trips for the primary purpose of observing, studying, and photographing wildlife. However, the same study found that as many as 45 percent of Canadians enjoy wildlife and spend money on wildlife-related activities during trips taken primarily for another purpose, such as business and pleasure. Because of the differing levels of commitment characterizing these market segments, the amounts of time and money expended vary appreciably.

Clearly, flora, fauna and natural areas are not always the main reason that tourists travel. However, it is our contention that flora, fauna, and ecosystems do constitute an important draw to certain destinations over others, and they are important in providing or enhancing the enjoyment of tourists once they arrive.

The ecotourism phenomenon is especially promising for developing countries that are rich in biodiversity but which may not always have the means of preserving it from alternative forms of economic development that are not sustainable.

Purpose of This Chapter

This chapter will shed light on the economics of global ecotourism by addressing three key questions:

- How large is the international tourism industry, and what portion of it could be considered ecotourism?
- How large is the domestic tourism industry, and what proportion of it could be considered ecotourism?
- What are the implications for global tourism, and why does this form of sustainable development offer promise for conservation?

The Economics of Global Ecotourism

In order to understand the magnitude of global ecotourism, it is necessary to examine its constituent parts, both international and domestic ecotourism, worldwide. Our examination of the economics of tourism and ecotourism will focus largely on the economic impacts that result from the expenditures of tourists.

The Magnitude of the International Tourism Industry and Ecotourism

United Nations—World Tourism Organization data reveal that international tourism is a significant business both in terms of the total number of people who travel and in terms of its economic impact. For example, as indicated in Figure 20–1, there were 393 million tourist arrivals from abroad in 1988. The arrivals are broken down into six regions, with the most popular destinations being Europe, Asia, North America, and Latin America. Latin America and the Caribbean (not including Mexico) received 25 million tourists, which ranked fourth and accounted for 6.4 percent of all international tourist arrivals that year.

Still unclear is how much the number of tourists from abroad and their expenditures actually contributed to the national income of various nations. Figure 20–2 indicates that between US$233 and US$388 billion may have been contributed by international tourists to national incomes worldwide in 1988. These estimates were derived by applying multipliers of 1.2 and 2.0 to the $194 billion in reported expenditures that year. These are the best multipliers available at the present time to

estimate the actual impact of every dollar spent on local economies (Wharton Econometric Forecasting Associates, 1989).

Europe, North America, Asia, and Latin America were affected the most by the dollars spent on local economies. Latin America and the Caribbean received $32 billion, or 8 percent of the total, and ranked fourth among regions.

One of the key objectives of this chapter is to estimate the socioeconomic magnitude of global ecotourism. At present, this information does not exist. Data on ecotourism are not being systematically collected by the private sector, governments, or the United Nations—World Tourism Organization, partly because ecotourism is a recent phenomenon and partly because of a lack of a universally accepted and quantifiable definition.

To overcome this problem, a three-step procedure was devised which would allow the creation of estimators (or ratios) which could be applied to existing data on tourism. The steps included (a) examination of regional studies on nature-related tourism; (b) generating actual ecotourism estimators; and (c) the application of estimators to the United Nations—World Tourism Organization data base on global tourism.

Examination of regional studies on nature-related tourism

To develop the estimators, we began by speaking to experts in tourism at organizations such as the United Nations—World Tourism Organization, the United Nations Economic Council of Europe, the Organisation of Economic Co-operation and Development, and the World Conservation Union to obtain as much of the existing data on the global picture as possible. To our surprise, we found there was very little information available that could be used empirically.

We then reviewed a number of studies on nature-related tourism from within the five United Nations—World Tourism Organization regions. These included Canada (North America); Mexico, Belize, Dominica, Ecuador, Costa Rica (Latin America); Kenya and Zimbabwe (Africa); Australia and New Zealand (Oceania); and Organisation of Economic Cooperation and Development countries (Europe). The purpose of this search was to find information in various regions on (a) what motivates people to travel abroad and (b) what they do when they get there.

The following examples shed light on the relative importance of nature in tourism.

Example 1: Australia and New Zealand

Surveys of international tourists to Australia (National Parks and Wildlife Service 1989) reveal that for 32 percent of visitors, scenery, open spaces, nature, and wildlife were the aspects *most* enjoyed while in the country (Figure 20–3).

Similar results have been reported for New Zealand (personal communication, Dept. of Conservation 1991).

Example 2: Africa

An examination of studies by Ingram and Durst (1989), Summary (1987), and Adujuwon (1986), coupled with discussions with tourism officers in Kenya and Zimbabwe, indicate that approximately 80 percent of tourists come to these countries primarily for the Wildlife (Figure 20–4).

Example 3: North America

Surveys of Europeans and Japanese traveling to North America (Tourism Canada 1989) reveal that 69–88 percent *feel* that wildlife and birds are *important* factors in choosing North America as a travel destination (top bar in Figure 20–5). With these observations in mind, the key question that remains is whether travelers behave accordingly. Evidence from the same surveys reveal that they do. As the remaining four bars in Figure 20–5 indicate, about 70 percent actually visit national parks and view scenic landmarks when they arrive in North America. Further, 30 percent to 64 percent actually observe birds and other wildlife while in North America.

Example 4: Latin America

A major survey sponsored by the World Wildlife Fund (Boo 1990) of tourists to Mexico, Belize, Dominica, Costa Rica, and Ecuador produced findings similar to those obtained for North America. For example, between 50 and 79 percent of visitors questioned said that “protected areas” constituted an important factor in choosing their travel destination (top bar in Figure 20–6). What did they do once

they had arrived? According to the four lower bars in Figure 20–6, between 41 and 75 percent visited protected areas; between 7 and 56 percent participated in jungle excursions; 13–68 percent went birdwatching; and between 9–60 percent went to observe other wildlife.

In addition to the four examples given for the above continents, Arzeni (1990) reports that "rural tourism" (including beaches) accounts for approximately 50 percent of all tourism in Northern Europe and significantly more than 50 percent in the South.

Generating International Ecotourism Estimators

Based on the above findings, we conclude that it would be valid to apply the following estimators to the United Nations—World Tourism Organization data to determine the approximate magnitude of global ecotourism:

- Depending on the region, ecotourism appears to account for some *40–60 percent* of international tourism.
- Depending on the region, wildlife-related tourism appears to account for some *20–40 percent* of international tourism.

These estimator ranges constitute the foundation upon which the following section is based to estimate the socioeconomic magnitude of international ecotourism.

Application of the Ecotourism Estimators to the Data Base on International Tourism

When the estimators for ecotourism and wildlife-related tourism are applied to the United Nations—World Tourism Organization data reported earlier, wildlife and ecotourism emerge as big business worldwide. For example, Figure 20–7 estimates that in 1988 there were between 157 million and 236 million international ecotourists worldwide. It also estimates that there were between 79 and 157 million people that could be considered wildlife oriented.

The economic impact of this many ecotourists is quite significant, as revealed by Figure 20–8. If the above estimators and multipliers are applied to the United Nations—World Tourism Organization data, the results suggest that between $93 billion and $233 billion were contributed to the national income of various countries in 1988. It is further estimated that wildlife-oriented ecotourism accounted for economic impacts ranging from $47 billion to $155 billion.

Magnitude of Domestic Tourism and Global Ecotourism

As large as the above international figures may seem, they underrepresent the true magnitude of ecotourism. In fact, the true socioeconomic picture is probably five or seven times as large as the amounts shown so far. The reason for the underrepresentation is that international tourism accounts for only 9 percent of global tourism receipts (Figure 20–9), whereas domestic tourism accounts for 91 percent (*Travel Industry World Yearbook* 1990).

The apparent importance of domestic tourism leads to the next logical question: what portion of domestic tourism worldwide would be accounted for by ecotourism? Unfortunately, we do not yet have an answer to that question. However, based on some related research in Canada, it would appear to be significant. In 1987, $14.4 billion were spent in Canada on domestic tourism. We believe that the wildlife component of ecotourism may account for as much as one quarter of the total amount spent domestically by tourists.

More specifically, according to Statistics Canada (Filion and others 1991), we know that millions of Canadians enjoyed wildlife-related activities in Canada in 1987. Participants spent billions of dollars on these activities, resulting in significant economic impacts in terms of gross domestic product, personal income, number of jobs created and government revenue from taxes (Figure 20–10). A significant amount of money ($3.4 billion) was spent on wildlife-related trips, which were responsible for 67 percent of the economic impacts shown in Figure 20–10. These $3.4 billion in expenditures on wildlife-related trips account for about 25 percent of the total expenditures on domestic tourism in Canada.

If we consider this 25 percent estimator for domestic wildlife-related tourism in Canada as a conservative figure for domestic ecotourism, and if we apply this estimator to domestic tourism of other countries, this would significantly augment the apparent scale of global ecotourism. For

example, it would mean that the socioeconomic results presented above would increase in magnitude several fold. Thus, it could be argued that the economic impacts resulting from global ecotourism (i.e., domestic and international ecotourism) might well range from as little as $660 billion to as much as $1.2 trillion, depending upon the percentage range and multipliers reported above.

Why This Form of Sustainable Development Offers Promise to Conservation

The apparent magnitude of the ecotourism phenomenon indicates that people from all parts of the world have a strong desire to observe and appreciate nature. This realization of course presents a unique challenge to managers and decisionmakers, whose mandate it is to protect ecosystems and all forms of biological diversity for present and future generations. However, this appeal, this fascination with nature, also presents tremendous opportunities to conservationists, who need sound arguments to justify investing massive amounts of funds into the conservation of these precious environmental assets.

At this point, there is no indication that tourism is merely a passing fad. Quite the contrary, travel data from United Nations—World Tourism Organization since 1950 reveals that world tourism arrivals have tended to double every 10 years. Further, expenditures by tourists from abroad have tended to triple each decade. It is noteworthy that United Nations—World Tourism Organization estimates that by the turn of the century, travelers to foreign nations will increase to 650 million, up from an estimated 400 million in 1991.

The United Nations—World Tourism Organization data also reveal a tourism shift favoring developing countries in the last 20 years—countries where flora, fauna, and ecosystems have the greatest diversity, and where the potential for ecotourism is highest. This trend is likely to continue, especially in those regions where there is political stability and security for tourists.

According to the *Travel Industry World Yearbook* (1990), American Airlines entered Latin America with its single largest route expansion in the carrier's history. At last check, it was serving 20 cities in 15 Latin American countries.

The tourism industry is more labor intensive than any other business sector because of the services it provides. It is often a source of employment for less privileged groups, and the employment is less centralized than in other businesses or industrial activities. Tourism is also an important generator of foreign currency and an incentive for political stability. It is an important generator of tax revenues to governments at all levels (Edgell 1990).

Canadian federal and provincial governments receive $1.7 billion in tax revenues annually because of domestic wildlife-related tourism. These tax revenues are considerably larger than the $300 million that governments actually spend on wildlife conservation programs annually. This approximate revenue-cost ratio is 5 to 1, and may be even larger in many developing countries, which could benefit significantly from a portion of the income provided by ecotourism. If this hypothesis is true, then quantifying the socioeconomic importance of ecotourism would provide powerful arguments to motivate governments and businesses alike to increase their efforts to conserve the environment (Filion 1991).

Socioeconomic results similar to the ones presented here have major implications for protecting the environments upon which products of the tourist industry depend and for enhancing the recognition of ecotourism as a powerful global economic force.

Conclusions

Global tourism (domestic and international) is the largest and fastest growing industry in the world, accounting for 12 percent of the world gross national product (U.S. Department of Commerce 1990). According to our preliminary analysis of the limited information that was available, economic impacts resulting from global ecotourism (domestic and international) might well range from about $0.5 trillion to $1 trillion U.S. dollars.

The groundwork analysis presented here brings us to the conclusion that ecotourism and wildlife-related tourism probably have much more economic significance than many conservationists had initially imagined. An important opportunity thus exists for conservationists to employ this form of sustainable development to justify the major investment required to conserve the environmental amenities on which this form of tourism depends, and to maintain the well-being of local communities.

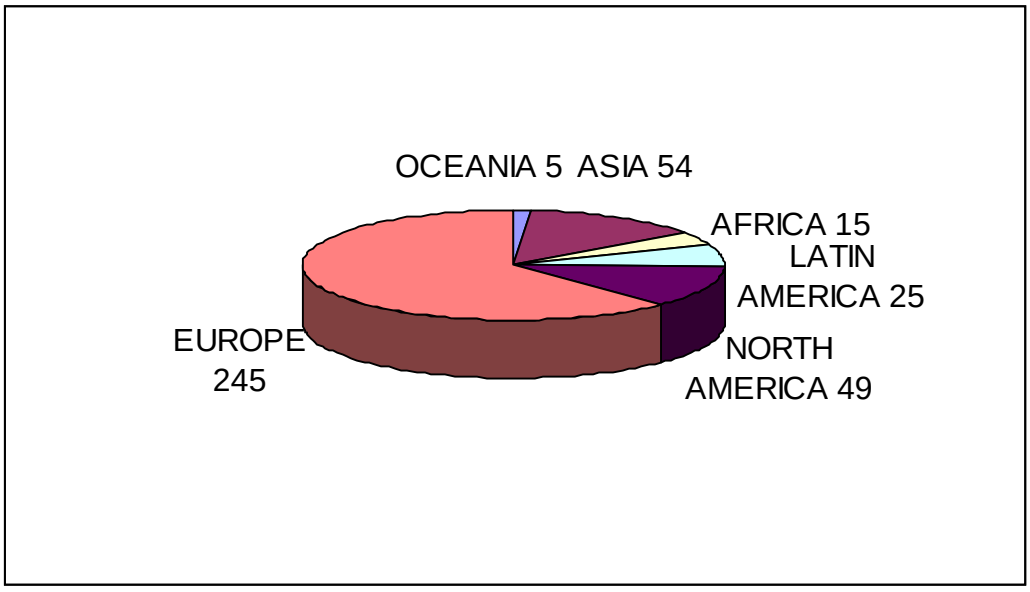
While travel for the purposes of enjoying and appreciating nature has many potential benefits, there are also some potential downsides. These include “leakages” of the economic benefits away from local populations to international air carriers, hotel chains, etc. There can also be negative environmental and social impacts resulting from over-use or inappropriate controls. These potential drawbacks can and must be avoided through mindful management of ecotourism to ensure that local benefits are optimized. Guidelines for ecotourism which attempt to address these potential lacuna are being developed by the World Conservation Union, WTO, and the United Nations Environment Programme (Ceballos and others 1992).

The lack of a universally accepted definition of ecotourism is an impediment to the development of a reliable data base on the subject. Significant progress on arriving at a universally accepted definition of ecotourism has been constrained by insufficient coordination of those involved in the field.

Recommendations

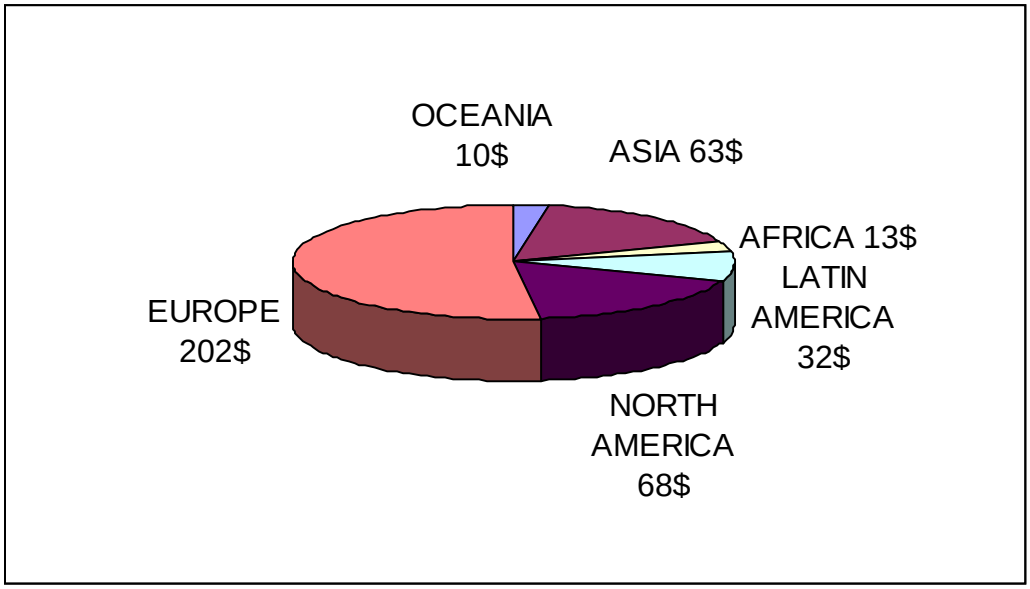
- In view of the strategic role of socioeconomic insights in conserving the environment, and given the obvious lack of information about ecotourism, there is a need to develop an official data base on the magnitude of, and the benefits resulting from, this phenomenon.
- Further research and guidelines are required on mechanisms to minimize the potential problems of economic leakage, and on negative environmental and social impacts.
- Because of the need to develop a data base on ecotourism and because of the expanding number of definitions of the term, there is a need for a universally accepted definition of ecotourism. The practical necessity of being able to quantify the phenomenon should be considered when developing the definition.
- United Nations—World Tourism Organization, in collaboration with other leading conservation institutions such as the United Nations Environment Programme and the World Conservation Union, among others, should be encouraged to provide leadership and coordination in this area.

Figure 20-1. international Tourism Arrivals from Abroad by Region, 1988



WORLD TOTAL 393 MILLION

Figure 20-2. Estimated International Tourism Economic Impacts (National Income) by region, 1988



National income multiplier : 2.0

WORLD TOTAL $388 BILLION (US)

Figure 20-3. Significance of Nature for Travelers to Australia

Scenery Nature Wildlife Enjoyed Most	32 %

Figure 20-4. Significance of Nature for Travelers to Kenya / Zimbabwe

Observing Wildlife	80 %

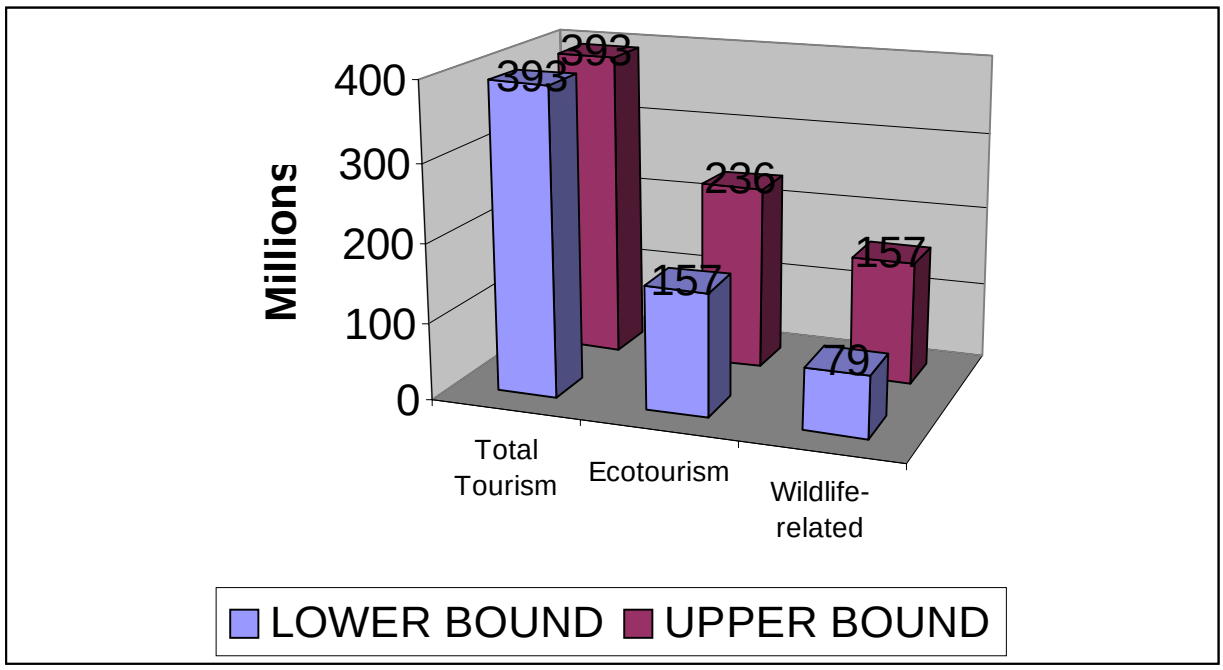
Figure 20-5. Significance of Nature for Europeans and Japanese Traveling to Traveling to North America

Wildlife Important	**69 to 88%**
National Parks	**69%**
Scenic Landmarks	**70%**
Hunting & Fisching	**12 to 27%**
Wildlife & Birds	**30 to 64%**

Figure 20-6. Significance of Nature for Travelers to Five Latin American Countries

Protected Areas Important	**50 to 79%**
Natural History Important	**11 to 76%**
Protected Areas	**41 to 75%**
Jungle Excursions	**7 to 56%**
Observe Wildlife	**9 to 60%**
Birdwatching	**13 to 65%**

Figure 20-7. International Ecotourism Arrivals from Abroad for 1988



WORLD TOTAL 393 MILLION

Figure 20-8. Estimated Range of Economic Impacts (National Income) from International Ecotourism for 1988

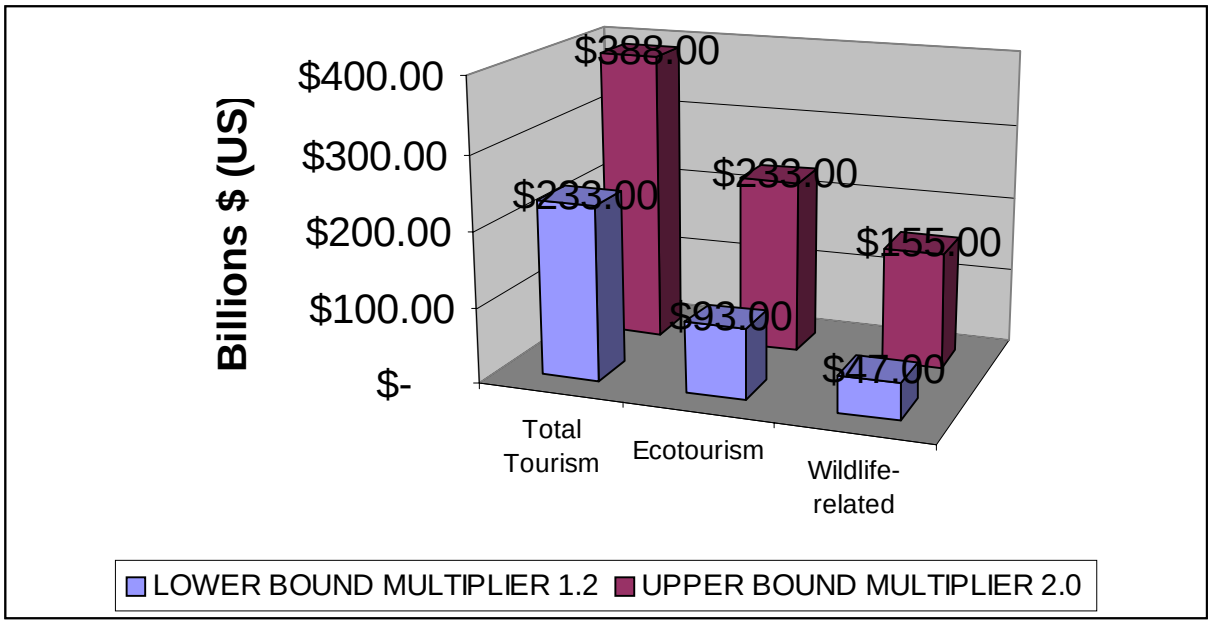
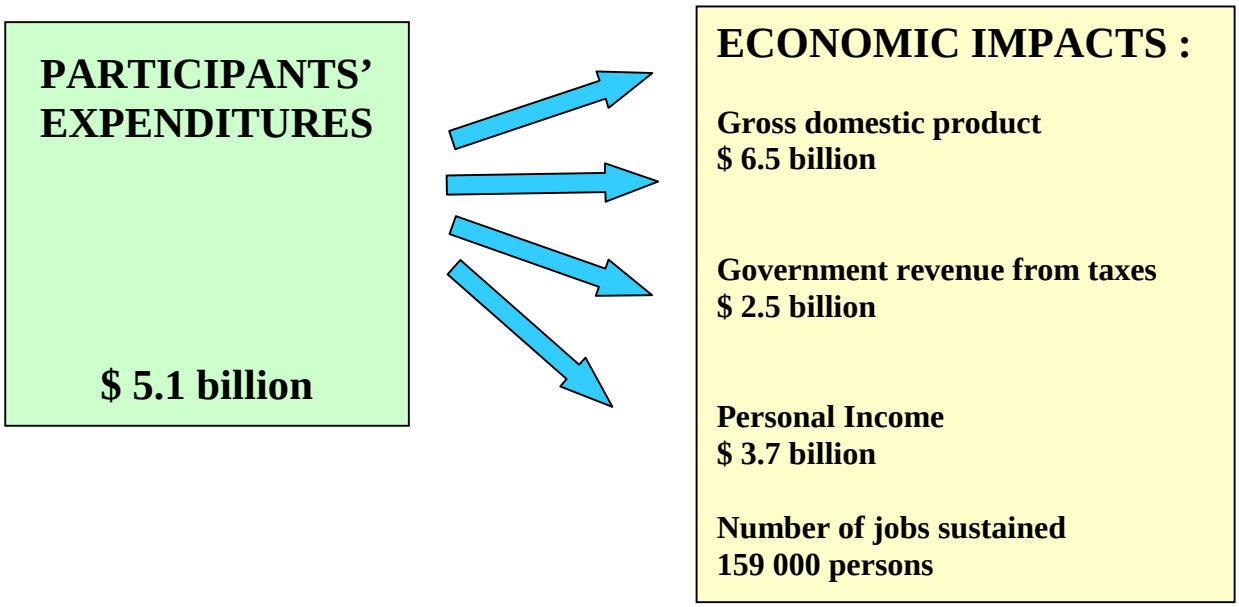


Figure 20-9. Global Tourism Receipts, 1988

TYPE OF TOURISM	RECEIPTS IN BILLIONS $	%
TOTAL	$ 2,094	100 %
DOMESTIC	$ 1,900	91 %
INTERNATIONAL	$ 194	9 %

Figure 20-10. Expenditures by Participants in Wildlife-Related Activities In Canada in 1987 and Resulting Economic Impacts



Bibliography

Adujuwon, Franklin J. 1986. "Trends of Tourist Demand in Africa." *The Tourist Review* 1 (January/March):20–24.

Arzeni, Sergio. 1990. "Tourism in Mediterranean Cities." *Organisation of Economic Co-operation and Development Observer*. No. 164 (June/July):25–27.

Australian Federal Department of Arts, Sports, Environment, and Tourism and the Australian National Parks and Wildlife Service, 1991. 217 Northbourne Ave., G. P.O. Box 636, Canberra ACT 2601. Data on purpose of visit by visitors *from abroad for 1989*. Personal communication.

Boo, Elizabeth. 1990. *Ecotourism: the Potentials and Pitfalls*. Vols. 1 and 2. Baltimore: World Wildlife Fund.

Butler, J. R. 1991. *Ecotourism: Its Changing Face and Evolving Philosophy*. Department of Forest Science, University of Alberta, Edmonton.

Ceballos-Lascurain, Hector., Jeffrey McNeeley, and James Thorsell. 1992. *Tourism Guidelines for Protected Areas*. Madrid: World Tourism Organization.

Ceballos-Lascurain, Hector. 1987. As cited in E. Boo, 1990. *Ecotourism: the Potentials and Pitfalls*, Vols. 1 and 2. Baltimore: World Wildlife Fund.

Ecotourism Society. 1991. *Publicity Brochure*. 801 Devon Place, Alexandria, Va. 22314, U.S.A.

Edgell, David, L. 1990. *Charting a Course for International Tourism in the Nineties*. Washington, D.C.: U.S. Department of Commerce Washington:14.

Filion, Fern, Elaine DuWors, André Jacquemot, Pierre Bouchard, Peter Boxall, Paul Gray, and Roger Reid. 1989. *The Importance of Wildlife to Canadians in 1987: Highlights of a National Survey*. Ottawa K1A 0H3: Canadian Wildlife Service, Environment Canada.

———. 1991. *The Importance of Wildlife to Canadians in 1987: The Economic Significance of Wildlife-Related Activities*. Ottawa K1A 0H3: Canadian Wildlife Service, Environment Canada.

Ingram, C., Denise Durst, and Patrick B. Durst. 1989. "Nature-Oriented Tour Operators: Travel to Developing Countries." *Journal of Travel Research* (Fall):11–15.

Kenya and Zimbabwe Departments of Tourism. 1991. *Discussions with officials on the main reasons tourists visit these countries*. Personal communication.

New Zealand Department of Conservation. 1991. *Data on visitor interest in parks and wildlife*. P.O. Box 10420, Wellington, New Zealand. Personal Communication.

Summary, Rebecca M. 1987. "Tourism's Contribution to the Economy of Kenya." *Annals of Tourism Research* 14(4):531–40.

Tourism Canada. 1989. *Pleasure Travel Markets to North America: United Kingdom, France, West Germany and Japan: Highlights Report*. Department of Industry Science and Technology, Tourism Canada, Ottawa.

Travel Industry World Yearbook. 1990. *The Big Picture 1990*, Vol. 34. New York: Child & Waters, Inc.

United Nations—World Tourism Organization. 1989. *Yearbook of Tourism Statistics*, 42nd Edition, Vol. 1. Calle Capitan Haya, 42, 28020 Madrid, Spain.

U.S. Department of Commerce. 1990. As cited in *Travel Industry World Yearbook, The Big Picture 1990*, Vol. 34. New York: Child & Waters, Inc.

Wharton Econometric Forecasting Association. 1989. *The Contribution of the World Travel and Tourism Industry to the Gobal Economy*. WEFA, Inc., 150 Monument Road, Bala Cynwyd, PA 19004, U.S.A.

21 Economic Values of Bird-Watching at Point Pelee National Park, Canada

James R. Butler, Glen T. Hvenegaard, and Doug K. Krystofiak

BIRD-WATCHING, OR BIRDING, is one of the fastest growing wildlife recreation activities in North America (Harrison 1979; Butler 1984), and it involves 20–30 million people annually (Jacquemot and Filion 1987; Kellert 1985; Lyons 1982; More 1979; Shaw and Mangun 1984).

The Natural Sciences and Engineering Research Council of Canada, University of Alberta, and the Canadian Wildlife Service provided financial support. We thank Point Pelee National Park personnel and the community of Leamington for their cooperation and provision of services. Thanks also go to P.J. Barss and B.G. Larson for assistance in collecting data, and to E.B. Butler for critical review.

In Canada, at least 13.1 percent of the population undertook special trips to observe, photograph, or study birds (Jacquemot and Filion 1987). Bird-watching results in substantial economic expenditures, conservatively estimated at more than $20 billion each year in North America (Filion and others 1983; U.S. Fish and Wildlife Service 1982). Although some researchers have examined the economic expenditures of nonconsumptive wildlife activities (DeGraaf and Payne 1975; Myres 1968), relatively few have focused on the economic contribution associated with bird-watching itself (Horvath 1974; Stoll and Johnson 1984).

The purpose of our study was to determine the net economic value of bird-watching at Point Pelee National Park, Canada, and to assess the local economic impact of birders on the Point Pelee—Leamington district of Ontario. Preliminary assessments have revealed that the community of Leamington has made successful efforts to accommodate bird-watchers during the spring season (Butler 1984; Butler and Fenton 1987).

Study Area and Methods

Point Pelee, one of Canada's smallest national parks, is located in the southwest corner of Ontario, 80 kilometers from Windsor. Internationally renowned for its bird-watching potential in May, the park is rated as one of the premier birding locations in North America (Greij 1987; Harrison 1976; Hince 1986). Each spring, corresponding with the northward migration of birds, nearly 60,000 gate visits by birders (involving nearly 20,000 individual bird-watchers) are recorded at Point Pelee. The town of Leamington, located 9 kilometers north of the park, receives most of the benefits of tourism associated with this activity.

In 1987, during the peak spring birding season (May 1–24) at Point Pelee National Park, we conducted random personal interviews with 603 bird-watchers (96 percent response rate). Information on expenditures for travel and equipment, use value, and sociodemographics was collected, as well

as data on potential purchases by birders, their attitudes toward park and local facilities and services, and their ideas on how birding experiences could be improved. Only bird-watchers over 16 years of age were interviewed. We used the Contingent Valuation method (Cummings and others 1986; Dwyer and others 1977) to obtain use value estimates. Data were summarized and analyzed for relationships using the Statistical Package for the Social Sciences (SPSS Inc. 1983). Expenditure data were weighted according to weekday and weekend park visitation records, and they were summarized for the month of May and for the entire year (reported in 1987 Canadian dollars). In addition, we conducted interviews with 183 business establishments throughout the Leamington district. This systematic sampling essentially included all facilities and services that bird-watchers frequented during their stay.

Results and Discussion

Demographic characteristics

Fifty-nine percent of respondents were male; 41 percent were female. Their average age was 49.3 years, compared with the 1986 Canadian average of 42 (for those over 16 years of age) (Statistics Canada 1987). Birders at Point Pelee were highly educated, with 62.4 percent possessing a bachelor's degree or greater, compared with only 10.0 percent of the Canadian population (Statistics Canada 1988a). The average number of years of formal education was 15.8 years, almost the equivalent of a bachelor's degree. Ten percent possessed a doctorate degree.

Bird-watchers reported an average 1986 gross household income of Can$57,175, considerably more than the Canadian average of Can$37,827 (Statistics Canada 1988b). In fact, more than 68 percent of respondents had household incomes greater than the Canadian average. This is reflected, in part, by the large proportion of bird-watchers (57.9 percent) employed in professional occupations.

Most respondents were international visitors:48.4 percent from the United States and 2.8 percent from Europe—primarily the United Kingdom. Of the North American birders, the average one-way travel distance was 513 kilometers (based on the most efficient road route). A majority of the Point Pelee bird-watchers originated from nearby provinces and states, mainly from Ontario (43.0 percent) and Michigan (23.9 percent), with smaller percentages originating from New York, Ohio, Illinois, and Quebec. The most common metropolitan centers of origin were Toronto (10.4 percent), London (5.5 percent), and Ottawa, Ontario (2.3 percent); Montreal, Quebec (2.5 percent); and Detroit, Michigan (7.1 percent). Eighty-two percent of respondents came from urban residential settings.

Recreational characteristics

Point Pelee birders reported an average of 15.2 years of active bird-watching experience. They participate, on average, 35.6 days per year in their sport. Twenty percent were first-time visitors to Point Pelee. Over 42 percent had visited the park at least 5 times, and 5 percent of the respondents had visited the park more than 100 times. The average number of previous visits was 28.6. However, only 38.3 percent of the respondents visit Point Pelee more than once a year. Ninety-six percent of the May birding respondents stated that visiting the park was the primary intent of their trip.

Photography is an important aspect of the bird-watching experience at Point Pelee (40.8 percent were photographers). Based on the type of equipment used, 12.2 percent of our sample were classified as snapshot photographers, 17.8 percent general photographers, and 10.8 percent advanced photographers.

Visitors spent an average of 3.4 days birding in the Point Pelee area; the length of the visit ranged from 1 to 31 days in May. Point Pelee attracts bird-watchers throughout the year, but the month of highest visitation is May, which accounted for 64.9 percent of the total birding gate visits and 43.5 percent of bird-watchers in 1987. Most birders stayed in the Leamington district a short time (26.9 percent for 1 day and 39.7 percent for 2–3 days), but 33.4 percent stayed for more than 4 days. The overall trip length averaged 5.4 days, of which 63 percent were spent in the Point Pelee area.

Trip expenditures

Bird-watching trips to Point Pelee in May resulted in total trip expenditures of over Can$3.8 million, Can$2.1 million of which was spent locally in the Leamington district, as reported by the birders sampled. Using summary statistics for gate visitation in 1987 (compiled by the Canadian Parks

Service), we estimated by extrapolation that expenditures associated with bird-watching at Point Pelee for the year (including May) were Can$5.4 million in 1987. Of this, Can$3.2 million (57 percent) was spent in the local Leamington area. Major expenditures included travel (27.2 percent of total), food (26.3 percent), and accommodations (22.5 percent) (Figure 21–1). Based on the percentage of use for birding and days of bird-watching throughout the year, an additional Can$506,000 (13.4 percent) of annual birding equipment expenditures can be attributed to May birding trips at Point Pelee (Figure 21–2). The average bird-watcher spent Can$224 per trip, with an average of Can$66 per day for his or her trip to Point Pelee. Birding trip expenses differed for various lengths of stay. Birders staying for only 1 day incurred average expenses of approximately Can$54 per day; they spent Can$75 per day for a 2–3 day stay and Can$74 per day for stays of more than 4 days. This difference is mostly attributed to corresponding differences in accommodation and food costs for longer stays.

In the local area, expenditures were mainly on food (36.7 percent) and accommodations (38.4 percent), with additional amounts on souvenirs (6.5 percent) and equipment (6.3 percent) (Figure 21–1). Twenty-four percent of Point Pelee birders had purchased binoculars within the past year; however, only 5 respondents (0.8 percent) had purchased them locally. Many other items of equipment represented major annual expenditures (Can$3.6 million, collectively) for these birders (Figure 21–2), but only a small proportion (4 percent) of expenditures on equipment was made locally. Forty-one percent of Point Pelee birders reported buying souvenirs in the local area. The average bird-watcher spent a total of Can$126 locally on a May birding trip and spent Can$37 per day of birding.

Ninety-three percent of respondents used personal vehicles to travel to Point Pelee. Others traveled by airplane (7.5 percent), rental vehicles (7.0 percent), or other forms of transportation (4.3 percent), such as guided bus tours. Some travelers used a combination of these transportation modes. Costs were incurred for food at restaurants by 76 percent of our respondents and at grocery stores by 74 percent of Point Pelee birders during their May birding trips. Over Can$654,000 was spent in local restaurants by Point Pelee birders in May, whereas only Can$125,000 was spent in local grocery stores. Fifty percent of bird-watchers interviewed incurred expenses on hotels or motels, and only 24 percent reported expenditures on camping. Over Can$711,000 was spent locally in May for accommodation in hotels and motels and Can$89,000 was spent locally for camping.

With the primary birding attraction being Point Pelee National Park, Leamington is the major beneficiary in providing facilities and services to this user group (Figures 21–1 and 21–2). A birder's desire is often to be as close to the park as possible because the birding day is long (9.8 hours per day [Butler and Fenton 1987]). However, with the limited supply of suitable accommodations during peak visitation periods, visitors commonly commute from as far away as Windsor. Many Leamington hotels are prebooked a year in advance.

Net economic value

The net worth of bird-watching at Point Pelee includes more than just dollars spent. Value is more appropriately measured by estimating willingness to pay, based on satisfaction gained and other value derived from the sport (Randall 1987). After being asked the question, "What is the most your costs on this trip could have risen before deciding not to come birding at Point Pelee?" most respondents (75 percent) stated that their costs could have doubled. Respondents answered in one of two ways, in terms of actual dollars or as a percentage of their actual trip expenditures, whichever they preferred. This hypothetical question was used to determine the net economic value of a birding experience; it was not intended to be used as a justification for increased prices or gate fees. The average response to the above question was Can$256 per trip, or Can$76 per day, and totalled Can$4.1 million for May birding trips to Point Pelee or Can$6.3 million for 1987.

Economic impact on local businesses

Seven percent of businesses (solely in the hotel-motel and restaurant sectors) reported hiring additional staff or increasing regular staff hours to assist during peak birder visitation. This amounted to more than 3,000 extra person-hours and approximately Can$16,000 in additional wage earnings in Leamington.

In order to assess potential sales opportunities, an open-ended question, "What items might you have purchased in the Point Pelee—Leamington district, had they been available?" was posed to individual birders. Figure 21–3 summarizes the general categories of responses. When asked how

much additional money would have been spent on these items, a total of Can$1.3 million was reported (average of Can$78 per person).

Business owners who were interviewed estimated their gross spring sales to birders to be less than 25 percent of the Can$2.1 million in local expenditures reported by birders. This would appear to suggest that many local businesses are presently underestimating the economic contribution birders make to the community. At present, only 8 percent of the businesses are making efforts to advertise and attract birders.

Conclusions

Already well-known in recreational terms, the values of bird-watching at Point Pelee National Park are further illustrated by the preceding summaries of economic data. The community of Leamington is the primary beneficiary of this international asset despite a relatively small investment in advertising and virtually no investment in marketing the attraction. Point Pelee's bird-watching reputation has generally been spread by word of mouth and by external references in books and articles. The community of Leamington welcomes birders each May with a highly visible banner and has recently devoted some resources to develop a much-needed brochure designed for bird-watchers, describing available attractions, facilities, and services.

Even though the local area benefits directly and indirectly from bird-watchers, we estimate that the current local economic impact has the potential to triple, based on expanded local spending on desired goods and services and increased birder visitation across other months. Fall migrations are equally impressive in concentrations of birds at Point Pelee, but this period is presently underutilized by visiting bird-watchers.

A wider effort to disperse an increased visitor audience to other regional attractions would also be desirable so that social and ecological impacts can be minimized (Butler and Fenton 1987). Additional birders in the fall could enjoy attractions such as Holiday Beach Provincial Park's fall raptor migration, the swallow roosts of Pembroke, Ontario, and Point Pelee's own monarch butterfly (*Danaus plexippus*) concentrations and autumn fall colors. These attractions could further enhance the existing economic contribution of the Point Pelee birding resource. Our projections would suggest that such enhanced marketing efforts (Filion 1987), combined with an improved availability of products and services, would conservatively bring an additional Can$6.6 million to the local area directly from bird-watcher expenditures.

The rapid expansion of bird-watching and other forms of wildlife recreation tourism throughout much of the world is making a substantial contribution in economic terms that we are only now beginning to measure quantitatively. Such tangible benefits associated with parks and wildlife areas are providing sound incentives for the protection of landscapes and species, many of which are endangered, especially when threats are derived from alternative resource uses that are traditionally measured in the market place.

We believe that Leamington is an example of an emerging role model that demonstrates the positive economic benefits attainable by effectively hosting this expanding user group. Other communities and private sector opportunities located in the proximity of parks, sanctuaries, and wildlife refuges may find these results useful in effectively promoting the resource and expanding upon the economic benefits of attracting this particular user group. By recognizing these potential ecotourism benefits and other socioeconomic considerations, wildlife and resource conservation can gain political support (Filion 1988; Vickerman 1988).

Tourism values associated with visiting bird-watchers seeking to observe the resplendent quetzal (*Pharomachrus mocinno*) in Costa Rica are now responsible for local incentives to protect the vanishing cloud forests of Monteverde (Simons 1988; Sun 1988). A live, fully grown maned lion (*Panthera leo*) in Amboseli National Park is now worth over $500,000 to Kenya's economy tourism revenues (Durrell 1986). Thus, it is evident why there is a commitment from Costa Rica to protect quetzals and a commitment from Kenya to protect lions.

Benefits from bird-watching are often underrated as a significant contribution to the economy (Vickerman 1988). Such contributions are substantial, and the rapidly-growing sport of bird-watching promises to be an emerging force that society will no longer fail to recognize. Leamington now realizes this, as do other communities in the vicinity of birding attractions, such as Haines, Alaska; Rockport, Texas; Churchill, Manitoba; and many others. The insights provided during this investigation have global relevance and offer counter arguments in defense of wildlife protection.

Figure 21-1. Breakdown of Bird-watching Expenditures for 1987

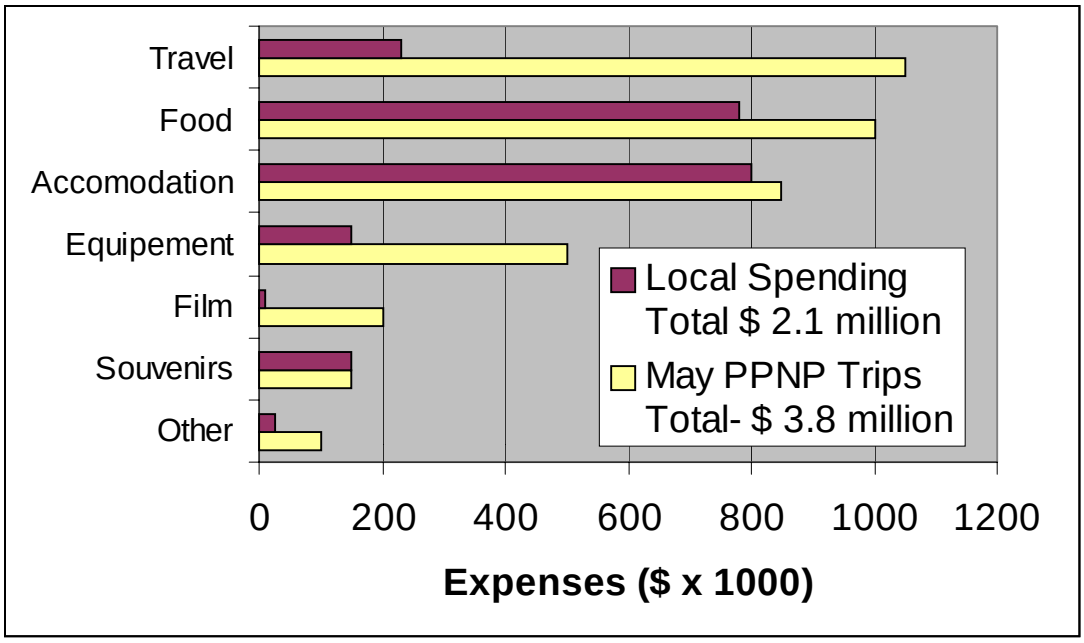


Figure 21-2. Breakdown of Bird-watching Expenditures for May 19

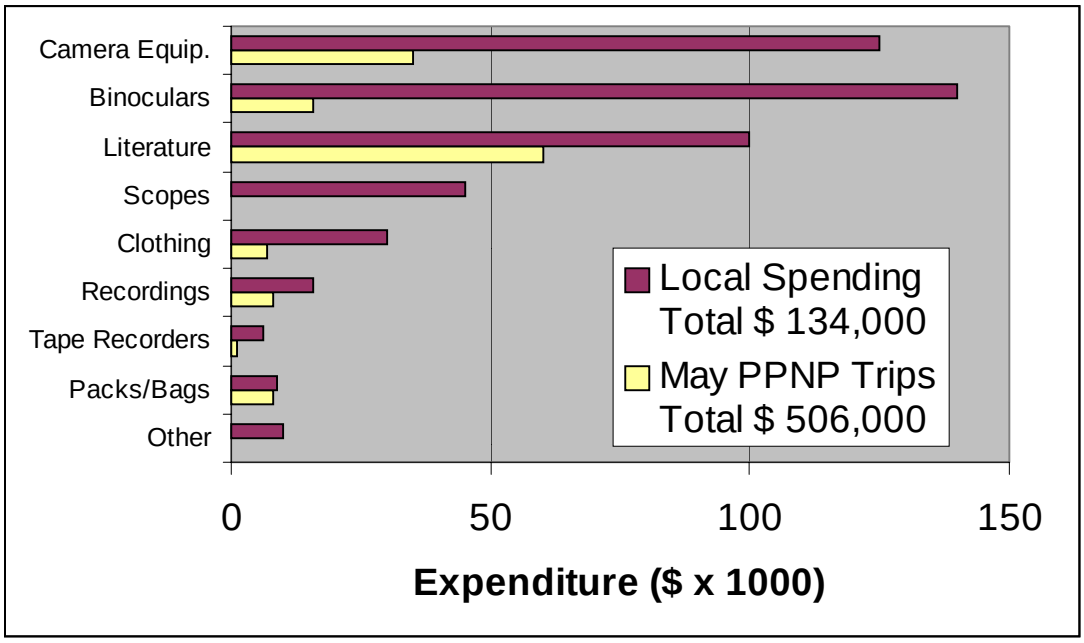
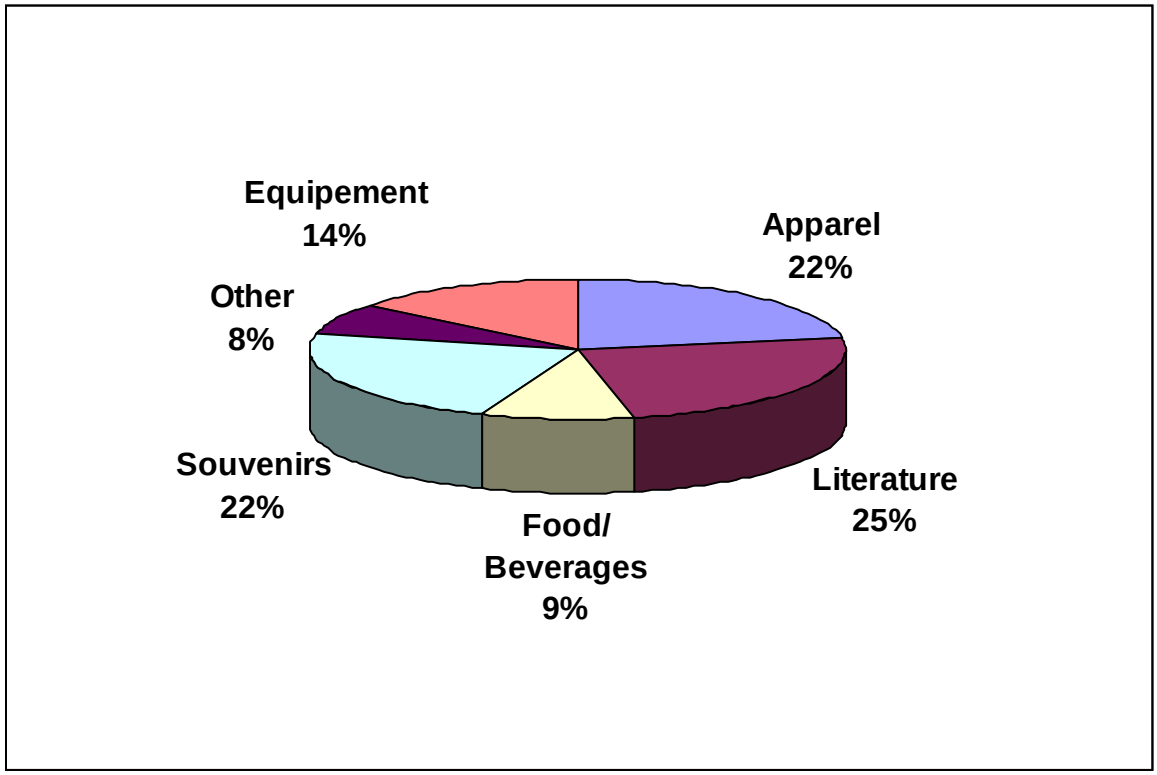


Figure 21-3. Breakdown of Potential Additional Expenditures



Bibliography

Butler, J. R. 1984. “The Myths, the Reality, and the Challenges of Managing for the Nonconsumptive Wildlife User.” In *Proceedings of Symposium on the Management of Nongame Species*. Lexington: University of Kentucky:127–35.

Butler, J. R., and G. D. Fenton. 1987. “Bird Watchers of Point Pelee National Park, Canada: Their Characteristics and Activities, with Special Consideration to their Social and Resource Impacts.” *Alberta Naturalist* 17:135–46.

Cummings, R. G., D. S. Brookshire, and W. D. Schulze. 1986. *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method*. Totowa, N. J.: Rowman and Allanheld.

DeGraaf, R. M., and B. R. Payne. 1975. “Economic Values of Non-game Birds and Some Urban Wildlife Research Needs.” Trans. *North American Wildlife and Natural Resource Conference* 40:281–87.

Durrell, L. 1986. *State of the Ark: An Atlas of Conservation in Action*. London: Gaia Books Limited.

Dwyer, J. F., J. R. Kelly, and M. D. Dowes. 1977. “Improved Procedures for Valuation of the Contribution of Recreation to National Economic Development.”

————: University of Illinois. *Water Resour. Cent. Rep*. 128.

Filion, F. L. 1987. “Birds as a Socio-Economic Resource: A Strategic Concept in Promoting Conservation.” In A. W. Diamond and F.L. Filion, eds., *The Value of Birds. International Council for Bird Preservation Technical Publication* 6. Cambridge, United Kingdom:7–14.

———. 1988. “Managing for Sustainable Development: The Strategic Role of Economic and Social Aspects of Wildlife.” Paper presented at Second International Wildlife Symposium: Economic and Social Aspects of Wildlife. Acapulco, Mexico.

Filion, F. L., S. W. James, J. L. Ducharme, W. Pepper, R. Reid, P. Boxall, and D. Teillet. 1983. *The Importance of Wildlife to Canadians: Highlights of the 1981 National Survey*. Canadian Wildlife Service and Ministry Supply and Services Canadian Catalogue Number CW66–62/1983E. Ottawa, Ontario.

Greij, E. D. 1987. "Birding Hot Spots: Point Pelee, Ontario." *Birder's World* 1(3):34–38.

Harrison, G. H. 1976. *Roger Tory Peterson's Dozen Birding Hotspots*. New York: Simon and Shuster.

———. 1979. "Bird Watching: The Fastest-Growing Family Fun Is an Industry." *Science Digest* 86(October):74–80.

Hince, G. T. 1986. "Site Guide: Point Pelee National Park, Ontario, Canada." *American Birds* 40:26–31.

Horvath, J. C. 1974. "Economic Survey of Southeastern Wildlife and Wildlife-Oriented Recreation." Trans. *North American Wildlife and Natural Resource Conference* 39:187–94.

Jacquemot, A., and F. L. Filion. 1987. "The Economic Significance of Birds in Canada." In A. W. Diamond, and F. L. Filion, eds., *The Value of Birds*. International Council for Bird Preservation Technical Publication 6, Cambridge, U.K.:15–21.

Kellert, S. R. 1985. "Birdwatching in American Society." *Leisure Science* 7:343–60.

Lyons, J. R. 1982. "Nonconsumptive Wildlife-Associated Recreation in the U.S.: Identifying the Other Constituency." Trans. *North American Wildlife and Natural Resource Conference* 47:677–85.

More, T. A. 1979. *The Demand for Nonconsumptive Wildlife Uses: A Review of the Literature*. U.S. Forest Service General Technical Report NE–52.

Myres, M. T. 1968. "A Sample Survey of the Expenditures of Naturalists." *Canadian Audubon* 30(1):12–20.

Randall, A. 1987. "The Total Value Dilemma: Toward the Measurement of Total Economic Value." In G. L. Peterson and C. F. Sorg, eds., U.S. Foreign Service General Technical Report RM–148:3–13.

Shaw, W. W., and W. R. Mangun. 1984. *Nonconsumptive Use of Wildlife in the United States*. U.S. Fish and Wildlife Service Resources Publication 154.

Simons, P. 1988. "Costa Rica's Forests Are Reborn." *New Science* 120:43–47.

SPSS Inc. 1983. *Statistical Package for the Social Sciences*. Chicago: SPSS Inc.

"Statistics Canada." 1988a. *The Daily*, March 1. Ottawa, Ontario: Minister of Supply and Services Canada.

———. 1988b. *The Daily*, April 20. Ottawa, Ontario: Minister of Supply and Services Canada.

———. 1987. *The Nation—Population and Dwelling Characteristics: Age, Sex and Marital Status*. Ottawa, Ontario: Minister of Supply and Services Canada.

Stoll, J. R., and L. A. Johnson. 1984. "Concepts of Value, Nonmarket Valuation, and the Case of the Whooping Crane." Trans. *North American Wildlife and Natural Resourources Conference* 49:382–93.

Sun, M. 1988. "Costa Rica's Campaign for Conservation." *Science* 239:1366–69.

U.S. Fish and Wildlife Service. 1982. *The 1980 National Survey of Fishing, Hunting and Wildlife-Associated Recreation*. Washington, D.C.: U.S. Fish and Wildlife Service.

Vickerman, S. 1988. "Stimulating Tourism and Economic Growth by Featuring New Wildlife Recreation Opportunities." Trans. *North American Wildlife and Natural Resources Conference* 53:414–23.

22 Sustainable Tourism Development

Kathryn Lawrence

THE THEORY THAT ECONOMIC and environmental goals are not mutually exclusive has become prominent in recent research literature. It has been suggested, in fact, that they are mutually beneficial and interdependent (Gardner 1989; World Commission on Environment and Development 1987). Although much has been published about long-term, resource based development, only rarely is this

approach used in planning (British Columbia Task Force on Environment and Economy 1989). Tourism development models have traditionally been spatial and economic plans, with environmental impacts assessed late in the planning process (Baud-Bovy 1982; Gunn 1988; Innskeep 1991). The assessment of social impacts, when addressed, is also one of the final steps taken before plan implementation.

For tourism development to be truly sustainable, it must be based upon environmental and social attributes. The maximum level of environmental and social change must be set by those who must live with those changes. Once the limits of change are set, a development plan can be made and an economic feasibility analysis can be completed for tourism or alternative developments. The result is a project that if economically feasible, will also be socially and environmentally sustainable. This type of tourism planning facilitates promotional and management objectives because environmental, social, and economic goals are already in place.

This chapter looks at the development of the tourism industry from an economic, environmental, and social viewpoint. It also addresses the issue of sustainable tourism development and proposes a method of basing tourism development on acceptable levels of social and environmental change.

Tourism Development

Economic

Worldwide tourism development expanded rapidly after World War II. Much of this expansion was brought on by advances in transportation technology that decreased the time and cost of traveling. Tourism also benefited from the decrease in average workweek hours and the increase in vacation time and personal wealth in industrialized nations (Fridgen 1991).

During the birth of mass international travel, beginning in the late forties and lasting through most of the sixties, tourism was regarded as a panacea for developing and underdeveloped countries (Mings 1978). Tourism was the smokeless industry that could raise foreign exchange earnings, the gross national product, and tax revenue, and increase employment for unindustrialized countries (Lea 1988).

This prodevelopment view was challenged in the 1970s. During this time economic benefits from tourism came under harsh scrutiny. Although international tourism earns foreign exchange for developing countries, fifty-five cents of every tourist dollar spent leaks back to developed countries in the form of imports (Lindberg 1991). A close look at employment in tourism reveals that foreign nationals have held most management level jobs (de Kadt 1979). Jobs held by locals are usually seasonal and many employees migrate from other employment sectors such as agriculture, possibly leading to an increased demand for agricultural imports. Recognition of problems with measuring of tourism's economic benefits has led to the increased analysis of tourism costs. The close scrutiny of the tourism industry continued as negative environmental and social impacts were identified.

Environmental

The environmental awareness that started in the 1970s exposed environmental problems in many prosperous industries. The physical impacts of tourism can be widespread. Examples of negative environmental impacts are soil erosion, air and water pollution, decreased diversity of flora and fauna, increased noise levels, and aesthetic degradation (Williams 1987). Not all areas suffer equal amounts of environmental change. The intensity of tourism development and use, the resiliency of the ecosystem, long-term versus short-term tourism planning, and the extent of modification an area undergoes affect the amount of environmental damage incurred (Cohen 1978).

Controlling negative environmental impacts in tourism is important for ecological and economic reasons. As with any type of development, unsound ecological practices can have far-reaching effects. Examples of this are flooding due to watershed deforestation and species extinction due to habitat loss. Environmental degradation in tourism areas, especially with increasingly sophisticated and environmentally conscious travelers, can lead to a decrease in tourist visitation and the ensuing revenue loss. Increasingly, environmental impact assessments and carrying capacity calculations are used to control the environmental impacts associated with tourism development (Vining 1990; Whelan 1991).

Social

An important area of tourism development deals with the effects of tourism on the host society. Some of the negative social impacts of tourism are demographic, such as changes in the size and composition of the host community. Often, when tourism is introduced, there are changes in the demographics of wage earners due to the employment of women and teenagers (de Kadt 1979). The workers are also affected by seasonality; many jobs in the tourism sector are only available during the "high season." The transformation of social norms often leads to increased crime and prostitution, and negative influences on native language, art, and religion are also documented (de Kadt 1979; Pizam and Milman 1986).

Social changes in societies caused by tourism development are sporadically measured and few attempts to minimize tourism's social impacts have been made. Sociocultural quality is important to local inhabitants and visitors. Social tension and high crime rates lead to decreased tourist arrivals just as a degraded environment will. Innskeep (1991) suggests controlling social impacts by gradual tourism development, community involvement, and the integration of tourism into the local economy.

Sustainable Development

Long-term, sustainable development "must depend upon a partnership and balance between economics, the environment and social values and benefits" (British Columbia Task Force on Environment and Economy 1989, p. 16). Sustainable development can only be achieved if social and environmental impacts are in balance with economic goals. There is no "zero impact" tourism, and therefore the minimum acceptable levels of negative impacts need to be planned. Many minimum levels of acceptable environmental change, such as tolerable amounts of air and water pollution, are set by governments. Other limits of acceptable environmental and social change may be set by biologists, park officials, or local residents. This balance between economic benefits and limits of acceptable social and environmental change can be visualized graphically as an economic model.

Tourism destination areas have cyclical tourist populations over time (Butler 1980). A tourist's perception of the social and environmental quality of a destination influences future tourist visitation levels to the destination. If tourists have a favorable impression of an area, they are more likely to return. They may also express their opinions of an area to others. In this way, tourists influence future travelers' desire to visit the area. There are many influences on a potential tourist's knowledge of and desire to visit a destination, such as media coverage and advertising. However, recent evidence suggests that word-of-mouth and personal preference are more important than traditional influencing factors with nature-based tourists (Fennell and Eagles 1990).

If tourists have a positive perception of a destination, increasing numbers of tourists will want to visit the area. The greater the number of tourists visiting the area, the greater the effects on the social and environmental quality of the area. Substantial degradation of an area may lead to a downturn in tourist visitation levels. This is known as the "tourist cycle," illustrated by Figure 22–1. Instead of looking at this phenomenon from a linear perspective, I suggest using an ellipse to conceptualize the tourism cycle.

Because tourism is cyclical in nature, the effects it has on environmental and social impacts are also cyclical. To illustrate this relationship, a negative impact ellipse can be overlaid onto Figure 22–1. The *x* axis measures the level of negative environmental impacts.

Figure 22–2 shows the importance of balancing negative impacts with benefits in achieving sustainable development. In this conceptual model, tourist population is used as an indicator of positive economic benefits so that a general level of tourist sustainability can be found. The visitation level can be correlated to current demand rates to find the optimal economic benefits obtainable at this tourist density.

In this graph, negative impacts have been consolidated. The negative impact ellipse can include both social and environmental impacts. As the graph shows, negative impacts increase (*x* axis) as the tourist population increases (*y* axis). Eventually the tourist population will increase to point MPT (Maximum Tourist Population), after which tourist arrivals begin to drop due to perceived overcrowding and/or negative impacts, such as pollution and crime.

Negative impacts do not immediately begin to improve when tourist population levels drop, because of time needed for environmental regeneration and for sociocultural changes to take place.

However, if tourist arrivals continue to decline, negative impacts will begin to improve at point NIT (Negative Impact Turnaround).

As with the demand and supply curve in economic models, tourist population and negative impacts will naturally fluctuate around their intersection. Causes of fluctuation could be seasonality or varying levels of environmental sensitivity.

The area where the ellipses intersect is the area of sustainable development. If tourist population and negative impacts do not exceed the maximum levels in this area, long-term sustainable development can be achieved. In the past, many tourism projects ignored negative social and environmental impacts and continued to push tourism population above its sustainable level. In many cases this caused an eventual downturn in tourist arrivals, and the area was left with severe negative social and environmental changes brought on by an unsustainable level of tourism.

Measurement Techniques

Maintaining an economic, social, and environmental balance will result in sustainable tourism development. Several measurement techniques have been developed that attempt to integrate these variables in tourism planning. This section describes some of these methods and their affects on tourism development. Cost-benefit analysis, carrying capacity, and limits of acceptable change are examined.

Cost-benefit analysis

Cost-benefit analysis was developed to test the economic feasibility of projects. This type of analysis determines feasibility by subtracting the costs incurred over the life of a project from the projected revenue earned from the project. The result of this equation can be positive, negative, or zero. If the cost-benefit analysis is positive, the project is economically feasible, and if negative, it is not economically feasible. Cost-benefit analyses are useful in comparing alternative developments.

Including environmental and social factors in cost-benefit analysis is difficult. Because cost-benefit analysis is based on a mathematical equation, dollar values must be given to social and environmental factors. If this valuation can be done, then the net tourism benefit for a region can be calculated. However, past difficulties in valuing environmental, and especially social variables, led to problems with this approach (Leathers and Misiolek 1986). Typically, some variables remain unquantified, leading to incorrect net benefit calculations (Sherman and Dixon 1991).

Carrying capacity

Carrying capacity developed in the tourism industry as a result of “the growing problem of tourist saturation” (World Tourism Organization 1984, p. 30). Mathieson and Wall define carrying capacity as “the maximum number of people who can use a site without an unacceptable alteration in the physical environment and without an unacceptable decline in the quality of the experience gained by visitors” (1982, p. 21). Carrying capacity must not only account for the physical number of people in an area, but also for the type of recreational activity the tourist undertakes, because some activities are more damaging to the environment than others.

Carrying capacity has useful implications for tourism planning and management; several negative issues, however, need to be addressed. It is difficult to predict the impacts resulting from tourist use, yet carrying capacity accounting limits use based on these predictions (Getz 1983). Enforced limits on visitation levels often result in problems. Developers, wanting to earn revenue quickly, dislike limits on the number of tourists allowed to visit an area. Carrying capacity may also alienate tourists who are turned away from an area or are restricted in their activities at a tourist attraction.

Limits of acceptable change

Carrying capacity spawned the “limits of acceptable change” system (Stankey and McCool 1984). This system was developed for use by wilderness area managers and is used to identify and monitor important environmental and social indicators. The LAC system consists of nine steps, including identifying environmental and social impacts and their indicators, analyzing and developing standards for conditions in the area, identifying and analyzing alternative allocations of the area, implementing the selected alternative, and establishing a monitoring program (Stankey and others

1985). The limits of acceptable change system is useful for maintaining and improving the environmental and social quality of an area. It also leads to a high level of customer satisfaction.

There are some problems with using this system as a tool for tourism planning. Because the limits of acceptable change system is implemented solely by managers of protected areas, there is little, if any, community involvement. Many local inhabitants, such as guides and hotel proprietors, depend on tourism attractions for their livelihood. They have a personal and financial stake in the future of the tourist attraction. They also have substantial interactions with tourists, and their input would be valuable to the success of the program. Tourism officials and certain scientists can also provide information valuable to analysis and the planning process in the limits of acceptable change system.

Proposed planning process

Successful tourism development needs to be sustainable environmentally, socially, and economically. This chapter proposes a way to achieve sustainability by basing economic development on acceptable changes in environmental and social quality. The planning method used incorporates several analysis and management techniques. The first step in the planning process identifies important social and environmental concerns in the destination area and evaluates their level of acceptability. Next, the managers of the attraction decide what steps to take in achieving and maintaining acceptable levels of social and environmental change. Once the direction of future tourism development is decided, a cost-benefit analysis will analyze the economic feasibility of the tourist development.

The process begins with the identification of important social and environmental indicators. Although this is based on the limits of acceptable change system, a wider variety of people must identify variables and set the limits of acceptable change. The researchers conducting the analysis are responsible for choosing participants with long-term interest in the development area. Government officials, attraction managers, concerned hotel proprietors, tourist guides, and perhaps biologists and anthropologists should be involved in determining areas of important social and environmental change. The types of people used in this phase of the process will vary with different types of attractions. It may be beneficial to work with an anthropologist if area tourism includes an ancient ruin, whereas an ornithologist would better serve an area with rare birds attracting birdwatchers. Once this panel of experts has been chosen, the Delphi technique will be used to acquire a consensus on variables to be studied further.

The Delphi technique consists of a series of questionnaires given to selected experts in a field. These participants complete and return the questionnaires on their own time and are guaranteed anonymity. This gives the participants time for contemplation and allows them to be more candid than they might be in a group session (Moeller and Shafer 1987). The first round of questioning is used to identify variables of concern. Subsequent rounds attempt to draw a consensus as to the importance and condition of the variables. In the first round of questioning, respondents will be asked to identify social and environmental impacts caused by tourism development. The second round of questioning asks participants to rank the chosen impacts and assesses the existing condition of the tourist attraction. Following rounds attempt to reach a consensus on the ranking and condition of tourism impacts. It is important that the participants in this test reach a consensus on whether the current conditions of selected environmental impacts are acceptable. In a similar project, the Delphi technique identified and assessed potential environmental impacts of a tourism project in Bradford, UK (Green, Hunter, and Moore 1990).

Problems with the Delphi technique are (a) moderator bias and (b) a high dropout rate. The moderator is responsible for interpreting and summarizing questionnaire responses and using this information in subsequent questionnaires. As with any survey instrument, it is important that the moderator remain objective throughout the survey process. The second possible problem is the substantial amount of time required by participants, which has led to high dropout rates of participants in past Delphi tests (Green, Hunter, and Moore 1990). To alleviate this problem, the individuals selected must be committed to finding the optimal level of tourism development for the area. With proper planning, the drawbacks of the Delphi technique can be diminished.

Once the limits of acceptable change have been established using the Delphi technique, planning goals can be set so that tourism development stays within these limits. At this point it is important to determine the tourist's views on social and environmental impacts. A written survey best measures the tourist's attitudes because of the minimal time commitment required of the tourist and

the possibility of obtaining a large sample size. Tourists should be asked to rank the acceptability of social and environmental impacts and rate the current conditions in the destination area. Respondents should also be allowed to comment on proposed changes to the tourist attraction.

The results of the tourist survey can be compared to the Delphi analysis results. This comparison may show a strong correlation between tourists' and locals' views on social and environmental impacts. If the tourists' views differ greatly from the locals', this may signal that the visitors are incompatible with the chosen social and environmental goals. In this case, current promotional campaigns need reevaluation.

A successful Delphi analysis and visitor survey evaluates the acceptability of important environmental and social changes for an existing or proposed tourism project. Achieving and maintaining these acceptability limits are the goals of tourism managers. Specific management techniques will vary by area. Examples of management techniques are decreased access to ecologically sensitive areas, increased visitor education, implementation of a litter control program, and restricted construction in congested areas.

The tourist survey will assist marketing specialists decide upon the type of tourist most likely to visit the area. This information can be used to project the volume of future tourists arrivals and the price tourists will pay for the recreation experience. These projections predict the future income of the area and can be used in a cost-benefit analysis.

Once a course of action has been decided upon, a cost-benefit analysis will determine if the project is economically feasible. Normally, the cost-benefit analysis is one of the first measurement techniques used when planning a development project. The type of planning proposed in this chapter differs from traditional planning, however, because development must be sustainable within acceptable social and environmental changes. After the development goals have been established, the economic feasibility of the project can be determined.

As with any plan, this process needs continuous monitoring. Surveys based on the Delphi test results should be given to chosen locals at predetermined intervals. This accommodates changes in acceptance levels and changes in the types of impacts measured. Tourist surveys must also be given occasionally to gauge satisfaction with the tourist attraction. Continued monitoring will ensure the social, environmental, and economic future of the development.

Figure 22-1. Maximum Tourist Population

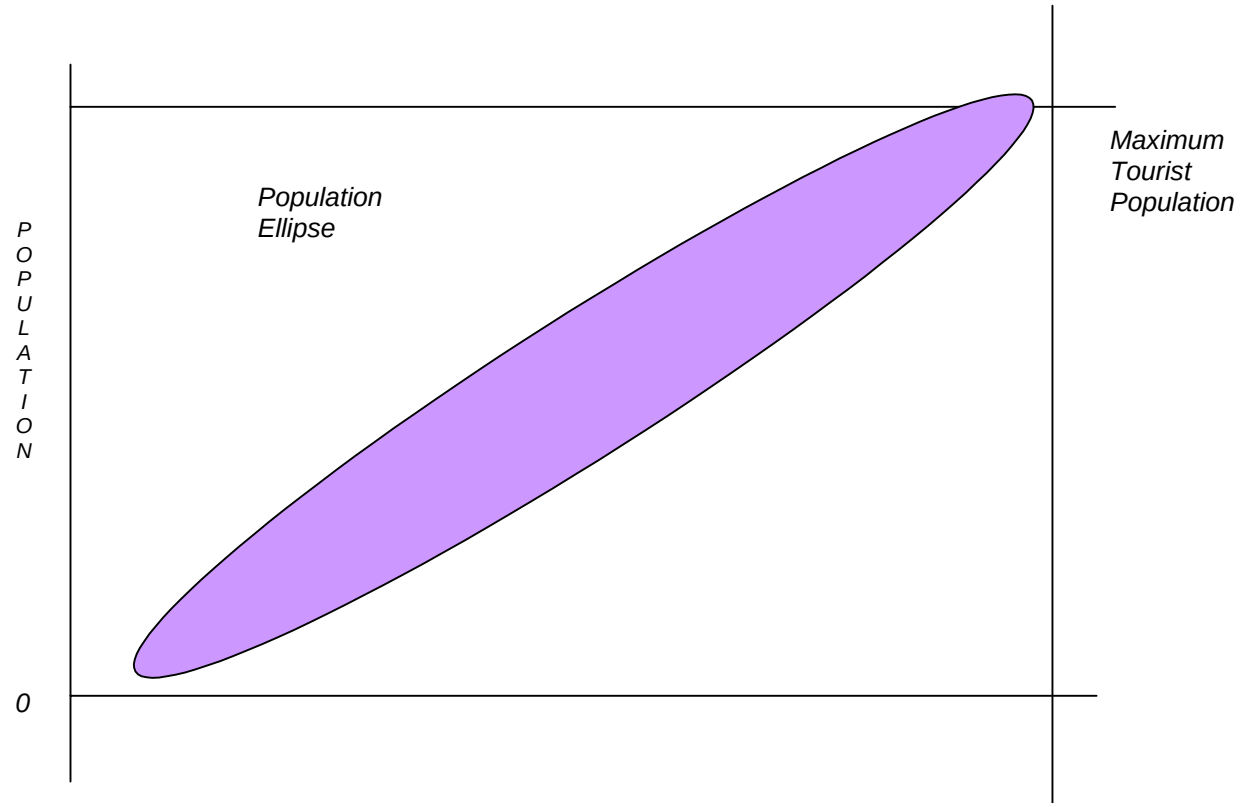
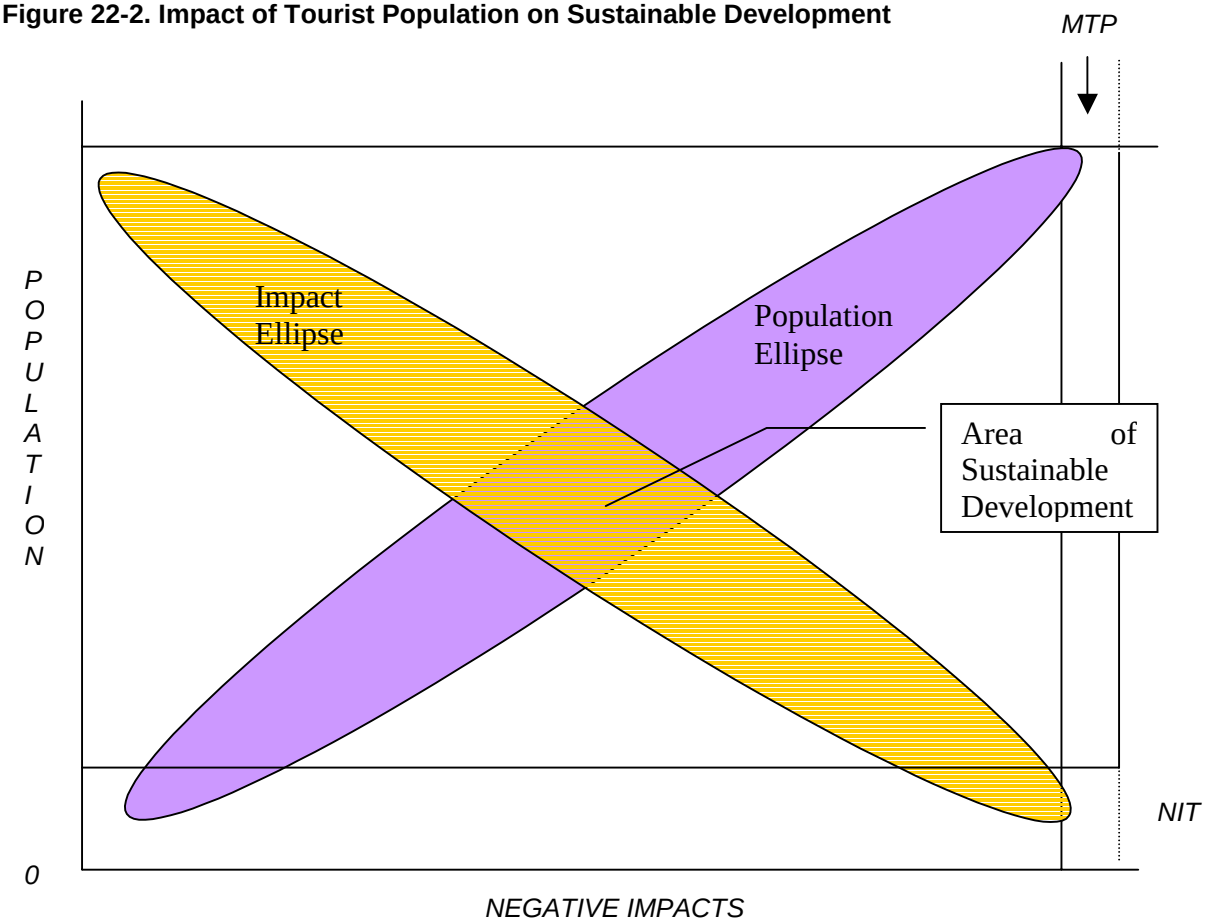


Figure 22-2. Impact of Tourist Population on Sustainable Development



Bibliography

Baud-Bovy, Manuel. 1982. “New Concepts in Planning for Tourism and Recreation.” *Tourism Management* 3(4):308–318.

British Columbia Task Force on Environment and Economy. 1989. *Sustaining the Living Land*. British Columbia: British Columbia Task Force on Environment and Economy.

Butler, R.W. 1980. “The Concept of a Tourist Area Cycle: Implications for Management of Resources.” *Canadian Geographer* 24:5–12.

Cohen, Erik. 1978. “The Impact of Tourism on the Physical Environment.” *Annals of Tourism Research* 5:216–237.

de Kadt, Emanuel. 1979. *Tourism: Passport to Development?* Oxford: Oxford University Press.

Fennell, David A., and Paul F. J. Eagles. 1990. “Ecotourism in Costa Rica: A Conceptual Framework.” *Journal of Park and Recreational Administration* 8(1):23–24.

Fridgen, Joseph D. 1991. *Dimensions of Tourism*. East Lansing, Michigan: Educational Institute of the American Hotel & Motel Association.

Gardner, Julia E. 1989. “Decision Making for Sustainable Development: Selected Approaches to Environmental Assessment and Management.” *Environmental Assessment Review* 9:337–366.

Getz, Donald. 1983. “Capacity to Absorb Tourism: Concepts and Implications for Strategic Planning. *Annals of Tourism Research* 10:239–263.

Green, Howard, Colin Hunter, and Bruno Moore. 1990. “Application of the Delphi Technique in Tourism.” *Annals of Tourism Research* 17:270–279.

Gunn, Clare A. 1988. *Tourism Planning*. 2nd edition. New York: Taylor and Francis.

Innskeep, Edward. 1991. *Tourism Planning: An Integrated and Sustainable Development Approach*. New York: Van Nostrand Reinhold.

Lea, John. 1988. *Tourism Development in the Third World*. London: Routledge.

Leathers, Charles G., and Walter S. Misiolek. 1986. “Cost-Benefit Analysis in Planning for Tourism Development: The Special Problem of Socio-cultural Costs.” *Tourism Recreation Research* 11(2):85–90.

Lindberg, Kreg. 1991. “Policies for Maximizing Nature Tourism’s Ecological and Economic Benefits.” *International Conservation Financing Project Working Paper*. Washington, D.C.: World Resources Institute.

Mathieson, Alister, and Geoffrey Wall. 1982. *Tourism: Economic, Physical and Social Impacts*. New York: Longman.

Mings, Robert C. 1978. “The Importance of More Research on the Impacts of Tourism.” *Annals of Tourism Research* 5(3):340–341.

Moeller, George H., and Elwood L. Shafer. 1987. “The Delphi Technique: A Tool for Long-Range Tourism and Travel Planning.” In J.R. Brent Ritchie and Charles R. Goeldner, eds., *Travel, Tourism and Hospitality Research: A Handbook for Managers and Researchers*. New York: John Wiley and Sons.

Pizam, Abraham, and Ady Milman. 1986. “The Social Impacts of Tourism.” *Tourism Recreation Research* 11(1):29–33.

Ritchie, J. R. Brent, and Charles R. Goeldner, eds. 1987. *Travel, Tourism, and Hospitality Research: A Handbook for Managers and Researchers*. New York: John Wiley and Sons.

Sherman and Dixon. 1991. “The Economics of Nature Tourism: Determining if it Pays.” In Tensie Whelan, ed., *Nature Tourism: Managing for the Environment*. Washington, D.C.: Island Press.

Stankey, George H., David N. Cole, Robert C. Lucas, Margaret E. Petersen, and Sidney S. Frissell. 1985. “The Limits of Acceptable Change (LAC) System for Wilderness Planning.” Washington, D.C.: *USDA Forest Service General Technical Report INT–176*.

Stankey, George H., and Stephen F. McCool. 1984. “Carrying Capacity in Recreational Settings: Evolution, Appraisal, and Application.” *Leisure Sciences* 6(4):453–73.

Vining, Joanne, ed. 1990. *Social Science and Natural Resource Recreation Management*. Boulder, CO: Westview Press.

Whelan, Tensie, ed. 1991. *Nature Tourism: Managing for the Environment*. Washington, D.C.: Island Press.

Williams, Peter W. 1987. “Evaluating Environmental Impact and Physical Carrying Capacity in Tourism.” In *J. R. Ritchie and Charles R Goeldner, eds., Travel, Tourism, and Hospitality Research: A Handbook for Managers and Researchers*. New York: John Wiley and Sons.

World Commission on Environment and Development. 1987. *Our Common Future*. Oxford: Oxford University Press.

World Tourism Organization. 1984. “Tourist Carrying Capacity.” *United Nations Environment Programme Industry and Environment* 7(1):30–36.

23 The Economics and the Role of Privately-Owned Lands Used for Nature Tourism, Education, and Conservation

Claudia L. Alderman

THERE IS INCREASING RECOGNITION that environmental protection must include economic considerations that both influence the political support for government programs and change the economic incentives for resource exploitation.

I would like to thank the many people who made this study possible, in particular the kind respondents who took the time to complete the questionnaire for this study. I also thank my advisor, Dr. Stephen Kellert, as well as Karen Ziffer for their support with this project. Conservation International kindly provided sponsorship and funds for this survey. Finally, I would like to thank my husband, Harold Alderman, for his patience and insightful advice. I promise I will not make him read this chapter “just once more” ever again.

One manifestation of this perspective is the recent interest in nature tourism, or “ecotourism,” as a means to promote sustainable development while at the same time creating an economic justification for the preservation of natural lands and wildlife.

While the potential of ecotourism is promising in principle, careful research and planning is needed so that the dual goals of economic development and conservation are achieved. There is, for example, a large body of literature that discusses the environmental threats posed by tourism. Other researchers caution that tourism, in general, has drawbacks as a development tool, often failing to establish linkages to the local economy.

As part of the process of going beyond speculation regarding the connection between conservation and nature tourism, it is important to study the institutional arrangements and structures on which ecotourism is based. To this end, the research that is the subject of this chapter was designed to look at one such structure: private lands used for nature tourism. Over the past 10 years, the number of such privately-owned protected areas in Latin America has increased substantially. Africa, on the other hand, has a long history of private lands used for tourism and sport hunting. For brevity, this chapter will refer to these lands by the generic term “private nature reserves,” although not all of the cases discussed are “reserves” in the strict meaning of the term. Thus, “privately-owned nature reserves” are defined as properties that are larger than six hectares, not owned by the government, and maintained mostly undeveloped with the intention of preserving the land in the most pristine state possible. While this definition is somewhat broad, and “most pristine state possible” is a highly subjective term, it serves to indicate the *intention* of protecting the natural features and biota of the land. While the actual legal designation of the reserve was not a consideration for inclusion in the survey, one of the goals of this research was to ascertain the legal designation of these lands. Finally, the most important criterion for inclusion in this study was that the reserve allow visitors, either as tourists or as students.

While there has been an increasing trend in the establishment of private reserves, they are not a new development; their precursors trace back hundreds of years to royal hunting preserves. Although the use of these and similar reserves was an exclusive privilege of nobility for sporting purposes, they served to preserve habitats in areas where human settlements encroached upon wild

lands. As a more modern example, The Nature Conservancy owns land throughout the world for the sole purpose of preserving particular habitats or species. In many cases, private reserves have provided a model for later public conservation efforts. In fact, many national parks today were once privately-owned lands that were donated or purchased by the government.

Despite this legacy, there is still little information about private reserves. Nevertheless, they have the potential to provide a substantial and flexible complement to the conservation strategies of national governments. While governments can provide an economic environment in which nature tourism is possible, governments are generally not efficient as tour operators and hoteliers. Thus, the reserves discussed in this chapter are examples of how the private sector can be incorporated into a strategy of sustainable development and conservation.

The research presented in this chapter involved a mail survey to 93 private reserves in Latin America and Africa. The goal of the study was to evaluate the role of nature tourism in private reserves and to assess the potential of private reserves as a tool for conservation, education, and development.

Nature Tourism

Nature tourism and ecotourism defined

As Ziffer (1989) aptly stated, “The term [ecotourism] has eluded firm definition because it is a complex notion which ambitiously attempts to describe an activity, set forth a philosophy, and espouse a mode of development.” While there are many definitions of ecotourism and nature tourism, this study will use the terms interchangeably and will rely on the definition proposed by Ceballos-Lascurain (1988):

> Tourism that involves travelling to relatively undisturbed or uncontaminated natural areas with the specific object of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspects (both past and present) found in these areas. Ecological tourism implies a scientific, aesthetic or philosophical approach, although the ecological tourist is not required to be a professional scientist, artist or philosopher.

One useful distinction can be made between mass tourism and nature tourism. While tourism in general depends upon natural features such as beautiful scenery, beaches, etc., it can be broadly distinguished from nature tourism in that the latter tends to have a lower impact on the environment and requires less infrastructure development.

In this chapter the term “tourism” will be used to include all tourism activities, while “ecotourism” will be used to refer to the more limited meaning of the term, as defined above.

The ecotourism controversy: a review of the literature

For ecotourism to be a viable conservation strategy, it must lead to economic development while not adversely affecting the natural resources on which it depends. Thus, two broad conditions must be met: (a) ecotourism must fit in with conservation requirements, and (b) it must be profitable and financially sound. The former should be obvious, and the second should be almost as apparent; if ecotourism requires continual subsidies or it does not lead to community development, it is reasonable to ask if resources are not better spent directly on conservation activities. While it is not the purpose of this chapter to recapitulate all the evidence for and against tourism and ecotourism, some of the relevant issues are reviewed below in order to lend context to later discussions.

Economic and social aspects of ecotourism

On the economic side, overall tourism is a major source of revenue for many developing nations; in 1988 alone, tourism generated $55 billion for developing countries (South Magazine 1989). Mexico’s tourist trade accounts for almost 4 percent of its gross domestic product, surpassed only by petroleum exports (South Magazine 1989). Similar statistics could be given for countries such as Kenya, Costa Rica, and Ecuador, among others. Nor is tourism only a third world trend; travel and tourism to the United States generates higher revenues from foreign dollars than revenues from exports of automobiles, agricultural goods, or chemical products (The Washington Post, May 21, 1990).

While statistics do not separate mass tourism figures from nature tourism, the market for ecotourism has been expanding rapidly. Witness to this is the growth in visitation rates to national parks in developing countries. The number of visitors to the Galapagos National Park in Ecuador, for example, has gone from 7,500 in 1975 to 32,595 in 1987 (Lindberg 1989). The share of nature tourism in overall tourism is also indicated by a recent study which found that natural history was an important motivating factor for international visitors to Ecuador, Costa Rica, and Belize (Boo 1990). In Ecuador, 76 percent of the international visitors surveyed reported natural history as a reason for their visit. Of the visitors surveyed in Belize, 51 percent considered natural history an important factor in choosing that country and 63 percent toured a protected area during their stay. Similarly, in Costa Rica, 30 percent of the travelers said that natural history was an important factor in their travel decision, and 50 percent visited a protected area during their stay (Boo 1990).

This interest in visiting natural parks often translates into appreciable revenues. In Rwanda's Parc Nacional des Volcans, tourists going to see the gorillas generate annually about $1 million in entrance fees, and $2 million to $3 million in other expenditures (Lindberg 1989). Costa Rica's Corcovado National Park, one of the many parks in that country, generates over $1 million in foreign earnings per year (Heyman 1988).

Advocates of ecotourism assert that nature travel to the tropics fits well with other worldwide initiatives to protect biological diversity by making nonconsumptive use of resources (Laarman and Durst 1987). Western and Henry (1979) maintain that the economic exploitation of parks needs not be at odds with conservation. These authors use Kenya as an example to argue that an economic motivation for protecting wildlife is not only compatible with conservation but adds greatly to its viability. In fact, Kenya's recent strong stand on ivory poaching can likely be traced to its need to maintain tourist revenues.

In addition to generating foreign exchange and providing economic incentives for the establishment and protection of natural areas, proponents of ecotourism list several other economic benefits. These include generation of employment, stimulation of local economies, and the creation and improvement of infrastructures and recreational facilities for local use (McNeely and Thorsell 1988). Additionally, since nature tourism tends to occur in rural areas, it can lead to economic development in otherwise neglected regions. For discussions on how ecotourism can be an important component of integrated rural development strategies, see Chow (1980) and Heyman (1988).

While there is little doubt that tourism generates large amounts of money, a generally more controversial issue is the matter of economic leakages, that is, what proportion of tourist spending benefits the host country. The World Bank estimates that 55 percent of gross tourism revenues leak back to developed countries (as quoted by Boo 1990). Laarman and Durst (1987), however, recognize leakage to be a problem but argue that this is not a predetermined outcome of tourism but depends on consumer choices such as whether to use local airlines and travel agencies, and the types of goods and services consumed. In this regard, ecotourism has a greater potential for diminishing leakage than does mass tourism because nature tourists are generally more tolerant of simple accommodations and infrastructure. Thus nature tourism can be expanded without major capital investments, using local construction materials and goods (Kutay 1989). Moreover, in many developing countries, the leakage of tourism may be smaller than that from other non-agricultural industries.

Another facet of the economic benefits of ecotourism includes the direct revenues that this activity can generate for conservation, either from entrance fees or donations. For example, the Darwin Research Station in the Galapagos National Park raised $150,000 through a direct mail appeal to visitors who had signed the guest book at the park (Lindberg 1989). The expansion of the Monteverde Cloud Forest Reserve was also financed by donations to the Monteverde Conservation League (Boo 1990). An important source of support for conservation arises as visitors who experience natural environments in their travels become "converts" and provide financial and political support for conservation (Lindberg 1989). Finally, some tour groups occasionally donate part of their profits for conservation. Recently, Victor Emanuel Nature Tours donated $5,000 to El Triunfo Cloud Forest Reserve in Mexico from the proceeds of one of its birdwatching trips (Kutay 1989).

A number of critics of tourism such as Pelham-Burn (1975) and Bryden (1973) (as quoted in Dunkel 1984) contend that the economic benefits of tourism have been inflated while the social costs associated with tourism development have either been ignored or minimized. This and other negative economic effects listed in the literature, such as increased costs of property values and concomitant increases in the cost of living for locals (Oliver-Smith, Arrones, and Arcal 1989), are, however, more

intense in mass tourism than in nature tourism. It is true that nature tourism when highly concentrated (such as in Nepal) may put pressure on certain goods that are in particular demand by tourists. In the long run, however, if these goods are locally produced, the higher prices will translate into raised incomes to producers and increased supply of the good, which will stabilize prices.

Similarly, a number of critics point out the potential for cultural dislocation. For example, the Summer 1982 issue of Cultural Survival Quarterly—"The Tourist Trap: Who is Getting Caught"—is devoted to this question. The cultural impacts of nature tourism are important to consider and the experiences have been mixed.

Another criticism of tourism in general is that it is highly seasonal. This in itself, however, does not mean that jobs are not created. Some estimates place the number of tourism-related employment at 50 million people in developing countries alone (South Magazine 1989). Moreover, while tourism is seasonal, so is agriculture, the major source of employment in developing countries. The links between these two sectors is an area where more research needs to be carried out (Dunkel 1984).

Boo (1990) cautions that ecotourism may produce labor shortages if it coincides with the agricultural harvest. Yet, tourism often occurs during the dry season, when agricultural labor requirements are low, and it may actually provide complementary employment to local cultivators. Thus, the effects of ecotourism on agriculture are area-specific and the dangers of seasonality should not be over-generalized. On the other hand, a limited tourist season does decrease the return on investments and infrastructure. Seasonality also results in excess capacity during the low tourist season. Ironically, this real concern is seldom mentioned by critics of tourism.

Another criticism of tourism is its vulnerability to international market whims and domestic unrest. While this is true, tourism downswings are likely to be unrelated to patterns of export crops and other foreign exchange earnings. Even if tourism is variable, it nonetheless may stabilize national foreign exchange accounts and regional employment and income when other economic activities such as agriculture are in their low earning cycles. Moreover, the susceptibility of tourism to local unrest is symptomatic of other problems and not the cause of the problem. In this respect, tourism is like any other business in that its profitability is affected by external factors.

An issue specifically relevant to nature tourism is the tendency for parks in developing countries to form enclaves in which the economic disparity in earnings between the park or reserve and the local community is large (Western and Henry 1979). Under this circumstance, the park can become isolated from the people surrounding it. This issue is exacerbated when the creation of the park meant that the community lost access to the park's resources. This problem can only be alleviated if tourism is developed in such a way as to provide economic benefits to the local populace through employment and other forms of income generation. One example of a protected area successfully creating a source of income for the local community is the Monteverde Cloud Forest Reserve in Costa Rica. There, a women's cooperative grosses over $50,000 per year by selling handmade crafts to Monteverde's tourists (Southworth 1989).

Ecological impacts of ecotourism

The ecological impacts of ecotourism are equally as important as economic concerns. If ecotourism destroys the resources on which the industry depends, then the activity cannot be considered a conservation tool. Yet, nature tourism is not necessarily ecologically sound (Ziffer 1989). Many of the places visited by ecotourists support fragile ecosystems that cannot endure heavy disturbance (Budowski 1976). The Galapagos National Park, once thought to be a model of conservation through tourism, is today an example of how excessive and uncontrolled tourism can cause severe environmental degradation (De Groot 1983). The original management plan for the park called for a maximum of 12,000 visitors. When the demand for the park increased, government officials simply increased the visitor's quota to three times the original allotment. Thus, tourism has the potential not only to raise incentives for preservation but also to increase incentives for misuse. Even with good intentions, the sheer number of visitors can collectively lead to resource strain.

While in theory the visitor capacity can be increased to the point of diminishing returns, for national parks (unlike other market economies) capacity cannot be evaluated through use; by the time capacity has been reached, the resource may have been irreparably damaged (Western and Henry 1979).

Dearden and Hall (1983), Edington and Edington (1986), Kutay (1989), and Lancaster (1989) recount that in some instances tourism negatively impacts the animals in protected areas. Cheetah

and lions, for example, have been reported to decrease their hunting activity when surrounded by more than six vehicles (Western and Henry 1979). Harrington (1989) reports that uncontrolled expansion of tourism to the Brazilian Amazonia is leaving behind a trail of litter and is destroying fragile forest habitats and wildlife. Other potential impacts of ecotourism include physical degradation of the environment through water and air pollution and trail erosion.

On the positive side, Budowski (1976) and Pigram (1980) argue that since ecotourism and the environment are not merely interrelated but are interdependent, the possibility of economic gain may provide incentives for substantial enhancement of the environment. More importantly, Inskeep (1987) contends that there is already considerable knowledge and experience to allow for sound environmental tourism planning. In this regard, McNeely and Thorsell (1988) and Smardon (1989) offer suggestions on how to plan nature tourism to avoid some of the environmental, social, and economic pitfalls discussed above.

Privately-Owned Nature Reserves

The niche of private nature reserves

A recent study by the World Wildlife Fund concluded that the potential benefits of ecotourism have not yet been realized because many national parks are fairly new and currently do not have the infrastructure in place to support ecotourism (Boo 1990). To a fair degree, however, private reserves are filling this gap by providing lodging and other facilities important for ecotourism, research, and education. This reflects the comparative flexibility inherent in private enterprises. Individual and small corporate investors are unencumbered by complex decisionmaking structures, and they can focus their attention and funds on a narrower set of problems than governments can.

By providing essential infrastructure outside parks, private reserves are appealing to those who believe that the parks themselves should be kept free of human settlements. Moreover, since parks in developing countries often have limited resources, it makes sense to devote scarce funds to conservation and research instead of construction and maintenance of expensive accommodations. This is particularly true because governments in general are not efficient at providing services or running businesses. Thus, these economic activities and concomitant risks are better left to the private sector. (While it is beyond this chapter to discuss all aspects of this debate, it is worth recognizing that the private sector does need to be moderated or regulated, particularly in the face of externalities such as carrying capacity issues.)

Private reserves effectively market tourism. According to Boo (1990), many government tourism offices complain of lack of funds for the promotion of their countries' attractions. Yet, private reserves often have substantial advertising budgets. Many can afford to place ads in foreign magazines, which is seldom possible for public parks. Of the reserves responding to our survey, 70 percent have brochures, many of which are highly attractive and of excellent quality. Once the reserve attracts a tourist to its country, other sectors of the national tourism industry may benefit as well. Also, unlike many government offices, private businesses tend to respond quickly to requests for information. Thus, many private reserves are directly promoting tourism to their home countries.

Private lands dedicated to ecotourism or education can play an important role in the overall conservation strategies for developing countries; private reserve owners have strong incentives to maintain the integrity of their natural areas since the continued success of their business depends on their quality. The degree to which private ownership leads to conservation, however, remains an open question; unregulated private reserves may have an incentive to mine or otherwise overexploit their natural resources. Private reserves, when properly managed, also add to the amount of land under protection. This is welcome since governments, even when strongly committed to conservation, are constrained both financially and politically from devoting more than a small fraction of their land area to protection.

Many private reserves are particularly significant because they are located around parks and other protected areas. In fact, 46 percent of the reserves surveyed by this study border protected areas. This means that private holdings are serving to increase the effective protected area of many parks. This is especially relevant in the context of island biogeography theory, which indicates that the rate of extinctions on a given area is inversely correlated with the amount of contiguous land under protection. Moreover, park viability is enhanced by the existence of these reserves, since it precludes more disruptive activities from extending to the park's edges. Specifically, neighboring reserves often

serve to buffer parks from the detrimental effects of poaching and logging as well as the silting of rivers and leaching of agricultural chemicals into parks' ecosystems.

Private reserves serve an economic role in local economies as well. In general, parks take resources away from local people. Yet ecotourism can provide compensatory opportunities. For example, government employment practices often exclude local people from receiving government jobs. Even when nepotism is not an issue, central hiring practices may mean that only those with links to the capital centers are considered for job openings. Private reserves, on the other hand, have far more flexibility for hiring local personnel. Such integration with the local community further enhances the viability of conservation efforts.

Types of private nature reserves

The reserves discussed in this study are by no means a homogeneous group. While some are profit-making ventures dedicated exclusively to ecotourism, others are owned by nonprofit organizations for the purpose of habitat protection and scientific research. Many others are hybrids: they combine a mix of activities that includes ecotourism, education, conservation, and in many cases extractive activities such as agroforestry and cattle or game ranching. Table 23–1 shows the breakdown of reserve types by continent. The reserves were classified based on the combination of answers provided by each reserve. This analysis considered the reasons for the establishment of the reserve, visitor information, educational and extractive activities in the reserve, and the amount of revenues derived from various sources. In addition, other materials returned with the questionnaire, such as letters and brochures, were used in this assessment. By looking at the responses as a whole, a "gestalt" of the reserve was translated into a classification code. While this is a subjective evaluation, it nonetheless serves to establish a broad classification from which other analyses can be based.

As can be seen in Table 23–1, the majority of the reserves fall into the "hybrid" model; 32 percent of the reserves combined tourism with extractive activities, while only 25 percent were devoted to tourism exclusively. Thirty percent of those who responded were dedicated mainly to research and education, but allowed tourism as well, bringing the total reserves in which tourism was a component to 87 percent. In fact, many reserves that were originally set up for conservation and research are turning to ecotourism as a way of making themselves self-supporting. Finally, of the remaining 13 percent of the reserves studied, 11 percent are devoted to research and environmental education exclusively, while 2 percent combine farming with conservation and education.

Research Results

Methodology

The survey questionnaire that forms the core of this study was sent to all the private reserves that could be identified in Latin America as well as in four African countries (Kenya, South Africa, Zimbabwe, and Madagascar). In addition, to pretest the questionnaire, four reserves in Costa Rica and one in Colombia were visited. These reserves are also examined as case studies. Additionally, data were obtained by reviewing the literature on nature-based tourism and examining published reports of individual reserves. A copy of the survey's questionnaire is included in Annex 23–B.

Although it is not possible to establish with certainly whether all the reserves included in this study meet the philosophical criteria embedded in the term "ecotourism," the reserves selected were thought to at least endeavor to cater to the ecotourism and nature education market.

The names and addresses of the respondents were obtained by writing to conservation groups in Latin America and Africa requesting that they identify private reserves in their countries. Additionally, government travel offices, several tour companies, and nongovernmental organizations based in the United States were asked for this information. Finally, magazines such as *Natural History, Sierra, and International Wildlife*, and tour advertisements and catalogues were reviewed to obtain names of tourist destinations.

A total of 93 private reserves were identified and questionnaires were sent to all of them. Sixty-nine questionnaires were sent to reserves in Latin America and 24 to reserves in Africa. The overall response rate to the survey was 71 percent: 74 percent from Latin America and 63 percent from African countries. Annex 23—A contains the list of the reserves to which questionnaires were sent and their response outcome. Sixty-six questionnaires were returned. Two responses were excluded

from the analysis because they came from lands owned by the government while a third response was eliminated because the reserve did not permit visitors. By design, this survey did not include reserves that are publicly owned, even if privately managed. While these are recognized to serve an important research and conservation role, they do not reflect the same set of private incentives and legal issues that are the subject of this study.

Survey results

The following analysis uses private reserves as a model of the ecotourism industry to attempt to answer some of the empirical questions posed by both the proponents and detractors of ecotourism. Among the questions addressed are: Are private reserves profitable? How many jobs do they create and how many of these go to the community near the reserve? What is the size of the investment needed? How much of this investment comes from foreign capital? Finally, do private reserves foster conservation and, if so, in what ways?

Clearly, if the private sector is investing in ecotourism, the investors have expectations of profitability. This study looks upon such investments both from the perspective of private returns as well as from the larger perspective of social returns. The latter pertains mainly to conservation but also to employment generation and education.

Reasons for establishing the reserves

Anticipation of profits is not the only motivation for the establishment of private reserves. In many cases, the reserves were set up for conservation and other reasons, and use tourism to augment other activities. Table 23–2 lists the stated reasons for the establishment of reserves.

Several respondents expressed their strong commitment to conservation, either in letters or notes on the questionnaire. While some people may be skeptical about this, and may construe these statements as propaganda, there are many tangible examples of this commitment. For instance, some of the commercially oriented reserves include reforestation and community development programs as part of their activities. Other reserves can be shown to have been created in response to increased habitat destruction around them. Finca Merenberg in Colombia and the Community Baboon Sanctuary in Belize are examples of this and are discussed in more detail later as case studies.

Many of the private reserves in Africa were set up as hunting preserves, and this tradition of consumptive use of wildlife remains to this day. Of the reserves responding to the survey, 40 percent of those located in Africa allow hunting while only 2 percent do so in Latin America. This contrast, of course, reflects wildlife differences. After all, Latin America does not have the large game found in Africa. But the differences in hunting uses are also attributable to a stronger, older tradition in African nations making wildlife conservation pay for itself. In fact, two African reserves expressed the concern that if they cannot show that tourism is a profitable use of their land, they may lose it to the government's agrarian redistribution programs. The economic importance of extractive activities in African reserves was mentioned by one respondent, who indicated that because they do not allow hunting, they have trouble making ends meet.

Amount of land owned

The reserves studied ranged in size between 6 and 100,000 hectares. Table 23–3 shows the size distribution of the reserves. This table also illustrates marked size differences between the two continents; African reserves are, on the average, larger than their Latin American counterparts. While 30 percent of the reserves in Latin America were under 200 hectares, none of the ones in Africa were that small. Indeed, three-quarters of the African reserves exceeded 2,500 hectares. This most likely reflects the fact that the majority of the African reserves are located in savanna ecosystems.

The total amount of land owned by the reserves included in this survey was 493,850 hectares. In addition to this, 30 percent of the reserves reported that they manage land other than that which they own. It is noteworthy that this additional land actually exceeded the land owned, since this land managed amounted to 496,044 hectares.

Visitor rates to private reserves

According to visitor records provided by the respondents, the number of visitors to private reserves has increased steadily over the past decade. Figure 23–1 shows the total number of visitors

to private reserves for the years 1980, 1985, 1987, 1988, and 1989, by continent. These numbers are suggestive of the steady growth of the ecotourism market. The graphs represent aggregate sums of day and overnight visitors, and are indicative of a total growth rate of 15.5 percent between 1980 and 1989.

A somewhat different perspective is indicated in Table 23–4. This table shows the mean unweighted percentage growth of overnight visitors to a given reserve in the various time periods.

As can be seen by Table 23–4, between 1980 and 1989 there was little difference in the average visitor growth rates between Africa and Latin America. In the past five years, however, the data show a much faster growth rate in visitors to Latin American reserves. It is worth noting, however, that many new reserves have been established in Latin America in the last half decade. Africa, on the other hand, has a steadier trend of reserve establishment. Figures 23–2 and 23–3 depict these trends. The newness of the reserves in Latin America may account in part for the more rapid expansion on the rate of visitors. The older African reserves may have more stable visitation rates due to having reached capacity.

As can be expected, a significant relationship was found between the total number of visitors and the age of the reserve. A regression of the logarithm of the total number of visitors on age of the reserve indicates a coefficient of 0.057 (t=2.25) on the variable age. By construction, the coefficient gives the growth rate; for each additional year of operation, the reserve can expect a 5.7 percent increase in visitors. This cross-sectional result differs slightly from the results shown in Figure 23–1. In the latter case, the growth rates reported control for heterogeneity among reserves as the regression compares the size of a reserve in one period with the size of the same reserve in a previous year.

The multivariate regression did not show a significant relationship between the number of overnight visitors and either the amount of land owned by the reserve or the continent in which it was located. The size of the investment on infrastructure was found to be only marginally significant.

Importance of tourist revenues

Respondents were asked to rate on a scale from 0 to 5 (0 meaning “of no importance” and 5 meaning “very important”), the importance of tourist revenues to the profitability of the reserve. Table 23–5 summarizes the responses to this question. It is worth noting, additionally, that several respondents mentioned that while ecotourism is not currently important, they expect it to generate a greater share of income over the next few years.

While 54 percent of the reserves said that tourism revenues were very important, on the average only 39 percent of the operating expenses of reserves came from tourism. Table 23–6 reports the average percent revenue from each source, broken down by the reported importance of tourism for a particular reserve. For the overall sample, tourism provided 40 percent of last year’s operating costs with another 20 percent met by grants and government funds. This is discussed further below.

One reason for the modest share of tourism revenues in the total sample is that a fair number of reserves are oriented primarily towards research and conservation. Yet, even these reserves generally had a substantial number of visitors, although expenditures per guest are comparatively low. The average length of stay and daily expenditures per visitor are listed in Table 23–7, by type of reserve.

Profitability of private reserves

Another reason tourist revenues have only a modest share as total sources of revenue is that 54 of the reserves that responded to the survey have not yet made profits. This is not restricted to reserves where profit is not a major motivation; only 50 percent of the reserves concentrating in tourism are currently profitable. This, however, may be attributable to the large proportion of recently established reserves, as is implied by Figure 23–4.

When asked when they expect to start generating profits, 49 percent of the reserves that are not yet profitable said they expect to go into the black within the next five years. Of the remainder, 13 percent do not expect to ever make a profit, and 38 percent did not respond to this question.

Of the 24 reserves that are currently profitable, 83 percent said that they have re-invested 60 percent or more of their profits into the reserve. It is noteworthy that in at least two cases, profits were used to establish additional reserves.

Size of investments

The moderate number of reserves that are profitable may reflect, in part, the size of investments necessary to start up a reserve. The largest share of such investments comes from the land itself, as can be seen in Figure 23–5. Thirty-five percent of the land holdings were valued at more than a million dollars.

Alternatively, 61 percent of the reserves owned land worth over $250,000, while only 30 percent of the reserves had invested that much in infrastructure.

Despite the large initial investment, over half the reserves are owned by individuals or families. While it may seem that such a large investment would be prohibitively high, it should be noted that half the reserves also had foreign investors. Figures 23–7 and 23–8 depict the proportion of national to foreign ownership for reserves in Africa and Latin America respectively. At least some of the investment partnerships reported reflect marriages between a national and a foreigner.

An additional way of meeting the large capital requirements for reserves is through aid from government and nongovernmental agencies. Of the reserves surveyed, 38 percent reported receiving some form of financial aid from either government or private sources. This type of support is also indicated by the fact that 22 percent reported receiving advisory help; nearly half the reserves received either advice, aid, or both. It is of some surprise that 15 reserves reported receiving financial aid but did not report receiving advice.[1]

Links of Private Reserves to Neighboring Communities and Other Protected Areas

Employment and other economic linkages

One of the most tangible links between reserves and their neighboring communities is through the employment they generate. As a group, the reserves that responded to this survey employ 1,289 people on a permanent basis, plus 336 additional people during the high tourist season.

In order to analyze employment data, the number of employee months was calculated for each reserve as follows:

EMPLOYMO = (12 * pemploy + emphi*nhimo + emplo*(12-nhimo))

> Where *pemploy* is the number of permanent employees, *emphi* is the number of additional employees during the high tourist season, *emplo* is the number of additional employees during the low season, and *nhimo* is the number of months which constitute the high tourist season.

As can be seen in Table 23–8, the mean number of employee months varies greatly by type of reserve. (One of the reserves in this study was not included in the above calculations because it is much larger than the others and thus it *raises* the average employment figures in a misleading manner.) For example, the reserves dedicated only to tourism generate higher employment than those that combine tourism with other activities.

While the sample size in the subgroups is small to draw firm conclusions, it is not surprising that reserves that have tourism as secondary to research and education have a substantially higher number of employee months than do those that have no tourism at all.

The importance of tourism in employment is substantiated by the findings reported in Table 23–9. Model 1 in that table indicates that each 1,000 visitor nights generates 40 employee months. This table also reveals the scale economies that encourage expansion. The constant in this type of model can be interpreted as indicative of fixed employment costs. It is a basic economic premise that when

[1] There are some inconsistencies in responses between the sections on the questionnaire which asked if the reserves received aid, and the question regarding percent of revenue sources. For the purposes of this analysis, if the reserves reported any grants from the government or private sources they were included as receiving aid, regardless of their later response.

fixed costs exist, unit costs decline with the scale of operation. Thus, from a purely accounting perspective, the reserves do better if they add visitors.

Model 2, although not suited to address questions of fixed costs per se, does show the impact of other variables. It indicates, for example, that there is more employment per visitor night on average in Africa. This does not, however, have to do with the relative sizes of the reserves, as is indicated by the insignificant coefficient for land ownership. This model also suggests that investment in infrastructure leads to more employment, holding visitors constant. By construction the coefficient of the infrastructure variable can be interpreted as the impact of a proportional increase in infrastructure. This is likely indicative of greater value added per visitor when facilities are more developed. When infrastructure is controlled for, the impact of visitor nights declines slightly, reflecting a correlation between visitor nights and infrastructure. In model 2, each 1,000 visitor nights generate 34 employment months, holding infrastructure constant.

Note also that the additional impact of day visitors on employment is low and apparently not significant in this sample. Finally, the age of the reserve does not influence the number of employee months, that is, the younger reserves do not have fewer employees than older ones, controlling for the number of visitors.

The results above serve to support the idea that private reserves generate substantial employment. This result is further buttressed by the finding that the 84 percent of the people employed by the reserves originate from nearby communities.

It should also be noted that a number of reserves stated that they make particular efforts to use local materials. Over half the reserves have gift shops, which often sell local crafts. Similarly, some reserves refer their guests to neighbors who provide services such as renting horses, boats, etc.

Recreation and education

Private reserves have the potential to serve as sources of recreation and education to local communities as well. Of the reserves studied, 62 percent reported that they offer tours to community groups and 60 percent said that they offer this service to schools. On the recreational side, 92 percent of the reserves surveyed said that they allow people to visit for the day only. Of these, 78 percent do not charge a fee to nationals, while 69 percent do not charge a day fee to foreigners. Even when they do charge an entrance fee, the majority of the reserves charge lower fees to nationals than they do to foreigners. The amounts charged range widely; charges for nationals range between $1 and $40, while the charges for foreigners range between $2 and $100 per day.

The fact that many reserves do not charge for day visits means that these reserves are potentially available for local tourism, even if the overnight charges are prohibitive for local budgets. One reserve in Costa Rica actively encourages locals to visit the reserve; it offers a free lunch and tour to any person from the nearby community visiting the reserve for the first time. Clearly, this openness to the community fosters a positive relationship between the reserve and the community.

Relationships between reserves and other protected areas

Without exception, the 29 reserves that border other protected areas offer lodging. This supports the idea that private reserves supplement the tourism infrastructure of parks. In addition, 55 percent of these respondents said that they provide some service to the neighboring park. Table 23–10 lists the services listed and the frequency of each response.

While some reserves provide services to parks, the relationship goes both ways; many are dependent upon neighboring parks for attracting visitors to their area. Figure 23–9 illustrates the responses to the question regarding the importance of neighboring protected areas for attracting visitors to the reserve.

Ecological importance of private reserves

Many reserves discussed in this study are protecting valuable wildlife habitats by using the land in ways that do not entail its permanent modification. Clearly, however, not all reserves are of equal biological value. It is fair to assume, for example, that the reserves established by conservation oriented groups encompass more valuable habitats (from a strictly biological perspective) than do those reserves of a more commercial nature. This does not mean, however, that many commercial lands are not protecting important habitats. As was discussed earlier (in the section about the “niche”

of private reserves), many reserves in this study border other protected areas and thus enhance the conservation potential of these areas. Moreover, many of the tourism enterprises have been undertaken to subsidize the protection of rain forests and other habitats. Two examples of this are Rara Avis in Costa Rica (discussed as a case study), and Shipstern in Belize. The latter is using butterfly farming as a means of generating income for locals without destroying the tropical rain forest.

In order to answer some of the questions regarding the ecological soundness of private reserves, the survey asked a set of questions concerning land and wildlife management practices. Of the reserves that responded to this survey, 32 percent said that they have a formal agreement with the government or a nongovernmental institution to manage the reserve according to written guidelines. This indicates a high level of integration with other conservation strategies.

The reserves were also asked if they have a formal land or resource management plan, and if so, which issues does the plan include. Table 23–11 summarizes the responses to this question. In addition, 54 percent of the reserves reported having a biologist among their staff.

The reserves were also asked if the they make active efforts to protect rare or endangered plants or animals. Seventy-nine percent of the reserves answered positively, and listed a number of such species found in their lands.

While having a biologist on staff, or having a management plan, does not ensure sound ecological practices, it does, however, indicate that in many cases the ecological aspects of the reserve are being considered.

Problems faced by private reserves

In the same way that many parks face encroachment and poaching, reserves have to deal with threats to their resources. To identify what issues are important to reserves, respondents were asked to rate, on a scale from one to five, which problems had afflicted them. Table 23–12 gives the percentage of respondents who listed the following as problems.

Poaching was listed as the most common problem, but the measures taken to solve this problem varied. One common response was that reserve owners or employees explained to their neighbors that hunting was not permitted on their lands. Many said that they made efforts to increase awareness about the importance of conservation among their communities. A few reserves said that they had appealed to authorities to help them control illegal hunting. One reserve owner dealt with poaching by taking matters into his own hands; he shot over the heads of poachers to discourage illegal hunting. A drastic approach was taken by one African reserve to protect its rhino population; the reserve is patrolled by a group of soldiers from the national army. A more conciliatory strategy, on the other hand, was taken by another reserve, which hired a poacher as its ranger.

The second most common problem reported by reserves was lack of government cooperation. Since the role of governments in tourism development falls in the arena of policy, this is discussed further in the conclusions.

Another problem mentioned by two reserves was that the short duration of the tourist season makes it difficult for them to recover their investment. One of the reserves is dealing with this problem by promoting tourism to retirees, who are less constrained by the usual Christmas and summer vacation schedules. This reserve is particularly well suited to cater to elderly people, as it has comfortable accommodations and is easy to reach from the capital city.

As was mentioned earlier, a few respondents expressed concern about the future of the reserve. In two cases in Africa, perceived land scarcity in their countries means that the reserve lands could be expropriated for agriculture if they cannot show that tourism is a profitable use of the land. One respondent in Latin America mentioned that they had obtained official recognition for the reserve as a means of exempting it from agrarian redistribution programs. Another respondent, for a reserve in Brazil, was worried that other family members who also own the reserve may want to put the land to other uses.

It is interesting to note that community opposition to tourism was named as least prevalent among the problems. While this response expresses the perception of the reserves, and not the communities themselves, about how the community views tourism, it nonetheless suggests that opposition to tourism may not be as prevalent as some critics tourism of imply. (A recent survey by Jessica Brown found that there is little or no opposition to tourism among communities around national parks in Costa Rica [personal communication]).

Other problems reported included difficulties of access, habitat destruction, and unwanted development around reserves.

Case Studies: Some Examples of Private Nature Reserves

The following case studies are used to illustrate various models of nature reserves and some of the issues relevant to them. The first case discussed, the Marenco Biological Station in Costa Rica, is an example of a business oriented enterprise. Rara Avis, also in Costa Rica, illustrates a mixed strategy model, which combines tourism with research and sustainable forest products extraction. Reserva Natural La Planada in Colombia provides an example of a reserve whose primary mandate is education and community development and where tourism is a secondary activity. Another private reserve discussed below, the Finca Merenberg, is different from those above in that it is primarily a farm, yet actively involved in conservation, community development, and education, and tourism is negligible. Yet, Merenberg illustrates some of the problems private reserves can encounter, particularly local opposition and political instability. Finally, the Community Baboon Sanctuary is discussed because it is a unique model, owned by neither an individual nor a group, but instead composed of several individual private properties in which the landowners have agreed to use their land in accordance with the reserves's goals and standards.

Marenco Biological Station, Costa Rica

Unlike most private reserves in Costa Rica, which were established with foreign capital, Marenco is owned by a Costa Rican corporation. The station's owners, Sergio Miranda and his family, came to the area in 1972. Three years later, the government of Costa Rica established the 42,510—hectare Corcovado National Park. Because of its convenient location, halfway between the park and the nearest air strip, Miranda's farm provided occasional lodging and transportation for visitors to the neighboring park. Taking advantage of the business opportunity presented by Corcovado's proximity, Miranda and his family entered the nature tourism business in 1985.

Marenco owns 300 hectares of land on the Pacific side of the Osa Peninsula. Remoteness is the source of Marenco's strength but also its weakness. The beauty of the reserve is derived from its secluded, unspoiled beaches and virgin rainforest. As with many wilderness reserves, however, isolation also means that food and supplies are difficult to procure. Transportation expenses add greatly to the cost of running the reserve. Because these charges are in turn passed on to the reserve's visitors, it is economically inaccessible to most Costa Ricans. During the 1990 tourist season, for example, the cost of a three-day visit to Marenco, including transportation and meals, was $515 per person.

Another important consequence of the reserve's remoteness is that isolation makes it difficult to retain qualified personnel from season to season. All of the managing personnel in January 1990 were new employees. This turnover of personnel results in lack of continuity in management thereby precluding continued learning over seasons. One consequence of this inexperience is loss of potential profits. For example, an insufficient quantity of soft drinks was ordered for the Christmas peak season, and business opportunities such as the marketing of hats, suntan lotion, flashlights, and other incidentals were missed. These are nonperishable goods that could have brought substantial profit. While the reserve did have some local crafts for sale, these were not quality items or prominently displayed, and thus were unlikely to attract many buyers.

Any management flaws, however, were compensated for by Marenco's resident naturalist guides, some of whom were professionally trained biologists, accepting relatively low earnings for the opportunity to obtain field experience. Knowledgeable guides can substantially enhance the trip's enjoyment for the visitors, and thus increase the chances of repeated visits to the same or similar tourist destinations. More importantly, requiring tourists to always be accompanied by guides may serve to reduce some of the negative impacts of tourism on fragile ecosystems. Some of these include harassing or feeding wildlife, collecting plants and animals, or leaving garbage behind.

As with many reserves, Marenco faces pressure to reduce unit costs of operation by expanding the number of visitors. Marenco, currently handling up to 40 visitors per night, is in the process of increasing capacity to 56 overnight guests. While there is no evidence that this expansion will affect the quality of the reserve's natural environment, it illustrates a generic issue that business requirements of tourist facilities follow an economic logic that is distinct from environmental planning.

Finca Merenberg, Colombia

Located at 7,000 feet above sea level in the eastern Colombian Andes, the Merenberg reserve is a “refugia” harboring an array of flora and fauna no longer found in other parts of the region. Merenberg, however, is a poignant example of the severe problems that private reserves can face; over time Merenberg has become an island of forest in a sea of degraded land and impoverished people.

Merenberg’s history began in 1932, when a group of expatriate Germans purchased a vast expanse of then unpopulated primary forest. The Germans, however, had to leave their land when they were called into the army at the beginning of World War II. In 1948, Gunther Buch and his wife Metchild came to Colombia to settle on the land that Metchild had inherited from her father. When the Buchs arrived at Merenberg, they found that a new road had brought waves of displaced, landless peasants, who had invaded their property. The family lost over half its land to squatters. De jure ownership gave way to de facto possession. Left without alternative, Buch bought back some of his property from the settlers and began to reforest the denuded land.

Gunther and Metchild Buch managed their remaining 304-hectare property as a ranch. Unlike their neighbors, however, the Buchs zealously protected the primary forests on their land. By conserving their forests, their water supply was protected and they minimized erosion. This was not the case in the adjacent lands. Escalating immigration resulted in uncontrolled logging and burning of the forest. In proportion with the degradation of the adjacent lands, pressure on Merenberg increased. Not unjustifiedly, Buch’s landless neighbors viewed Merenberg’s “wasted jungle” as an affront to their poverty. The Buchs found their fences cut regularly, and cattle belonging to their neighbors grazing on their pastures. Under cover of darkness, trees and game were poached regularly. In 1970, squatters invaded the farm in such large numbers that Buch had to get the army’s help in evicting them.

Conflict between the Buchs and the sur rounding community peaked with the murder of Metchild. Two of the farm’s neighbors, posing as poachers, shot her in the back in 1975. It was later discovered that the killers planned to divide Merenberg’s forests among themselves. Despite his grief at the murder of his wife, Gunther Buch persisted in his commitment to keep his land as a nature reserve. His plight attracted national and international attention, and in 1977 Gunther was named “Conservationist of the Year” in Colombia. In 1980, the World Wildlife Fund made Merenberg a special project, creating the Merenberg Foundation. The Foundation’s goal was to promote conservation by improving the standards of living of the area’s residents. To this end, Gunther Buch began teaching his neighbors how to replant their denuded lands using seed stock from Merenberg’s forests. Moreover, a ten-year management plan for the reserve includes the purchase of additional land to expand wildlife habitat and the reforestation of degraded areas.

The ultimate success of Buch’s endeavor is not clear. The president of the Merenberg Foundation, Henry Von Tral, was tragically killed by a terrorist bomb placed on an Avianca plane in late 1989. Guerrilla activities in the area, and the general climate of political instability in Colombia, have likely contributed to the decline of the reserve.

The Merenberg reserve illustrates some of the potential problems of continuity for private reserves. Without a strong leader committed to its existence, the reserve may easily perish. Heirs may be unwilling to keep the land as a nature reserve, and may sell it or develop it. Second generation problems have been solved in other places by the establishment of foundations to ensure the continuity of the reserve. One such example is Asa Wright in Trinidad, whose owner set up a private trust to manage the reserve upon her death.

In general, problems of encroachment arise when owners of private reserves are not present. An absentee landlord, especially a *foreign* one, is a sure lure for squatters, particularly in areas where landless and impoverished peasants abound. Swift degradation of lands due to logging and to slash and burn agriculture is likely to follow. This deforestation process is encouraged by agrarian reform laws in many Latin American countries that decree that settlers can get title to lands that they have “improved.” This means clearing the forest. Moreover, degradation of lands is fueled by simple economics. Unlike owners, who have a long-term interest in the land, squatters, with their uncertain tenure, are forced to extract the land’s resources without regard for long-term sustainability.

Rara Avis, Costa Rica

In 1983, Amos Bien, a North American biologist, set out to prove that a rain forest is a valuable economic resource that can provide substantial gains to the surrounding communities. To this end, Dr. Bien founded Rara Avis, a for-profit corporation that owns 414 hectares of primary rain forest. His goal was to develop a nature tourism business, foster biological research, and develop ways to use the forest profitably without destroying it. In addition to the valuable rain forest that Rara Avis protects, the importance of this reserve is amplified by the fact that it serves as a buffer for two additional protected areas, Braulio Carrillo National Park and the Zona Protectora La Selva.

Despite Dr. Bien's optimism about the economic potential of his reserve, Rara Avis has not yet made a profit. The reasons are many. The main problem for the reserve is access. The corduroy road from the nearest town is often too muddy for most vehicles. Even jeeps cannot easily reach the reserve because they must ford two rivers. The usual travel arrangement is by a tractor-pulled cart, or when the tractor is not available or the river is too high, by horse or foot. The difficulty of travel to the reserve makes it unsuitable for elderly or very young tourists. Also, visitors with tight schedules must consider that transportation difficulties may force them to spend an extra day at Rara Avis, unless they are willing to walk ten miles to the nearest town with their luggage on their backs. Unfortunately, Rara Avis' access difficulties are not likely to disappear soon since improving the road is prohibitively expensive. This problem places Rara Avis at a competitive disadvantage, particularly since access is not a problem shared by neighboring tourist facilities such as Selva Verde and El Gavilán Lodge.

Another reason why the reserve is not yet profitable has to do with the seasonality of tourism to Costa Rica. The short visitor season between Christmas and Easter means that lodges are operating below capacity for eight months out of the year. Without a minimum 38 percent occupancy rate, the reserve cannot make a profit. Dr. Bien, however, expects to reach this critical occupancy rate by 1990.

The above points regarding profitability raise an important issue about private reserves: profitability is not necessarily correlated with biological importance. While Rara Avis' ecological value is higher than that of many other reserves, because of access difficulties it may not be as lucrative as reserves of lesser ecological caliber.

To augment its tourism business, however, Rara Avis plans to develop a forest products industry. The reserve is hoping to set up a nursery of hardwood trees for reforestation. Also, the reserve is exploring the possibility of exploiting *Geonoma epetiolata*, an ornamental plant, and the roots of a tree fern that is commercially used as support for orchids. This tree fern can be sustainably harvested by removing half of its roots. Another potential source of revenue from the forest is the harvest of pacas, a rodent considered a delicacy in Costa Rican bars.

An interesting aspect of Rara Avis' enterprise is its involvement with SelvaTica S. A., a nonprofit corporation established in 1988 by conservation oriented stockholders, mainly biologists and scientists. SelvaTica owns 567 hectares of adjacent land, and like Rara Avis, it was established with the goal of preserving the forest and developing economically viable ways to extract forest products sustainably. Both corporations benefit by their cooperative agreement; Rara Avis gets the use of additional land for its tourist activities, and SelvaTica's investors benefit by the protection and management of their land by Rara Avis' staff. In addition, SelvaTica's shareholders have a specified number of days per year that they can spend free of charge at Rara Avis' lodge. This is particularly an inducement for scientists conducting research. In fact, noted tropical biologists, such as Don Perry and Phil DeVries, are carrying out long-term studies on the reserve. As an example of the overlap between tourism and scientific research, their work is facilitated by the existing tourism infrastructure.

Community Baboon Sanctuary, Belize

The Community Baboon Sanctuary was originally created in 1985 to protect the habitat of the black howler monkey (*Alouatta pigra*), but since its inception its goals have broadened to promote sound agricultural practices as well (Information regarding this sanctuary is based on personal communications with Robert Horwich. See also Horwich 1990 and Hartup 1989.) This sanctuary differs from all others in this study in that it is composed entirely of lands belonging to individual landowners who have voluntarily pledged to manage their lands in accordance with the reserve's guidelines. The result is the protection of the habitat of howler monkeys and other wildlife. In return, the land management practices espoused by the reserve have the potential to decrease soil erosion, stabilize the water table, and hasten nutrient replenishment following slash and burn (Hartup 1989).

The Community Baboon Sanctuary was established when 11 landowners agreed to preserve howler habitat by leaving in place food trees used by the monkeys, preserve strips of uncut vegetation along the river banks and property boundaries, and consider leaving aerial pathways for the howlers throughout cultivation areas. Since then, the reserve has grown to encompass the lands of a total of 70 owners in seven villages.

To enlist support for the sanctuary in the various villages, project leaders met with village leaders, teachers, and other community members. These discussions were followed by an education drive to make people cognizant of the uniqueness and vulnerability of the howler monkeys. Later a petition was circulated locally by a villager to gain government support for the project. Finally, the plan was presented formally at a community meeting. At the request of the community, tourism development became one of the reserve's goals. To accommodate the new visitors, local people have acted as tourist guides and several families have established bed and breakfast inns. Local ferrymen act as informal sources of tourist information. As of 1989, the reserve had received over 5,000 day visitors and it had provided lodging to 50 tourists. While the number of overnight visitors is modest, as the reserve becomes better known, this number will probably increase. This is particularly likely because Belize is increasingly a popular destination for nature tourists. Note that in keeping with ecotourism ideals, the tourism development at the Community Baboon Sanctuary has required little investment, and has few apparent leakages.

In addition to its conservation and community development programs, the reserve has a strong educational program. With the support of the World Wildlife Fund, a small natural history museum and visitors center has been built at the reserve's Bermudian Landing. Also, in order to enhance the sustainability of the sanctuary, the Community Baboon Sanctuary has developed an operations manual and has hired a full-time manager to be in charge of the education and research programs of the reserve. In the future, a trust fund will be created to pay the manager's salary and expenses. Currently visitors who come as part of organized tours are charged an entrance fee of $2.50.

The Community Baboon Sanctuary plans to expand to link up with two other wildland areas: Crooked Tree Waterbirds Sanctuary and Mussel Creek Reserve. When this happens, as is the case with 47 percent of the reserves surveyed by this study, Community Baboon Sanctuary will be providing a buffer zone to other protected areas.

Finally, the importance of the Community Baboon Sanctuary rests with its potential for being a replicable model. In Brazil, for example, a tour company owner involved in conservation is trying to convince local land owners to establish a reserve to protect the birds of the region (personal communication with Christoph Hrdina, owner of Safari and Tours in Brasilia). Also in Belize, a similar project to the Community Baboon Sanctuary is being proposed for a sea turtle nesting beach. The experience gained by the Community Baboon Sanctuary can provide useful lessons for these new projects.

Reserva Natural La Planada, Colombia

The La Planada Reserve is a very good example of a model of private reserves dedicated to conservation, education, and research. La Planada was created in 1982 by the Fundación para la Educación Superior FES, with the support of the World Wildlife Fund. FES is a private nonprofit institution with the goal of supporting educational, scientific, and cultural programs. The Planada is located in the southwest of the country, nestled in the Western Andes. The reserve owns 3,200 hectares of land, mostly cloud forest, as well as a small amount of pasture undergoing succession. The biological wealth of the reserve is immense; of the 300 species of birds present, 24 are endemic to the region. In addition, the reserve harbors the endangered spectacled bear, *Tremarcous ornatus*.

La Planada has three main goals: to promote environmental education, to promote biological research, and to carry out research and extension work on appropriate technologies for agriculture, animal husbandry, and agroforestry. For its educational component, the reserve has a full-time staff member dedicated to providing educational programs for school-age children in the region. The reserve has a well-designed interpretative trail that explains important ecological concepts such as succession, watershed protection, and the interdependence of forest communities. It also has a museum with good exhibits, a multimedia room, and a live orchid collection.

Research facilities include a laboratory and specimen collection. Some of the biological research includes captive breeding of spectacled bears and long-term studies of bird populations. The appropriate technology component of the reserve has demonstration projects on the conversion of

farm animals' manure into methane gas and the use of sugar cane refuse for feeding chickens, pigs, and fish.

La Planada is clearly underutilized. The reserve is beautiful, and its accommodations are basic but comfortable. The staff did not keep records of the number of visitors, but guessed that they received between 600 and 1,000 day visitors per year. While the reserve can accommodate 35 people overnight, there are seldom more than a handful of overnight guests. This is partly due to the isolation of the reserve, and partly due to lack of information about the existence of the reserve. It is clear, however, that the reserve could be serving as a base for science students to carry out research on cloud forest dynamics and biota. Furthermore, the habitat of the reserve would make it very appealing to bird watchers. Unfortunately, the unstable political situation of Colombia means that few foreign tourists visit the country.

La Planada is also underutilizing its potential to raise funds. While the reserve reported not to have any economic problems, the fees charged to visitors are barely high enough to cover the cost of the food provided. Like Rara Avis, La Planada reflects trade-offs between profitability and biological significance.

Conclusions

This research has discussed private reserves as a model to explore some of the issues associated with nature tourism. This section briefly reiterates some of the key results of the study, and when appropriate, discusses some of the policy recommendations that follow from these findings.

1. The survey's results indicate that private reserves generate substantial local employment, this being particularly true about reserves that cater to nature tourism. For each 1,000 visitor nights, between 32 and 40 employee months are generated, and 84 percent of the permanent employees of the private reserves surveyed are from the local community. This provides some empirical response to the criticism that nature tourism creates few jobs, often not from local communities.

2. The results show that while the costs of establishing private reserves are relatively high and depend largely on foreign investments, 75 percent of the reserves are either owned by nationals, or are owned by partnerships between locals and foreigners. Restrictions on foreign investment may, however, be an obstacle to the establishment of these reserves. For example, countries like Costa Rica and Ecuador that have a large number of private nature reserves are also countries that allow foreigners to own land. In fact, Costa Rica has a law of "Tourism Incentives" to attract investments in tourism development. Governments may thus set the climate in which private reserves may flourish.

3. Sixty-three percent of the reserves said that one of their major problems was lack of government cooperation. In this regard, the establishment of private reserves is hampered in some countries by legislation which proscribes that ownership of land is conditional on use. In most cases, "use" means that the land must be cleared of its forests. Obviously, this type of legislation prevents landowners from preserving the land in its natural state. To deal with this problem, one reserve owner in Costa Rica is trying to have the government legally recognize nature tourism as a valid use of the land. Some caution, however, must be used with this approach as it would be unfortunate to have private nature reserves become a loophole to bypass needed agrarian reform. Nonetheless, in cases where private lands are well managed as natural lands, it is important to establish legal mechanisms to allow private reserves to exist.

4. The long-term survival of these reserves as protected areas could be fostered by developing links between the reserves and government agencies and nongovernmental groups. Some reserves, such as Hato Pinero in Venezuela, and Asa Wright in Trinidad, have established nonprofit foundations to ensure the continued management of the land as a reserve. Thirty-one percent of the reserves have made agreements with the government or private institutions to restrict the future development of the land, in exchange for incentives such as lower taxes, or commitments on the part of the government not to expropriate the land. These incentives could make private reserves an attractive alternative to destructive uses of the land.

5. One caveat about the links between private reserves and conservation is that ecological importance is not the same as economic viability. Those reserves with the highest ecological value are not necessarily the ones that can do well financially. The economic success of private reserves is often dependent upon nonconservation-related factors such as accessibility, management, and the political situation of the country in which they are located. Ecologically important, but financially shaky

reserves, could be given assistance by conservation groups to concentrate on research and conservation, using tourism only to supplement funds.

6. Scale economies provide incentives for private reserves to expand the number of visitors. Yet, the ecosystems of these reserves will be taxed if the reserves expand beyond their carrying capacity. This is one place where conservation oriented groups may provide some technical assistance in developing plans for sustainable resource use.

7. The high response rate to this survey is indicative of the desire of the reserves to be recognized. Their willingness to promote ecological conservation was indicated by the large number of reserves that said that they would like to implement habitat management plans but did not have the resources or expertise to do so. This is a place where local conservation groups could become more involved in providing technical assistance. This should not be viewed as a subsidy to the private sector, but rather as an opportunity to develop mutually beneficial relationships.

Table 23–1. Types of Private Reserves by Continent

	Latin America		*Africa*		*All*	
Type of Reserve	*n*	%	*n*	%	*n*	%
Farm & Tourism	12	25.0	8	53.3	20	31.7
Tourism Only	12	25.0	4	26.7	15	25.4
Research, Conservation, Tourism	17	35.4	2	13.3	19	30.2
Research, Education, No Tourism	6	12.5	1	6.7	7	11.1
Farm, Cons., Education, No Tourism	1	2.1	0	0.0	1	1.6
TOTAL	48	100.0	15	100.0	63	100.0

Table 23–2. Reasons for Establishing the Reserve

Reason for Establishment	*Percent who gave this as a reason*
Conservation ethic	85.7
Scientific research	85.7
Nature tourism	84.1
Education	80.9
Community development	60.3
Farming or cattle	31.7
Personal residence	25.4
Forest products extraction	7.9
Watershed protection	6.3
Show conservation can be profitable	3.2
Soil protection	1.6
More profitable than agriculture	1.6
Prove land-tenure model	1.6
Reforestation project	1.6

Note: Because usually more than one reason was given, the percentages in the table do not add up to one hundred.

Table 23–3. Amount of Land Owned by Continent

Size	All		Latin America		Africa	
(hectares)	n.	%	n.	%	n	%
1 to 50	7	11.1	7	14.6	0	0.0
51 to 200	8	12.7	8	16.7	0	0.0
201 to 500	10	15.9	9	18.8	1	6.7
501 to 2500	13	20.6	10	20.8	3	20.0
over 2500	25	39.7	14	29.2	11	73.3
TOTAL	63	100.0	48	100.0	14	100.0

Table 23–4. Average Overnight Visitor Growth Rates by Year and Continent

	All		Latin America		Africa	
Year	n.	growth rate	n.	growth rate	n.	growth rate
1988–89	33	37%	22	42%	11	29%
1987–89	27	44%	18	53%	9	25%
1985–89	19	28%	11	36%	8	16%
1980–89	11	13%	5	14%	6	13%

These compound growth rates were calculated as follows:

GROWTHx = {Exp[ln(nvyr2 / nvyr1) / nyears] - 1} * 100

Where GROWTHx is the growth rate for a given time period, nvyr2 is the number of overnight visitors in the later year, nvyr1 is the number of overnight visitors in the earlier year, and nyears is the years lapsed between the two time periods.

Table 23–5. Importance of Tourist Revenues to the Profitability of the Reserve

RESPONSE (scale value)	n.	%
Not important (0)	10	15.9
Some importance (1,2,3)	17	27.0
Very important (4,5)	34	54.0
No answer	2	3.2

Table 23–6. Sources of Operating Expenses for 1989 by Reported Importance of Tourism (percent of total revenues)

	Importance of Tourist Revenue			
Revenue Source	none/low	mid	high	all
Tourism revenues	0.0	28.7	60.3	40.5
Forest products extraction	0.0	2.6	0.2	0.7
Cattle or agriculture	12.5	16.2	15.0	16.6
Endowment	15.0	7.7	0.0	4.1
Grants from the government	0.0	3.1	0.0	1.3
Grants from private sources	53.8	21.5	8.0	19.4
Loans from the government	0.0	3.1	0.7	1.1
Loans from private sources	0.0	0.0	0.5	0.3

	Importance of Tourist Revenue			
Revenue Source	*none/low*	*mid*	*high*	*all*
Investors	2.5	0.0	9.0	5.4
Membership dues	1.3	1.5	0.3	1.1
Other	15.0	15.6	6.0	9.6

Note: the column for *All* includes 4 cases for which importance of tourism was not reported. Hence, it is not the average of the previous three columns.

Table 23–7. Average Length of Stay and Expenditure per Visitor

Reserve type	*n.*	*Average length of stay*	*Average dollar expenditure per visitor*
All reserves	57	3.4	226
Farm and tourism	18	3.2	381
Tourism only	16	3.3	291
Res., conservation, tourism	16	4.4	54
Res. education, no tourism	6	2.5	33
Farm, conserv., education; no tourism	1	1.0	0

Table 23–8 Average Number of Employee Months by Reserve Type

Reserve Type	*n.*	*Average Employee Months*
All reserves	42	350.6
Farm and tourism	16	284.5
Tourism only	12	651.3
Res. conservation, tourism	12	191.5
Res. education, no tourism	2	30.0

Table 23–9. Regressions on Employment

Variable	*Model 1 coeff. (t)*	*Model 2 coeff. (t)*
Visitor nights, 1989	.0402 (9.81)	.0339 (8.58)
Day visitors, 1989	.0050 (0.73)	.0068 (1.14)
Land owned	—	-.0037 (0.14)
Continent	—	198.4 (1.95)
Value of infrastructure	—	74.2 (2.19)
r2	.735	.816
n	39	39

Table 23–10. Services to Parks Provided by Private Reserves

Service	*Frequency*
Border patrolling	7
Environmental education	5
Logistical support	5
Information & first aid	3

Service	*Frequency*
Research	3
Food & lodging for guards	2
Live game for re-stocking	2
Train guards, rangers	1
Promoted creation of park	1
Trail maintenance, development	1
Endangered species documentation	1

Table 23–11. Management Plans of Private Reserves

Management issue	*Percent who said they have plan*
Restore degraded habitats	50.8
Manage endangered species	54.0
Exclude visitors from fragile areas	50.8
Evaluate impact of tourists on ecosystem	39.7
Set limits on the numbers of visitors	52.4
Program for resource extraction	25.4

Table 23–12. Problems Faced by Private Reserves

Problem	%	*Intensity*
Poaching	87.3	3.1
Lack of cooperation from government entities	63.5	3.0
Budget deficiencies	60.3	3.2
Tree felling/ firewood collecting	57.1	2.8
Squatters	49.2	2.2
Political unrest in the country	38.1	3.0
Community opposition to loss of access to the reserve's resources	36.5	2.6
Community opposition to tourism	17.5	2.4
Other	31.7	—

Note: Percent refers to the number of reserves who listed it as a problem, and intensity is the average ranking given to it by people who listed it as being a problem.

Figure 23-1. Total Number of Visitors to Private Reserves

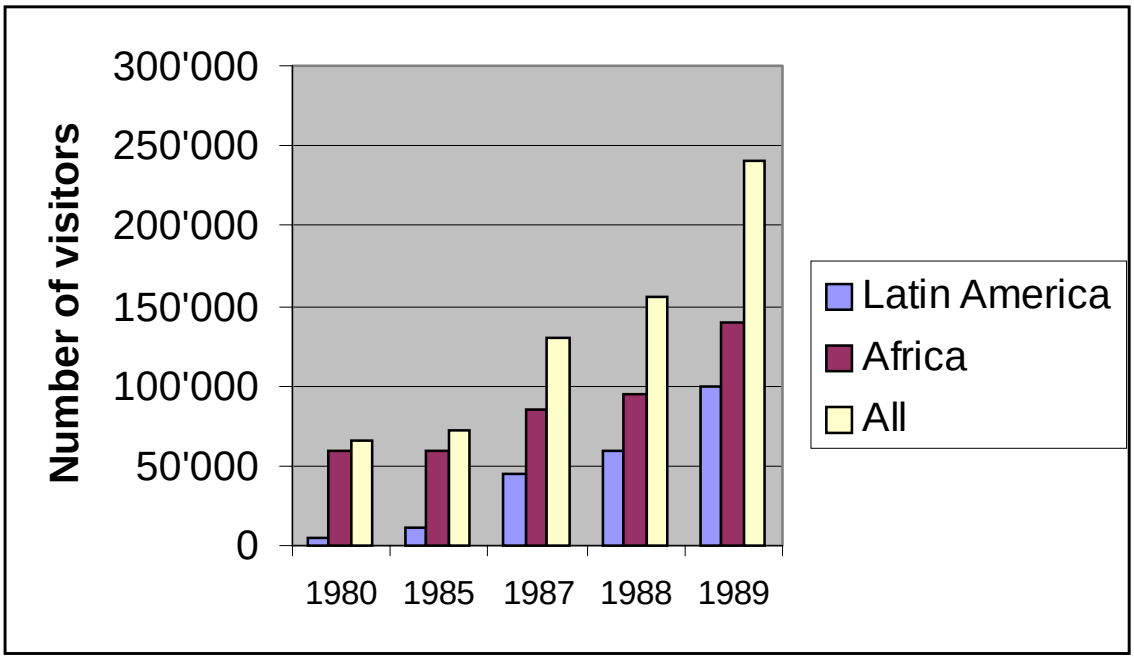


Figure 23-2. Year of Establishment of Private Reserves in Africa

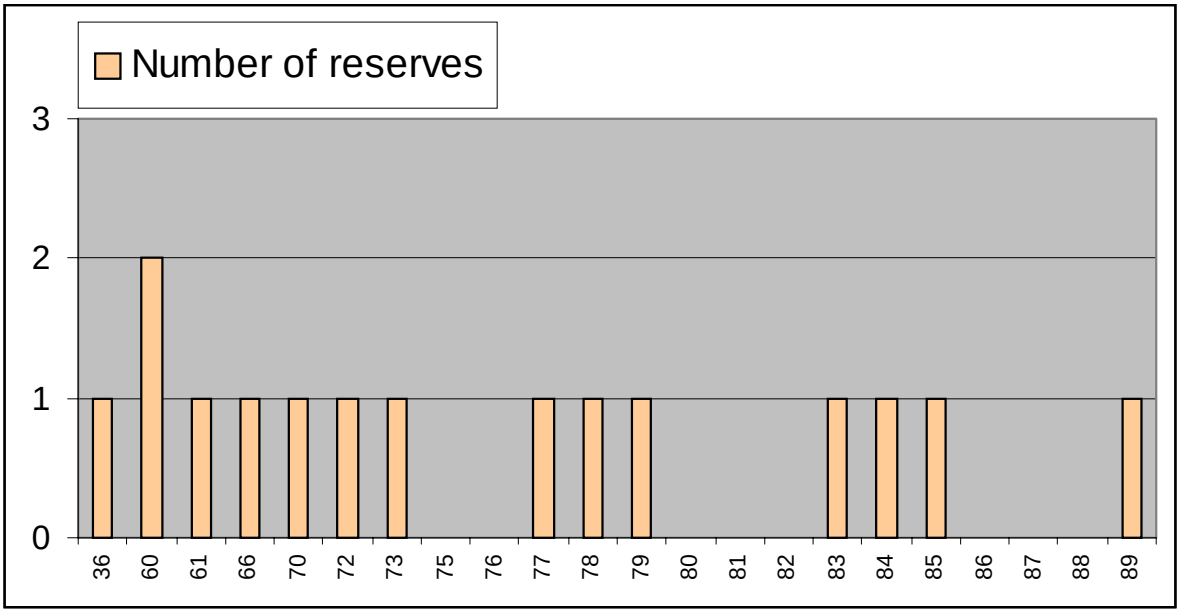


Figure 23-3. Year of Establishment of Private Reserves inlatin America

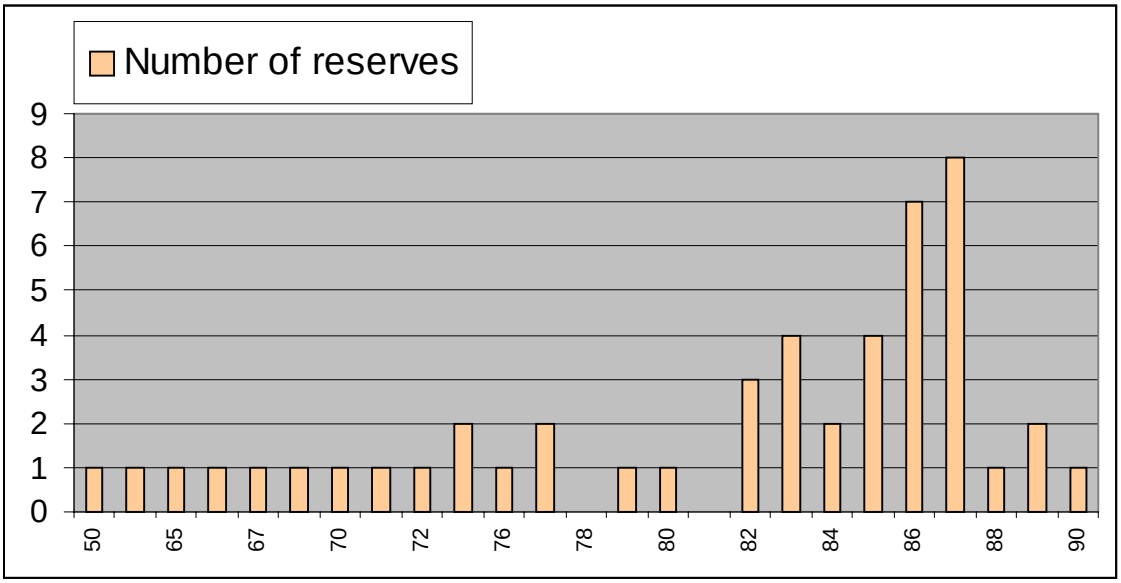


Figure 23-4. Profitability of Private Reserves as a Function of Year Established

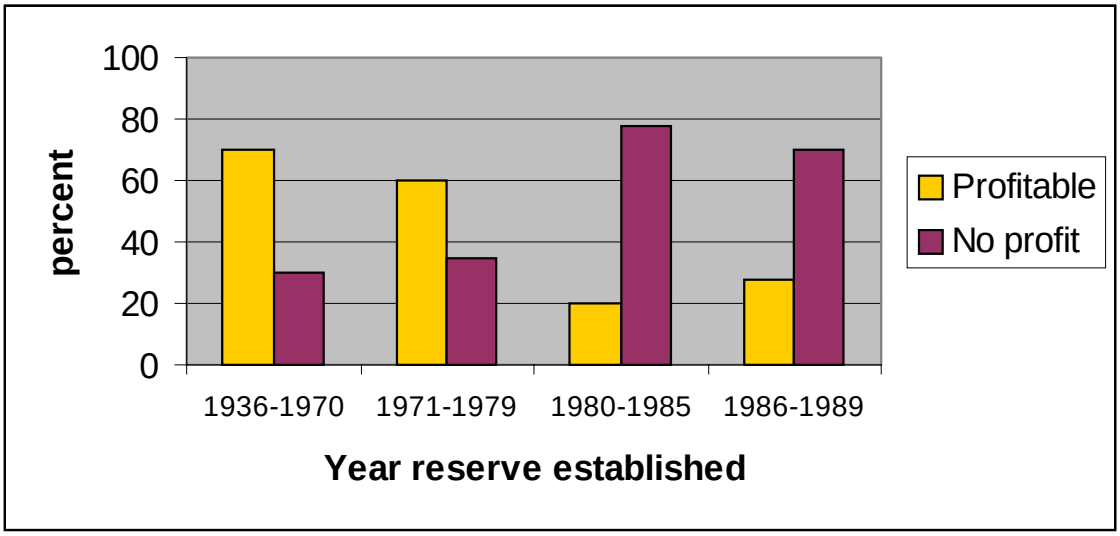


Figure 23-5. Value of Land and Infrastructure of Private Reserves

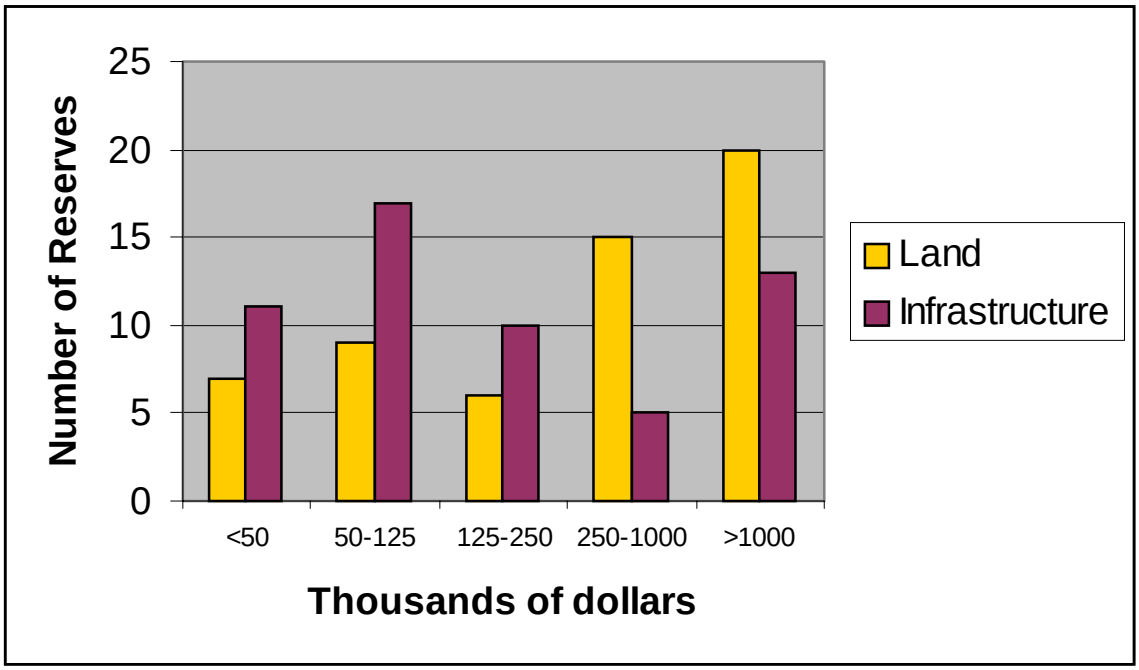


Figure 23-6. Who Owns Private Reserves

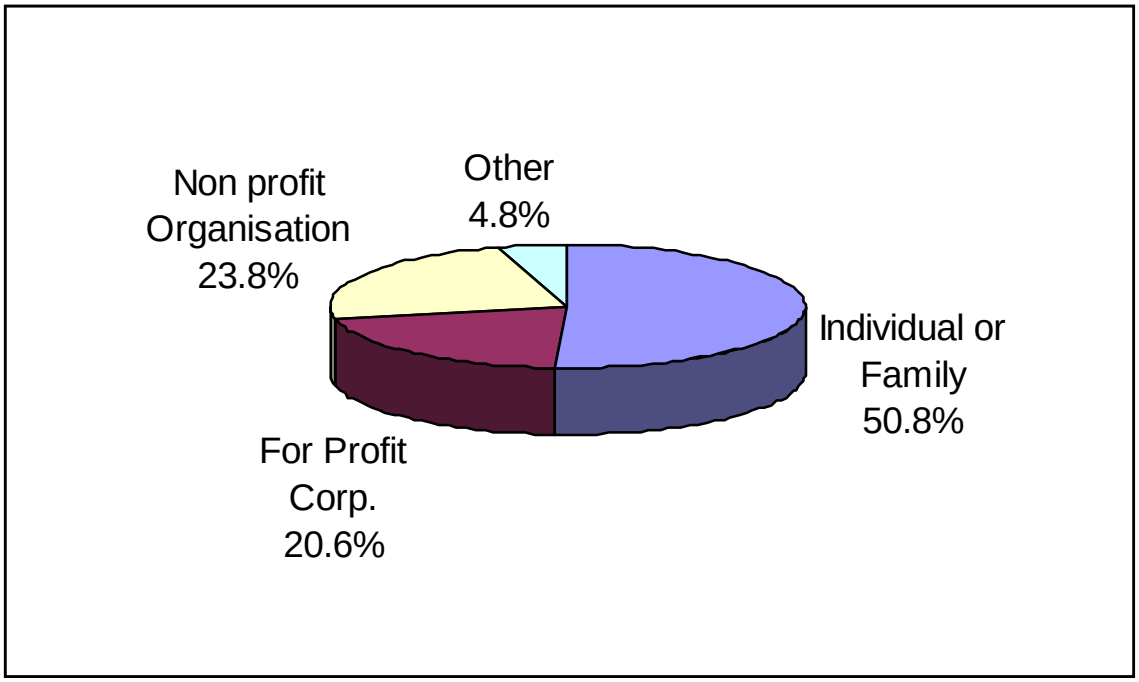


Figure 23-7. Foreign and National Ownership of Private Reserves in Africa

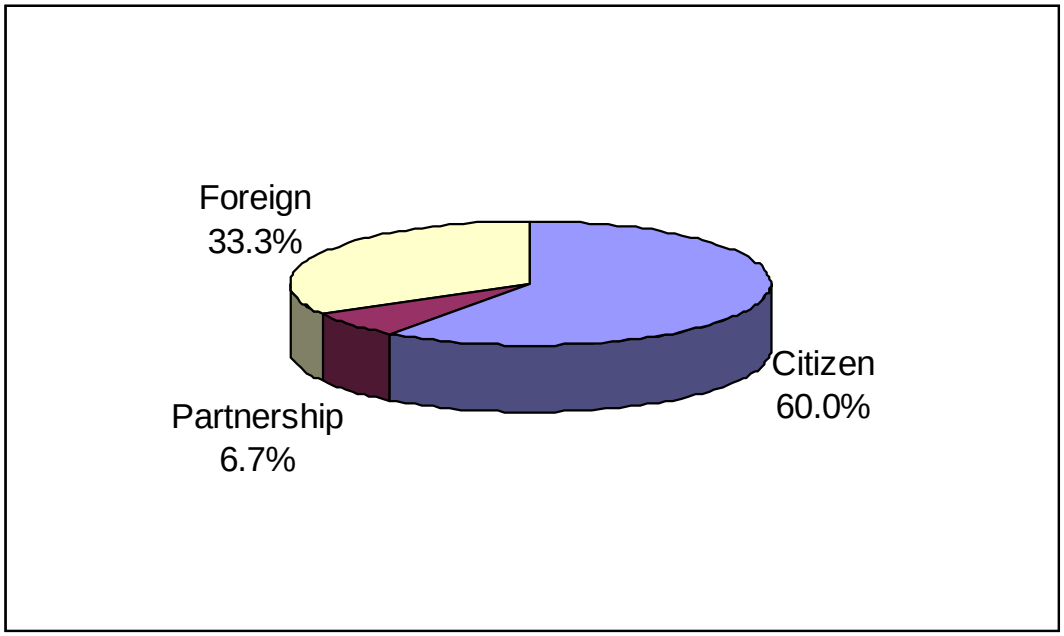
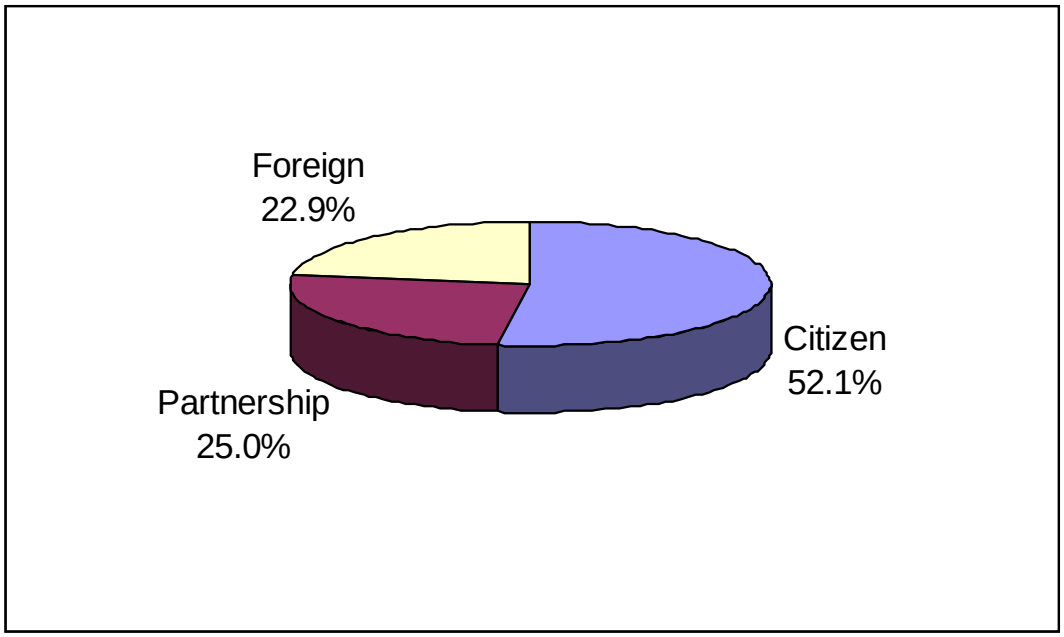


Figure 23-8. Foreign and National Ownership of Private Reserves in Latin America



Annex 23—A List of Private Reserves Surveyed

Name of Reserve	*Country*	*Response*
Green Island	Antigua	1
El Rincón	Argentina	2
Chaa Creek	Belize	1
Chan Chich Lodge at Gallon Jug	Belize	1
Community Baboon Sanctuary	Belize	1
Indio Perdido Jungle Lodge	Belize	2
Parrots Wood Biological Station	Belize	1
Río Bravo Conservation Area	Belize	2
Shipstern Nature Reserve	Belize	1
Estancia Espíritu	Bolivia	3
Estação Biologica de Caratinga	Brazil	1
Estação Biologica de Santa Lucia	Brazil	4
Estancia Caiman Reserve	Brazil	1
Praia do Forte	Brazil	2
Santuario de Vida Silvestre Fazenda Vaga-Fogo	Brazil	1
Reserva Biológica Carpanta	Colombia	1
Reserva Natural La Planada	Colombia	1
Reserva Natural Merenberg	Colombia	1
Reserva Natural del Alto Quindio, Acaime	Colombia	1
Albergue de Montaña Volcán Rincón de la Vieja	Costa Rica	1
Desarrollo Turístico Los Inocentes	Costa Rica	1
El Gavilán and Oro Verde	Costa Rica	1
Estación Biológica La Selva	Costa Rica	1
Genesis II Cloud Forest Reserve	Costa Rica	1
Hacienda Baru Private Nature Reserve	Costa Rica	1
Hacienda La Pacífica	Costa Rica	1
Las Ventanas de Osa Wildlife Refuge	Costa Rica	1
Magil Forest Lodge	Costa Rica	1
Marenco Biological Station	Costa Rica	1
Rara Avis	Costa Rica	1
Reserva Biológica Bosque Nebuloso Monteverde	Costa Rica	1
Selva Verde	Costa Rica	1
Tiskita Lodge Biological Reserve	Costa Rica	1
Tortuga Lodge	Costa Rica	2
Tortuguero Sea Turtle Beach	Costa Rica	1
Papillote Wilderness Retreat & Nature Sanctuary	Dominica	1
Bosque Mazan	Ecuador	1

Name of Reserve	*Country*	*Response*
Bosque Protector La Perla	Ecuador	1
Bosque Protector Pasochoa	Ecuador	1
Bosques de Mindo	Ecuador	2
Centro Científico Río Palenque	Ecuador	1
Estación Científica Jauneche	Ecuador	2
Estación Científica Río Guajalit	Ecuador	2
Fundación Maquipucuna	Ecuador	1
Jatun Sacha Biological Station	Ecuador	1
La Selva Lodge	Ecuador	2
Tinalandia Lodge	Ecuador	2
Finca el Faro	Guatemala	1
Reserva Natural de Sierra de las Minas	Guatemala	2
Cusuco (National Park)	Guatemala	4
Reserva Biológica Monte Uyuca	Guatemala	1
Colcheccio Ranch	Kenya	2
Ol Pejeta Ranch-Sweetwater Rhino Sanctuary	Kenya	1
Oserian Flowers	Kenya	2
Solio Wildlife Conservation Area	Kenya	1
Taita Hills Wildlife Sanctuary	Kenya	1
Wgare Sergoit Rhino Sanctuary	Kenya	1
Analabe Reserve	Madagascar	1
Barenty Reserve	Madagascar	1
Estación Biológica Pronatura Huitepec	Mexico	1
Albergue Lodge Cuzco Amazonico	Peru	1
Amazon Camp	Peru	2
Explorama Inn	Peru	2
Tambo Preserve	Peru	2
Yarapa Reserve	Peru	1
Zona Reservada de Tambopata—Explorer's Inn	Peru	1
Bonwa Phala Game Lodge	South Africa	1
Casa do Sol	South Africa	2
Cybele Forest Lodge	South Africa	2
Greater Kuduland Safaris	South Africa	1
Hoekfontein Game Ranch	South Africa	1
Inyati	South Africa	2
Londolozi Game Reserve	South Africa	2
Mabula Reserve Game Lodge	South Africa	2
Mala Mala Game Reserve	South Africa	2

Name of Reserve	*Country*	*Response*
Motswari L M'bali Game Lodges	South Africa	1
Sabi Sabi Private Game Reserve	South Africa	1
Tanda Tula Lodge-Timbavati Private Nat. Reserve	South Africa	1
Thorny Bush	South Africa	2
Tshukudu Game Lodge	South Africa	1
Ubizane Game Ranch	South Africa	1
Asa Wright Nature Center	Trinidad	2
Pointe-a-Pierre Wild Fowl Trust	Trinidad	1
Biological Reserve La Cueva del Guano	Venezuela	1
Biological Reserve Monte Cano	Venezuela	1
Biological Reserve Paramo de Piedras Blancas	Venezuela	1
Estación Biológica El Frío	Venezuela	1
Hato El Cedral	Venezuela	2
Hato Las Nieves	Venezuela	2
Hato Masaguaral	Venezuela	2
Hato Pinero	Venezuela	1
Vuelta Larga	Venezuela	1
Imire Game Park	Zimbabwe	5
Iwaba Wildlife Estate	Zimbabwe	1
Lion Park	Zimbabwe	5
Pamuzinda Safari Lodge	Zimbabwe	5

* Response Codes:

1. Responded and included in analysis

2. Did not respond to survey.

3. Responded but not included as it did not allow visitos

4. Responded but not included as it is not private

5. Contacted too late for response; included in this list for the sake of completeness

Annex 23—B Survey Instrument

CONSERVATION INTERNATIONAL

February 10, 1990

Dear Private Reserve Owner,

Private reserves such as yours, are playing a vital role in preserving important natural areas and providing a valuable complement to nationally protected areas. Despite their importance, there has been little systematic attention given to the role of private reserves. Policy makers often do not know where private reserves are located, how they are operated, or how they contribute to natural resource management.

The Yale University School of Forestry and Environmental Studies and Conservation International, a private non-profit organization dedicated to worldwide ecosystem conservation, are jointly sponsoring research to analyze the significance of private reserves which offer nature-based tourism. This

research will evaluate how “ecotourism” is implemented by over 90 private reserves in Latin America and Africa and their impact on conservation and economic development.

Please participate in this study by completing and returning the attached survey in the return envelope by March 15. The survey takes only 20–25 minutes to complete and all participants will receive an analysis of the results including common initiatives and trends that are not discussed elsewhere. (Please be assured that while general information such as name and location of your reserve will be used in the report, all sensitive information regarding visitors and finances will be reported only as aggregate trends). This information will be shared with potential tourists, conservation groups, and government policy makers.

Once you return the survey you will receive one year’s free membership to Conservation International to keep you informed on global conservation trends.

Thank you very much for responding to this questionnaire. We are certain that you will find the results both interesting and useful. Best wishes for your continued success,

Claudia Alderman
Principal Researcher
Yale University

Karen Ziffer
Microbusiness and Ecotourism Coordinator
Conservation International

1015 18th Street, N.W., Suite 1000. Washington, D.C., 20036 Telephone 202 429 5660

Yale University School of Forestry and Environmental Studies and Conservation International

SURVEY OF PRIVATELY OWNED LANDS USED FOR NATURE-BASED TOURISM

Name of the Reserve: _____

Address: _____

_____

_____

_____

Person filling out this questionnaire:

_____ _____
name position

What year was the reserve established? _____

How much land does the reserve own?_____

How much land is managed, but not owned by the reserve?_____

On a scale from 0 to 5, please rate the reasons for the establishment of the reserve:

REASON	Not important					very important
Nature tourism	0	1	2	3	4	5
Preservation of a particular habitat or species	0	1	2	3	4	5
Scientific research	0	1	2	3	4	5
Education	0	1	2	3	4	5
Community development	0	1	2	3	4	5
Conservation ethic	0	1	2	3	4	5
Farming or cattle	0	1	2	3	4	5

REASON	Not important					very important
Forest products extraction	0	1	2	3	4	5
Personal residence	0	1	2	3	4	5
Other (please specify):						
_____	0	1	2	3	4	5
_____	0	1	2	3	4	5

Of the recreational or educational activities offered by the reserve (such as hiking, bird watching, etc.) please list in order of importance the three most popular activities engaged by visitors to the reserve:

1) _____

2) _____

3) _____

What special features of your reserve, such as specific animals or natural environments, do you feel attract visitors the most?

_____
_____
_____
_____

Does the reserve offer:

Guided nature walks	___ YES	___ NO
Interpretative trails	___ YES	___ NO
Slide shows	___ YES	___ NO
Lectures	___ YES	___ NO
Educational displays	___ YES	___ NO
Tours to school groups	___ YES	___ NO
Tours to community groups	___ YES	___ NO

Does your reserve provide the following services?

Meals	___ YES	___ NO
Naturalist guides	___ YES	___ NO
Horse rental	___ YES	___ NO
Gift shop	___ YES	___ NO
Museum	___ YES	___ NO
Library	___ YES	___ NO

Is lodging available on the premises? ____ YES ____ NO

If yes, how many people can you accommodate? _____

If yes, types of lodging available:

Private rooms with shower	_____ # of rooms
Private rooms with shared facilities	_____ # of rooms
Cabins	_____ # of cabins
Collective dormitory	_____ # of beds

Camping facilities _____ # of spaces

Other (please specify) _____

Number of visitors to the reserve:

a) For the day only	1980	1985	1987	1988	1989
b) Overnight	1980	1985	1987	1988	1989

What do you expect your average yearly growth rate in number of visitors to be over the next five years? _____%

In 1989, what percentage of the visitors to the reserve were foreigners? _____ %

What is the average length of stay per visitor? _____ days

What is the average total expense per visitor per day?

Is there an admission fee for "day only" visitors? ____ YES ____ NO

If yes, how much is the fee? fee for nationals fee for foreigners

Which months constitute the "high" tourist season? _____

How many permanent employees does the reserve have? _____

How many occasional workers does the reserve employ?

_____ _____

employees high season # employees low season

How many of your permanent employees are originally from the region adjacent to the reserve? _____

Is the reserve owned by: (please choose one)

____ Individual or Family

____ For Profit Corporation

____ Non-Profit Group

____ Other (please specify) _____

What is the nationality of the owners of the reserve? (please choose one)

____ Citizen of the country where the reserve is located

____ Foreigner or a foreign group exclusively

____ Local/foreign partnership

____ Other (please specify) _____

On a scale from zero to five, 0 being "of no importance" and 5 being "critically important", please rate how important tourist revenues are to the profitability of the reserve (please circle the level of importance):

not important very important

0 1 2 3 4 5

In 1989, what percentage of the <u>operating</u> expenses of the reserve came from the following sources?

Tourism revenues _____%

Forest products extraction _____%

Cattle or agriculture _____%

Endowment	_____%
Grants from the government	_____%
Grants from private sources	_____%
Loans from the government	_____%
Loans from the private sector	_____%
Investors	_____%
Membership dues	_____%
Other (please specify):	_____%
TOTAL	100 %

In the last year for which you have complete figures, did the reserve's revenues exceed expenses? _____YES _____ NO

If yes, what percentage of the surplus was:

Re-invested into the reserve	_____%
Returned as dividends/profits to investors	_____%
Other (please specify):	_____%
TOTAL	100 %

If the reserve did not make a profit last year, when do you expect it to be profitable?

Does the reserve have any formal agreements with government institutions or non-governmental organizations to manage the reserve according to set guidelines?

_____ YES _____ NO

If yes, please describe briefly: _____
_____
_____
_____
_____

Does the reserve have a formal land or resource management plan to cover any of the following areas:

Restore degraded habitats	____ YES	____ NO
Manage endangered species	____ YES	____ NO
Exclude visitors from fragile areas	____ YES	____ NO
Evaluate impact of tourists on ecosystem	____ YES	____ NO
Set limits on the numbers of visitors	____ YES	____ NO
Program for resource extraction	____ YES	____ NO
Other (please specify):		
_____	____ YES	____ NO

Does the reserve allow:	Hunting	_____ YES	____ NO
	Fishing	_____ YES	____ NO

Does the reserve have a Biologist/Scientist on the staff? ____YES _____ NO

If yes, how many? _____

Are there any unique features of the design, management, or community relations of your reserve that you want to bring to the attention of this research?

_____
_____
_____
_____
_____

Does your reserve publish a brochure? _____YES _____ NO

If yes, kindly include a brochure with this questionnaire.

THANK YOU VERY MUCH FOR YOUR HELP COMPLETING THIS SURVEY.

WE WILL BE SENDING YOU A COPY OF THE STUDY'S RESULTS IN MAY 1990.

Please indicate the approximate current value for the reserve's land and facilities. (Check the range that applies in U.S dollars)

Dollar amount category		LAND	INFRASTRUCTURE
Under	$50,000	____	____
$50,001 -	$125,000	____	____
$125,001	$250,000	____	____
$250,001	$1 million	____	____
More than	$1 million	____	____

Has the reserve recovered its initial financial investment? (including land value and infrastructure). ____YES ____ NO

How many years did it take, or will it take, to recover the investment? _____ years

Were any of the following government-sponsored incentives important to the decision to establish the reserve?

Favorable Legislation	____ YES	____ NO	____ Not available
Tax incentives	____ YES	____ NO	____ Not available
Loans	____ YES	____ NO	____ Not available
Government advising	____ YES	____ NO	____ Not available

Other (please specify) _____

Have you had any advisory or financial support from the following agencies? (please check all those which apply)

AGENCY	ADVISORY	FINANCIAL
Government agency in your country		
Local non-governmental organizations		
Foreign non-governmental organizations		
Other (please specify)		

If you answered yes to any of the above problems, what measures have you taken to resolve them, and to what degree have you been successful?

What percentage of the reserve's total land is covered by the following ecosystem types?

Ecosystem

Tropical Rain Forest _____ % primary _____ % secondary

Tropical Seasonal Rain Forest _____ % primary _____ % secondary

Cloud Forest _____ % primary _____ % secondary

Dry/Scrub Forest _____ % primary _____ % secondary

Puna _____ %

Savanna _____ %

Coastal Ecosystem _____ %

Wetlands _____ %

Mangroves _____ %

Paramo _____ %

Farmland _____ %

Other: _____ _____ %

Are there any rare or endangered plant or animal species which the reserve makes an active effort to protect? ____YES _____ NO

If yes, please list which species:

_____
_____
_____

Has the reserve made any agreements with the government or private institutions which restrict or limit the development of its land in the future? (Such as commitments to maintain the land as a natural reserve for a set amount of time in exchange for lower taxes)

_____ YES _____ NO

If yes, please explain: _____
_____
_____
_____
_____
_____

Does the reserve border any public or private parks or reserves? _____ YES _____ NO

If the answer is yes:

Please give the names of the bordering parks or reserves:

_____
_____

What percentage of the tourism activities of your visitors takes place in the adjacent protected areas? _____ %

How important are the adjacent protected areas in attracting tourists to your reserve?

_____ Very important (visits to the reserve would decline without them)

_____ Of moderate importance

_____ Not important

Does the reserve provide any services to the neighboring park? ____ YES ___ NO

If yes, please explain briefly: _____
_____
_____
_____
_____

On a scale from 0 to 5 please rate if any of the following have posed, or currently pose, a problem for the reserve:

PROBLEM	no problem					severe problem
Poaching	0	1	2	3	4	5
Squatters	0	1	2	3	4	5
Tree felling/ firewood collecting	0	1	2	3	4	5
Community opposition to tourism	0	1	2	3	4	5
Community opposition to loss of access to the reserve's resources	0	1	2	3	4	5
Political unrest in the country	0	1	2	3	4	5
Budget deficiencies	0	1	2	3	4	5
Lack of cooperation from government entities	0	1	2	3	4	5
Other (please specify):						
_____	0	1	2	3	4	5

Bibliography

Ashton, R. E. 1989. "Defining the Ecotourist Based on Site Needs." Unpublished paper prepared for the 1989 International Workshop on Ecotourism and the Yucatan and Maya Region.

Bacon, P. R. 1987. "Use of Wetlands for Tourism in the Insular Caribbean." *Annals of Tourism Research* 14:38–57.

Breslin, P., and M. Chapin. 1984. "Conservation Kuna Style." *Grassroot Development* 8(2):26–35.

Boo, Elizabeth. 1990. *Ecotourism: The Potentials and Pitfalls*. Washington, DC: World Wildlife Fund.

Brooke, J. 1989. "Growth of Tourism Is Benefiting Fragile Environments." *The New York Times* August 8.

Budowski, Gerardo. 1976. "Tourism and Environmental Conservation: Conflict, Coexistence, or Symbiosis?" *Environmental Conservation* 3:27–31.

Ceballos-Lascurain, Hector. 1988. "The Future of Ecotourism." *Mexico Journal* January 17:13–14.

Chow, W. T. 1980. "Integrating Tourism with Rural Development." *Annals of Tourism Research* 7(4):584–607.

Clark, J. R. 1989. "Caribbean Opportunities for Tourism and Coastal Parks." Unpublished paper prepared for the 1989 International Workshop on Ecotourism and the Yucatan and Maya Region.

Cultural Survival Quarterly. 1982. Issue entitled "The Tourist Trap: Who is Getting Caught?" Vol 6(3), Summer.

de Groot, R. S. 1983. "Tourism and Conservation in the Galapagos Islands." *Biological Conservation* 26:291–300.

de Kadt, E. 1976. *Tourism: Passport to Development?* New York: Oxford University Press.

Dearden, P., and C. Hall. 1983. "Non-consumptive Recreation Pressures and the Case of the Vancouver Island Marmot." *Environmental Conservation* 10(1):63–66.

Drake, S. F. 1989." Development of a Local Participation Plan for Ecotourism Projects." Unpublished paper prepared for the

International Workshop on Ecotourism and the Yucatan and Maya Region.

Dunkel, D. R. 1984. "Tourism and the Environment: A Review of the Literature and Issues." *Environmental Sociology* 37, Spring.

Edington J. M., and M. A. Edington. 1986. *Ecology, Recreation and Tourism*. Cambridge: Cambridge University Press.

Englebert, V. 1984. “Guardian of the Cloud Forest.” *International Wildlife* July/August.

Epperson, A. F. 1986. “Recreation and Leisure for Profit.” In *A. F. Epperson, ed., Private and Commercial Recreation*. State College: Venture Publishing.

Farrell, B. H., and R. W. McLellan. 1987. “Tourism and the Physical Environment Research.” *Annals of Tourism Research* 14:1–16.

Garret, Wilbur E. 1989. “La Ruta Maya.” *National Geographic* Vol. 176, No. 4.

Getz, D. 1983. “Capacity to Absorb Tourism: Concepts and Implications for Strategic Planning.” *Annals of Tourism Research* 10:239–263.

Harrington, T. 1989. “Tourism Damages Amazon Region.” *The Christian Science Monitor* June 6.

Hartup, B. K. 1989. “An Alternative Conservation Model for Tropical Areas: The Community Baboon Sanctuary in Belize.” Unpublished master’s thesis, University of Wisconsin—Madison.

Healy, R. G. 1988. “Economic Considerations in Nature Oriented Tourism.” FPEI Working Paper No. 39. Southeastern Center for Forest Economics Research, Research Triangle Park, NC.

Heyman, Art. 1988. “Natural Tourism Attractions: It Pays to Protect Them.” Unpublished paper. Organization of American States, Washington, D.C.

Horwich, R. H. 1988. “The Geographic Distribution of the Black Howler Monkey (*Alouatta pigra*) In Central America and Efforts to Conserve it in Belize.” In A. Strada, R. Lopez-Wilchis, and R. Coates-Estrada, eds., *Primatología en Mexico: Comportamiento, Ecología, Aprovechamiento y Conservación de Primates*. Mexico: Universidad Autónoma Metro-politana.

Horwich, R. H., and Jonathan Lyon. 1988. “Experimental Technique for the Conservation of Private Lands.” *Journal of Medical Primatology* 17:169–176.

Horwich, R. H. 1990. “How to Develop a Community Sanctuary—An Experimental Approach to the Conservation of Private Lands.” *Oryx* 24:95–102.

Houseal, Bryan, and others. 1985. “Indigenous Peoples and Protected Areas in Central America.” *Cultural Survival Quarterly* 9(1):10–20.

Ingram, C. D., and P. B. Durst. 1987. “Nature Oriented Travel to Developing Countries.” FPEI Working Paper No. 28. Southeastern Center for Forest Economics Research, Research Triangle Park, NC.

Inskeep, E. 1987. “Environmental Planning for Tourism.” *Annals of Tourism Research* 14:38–57.

Keenan, J. 1989. “Ecotourism.” *Mexico Journal* May 22.

Kutoy, Kurt. 1989. “Ecotourism: Making Peach with Nature and Humanity.” In *Buzzworm: The Environmental Journal*.

Laarman, Jan G., and Patrick B. Durst. 1987a. “Nature Travel in the Tropics. Is this Growing Enterprise a Trend in Wildlands Management?” *Journal of Forestry* Vol. 85, No. 5.

————. 1987b. “Tropical Tourism as Economic Activity: OTS in Costa Rica.” FPEI Working Paper No. 33. Southeastern Center for Forest Economics Research, Research Triangle Park, NC.

Lancaster, J. 1989. “Intrusions Threaten Refuges’s Wildlife: Human Activity Endangers 60 Percent of Sanctuaries, GAO Says.” *The Washington Post*.

Lindberg, Kreg. 1989. “Nature Tourism as an Agent for Sustainable Development.” Unpublished report. World Resources Institute, Washington, D.C.

Liu, J., P. Sheldon, and T. Var. 1987. “Resident Perception of the Environmental

Impacts of Tourism.” *Annals of Tourism Research* 14:17–37.

McNeely, J. A., and J. W. Thorsell. 1988. “Jungles, Mountains, and Islands. How Tourism Can Help Conserve the Natural Heritage.” in L. D’Amore and J. Jafari, “Tourism a Vital Force for Peace”. First Global Conference, Montreal P. Q, Canada.

Moline, Sergio. 1982. *Turismo y Ecología*. Mexico City: Editorial Trillas.

Moore, A. W. 1981. “Tour Guides As a Factor in National Park Management.” *Parks* 6(1):12–15.

Oliver-Smith A., F. Jurdao Arrones, and J. Lison Arcal. 1989. “Tourist Development and the Struggle for Local Resource Control.” *Human Organization* 48(4):345–350.

Organisation for Economic Co-operation and Development. 1980. *The Impact of Tourism in the Environment*. Paris: Organization for Economic Cooperation and Development.

Pelham-Burn, H. 1975. “Packaging Paradise: The Environmental Costs of International Tourism.” *Sierra Club Bulletin* 60(5):25–28, May.

Pigram, J. J. 1980. “Environmental Implications of Tourism Development.” *Annals of Tourism Research* 7(4):554–583.

Ponce Slazar, A., and R. M. Hubber, Jr. 1982. “Ecuador’s Active Conservation Program.” *Parks* 6(4):7–10.

Sayer, J. A. 1981. “Tourism or Conservation in the National Parks of Benin.” *Parks* 5(4):13–15.

Smardon, R. C. 1989. “Ecotourism and Landscape Planning, Design and Management.” Unpublished paper prepared for the International Workshop on Ecotourism and the Yucatan and Maya Region.

Southworth, A. D. 1989. “The Environmental Tourist: A New Plan to Protect Latin America Lands.” *The Environmental Forum* July—August.

Swift, Byron. 1985. “Los metodos legales para proteger las reservas privadas.” Unpublished memo.

Swift, Byron. Undated. “Ecological Tourism: An Economic Incentive for Preserving Biodiversity.” Unpublished manuscript.

Takahashi, L. 1987. “Birding Tourism in the Third World: a Look at the Industry, the Destinations, and the Impacts.” Master’s Project. School of Forestry and Environmental Studies, Duke University, Durham, NC.

Western, D., and Wesley Henry. 1979. “Economics and Conservation in Third World National Parks.” *BioScience* Vol. 29, No. 7.

Williams, A. M., and Gareth Shaw. 1988. *Tourism and Economic Development: Western European Experiences*. New York: Belhaven Press.

Wilson, M. A. 1987a. “Nature Oriented Tourism in Ecuador: Assessment of the Industry Structure and Development Needs.” FPEI Working Paper No. 20. Southeastern Center for Forest Economics Research, Research Triangle Park, NC.

Wilson, M. A. 1987b. “Nature Tourism and Enterprise Development in Ecuador.” FPEI Working Paper No. 27. Southeastern Center for Forest Economics Research, Research Triangle Park, NC.

Ziffer, K. 1989. “Ecotourism: the Uneasy Alliance.” Working paper for Conservation International and Ernst and Young, Washington, D.C.

24 Parks Tourism in Nepal: Reconciling the Social and Economic Opportunities with the Ecological and Cultural Threats

Michael P. Wells

A SIGNIFICANT PROPORTION of Nepal’s spectacular landscape, culture, and biological diversity is legally protected within an impressive network of parks and reserves.

The following individuals generously shared time and information with the author during the preparation of this study: Alton Byers, Gabriel Campbell, Broughton Coburn, Chandra Gurung, Harka Gurung, Mingma Norbu Sherpa, and Stan Stevens. Earlier drafts were reviewed by John Dixon, Linda Lowenstein, Donal O’Leary, and Michael Wright. The Environment Department, World Bank, provided financial support for the author to present this material at the World Parks Congress in Caracas.

Since the first national park was established in 1973, the contribution of these protected areas to the national economy has increased rapidly—mainly by attracting large numbers of foreign visitors. Each year many of Nepal’s tourists visit at least one protected area. World-renowned national parks such as Sagarmatha (Everest), Langtang, and Royal Chitwan, as well as the Annapurna Conservation Area, have attracted increasing numbers of visitors from many parts of the world. Tourism has rapidly become one of Nepal’s most important development sectors as well as the country’s largest and most reliable source of foreign exchange earnings.

In Nepal, apparently, is the economically-minded conservationist's dream—a well-established network of protected areas which is generating substantial economic benefits for one of the poorest countries in the world. Can this be a case where expenditures to nurture Nepal's protected areas and sustain their numbers of foreign visitors would clearly be an economically-efficient use of resources?

Unfortunately, there is a growing consensus that Nepal's protected areas, despite their high economic value, are entering a stage of crisis. Several of the most important national parks are experiencing serious problems as a result of (a) inadequate resources for park management, (b) poor relations between protected areas and local communities, and (c) environmental degradation in and around parks related to tourism. Although social and institutional factors have contributed to these problems, conflicting economic interests appear to be critical.

Powerful arguments for conservation can be developed when the economic benefits from protected areas exceed the costs (Dixon and Sherman 1990; McNeely 1988), as appears to be the case in Nepal. However, this does not guarantee the survival of protected area networks. Using a variety of qualitative and quantitative approaches, this chapter will discuss the economic costs and benefits from protected areas in Nepal at national and local levels, with the discussion of benefits concentrating mainly on tourism. Particular attention will be given to economic factors contributing to the unexpected situation outlined above—that an apparently clear economic argument justifying conservation and careful management of Nepal's protected areas has so far been ineffective in assuring their preservation.

All Nepali rupee (NRe) amounts in this chapter have been converted into U.S. dollar ($) amounts at prevailing exchange rates averaged for the year in question.

Economic Benefits from Tourism in Protected Areas

Tourism on a large scale is relatively new in Nepal but extremely important. During the 1966–89 period, recorded annual arrivals increased from 6,000 to 240,000. Virtually all tourist travel taking place outside the Kathmandu Valley is limited to a few destinations—mainly protected areas—with most other parts of the country closed to foreigners. In 1987, about 26,000 tourists visited Royal Chitwan National Park in the Terai, drawn by its spectacular wildlife viewing opportunities. All other travel outside the Kathmandu Valley requires a trekking permit. Of the 61,273 permits issued in 1988, 62 percent were for the Annapurna—Manang—Jomson region, which overlaps considerably with the Annapurna Conservation Area; 18 percent were for the Khumbu, corresponding to Sagarmatha National Park; and 14 percent were for the Langtang—Helambu region, about half of which comprises Langtang National Park (Banskota and others 1990; ERL 1989; Gurung 1990; Ministry of Forests and Soil Conservation 1988; Ministry of Tourism 1988; Touche Ross and others 1990). The importance of the major parks as tourist destinations can thus hardly be overstated.

Not surprisingly, the economic impacts of tourism in rural areas have been highly concentrated in the few destinations open to tourists. As the case studies will describe, local people in and around the mountain parks have received substantial income and employment benefits from tourism, while the local benefits from tourism in the lowland Terai parks have been minimal.

Official foreign exchange receipts from all tourism to Nepal increased from $78,000 in 1961–62 to $76 million in 1987–88 (Nepal Rastra Bank 1989). These figures are thought to be low, and unofficial estimates suggest that $113 million might be a more realistic figure for 1987–88. More than 60 percent of these earnings are thought to leak out of the economy to finance import purchases for the tourism sector (Touche Ross and others 1990). Gross earnings from tourism have contributed between 10 and 20 percent to foreign exchange income since 1976, and tourism has become the country's leading foreign exchange earner (although official development assistance remains the largest single source). About 11,000 people were directly employed in the tourism sector in 1988 (Nepal Rastra Bank 1989).

Expenditures by Tourists in Protected Areas

Direct expenditures on food, accommodation, travel, and employment are the major economic contribution of tourism in Nepal. Although no serious attempt has yet been made to estimate the economic value of the benefits from protected area tourism in Nepal, the portion of total tourist expenditures attributable to the country's protected area network can be very roughly estimated (Table 24–1). Note that two-thirds of the expenditures leak out from the system because they are used to import goods and services from other countries, mainly India (Table 24–1, line 6). The $8.9

million estimate for tourist expenditures attributable to the protected area network (Table 24–1, line 7) is probably very conservative because it excludes tourist expenditures on international air travel where, for example, Royal Nepal Airline Corporation earned $31 million (NRs 674 million) carrying passengers in 1986–87 (Nepal Rastra Bank 1989).

There is an important distinction to be made between tourism's economic *impact* and its economic *value*. For example, the foreign visitor to developing country parks usually pays a certain amount for travel, accommodation, park entry, and so on, which is less—in some cases, considerably less—than the maximum amount that an individual might have been prepared to pay. This does not mean that the tourism value of a protected area with low access and entry costs is any less than an equivalent park where the costs of visiting are higher; it simply means that a higher proportion of the economic benefits are being retained by visitors and that a correspondingly lower proportion are captured in the host country. While actual expenditures by tourists—together with the increased employment and foreign exchange earnings which these expenditures can lead to—reflect their economic *impact*, the economic *value* of tourism is likely to be much higher, especially in the case of relatively low-cost protected area tourism.

The difference between what an individual actually pays and the maximum amount he or she would be prepared to pay is known as the *consumer's surplus*. To determine the true economic value from protected area tourism, it is necessary to measure the aggregate consumer's surplus. Surrogate market approaches, such as travel-cost or contingent valuation methods, can be used to develop a demand curve for a protected area and thereby estimate its value (Dixon and Sherman 1990). Although the use of these techniques in developing countries has so far been very limited, Tobias and Mendelsohn (1991) have used the travel-cost approach to estimate the tourism value of a protected rain forest in Costa Rica.

Government Revenues from Tourism in Protected Areas

The government of Nepal appropriates some of the value of the protected areas directly by collecting fees from visitors. At the most highly frequented parks, receipts from entry fees were about $725,000 in 1988 (Table 24–2), and from trekking permit fees for these parks and their surrounding areas totalled about $209,000. The innovative Annapurna Conservation Area Project (described below) has been authorized by special legislation both to charge higher fees to visitors and to retain the revenues for the conservation project. The government also collects mountaineering fees and trekking peak fees, totaling about $300,000 annually. Conceptually, these revenues are only attributable to the parks in cases where the respective peaks are located inside protected areas.

Apart from the Annapurna receipts, all of these revenues are paid into general Treasury funds. None has been made available either (a) for local communities adversely affected by parks or (b) to supplement the Department of National Parks and Wildlife Conservation's budget for protected area management. The Department does receive income directly from concessions granted to tourist lodges in some of the mountain parks, as well as from several lodges and camps in the Royal Chitwan National Park, but no data were available on the amounts involved.

The direct charges and fees attributable to the protected areas (entry fees and trekking permit fees) thus generate about $1 million annually (Table 24–2). The fees for park entry (up to $10) and trekking permits (up to $5 per week) have been so low as to be inconsequential to the vast majority of visitors. This almost certainly represents a small proportion of the value of the protected areas to tourists, and a strong case could be made for increasing these fees substantially. By providing large numbers of visitors with low-cost travel opportunities, Nepal has adopted an approach that contrasts sharply with neighboring Bhutan. Visitor numbers are strictly controlled in Bhutan, with daily visa fees set relatively high. The Bhutanese government therefore captures much higher direct fees per tourist, and the environmental and cultural impacts of tourism are correspondingly limited. Gurung (1990) has suggested that trekking or park entry fees in Nepal could be set at different levels in order to spread tourists more evenly over the country—with relatively high fees for over-crowded sites and low fees for rarely-visited sites.

The government of Nepal appears reluctant to increase direct fees substantially, perhaps not wishing to risk deterring some visitors, thereby reducing the total number of tourists. Maximizing tourist numbers may not be the best strategy, however. Depending on the demand for tourism, total revenues may in fact be maximized by reducing tourist numbers and increasing their per capita expenditures (ERL 1989; Touche Ross and others 1990). A survey-based research study to estimate

a demand curve for Nepal's parks-based tourism could either justify or help to eliminate fears of losing tourist revenues through higher charges.

The Costs of Managing Protected Areas

What resources have been made available to manage these valuable income-generating natural assets? From 1982/83 to 1987/88, the total budget of the Department of National Parks and Wildlife Conservation increased about $3.8 million—from NRs 35 million to NRs 84 million—of which 76 percent went to the Royal Nepal Army for law enforcement (Table 24–3). Adjusting for price changes, this amounts to a real increase of about 50 percent over five years.

This apparently strong upward trend does not stand up to closer scrutiny, however. Of the total 1982/83–1987/88 budget increase of NRs 51 million, more than NRs 48 million went directly to the army. The remaining budget fell in real terms by 72 percent to about NRs 20 million (less than $1 million), only a quarter of which was used for national park management.

To give some perspective to these figures, the total Department budget in the late 1980s works out to about $0.17 per capita (when Nepal's population was about 18 million). Removing the army costs leaves about $0.05. This can be compared to per capita government expenditures of $3.61 on defense and $3.04 on education.

The data reviewed so far suggest that—at a national level—the economic benefits from parks-related tourism alone are significantly greater than the direct costs incurred by the government in maintaining the protected area network. Two problems are readily apparent, however. First, the proportion of the total economic value of protected area tourism captured by Nepal—although still unquantified—appears to be extremely small, suggesting that even greater economic benefits are being unnecessarily foregone. Second, the protected area network is widely reported to be deteriorating, suggesting that the government should substantially increase its expenditures on maintaining the parks—a step with apparently ample economic justification, since a fall in visitor numbers based on perceptions of decline in the parks would be economically disastrous to Nepal.

Local People and Protected Areas

Estimates of the overall economic costs and benefits of a protected area can provide useful information at a national level. But to understand some of the problems facing Nepal's parks, it is necessary to look at some of the economic costs and benefits that accrue locally—in the communities that are directly affected by the establishment of protected areas. This section considers some specific examples.

Costs borne by local people

Expenditures from the national budget for protected area management represent direct costs. While these direct costs are usually borne at a national level, sometimes with international support, other costs—indirect costs and opportunity costs—tend to be borne locally by communities in and around protected area boundaries (Wells 1992). Indirect costs include the economic damage to local communities which are attributable to the existence of the protected areas. In the low-land Terai, for example, wildlife depredations frequently lead to injuries, fatalities, and crop damage near parks. In Royal Chitwan National Park, large mammal populations dramatically increased as a result of protection by the Royal

Nepal Army. Partly as a consequence, villagers living around the park have suffered (a) injury and loss of life caused by bears, tigers, and rhinoceroses; (b) losses of livestock to tigers and leopards; and (c) crop destruction by rhinoceroses. No direct compensation has ever been paid to the villagers.

The opportunity costs of a protected area are the benefits lost when an area is protected. They include foregone output, as well as the benefits which might have been gained from conversion to an alternative use (Dixon and Sherman 1990). In the case of Nepal, foregone use by local communities for agriculture, hunting, forest products collection, and livestock grazing may constitute the most significant protected area opportunity costs. However, even if the parks were opened to such activities, the absence of regulatory mechanisms would probably ensure that these benefits would only be available on a short-term basis, to be rapidly followed by resource depletion.

No attempt has yet been made to estimate the opportunity costs of Nepal's protected areas, but it would be surprising if the tourism value did not exceed the value of alternative uses for the most

popular parks. It is important to note that this economic rationale for maintaining the protected areas is of little consolation to local residents who have been denied access to the protected area resources but receive little—if any—benefit from tourism or any other form of compensation.

Benefits received by local people

Royal Chitwan National Park

Royal Chitwan provided one of the first and most widely-reported examples of local economic benefits from a park. These benefits have to be considered in the context of considerable costs and hardship, however, including the wildlife depredations described above. Following massive and rapid immigration from Nepal's hills into the lowland Terai region, about 260,000 people occupied 320 villages around the national park boundary by 1980. This population has continued to grow rapidly (Mishra 1984). Local communities which preceded the park had used the area to collect fuelwood, graze livestock, and collect tall grasses for use in construction. The forced relocation of several villages from inside the proposed park area generated considerable local hostility and mistrust. Many communities close to the park now suffer an acute lack of fuelwood and grazing land.

To mitigate some of these hardships, more than 100,000 villagers are permitted to collect tall grasses for house construction and thatching from the park once a year. There are few locally-available alternatives to these grasses, and none of the alternatives is affordable to the villagers. The total value of all grass products removed from the park—net of permit costs and an imputed labor cost—generates an estimated $250,000 (NRs 5.5 million) for the local economy (Lehmkuhl, Upreti, and Sharma 1988). Significantly, these grasses have been available for several years only inside the national park, with supplies outside having been exhausted.

Although the benefits to the local economy from the grass program are considerable, the national park imposes considerable costs on local communities. Local people have not been directly involved in tourism, and they appear to have little choice but to continue risking penalties by using the park to graze livestock and collect fuelwood. Without the presence of the army, it seems unlikely that Chitwan would have survived to the present. However, pressure on the park seems likely to increase unless alternative approaches can be found to mitigate the negative local people-park interactions, attributable to the imbalance of local costs and benefits.

Sagarmatha National Park

Sagarmatha National Park includes the highest peak in the world, as well as several other peaks over 6,000 meters. Important cultural and religious sites are located inside the park. The park has about 3,000 Sherpa residents, whose ancestors settled in the area about 400 years ago. The Sherpa settlements were excluded when the park was established in 1976, but lands used for livestock grazing and forests providing timber and fuelwood have since been subject to use restrictions, which have generated considerable local controversy. Local suspicion and resentment towards the park intensified when an army unit took over law enforcement in 1979.

Annual numbers of tourists increased from a handful in the early 1960s to more than 11,000 by 1989, mostly trekkers. In contrast to Chitwan, the local economic benefits from tourism in Sagamartha National Park are considerable, and tourism has been the driving force behind a rapid expansion of the local economy. The Sherpa involvement in tourism mainly consists of employment as guides and porters, and income from providing food, lodging, clothing, equipment, and handicrafts. Namche Bazaar has become the tourist center in the national park. A few dozen lodges have been constructed here, many with private financing from outside the region. New buildings include not only tourist lodges but grocery stores carrying a variety of imported supplies, numerous tea shops, a bank, and a telegraph office—a scene of apparently unbounded small-scale capitalism. A somewhat poor and remote rural society has rapidly become comparatively affluent and cosmopolitan, with considerable economic aspirations. In contrast, the villages away from the most popular trails in the park have changed little.

These local benefits are not being achieved without cost. For several years, international concern has been expressed over reports of (a) extensive deforestation within the park to satisfy the energy demands of tourists, and (b) deteriorating sanitation and rapidly accumulating quantities of litter and pollution left by climbing expeditions and trekkers. Not surprisingly, rapid changes have also taken place within the Sherpa society, which nevertheless appears remarkably cohesive and resilient.

In an attempt to reduce fuelwood consumption, climbing expeditions and agency trekkers in Sagarmartha have been required to be self-sufficient in kerosene since 1982. Collection of fallen timber for fuelwood has been limited to local people, who must obtain a permit from the park authorities before cutting trees for house construction. Implementation of these regulations has not been closely monitored, and the topic remains controversial. As fuelwood prices continue to rise, some reports claim continued high deforestation rates, while others dispute this. There does seem to be reasonable evidence that considerable deforestation has taken place just outside the park boundaries.

Park authorities regard excessive tourism as causing substantial environmental degradation. At present, however, they have little jurisdiction over visitors. Visas and trekking permits are issued from the Department of Immigration; permits for trekking peaks below 6,000 meters are issued by the Nepal Mountaineering Association, and expeditions to higher peaks are authorized by the Ministry of Tourism. World Wildlife Fund-US and the King Mahendra Trust for Nature Conservation are preparing a project to address the pollution issue, based on their promising model in the Annapurna region (described below).

In the Sagarmatha case, the local costs of protected area tourism are apparently being borne by the ecosystem—in terms of deforestation and accumulation of litter—while the human health hazard associated with inappropriate waste disposal has yet to be measured. Local people certainly bear costs as a result of protected area regulations that restrict their use of natural resources protected by the park, but these opportunity costs appear relatively minor in comparison to the economic gains from tourism.

There is a continuing need to reconcile the Sherpas' natural desire for improved living standards with the ability of the Khumbu ecosystems to support continued growth in tourism. This issue requires careful consideration of (a) the risks to the Sherpa economy should visitor numbers decline; (b) whether there are local mechanisms to recognize and respond to levels of environmental degradation before they become critical; and (c) to what extent continued, and virtually uncontrolled, development within the park is compatible with the park's conservation objectives.

Annapurna Conservation Area

The 2,600 square kilometer Annapurna Conservation Area is arguably the most geographically and culturally diverse conservation area in the world. About 40,000 people of diverse ethnic backgrounds inhabit the area, where agriculture and trade have flourished for hundreds of years. Most of the people are poor, rural farmers. Tourism has grown rapidly, and 40,000 foreign trekkers now visit the area each year, leading to a proliferation of small tea shops and lodges along the trails.

The Annapurna region has experienced deteriorating environmental conditions associated with tourism which are broadly similar to—if less severe than—those described at Sagarmatha. Concern over this situation led to a directive from the king in 1985 to improve tourist development in the area while safeguarding the environment. This task was given to the King Mahendra Trust for Nature Conservation—Nepal's preeminent nongovernmental organization.

The Trust's surveys and discussions with local people revealed that establishment of a national park would cause local resentment and hostility similar to that seen elsewhere in Nepal, based on the fear of substantial local costs and hardship, combined with skepticism about possible future local economic benefits. An alternative was clearly needed. Special legislation eventually led to the establishment of the multiple-use Annapurna Conservation Area in 1986, permitting hunting, collection of forest products, the use of visitor fees for local development, and the delegation of management authority to the village level. The objective of the Annapurna Conservation Area Project is to help the inhabitants, particularly the region's poor farmers, maintain control over their environment. High priority has been given to reducing the environmental impact of visiting trekkers and to increasing the local economic benefits from tourism.

Within a relatively short period of time, the Annapurna Conservation Area Project has made considerable progress in (a) motivating a skeptical local population to participate in natural resource management, (b) achieving a significant improvement in environmental conditions, and (c) generating local economic benefits. One of the most tangible economic benefits comes from the visitor entry fee of $8.00 (NRs 200), which generates more than $200,000 annually for the project—a unique arrangement in Nepal and virtually unknown elsewhere except in the case of private reserves.

Local lodge owners have benefitted substantially from the Project. Training programs have helped them upgrade the quality of service, standardize menus and prices, and improve standards of sanitation and waste disposal. Substantial new investment in lodges and tea shops has taken place in the areas where the project has been active. But the significant economic benefits from tourism have not been distributed widely. It is unclear, for example, whether the poor farmers, who comprise the vast majority of the local population, will benefit. On the other hand, it is not evident that these farmers are being harmed by the protected area and the increasing number of tourists.

The people-park equation

The relationship with local people may be the least tractable problem confronting protected areas in Nepal, as well as in many other countries. Efforts to minimize human impacts on parks have historically focused on patrolling by guards and the imposition of penalties to discourage encroachment and illegal activities. Most national parks reflect this emphasis, which clearly places a considerable economic burden on local communities, forcing them to bear the indirect and opportunity costs of the protected areas while receiving few economic benefits.

Recognition is growing that successful management of protected areas ultimately depends on the cooperation and support of local people—by establishing appropriate economic incentives to ensure that local benefits are commensurate with local costs. In Nepal, the experience of the innovative Annapurna Conservation Area Project corresponds with that of similar participatory initiatives in other countries. These results suggest that it is possible for projects to establish local institutions to promote economically viable and ecologically sustainable activities in or around protected areas in certain circumstances. This essentially means establishing systems of local economic incentives which bring local benefits into line with local costs. But such initiatives can be time-consuming, complex, and expensive, usually requiring national and local political support, specific legislation, highly-skilled management, and great sensitivity to local decisionmaking processes (Brandon and Wells 1992; Wells and Brandon 1992).

Conclusion

The argument that economic benefits from protected area tourism should provide an adequate incentive for effective management of Nepal's parks is intuitively attractive. It appears to be incorrect, however, and two further economic arguments appear to be contributing factors. First, probably only a very small proportion of the total economic value of protected area tourism has been realized inside Nepal, despite the obvious economic importance of tourism to the country. As a result, the value of tourism and—by inference—of the parks appears to have been substantially underestimated and a less-than-optimal investment made in park management. Second, many of the problems facing Nepal's protected areas arise from significant imbalances between economic costs and benefits at local levels—in communities close to park boundaries. A failure to correct these local cost-benefit imbalances could lead to a worsening of these problems, eventually making the parks less attractive to tourists. The result could be a reduction in the critically-important employment and foreign exchange generated from tourism.

To begin addressing the first problem, a study of the economics of nature tourism in Nepal should be undertaken to estimate the value of this form of tourism, construct demand curves for protected area tourism, provide guidance for setting direct fees and charges to tourists at optimal levels, and to reevaluate government policies and current levels of expenditure in these areas. The second problem requires emphasis on increasing the benefits to and mitigating the costs borne by people living near parks, an approach pioneered by the Annapurna Conservation Area Project.

Table 24-1. Estimate of Tourist Expenditures in Nepal Attributable to the Protected Area Network (1988)

Visitors to Nepal are required to indicate the purpose of their visit in one of five categories. The total number of people selecting each category in 1988 were as follows (1):

Pleasure	200,775
Trekking & Mountaineering	36,937
Business	12,008
Official	9,781

Other	6,442
Total number of foreign visitors in 1988	265,943

Most visitors to protected areas are in the first wo of these categories ("Pleasure" and "Trekking & Mountaineering"). Their expenditures while in Nepal can be roughly estimated as follows:

	Reason given for visit to Nepal		Total
	Mountaineering and trekking	Pleasure	
1. Principal reason for visit (from above)	36,937	200,775	
2. Estimated number of protected area visits (2)	34,425	18,750	
3. Average length of stay in Nepal (3)	25.8 days	5.9 days	
4. Average per capita daily expenditure on food and beverages, accommodation, local transportation, handicrafts, etc. (3)	NR 536 ($24.30)	NR 1,034 ($46.87)	
5. Gross tourist expenditures attributable to protected areas [lines 2×3×4] (millions)	NR 476.1 ($21.6)	NR 114.4 (5.2)	NR 590.5 ($26.8)
6. Leakages factor for imports of goods and services (4)	66.7%	66.7%	
7. Net tourist expenditure attributable to parks [line 5 less 6] (millions) (5)	NR 158.7 ($7.2)	NR 38.1 ($1.7)	NR 196.8 ($8.9)

Notes and sources

(1) Ministry of Tourism (1989)

(2) Adapted from ERL (1989), Gurung (1990) & Ministry of Tourism (1989)

(3) Length of stay and expenditure data from Nepal Rastra Bank (1989)

(4) Nepal Rastra Bank (1989)

(5) The total estimate of tourist expenditures attributable to the protected area network in 1988 - NRs 196.8 million or $8.9 million - is equivalent to NR 250 million ($8 million) in 1990/91 prices

(6) Monetary values have been converted at the 1987/88 average exchange rate of 22.06 NR to $1 (32.00 in 1990/91)

Table 24-2. Trekking Fees and Entry Fees for Selected Protected Areas (1988)

	Trekking fees [a]	*Park entry fees*
National parks:		
Sagarmartha	852,900	1,403,790 [b]
Langtang	694,320	985,320 [b]
Royal Chitwan	—	6,2250,000 [c]
Annapurna Conservation Area	3,065,460	7,358,300 [b], [d]

[a] a. Trekking fees are collected from visitors to areas in the Himalayas which correspond roughly—but not exactly—to the protected area boundaries.

[b] b. From Gurung (1990).

[b] b. From Gurung (1990).

[c] c. Chitwan receives about 25,000 visitors annually and the entry fee is NR 250 (ERL 1989).

[b] b. From Gurung (1990).

	Trekking fees [a]	*Park entry fees*
Total NR	4,612,680	15,997,410
Equivalent to	$209,000	$725,000

Notes:

Table 24-3. Department of National Parks and Wildlife Conservation Budget

(NRs thousands)	*1982/83*	*1987/88*
Headquarters	4,057	1,884
National parks	4,792	5,598
Wildlife reserves	3,760	2,938
Hunting reserves	338	602
Hatisar	3,019	6,561
Central zoo	1,257	2,517
Subtotal	17,223	20,100
Royal Nepal Army	18,170	63,635
Total	35,393	83,735

Source: Ministry of Forests and Soil Conservation, 1988.

Bibliography

Banskota, M. and others. 1990. “Tourism and Sustainable Development.” *Economic Policies for Sustainable Development in Nepal*. ICIMOD, Kathmandu.

Bjonness, I-M. 1983. “External Economic Dependency and Changing Human Adjustment to Marginal Environment in the High Himalaya, Nepal.” *Mountain Research and Development* 3(3):263–72.

Brandon, Katrina, and Michael Wells. 1992. “Planning for People and Parks: Design Dilemmas.” *World Development* 20(4):557–70.

Bunting, B. W., M. N. Sherpa, and R. M. Wright. 1991. “Annapurna Conservation Area: Nepal’s New Approach to Protected Area Management.” P. C. West and S. R. Brechin, eds., *Resident Populations and National Parks: Social Dilemmas and Strategies in International Conservation*. Tucson, AZ: University of Arizona Press.

Dixon, J. A., and P. B. Sherman. 1990. *Economics of Protected Areas: A New Look at Benefits and Costs*. Washington, D.C.: Island Press.

ERL. 1989. “Natural Resource Management for Sustainable Development: A Study of Feasible Policies, Institutions and Investment Activities in Nepal with Special Emphasis on the Hills.” Draft report for Overseas Development Administration/World Bank. London: Environmental Resources Limited.

Gurung, H. 1990. “Environmental Management of Mountain Tourism in Nepal.” Paper presented at Economic and Social Commission for Asia and the Pacific (ESCAP) Symposium on Tourism Promotion in the Asia Region, Hangzhou, China.

Lehmkuhl, J. F., R. K. Upreti, and U. R. Sharma. 1988. “National Parks and Local Development: Grasses and People in Royal Chitwan National Park, Nepal.” *Environmental Conservation* 15(2):143–48.

King Mahendra Trust for Nature Conservation (KMTNC). 1988. *Strategy for Environmental Conservation in Nepal: The Initial FiveYear (1988/89–1992/93) Action Plan of the King Mahendra Trust for Nature Conservation*. Kathmandu: KMTNC.

[d] d. These fees go directly to the Annapurna Conservation Area Project.

McNeely, J. A. 1988. *Economics and Biodiversity: Developing and Using Economic Incentives to Conserve Biological Resources*. Gland, Switzerland: IUCN-World Conservation Union.

Ministry of Forests and Soil Conservation. 1988. "Plan for the Conservation of Ecosystems and Genetic Resources." *Forestry Sector Master Plan*. Kathmandu: HMGN/ADB/FINNIDA.

Ministry of Tourism. 1988 and 1989. *Nepal Tourism Statistics 1988 and 1989*.

Mishra, H. R. 1984. "A Delicate Balance: Tigers, Rhinoceroses, Tourists and Park Management vs. the Needs of Local People in Royal Chitwan National Park, Nepal." J. McNeely and K. Millier, eds., *National Parks, Conservation and Development: The Role of Protected Areas in Sustaining Society*. Washington, D.C.: Smithsonian Institution Press.

Nepal Rastra Bank (NRB). 1989. *Income and Employment Generation from Tourism in Nepal*. Kathmandu: Napal Rastra Bank.

Sharma, U. 1990. "An Overview of Park-People Interactions in Royal Chitwan National Park, Nepal." *Landscape and Urban Planning* 19(2):133–44.

Sherpa, M. N., B. Coburn, and C. P. Gurung. 1986. "Annapurna Conservation Area, Nepal: Operational Plan." Report to the King Mahendra Trust for Nature Conservation, Kathmandu.

Tobias, D., and R. Mendelsohn. 1991. "Valuing Ecotourism in a Tropical Rain-Forest Reserve." *Ambio* 20(2):91–93.

Touche Ross, in association with ERL, University of Surrey, New Era, and METCON Consultants. 1989. *Nepal Tourism Development Programme* (several volumes and appendices). Asian Development Bank and Ministry of Tourism, HMGN.

Wells, Michael. 1992. "Biodiversity Conservation, Affluence and Poverty: Mismatched Costs and Benefits and Efforts to Remedy Them." *Ambio* 21(3):237–43.

Wells, Michael, and Katrina Brandon. 1992. *People and Parks: Linking Protected Area Management with Local Communities*. Washington, D.C.: World Bank, World Wildlife Fund-US, and U.S. Agency for International Development.

25 The Economic Feasibility and Ecological Sustainability of the Bonaire Marine Park, Dutch Antilles

Jan C. Post

THE MAJOR CAUSES OF LOSS OF BIODIVERSITY are habitat destruction and overexploitation of plant and animal species. In such cases, alternative uses or short-term profits are considered more attractive than long-term sustainability of the natural ecosystem. If, for whatever reasons, the decision is taken to preserve the habitat and protect the species therein, it often appears difficult to enforce protection, which includes preventing people from exploiting a resource, the preservation of which they consider to be of less benefit to themselves than the exploitation they intend.

Official establishment of protection and management becomes a lot easier when it can be demonstrated that the (long-term) economic benefits accruing from the protected area are greater than the financial benefits to individuals from destructive exploitation. Enforcement of regulations at the local level is greatly facilitated when it can be shown that the would-be exploiters also profit directly or indirectly from protection of the area. Ideally, every protected area should become ecologically sustainable and economically feasible for the community and for the individual so that everybody complies voluntarily with the regulations pertaining to the protection of the protected area.

Few protected areas have reached that stage. This case study describes an example of a protected area that comes close, the Bonaire Marine Park.

Some Differences Between Marine Protected Areas and Terrestrial Protected Areas

There are a few differences between marine and terrestrial protected areas, which favorably influence the chances of marine protected areas to become economically and ecologically sustainable compared with terrestrial protected areas:

- The opportunity costs of marine protected areas are in general much lower than for terrestrial protected areas. This means that there is less conflict of interest in establishing

a marine protected area. People usually have no need to convert underwater habitats for food production (except for as yet very limited mariculture enterprises), nor to harvest coral for building purposes or fuel, and, being land dwellers, they do not physically occupy the marine environment. Besides, as is the case with rain forests, the most biodiverse marine areas are in oligotrophic waters[1] (for example, coral reefs), which would in any case offer limited scope for fisheries production.

- In those marine protected areas that are attractive for marine ecotourism, most of the visitors are divers who tend to spend more time and money than in terrestrial protected areas because they need more local services and because they are less mobile.

The Bonaire Marine Park Case Study

The World Bank strongly promotes the conservation of biodiversity and would like to include more biodiversity conservation projects in its lending program. Because governments are often reluctant to borrow for projects that do not have a satisfactory rate of return, the Bank is interested in investigating the economics and ecological sustainability of protected areas. Most conservation activities have so far been on land, but recently the Bank has started marine biodiversity conservation activities as well. The Bonaire Marine Park was chosen as the first case study to investigate these parameters in the marine realm. For details on the study, see van't Hof (1992); Scura and van't Hof (1993); and Dixon, Scura, and van't Hof (1993).

Bonaire is made up of two islands—Bonaire and Klein Bonaire—with an area of 112 square miles. Klein Bonaire is a small coral cay close to the main island. Bonaire belongs to the Dutch Antilles and is situated 55 miles off the coast of Venezuela. It is sparsely populated by about 11,000 inhabitants. The southeastern part is flat with salt pans and a flamingo colony; the rest is hilly. It has a dry climate, rocky soil, and practically no inland water; consequently there is hardly any agriculture. The island is exposed to the northeast trade winds. The north and eastern shores are steep and inaccessible, and they are exposed to heavy wave action. The southern and western shores are sheltered and largely accessible by road. Well-developed fringing reefs are found around the whole of Bonaire and around Klein Bonaire, a small island in the lee of the main island.

Bonaire's extraordinary marine biodiversity and ideal conditions for diving were first discovered by the famous diving pioneer Hans Hass in 1938. Ever since, the island has kept this reputation, as is manifested in the words that appeared some years ago on every car license plate: *Divers Paradise*.

History of the Bonaire Marine Park

Before the establishment of the Bonaire Marine Park in 1981, several ordinances had been issued to protect marine life around Bonaire. The most important one was a ban on spear fishing in 1971. The rapid development of the diving industry prompted the island government to support the development of an island-wide marine park in the late 1970s.

The World Wide Fund for Nature—International in the Netherlands, the Dutch government, the government of the Netherlands Antilles, and voluntary assistance brought together $319,000 for a three-year period to set up the park, and the park was successfully established and run for three years. The idea was to make the park self-financing through the introduction of a user fee system. However, when this was proposed, protests by a major U.S. diving magazine threatening to reconsider the favorable reviews it had given of Bonaire as a diving destination caused the Bonaire government to shy away from implementation. With the initial funds exhausted and no more income, the park went broke in 1984 and joined the infamous category of "Paper Parks."

This sounds more tragic than it was in reality however, because by that time most users of the park, in particular, the diving tour operators, had become so convinced of the necessity to protect the marine environment that the most essential measures to ensure its protection were carried out on a voluntary basis by the users of the park. On Bonaire it became almost socially unacceptable to engage in activities harmful to the reef and its fauna.

[1] Oligotrophic waters have low levels of nutrients.

Revitalization

In early 1990, efforts to revitalize the park met with success. New grant money in the amount of some $400,000 was obtained from the Netherlands for a three-year period subject to certain conditions, one of which was that the park would be made self-financing. A new institutional structure to manage the park, consisting of a management committee including the government, the Antilles National Parks Foundation, and the private sector was established and, finally, a user fee of $10 was introduced in January 1992, which is to cover salaries and operational expenses to run the park.

Thus far, the Bonaire Marine Park sounds like a success story, but how successful is it really? Who benefits from the park? Who pays? And is exploitation of the park sustainable? Does the local population benefit from the park or only foreign travel agencies? Does the reef start to crumble under the flippers of excessive numbers of marine ecotourists? These questions are at the basis of the study conducted by Scura and van't Hof (1993), and the following is based on their findings.

Costs of the Bonaire Marine Park

Three different kinds of costs can be distinguished:

- direct costs, such as salaries for park wardens
- indirect costs
- opportunity costs

The direct management costs of the park are estimated to amount to some $150,000 per year. With an annual number of visitors of about 18,000 and an admission fee of $10, these costs will easily be covered. Indirect costs, such as damage done by divers to private property, such as fishing gear, are difficult to quantify and are probably very small. Opportunity costs include, among others, the value of foregone output from extractive use of resources in the protected area (fishing, coral mining) or the foregone benefits of conversion of the site for an alternative use. These issues have been dealt with in the section, Some Differences between Marine Protected Areas and Terrestrial Protected Areas, and would be low in Bonaire.

Benefits

Two major kinds of benefits have been distinguished: financial (private) and economic (public) benefits. The gross revenue of activities associated with dive-based tourism by the private sector is currently estimated at $21 million, about half of the 1985 estimated total gross domestic product (GDP) of the island, $43.9 million. The island government of Bonaire benefits from the Bonaire Marine Park mainly through collection of various taxes. It is, however, difficult to disaggregate the dive-based components. The direct taxes which the government levies on diving tourists has been estimated to amount to $340,000 in 1991.

Employment generated directly by the Bonaire Marine Park (dive-operating hotel, restaurant, park staff) has been estimated at a minimum of 516 jobs, some 11 percent of Bonaire's labor force. Including related activities in the tourism industry would elevate this figure considerably. The figures have been based on the official tourism statistics, which indicate that only 36.4 percent of all tourists were divers. Data generated by this study, however, show this percentage to be much higher (up to 80 percent) which means that easily 20 percent of Bonaire's labor force could be directly employed by the existence of the Bonaire Marine Park.

In order to promote similar models elsewhere, it is important to show that benefits of protected areas accrue to the local economy and local people. Often the complaint is heard that most of the benefits are reaped by foreign hotel companies and foreign travel agencies where tourists buy most of the services by way of vouchers. In the case of Bonaire, this is largely true as well. At least 50 percent of the hotels and dive operations are completely foreign-owned, 24 percent of the work force are foreign workers, and Bonaire has liberal laws regarding repatriation of funds and free exchange of currency. Consequently, a large part of the earnings from diving tourism leaves the country. Nevertheless, without diving tourism, Bonaire would lose the mainstay of its economy.

Economic Feasibility of the Bonaire Marine Park

It is clear that with a gross revenue of $21 million associated with dive tourism, the yearly cost of $150,000 to run the park and the very minor opportunity costs are small compared to the benefits. Financial sustainability seems ensured by the successful introduction of a yearly admission fee of $10 per diver.

It seems strange that it took so long before this obviously beneficial measure was taken, and that a press campaign had been mounted against it. It illustrates the fact that the notion of new scarcity of highly-diverse, intact ecosystems has not yet become commonplace. Throughout humankind's history, the free availability of such ecosystems has been taken for granted. However, a survey conducted under this study found that an astonishing 92 percent of the divers on Bonaire agreed that the fee was reasonable and were willing to pay. Approximately 80 percent of those surveyed were even willing to pay double that amount, 40 percent were willing to pay $30, and 16 percent were willing to pay $50. How could a magazine claiming to represent that same group of divers be?

The Ecological Sustainability of the Bonaire Marine Park

The economic benefits have little significance in the context of the aim of national parks and protected areas (the preservation of ecosystems) if these benefits are generated in a way which destroys the ecosystem. Therefore, an attempt has been made to assess the ecological sustainability of the Bonaire Marine Park and its carrying capacity for diving tourism. Little experience exists so far in this field.

Two different approaches were used in the study:

- A survey of 79 divers was taken regarding the perception of resident and visiting divers on changes that had taken place over time in the Bonaire Marine Park.
- A photoanalysis was done of coral cover between sites under heavy diving pressure and sites that received little visitation.

The majority of the divers rated the present condition of the reefs high, both for health and coverage of corals and for fish life. Commercial species like turtles, lobsters, groupers, and barracudas, however, were generally found to have become less abundant, while algae were found to have increased. This points to some pressure from perhaps spear and other types of fishing and to an increase in nutrient input into the coastal water. A decrease in coral coverage was also noted (67 percent of respondents). Overall, 81 percent of the more experienced divers believed that certain species had become less abundant while 57 percent felt that certain species had become more abundant. The results of the survey have to be treated with caution however, since people have a tendency to think things were better in the past, and since observation varies with experience and interests.

In the photoanalysis, a comparison was made between three heavily-dived sites and three comparable sites that were much less visited. Pictures were taken at all six sites and computer-analyzed for percentage of live coral cover and species diversity. The results show a significant impact of recreational diving on the coral communities in some of the heavily-dived sites, but the extent of the impact is limited to the immediate vicinity of the mooring buoys. The impact extends to more than 100 meters but less than 260 meters' distance from the buoys. Species diversity appeared to increase at intermediate levels of stress.

Carrying Capacity

Perhaps the most difficult question to address is: "What is acceptable in terms of diver-induced damage? Based on a comparison between the number of dives made at a diving site that does not yet show signs of wear and the number of dives made at two sites that do, a "critical level" of 4,500 dives per site was established. The total "diveable" coastline of Bonaire and Klein Bonaire is 52 kilometers. A reasonable space between moorings would be 600 meters, since divers seldom venture more than 300 meters from a buoy. The park could therefore have a theoretical number of 86 diving sites, which would yield a theoretical carrying capacity of 387,000 dives a year. However, the distribution of divers is not even, and many divers are shore divers, having access to the buffer zones in between the buoys. It therefore seems more realistic to set the carrying capacity at half the

theoretical number, which means 190,000 to 200,000 dives per year. Considering the yearly increase in diving tourism, this capacity could be reached as soon as 1995.

Although the estimate of the carrying capacity is crude and speculative, it demonstrates the urgent need for the establishment of a good monitoring system and agreement within the park committee (the government, Antilles National Parks Foundation, and the tourism industry) concerning a policy with respect to further development of diving tourism.

One other factor of importance to the sustainability of the park is the quality of the coastal water, which could be influenced negatively by the sewage being generated in increasing quantities by coastal development. Eutrophication of the water is one of the major causes of coral mortality. In particular, seepage from the septic tanks could be a problem, and indeed many divers have noticed a reduction in visibility over the past few years. This potential problem merits investigation; based on the results, strict regulations—in particular, concerning the distance of septic tanks from the edge of the water or concerning the collection and treatment facilities—should be established for the treatment and disposal of sewage.

Conclusion

The Bonaire Marine Park provides a good example of an area where biodiversity conservation and economic development have been mutually reinforcing. The park seems thus far to be ecologically sustainable, and institutionally functioning well, while at the same time constituting the mainstay of the island's economy. Close monitoring of the health of the reefs as a function of the number of divers is necessary to set eventual limits, whereas strict pollution control is essential.

Bibliography

Dixon, J. A., L. F. Scura, and T. van't Hof. 1993. "Meeting Ecological and Economic Goals: Marine Parks in the Caribbean." *Ambio* XXII(2–3):117–125.

Scura, L. F., and T. van't Hof. 1993. "Economic Feasibility and Ecological Sustainability of the Bonaire Marine Park." Environment Department Divisional Working Paper 1993–44. Washington, D.C.: World Bank.

van't Hof. 1992. "Bonaire's Marine Park: The Story behind the Success." *Ocean Realm* (December):75–78.

26 The Economics of Managing Fisheries and Tourism in the Great Barrier Reef Marine Park

Wendy Craik

THE GREAT BARRIER REEF MARINE PARK covers all of the Great Barrier Reef except for a small part north of the tip of Cape York Peninsula. Its area of 350,000 square kilometers makes it the largest protected marine area in the world and, after Greenland, the second largest protected area of any kind. The reef, including all of its 900 islands, is inscribed on the Australian National Estate Register and the World Heritage List and is the first area in the world to be designated a "Particularly Sensitive Area."

The ecological and hence economic value of the Great Barrier Reef for tourism and recreation lies in the fact that it is the largest accessible, relatively pristine system of corals and associated life forms anywhere in the world. The Great Barrier Reef is not a continuous barrier, but rather a broken maze of coral reefs, some with coral cays. Some 2,900 individual reefs, including 760 fringing reefs, lie within the formally defined area known as the Great Barrier Reef Region. These reefs range in size from less than 1 hectare to more than 100 square kilometers, and in shape from flat platform reefs to elongated ribbon reefs. In some places, the reefs are separated by channels of no more than 200 meters in width, while elsewhere they may be as much as 20 kilometers apart. Most reefs are submerged, with some being exposed at very low tide.

The individual reefs of the Great Barrier Reef are composed of the accumulated remains of plant and animal calcium carbonate skeletal material, and they support a veneer of living plants and animals. There are some 300 reef islands or cays; 87 of them are permanently vegetated. There are about 600 continental or high islands, often with fringing reefs around their margins.

The Great Barrier Reef Region provides habitat for a great many forms of marine life. There are an estimated 1,500 species of fish and about 350 species of hard, reef-building corals; more than 4,000 mollusk species and over 400 species of sponge have been collected. Other well represented animal groups include anenomes, marine worms, crustaceans, and echidnoderms. This great diversity of life forms, especially in the endemic species, makes it an area of enormous scientific importance.

The reef has developed over several million years on the northeast continental shelf of Australia. The reef and its adjacent mainland coastline provide unique habitats and breeding sites for several endangered species, including the dugong (*Dugong dugon*) and saltwater crocodile (*Crocodilus porosus*), and contain nesting grounds of world significance for the endangered green turtle (*Chelonia mydas*) and loggerhead turtle (*Caretta caretta*).

The Great Barrier Reef has not been intensively used for human subsistence, unlike other coral reef systems in the world. Apart from some very small areas, the Great Barrier Reef is still in pristine condition compared with the majority of reef areas and has not been unduly affected by human activity (Kelleher 1990). The reef also has outstanding educational, historical, and cultural values.

The protected status of the reef does not imply that commercial or other human activities are prohibited. Rather, its status ensures that human use is held at levels which are ecologically sustainable. In consequence, commercial activities can be developed with the confidence that the natural qualities of the reef that give it commercial value will not be degraded with time.

As with the general trend in Australia, tourism in North Queensland has grown rapidly in recent years, with occasional hiccups. There is no doubt that the weather and the natural environment are the features that attract visitors to North Queensland. Foremost among the natural environment features is the Great Barrier Reef. For Australian tourists, seeing the Great Barrier Reef is generally the second most important reason for visiting North Queensland (after the weather), and international tourists come to North Queensland primarily to see the Great Barrier Reef (Vanclay 1988).

A recent Gallup Poll (October 26–27, 1991) reported that 71 percent of Australians say they will be likely to take a holiday in the next two years, and the Great Barrier Reef was the favorite destination (mentioned by 29 percent) above the Gold Coast (20 percent), Tasmania (19 percent), and Kakadu National Park (18 percent) (Bulletin 1991).

Commercial fishing, by contrast, has not grown markedly in recent years. Poor prices and higher costs have contributed to a reduction in the number of vessels in the major fishery, the prawn fishery. Commercial reef line fishing has increased slightly in terms of effort and catch, and the remaining fisheries are small (aquarium, net, and crab) and fairly stable or subject to boom and bust (e.g., trochus, bêche-de-mer). Recreational fishing, on the other hand, increased in terms of effort, although catch per unit effort appears to have declined.

The Need for Management

Marine areas may be particularly vulnerable to the negative effects of tourism and fishing in that they are traditionally considered to be “commons”—or common resources—and development in marine areas is not usually closely controlled. Individuals operating in the marketplace are normally assumed to act in a way that will maximize their returns on investments over a usually fairly short period of time. Private corporations will generally have an obligation to their shareholders to act similarly, within the constraints of socially acceptable behavior, and government agencies may have equivalent motivations. It follows that such individuals and institutions have a strong incentive to externalize costs and to internalize benefits as much as practicable. That is to say, they have an incentive to maximize utilization of the “free” or common resources. In the case of the Great Barrier Reef, these common resources are the air and the water, their natural qualities, their pollution assimilative capacity, and their scenic vistas, wildlife habitat, and the wildlife itself, such as corals, fish, whales, and birds.

Before and since Garrett Hardin’s essay “The Tragedy of the Commons,” there has been sufficient study to demonstrate conclusively that these incentives work. Consequently, the usual long-term effects on the commons of the uncontrolled operation of the free market is that the commons are destroyed (Hardin 1968). General awareness of this fact, even in the absence of a clear perception of the processes involved, has led to demands by the public, particularly in the past two decades, for the right to participate in decisions affecting the commons, and for governments to protect these public properties.

The Great Barrier Reef Marine Park

Fortunately, a marine park was established in the Great Barrier Reef Region before the recent expansion of tourism. Fishing and tourism developments in the park are subject to innovative management with the aims of preventing unacceptable impacts of tourism and of ensuring a long-term sustainable partnership between fishing and tourism and environmental protection. The marine park is one of the world's first attempts at managing a large ecosystem on an ecologically sustainable basis. The marine park is attempting to demonstrate that good ecology is good economics.

The Great Barrier Reef Marine Park is a multiple-use protected natural area, fitting the definition of Category VIII of the classification system used by the IUCN—World Conservation Union. It also meets the criteria for selection and management as a Biosphere Reserve (Category IX), although it has not been formally proposed or established as one.

The Great Barrier Reef Marine Park was established under federal legislation. The Great Barrier Reef Marine Park Act 1975 provides the legal basis for management of the reef. It has some novel and critically important provisions in relation to the establishment, control, care, and development of a marine park in the region. They include the following:

- Establishment of the Great Barrier Reef Marine Park Authority (hereafter referred to as the Authority) consisting of three members, one nominated by the Queensland government and two by the federal government. The Authority has a staff of about 100, most of whom are located in Townsville.
- Establishment of a Consultative Committee, an interest group or government agency with at least a third of its members nominated by Queensland, the others by the federal government, with one Authority representative.
- Specification of the Authority's functions: recommending areas to be included in the marine park, carrying out or arranging for research, preparing zoning and management plans, establishing education and management programs, and anything incidental to these functions.
- Giving the Authority power to perform its functions in cooperation with Queensland or its agencies.
- Prohibiting drilling or mining in the marine park, except for approved research purposes.
- Providing that the Act, including the zoning plans and regulations made under it, prevail over conflicting provisions of all state legislation and all federal legislation, except in relation to the navigation of ships and aircraft.

The Value of the Great Barrier Reef

The Great Barrier Reef has a variety of values: economic, ecological, cultural, educational, and historic. Measuring the economic value of tourism on the reefs and islands of the Great Barrier Reef is not a simple exercise. Gross income from tourism in this area in 1987–88 was estimated to be $200 million; and gross expenditure from private boating (which includes recreational fishing) in 1987–88 was estimated to be in the order of $100 million. Additionally, tourism expenditures on the mainland related to the Great Barrier Reef were estimated at between $85 million and $600 million. Thus, taking inflation into account, direct tourism and recreation income and expenditures in the Great Barrier Reef in 1991 were probably in excess of $500 million. Using a multiplier of 2.2 (Driml 1987) suggests the direct and indirect economic impact of tourism and recreation to be in excess of $1 billion (Driml 1988, unpublished data). This can be compared with commercial fishing estimates, updated for inflation, of approximately $400 million in direct impacts alone (Driml 1988, unpublished data).

Tourism to the Great Barrier Reef is estimated to have increased 40-fold since World War II (ATIA 1984). In the last 10 years, the number of international airports serving the Great Barrier Reef has grown from 1 to 4, and the charter vessel fleet from 135 to 299; reef platforms now number 19, where 10 years ago none existed; island resort establishments now number 26 compared with 19 in 1976; bed spaces increased from 785 in 1976 to 2,059 in 1988; and speedboat usage of the Great Barrier Reef Region has grown from 15,000 boats in 1979–80 to 24,000 boats in 1991. In 1988, 900,000 visitor nights were spent at Great Barrier Reef resorts (Australian Bureau of Statistics 1989). It is estimated that some 1 million people per year visited the reef on tourist boats in the mid-1980s,

involving 1.2 million person-days. Three hundred thirty thousand people made boat trips which were directly associated with seeing corals and marine life (Hundloe and others 1988).

The growth rate in the numbers of international visitors to Australia, more than 200 percent between 1982 and 1987, was exceeded in the Great Barrier Reef with some 4 percent of international visitors coming to the Great Barrier Reef in 1979–80, increasing to 16 percent (224,000 visitors) in 1986–87, compared with a Queensland total of 35 percent (Australian Bureau of Statistics 1988).

Domestic visitors to the reef region still outnumber international visitors. Including mainland accommodation establishments (from which most visitors make trips to the reef itself), a comparison of domestic and international visitor nights by region is shown in Table 26–1.

The economic contribution of foreign tourists to the economy is greater per head than domestic tourists; a domestic tourist spends $156 per trip, compared with $1, 121 for foreign tourists (1981–82 data); 26 “average overseas tourist trips” are required to create a job, whereas 247 “average domestic tourist trips” are required (Department of Sport, Recreation and Tourism 1985).

The economic value of fishing in the Great Barrier Reef Marine Park is also not easy to estimate. Estimates of parameters for the two main commercial fisheries are displayed in Table 26–2.

The recreational and speedboat fishery can be accessed by any of the 24,000 speedboats registered in coastal Queensland. They catch around 4,000 metric tons of fish per year. The charter vessel fleet contains about 300 boats, and their catch is unknown (many of their vessels are primarily large-capacity tourism vessels). The value of the recreational fishery is estimated to be in the vicinity of $200 million per year.

Management in the Marine Park

The structure of management is shown in Table 26–3. The main plank of marine park management is zoning. The concept of zoning was introduced as the best solution to resolving the dual goals of protection and multiple use by possibly conflicting activities. Through the use of zoning, conflicting activities are separated, areas are provided that are suitable for particular activities, and some areas are protected from use. Levels of protection within the park vary from almost complete absence of restriction on activity in some zones to zones within which almost no human activities are permitted. The only activities that are prohibited throughout the park are oil exploration, mining (other than for approved research purposes), littering, spearfishing with scuba gear (except for the commercial lobster fishery in the Far North Section), and the removal of large specimens of certain species of fish.

There are three types of zones, whose names reflect the kinds and levels of human use that are permitted within them:

- *General Use Zones*. Most human activities (other than mining) are permitted, at levels which are ecologically sustainable.
- *National Park Zones*. Activities are permitted which do not remove living resources, or which remove only small quantities
- *Preservation or Scientific Research Zones*. Scientific research is the only activity allowed.

A major innovation being introduced in the rezoning of the Cairns Section of the marine park is the No-structures Sub-Zone. This subzone overlies approximately 22 percent of the reefs in the Cairns Section. Its principal purpose is to ensure that a proportion of those parts of the reef that are near centers of human population and are therefore subject to heavy human use do not end up dotted with permanent or semipermanent structures. The public feels very strongly about this issue. Vanclay (1988) found that 77 percent of tourists interviewed in a survey were opposed to more “development” on the Great Barrier Reef. This finding parallels the public concern about excessive coastal development on land.

Tourism may occur under permit within all zones except those designated as preservation and scientific research zones, that is, in 99.8 percent of the marine park. All tourist programs and facilities within the marine park require a permit. This requirement allows the Authority to assess each proposed tourist operation individually in terms of its suitability.

A spatial regulation management measure that relates particularly to tourism is the ability to declare Reef Appreciation Areas or Special Management Areas in zones in which fishing and collecting are normally permitted. These provisions allow up to 20 percent of the area of a reef to be declared a so-called *look, don't take* area to complement the provision of tourism facilities.

Trawling is permitted in the General Use A zone (about 80 percent of the park), and line fishing is permitted in over 95 percent of the park. Some fisheries, for example, collecting fisheries, require a permit and cannot be conducted in national parks or in more restrictive zones.

When assessing a permit application, the factors considered include the following:

- The objectives of the zone to be used or entered.
- The orderly and proper management of the zone to be used or entered.
- The conservation of the natural resources of the marine park.
- The existing use and amenity, as well as the future or desirable use and amenity, of the area and adjacent areas.
- The size, extent, and location of any proposed use in relation to any nearby use.
- The likely effects of any proposed use on adjoining and adjacent areas and any possible effects of the proposed use or entry on the environment.
- The proposed means of access to and egress from any use and the adequacy of provision for aircraft or vessel mooring, landing, parking, loading, and unloading.

Effort to prevent unacceptable ecological impact is paramount in the Authority's management of tourism development. The types of activities that may be associated with fishing-or reef-based tourism operations and that may have biophysical impacts include discharge of waste, litter, and fuel; physical damage to reefs from anchors; people snorkeling, diving, and reef walking; disturbance of fauna (especially seabirds); and overfishing or collecting. All of these may be managed to some extent by education, incentive, design, prohibition, or limitation.

Proponents of large-scale developments or those which have the potential to produce impacts may be required to prepare Environmental Impact Statements or Public Environment Reports. Through environmental impact assessments, the potential impacts can be identified and steps can be taken to prevent or mitigate the impacts. Often the prevention of impacts is a matter of adopting the appropriate design and operational guidelines.

The Cost of Management

As for estimating the economic value of activities in the marine park, the cost of management of the marine park is also difficult to estimate precisely because there are a number of agencies with management responsibilities in the marine park. An estimate of the cost of management in the marine park is provided in Table 26–4.

For field management of the marine park (day-to-day management), the cost has fluctuated over the years and has not kept pace with the growth in tourism usage of the marine park, estimated to be increasing at about 10 percent per year and recreational fishing at about 5 to 7 percent per year. See Table 26–5.

The Future

While not wishing unnecessarily to restrict tourism development, the Authority's foremost responsibility is to ensure that the facilities and activities are not causing impacts on a scale that could lead to unacceptable long-term damage. To this end, the Authority undertakes considerable effort to assess and manage tourist programs and facilities. The Authority expects tourist operators also to care for the environment that provides their livelihood. Further, the government has adopted a policy called *user pays*. This policy is based on the philosophy that people who benefit from the use of a public good or property, especially for commercial purposes, should contribute to the cost of managing or protecting that property. The application of this policy to the Great Barrier Reef would lead to the tourism industry's being asked to contribute to the cost of protecting it. This cost amounts to about $15 million per year. In considering this issue, the government has recognized that it retains a responsibility to provide core funds to protect the reef over and above contributions from the tourism

industry and from other industries. One “benchmark” option being considered is that the government would maintain its present core funding via appropriations, with any revenue from *user pays* being devoted to increasing management costs.

Such increases in costs are inevitable if the reef is to be protected. Experience has shown that the cost of protecting a natural resource increases at about the same rate as use increases. Use of the reef is likely to continue to increase into the indefinite future. The threats to the reef that must be defined and managed include physical damage from anchors and construction, reductions in water quality from sewage discharge and runoff from agricultural and industrial areas, the effects of fishing, and, perhaps, infestations like crown-of-thorns starfish.

No industry depends more on maintenance of the natural qualities of the reef than the tourism industry. The Authority will want to work closely with the industry in planning, research, and management aimed at protecting the Great Barrier Reef forever.

While the Great Barrier Reef is the best-managed large marine ecosystem in the world, we cannot be complacent. The future is certain to bring a variety of new challenges. For example, it will be important for innovative planning to be able to forecast changes in tourism demand in aggregate and particularly in terms of nature-related tourism. The past is not necessarily a good guide to the future. Tourist fashions change, exchange rates change, technology changes. All these factors, and others, have to be considered in forecasting and planning for *sustainable* tourism.

The task is a challenging one. Management of the Great Barrier Reef Marine Park is an international obligation and an obligation to future generations to which all the users of the reef and the tourism industry in particular can contribute and from which they will benefit.

Table 26–1. Comparison of Domestic and International Visitor Nights by Region

	Domestic ('000)	*International ('000)*
Cairns—North Reef	5750	860
Townsville	3020	500
Mackay/Whitsundays	2760	150
Rockhampton/Gladstone	3760	470
Sugar Coast (Bundaberg)	4010	280
	19,300	2,260

Source: Courier Mail 1986, cited in Craik 1988.

Table 26–2. Commercial Fishing

		Trawl	*Line*
No. of Primary Vessels		954	250 (1963—potential)
Prawn catchtiger, banana, kingreef fish, mackerel, endeavour prawns			
Approximate (metric tons 1990)	catch	7,000	4,000

Estimated direct and indirect value of commercial fishing: $400 million per annum.

Table 26–3. The Hierarchy of Management of the Great Barrier Reef Marine Park

Strategic Plan (GBRWHA)
Great Barrier Reef Marine Park Act
Zoning Plans (Section)
Zones/Subzones (reef, group of reefs, seabed)
Area Statement (regional group of reefs)

Management Olans (reef/island/use)
Designated Areas (reef or part of)
Permits (individual activities)

Table 26–4 Cost of Marine Park Management, 1989–90 (millions of $)

	Cost
Great Barrier Reef Marine Park Authority	
Commonwealth appropriation	9.3
Receipts for service	0.8
Queensland contribution to day-to-day management of the marine park	2.2
Queensland Marine Parks	N/A
Queensland Fish Management Authority	N/A
Queensland Department Primary Industries	N/A
Coastwatch	0.9
Australian Fisheries Service	N/A
TOTAL	13.2

N/A = Not available.

Table 26–5 Management Expenditure in Great Barrier Reef Marine Park

Year (section of park)	*Total expenditure ($)*	*Total area (km^2)*	*Unit expenditure ($/km^2$)*
1981/82 (Capricornia)	300,456	12,000	25.04
1982/83	665,720	12,000	55.48
1983/84 (Cairns)	1,355,590	47,000	28.84
1984/85	2,283,900	47,000	48.59
1985/86 (Far Northern)	2,754,024	130,000	21.18
1986/87	3,384,994	130,000	26.04
1987/88 (Central)	4,025,927	207,000	19.45
1988/89	4,886,006	344,000	14.20
1989/90	5,035,017	344,000	14.64
1990/91	6,264,517	344,000	18.21

Bibliography

ATIA. 1984. *Data Review of Reef Related Tourism 1946–80*. Great Barrier Reef Marine Park Authority Research Publication.

Australian Bureau of Statistics. 1988. *Survey of Environmental Issues and Usage of National Parks*. Australian Bureau of Statistics.

Australian Bureau of Statistics. 1989.

Bulletin. 1991. *Barrier Reef and Gold Coast Preferred Destinations*. Bulletin Monday, November 19, p.22. Queensland, Australia.

Craik, J. 1981. “Tourism Down Under.” *Tourism Policies in the Tropics*. Cultural Policy Studies. Occasional paper No 2.

Department of Sport, Recreation and Tourism. 1985. *Australian Tourism Trends*. AGPS.

Driml, S. M. 1987. "Great Barrier Reef." *Tourism: A Review of Visitor Use*. The Great Barrier Reef Marine Park Authority, Australia.

Hardin, Garrett. 1968. "The Tragedy of the Commons." *Science* (162):1243–48.

Hundloe, T., R. Neumann, and M. Haliburton. 1988. *Great Barrier Reef Tourism*. Griffith University.

Kelleher, G., and S. Driml. 1988. *Environmental Limits to Tourism in the Great Barrier Reef Marine Park*. Proceedings of "Frontiers of Australia in Tourism." ANU. 29 June—1 July 1988.

Kelleher, G. 1990. "Identification of the Great Barrier Reef as a Particularly Sensitive Area." International Seminar on the Protection of Sensitive Sea Areas. Malmo.

Mathieson, A., and G. Wall. 1982. *Tourism: Economic, Physical and Social Impacts*. New York: Longman.

Vanclay, F. 1988. "Tourist Perceptions of the Great Barrier Reef." Unpublished report to the Great Barrier Reef Marine Park Authority.

27 The Economic Impact of National Parks in Victoria, Australia

Geoffrey C. Wescott

VICTORIA IS AUSTRALIA'S SECOND SMALLEST STATE (22.8 million hectares) but has the second largest population (approximately 4 million people). The capital, Melbourne, is located in the center of the state (Figure 27–1). Examples of most of Australia's major ecosystems are found within the state's boundaries—including deserts, alpine country, large estuaries, forests, plains, and a spectacular coastline.

The author would like to thank the various officers in the local government areas surrounding both areas for their great assistance in accessing the data in the report. Particular thanks are also due to the Royal Automobile Club of Victoria (RACV) officers who provided access to records and to Don Saunders and many other officers of the Department of Conservation and Environment (DCE) for their help. Thank you to Ms. R. Dewar for typing the manuscript and Mr. P. Forsyth for doing the diagrams.

The state's 31 national parks cover 10 percent of the state and encompass approximately 85 percent of the 125 plant communities in the state. In Australia, state governments run the national parks (Wescott 1991) because of the peculiarities of the Australian constitution. Victoria's national park system is the second most extensive (Tasmania's is more extensive) in Australia and one of the most representative park system in the world.

This chapter, though, is not concerned with the biophysical or natural features of a park system but rather with the impact of national parks on the economy of local communities neighboring national parks. The chapter will attempt to quantify this impact by using a series of indicators to compare the changes over approximately a decade associated with a long established park (Wilsons Promontory National Park) and a relatively new park (Grampians National Park) declared in 1984 (Figure 27–1).

Before giving a portrait of each park and then comparing the chosen economic indicators, a brief history of the Victorian park system is in order to place the two parks in context.

History of the Victorian Park System

The first national park in Victoria, Tower Hill, was declared in 1892, although the Ferntree Gully area was known as the "National Park" from 1882. Two substantial areas were declared in 1898 (Wilsons Promontory and Mount Buffalo), and there was a sporadic and slow increase in parks up to 1968 (all locations shown in Figure 27–1).

In 1968, there were 20 small national parks in Victoria, covering 150,000 hectares or 0.7 percent of the state (Ovington 1980). In the following year, though, a major controversy broke out over a plan to subdivide the Little Desert for agriculture. There was nothing unusual about this proposal at the time, but it awakened the community's growing interest in nature conservation and the proposal was defeated and a small national park (Little Desert) declared (Figure 27–1).

More importantly, the state government established the Land Conservation Council in 1970 in response to the dispute. This little heralded Council became the state's public land planning body for

the next twenty years. Essentially the Council produced descriptive study reports for each area, collating all available data. The public then had 60 days to suggest how the land should be used. Next, a set of proposed recommendations were published recommending land designations, including national parks, for specific areas. The public had a further 60 days to comment on these recommendations before a set of final recommendations was published and forwarded to the government. This process and its outcomes are fully explained in the Council's 1988 Statewide Review (Victorian Land Conservation Council 1988).

The net result of Land Conservation Council activity and the increased community support for nature conservation was a 15-fold increase in the area of national parks declared in Victoria between 1968 and 1990 (Wescott 1991). The Grampians National Park was one park added during this time.

The Grampians and Wilsons Promontory National Parks

This chapter compares a series of indicators between a long established national park (Wilsons Promontory, declared 1898) and a recently established national park (Grampians, declared 1984) to determine whether the declaration of a new park resulted in any substantial increase in economic activity in the surrounding area.

Wilsons Promontory forms the southern most tip of the Australian mainland and hence is exposed to storms and high winds in winter months. It is a spectacularly beautiful area of 49,000 hectares dominated by granite outcrops from sea level to the highest peak at 755 meters. This mountainous granite outcrop is joined to the mainland by a flat sandy isthmus. The area has been joined to Tasmania regularly in the past, the last "land bridge" was severed about 12,000 years ago (Victorian Department of Conservation, Forests and Land 1987).

The vegetation is very diverse—ranging from small pockets of rainforest to grasslands and coastal heathlands, but predominantly forests and woodlands. A fifth of Victoria's plant species are found here (858 species). There are 34 species of mammals and 233 species of birds (92 resident, 82 regular migrants), with 19 species of native fish recorded as well. Although the area was seasonally inhabited by aborigines and grazed and burnt by European settlers, little evidence of human impact is now present except for various park facilities.

The nearest town to "The Prom," as it is affectionately known, is Foster (Figure 27–2), a small community to the north. The single road into the park leads down the western side of the promontory for approximately 40 kilometers to Tidal River (Figure 27–2), where the visitor center, lodges, and formal camping area are located. The only other built structures are the lighthouse at the southernmost tip and some radio and telecommunication beacons on Mt. Oberon. The main recreational activities are swimming on the beautiful beaches, bush walking, and nature study.

The Grampians National Park is a similar distance from Melbourne as the Prom (approximately 250 kilometers) and by comparison is completely surrounded by private land (rather than sea) and has multiple entry points (Figure 27–3). The park is 167,000 hectares in area.

The spectacular scenery in this park is due mainly to the upthrusted sandstones that rise up to almost 1,000 meters in the middle of the vast flat western plains of Victoria. These ranges spread for 85 kilometers from north to south and up to 45 kilometers east to west (Victorian National Park Service 1984). The rainfall varies considerably with altitude and the temperature can vary from below freezing in winter to above 40°C in summer. The park contains nearly one-third of Victoria's plant species, almost one-half of Victorian bird species, one-third of Victorian mammal and reptile species, and several endangered or threatened species of both plants and animals. The area is extensively roaded (from past forestry use), although there are still many rugged and remote areas.

Recreational activities are centered at Halls Gap (Figure 27–3) on private land surrounded by the park and to a lesser extent at Zumstein's camping area inside the park. There are several small settlements nearby, with the major towns being Stawell, Ararat, and Horsham. The area is also popular with South Australians, as Adelaide is a relatively easy four- to five-hour drive to the west.

Comparison of Economic Indicators Between the Two National Parks

There has been no previous study directly comparing the two areas although there have been attempts to study various factors in each park independently (see Victorian National Parks Service 1984; Victorian Department of Conservation, Forests and Land 1987).

This study looked at the areas immediately surrounding each park out to a radius of approximately 40 to 50 kilometers (Figure 27–2 and Figure 27–3) depending on the location of nearby towns and local government boundaries. Existing reports (Victorian National Parks Service 1984; Victorian Department of Conservation, Forests and Land 1985, 1987) were used, and were updated where possible with information obtained directly from the managing agency (the Victorian Department of Conservation and Environment) along with published local government reports (Shire of Stawell 1989; Budge and Associates 1991).

In addition, data were collected for three economic activity indicators (subdivision permits, planning permits, and building permits) directly from the one local government authority surrounding Wilsons Promontory and the eight in the Grampians study area (Figure 27–3). Finally, accommodation statistics were extracted from the comprehensive annual guides published by the state's major motorists organization (the Royal Automobile Club of Victoria).

Data were collected for the period 1978 to 1988 and more recently where possible. A full census of the whole country occurs each five years (1981–1986–1991). but as the data for the last census are yet to be published. population statistics have been omitted from this chapter as have been preliminary information from Shire of Stawell (1989) and Budge and Associates (1991).

Figure 27–4 summarizes the data published in the Wilsons Promontory management plan (Victorian Department of Conservation. Forests and Land 1987) on park visitation rates. Over 400,000 visitor days are recorded to the Promontory each year, with most occurring in the summer school holidays (December—February). There has been steady growth in day visitors and in lodge occupancy rates (around 5 percent per year) over the past decade, but little change in camping nights from 1979/80 onwards (Victorian Department of Conservation, Forests and Land 1987), which may be due partially to no increase in camping sites and accommodation units over the study period.

The Grampians estimated visitation rates have climbed from 352,000 visitor days in 1970 to 1.21 million in 1982 calculated to be a growth rate of 11.1 percent per year (Victorian National Parks Service 1984). If this estimated rate had been sustained, there would have been 3 million visitor days by 1991. The actual data (Table 27–1) show the estimate to be substantially incorrect, as there were 1.44 million visitor days in 1990. The difficulty with all these data is that there are over 20 entry points to the Grampians National Park, which makes data collection and analysis a risky exercise.

Accommodation figures were collected by individual locality from the accommodation guides published by the Royal Automobile Club of Victoria. The data collected for each year from 1978 to 1991 (where available) were for the number of hotels. motels, guest houses (including number of beds); number of caravan and camping parks; and number of camping sites or rooms in these parks. The data were aggregated to one area for Wilsons Promontory (Figure 27–2) and three zones (northeast, southwest and north) in the Grampians (Figure 27–3). Rather than present these data individually, three tables (27–2, 27–3, and 27–4) have been produced for the aggregated data.

Although not conclusive, there does appear to be a trend evident in Table 27–4. The data for the Wilsons Promontory area show little change over the period 1978 to 1991 in any indicator despite the increase in park visitation seen in Figure 27–4. In the Grampians study area, 37 new hotels/motels or camping areas have been added, with an increase of over 700 beds or sites between 1978 and 1991. Ten of these establishments, providing an additional 248 bed/sites, were added in the six years prior to park declaration (July 1, 1984), and 27 establishments, with 399 bed/sites, were added in the seven years since declaration.

Therefore, there was growth evident in the Grampians area and not the Promontory in this period, and that growth was more rapid after the declaration of the Grampians National Park than before its declaration.

When this trend is traced back to the pre-aggregated data, it can be seen that although camping areas and sites have changed little over the total period, there has been a substantial increase in hotel/motel beds, especially since the declaration of the park. This increase has been concentrated in Stawell and Halls Gap in particular.

Table 27–5 shows the number of planning permits, building approvals, and subdivision approvals over the study period in the Wilsons Promontory study area (a single Shire, South Gippsland). Table 27–6 shows the aggregated data for the same features for the Grampians study area (the Shires of Ararat, Mount Rouse, Wimmera, Arapiles, and Dundas).

Figure 27-1. Locations of Victoria's Major National Parks and Areas mentioned in the Text

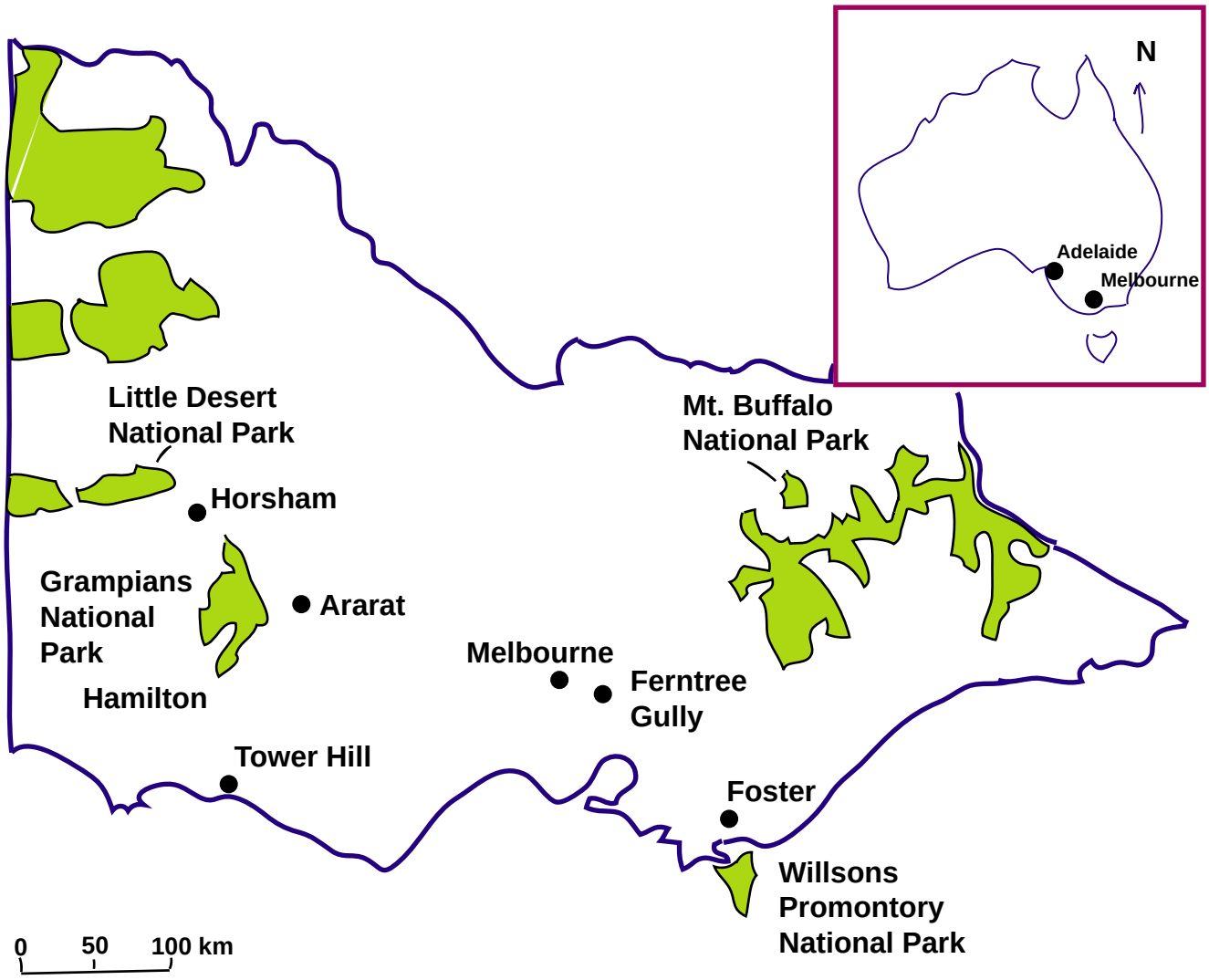


Figure 27-2. The Wilsons Promontory Study Area

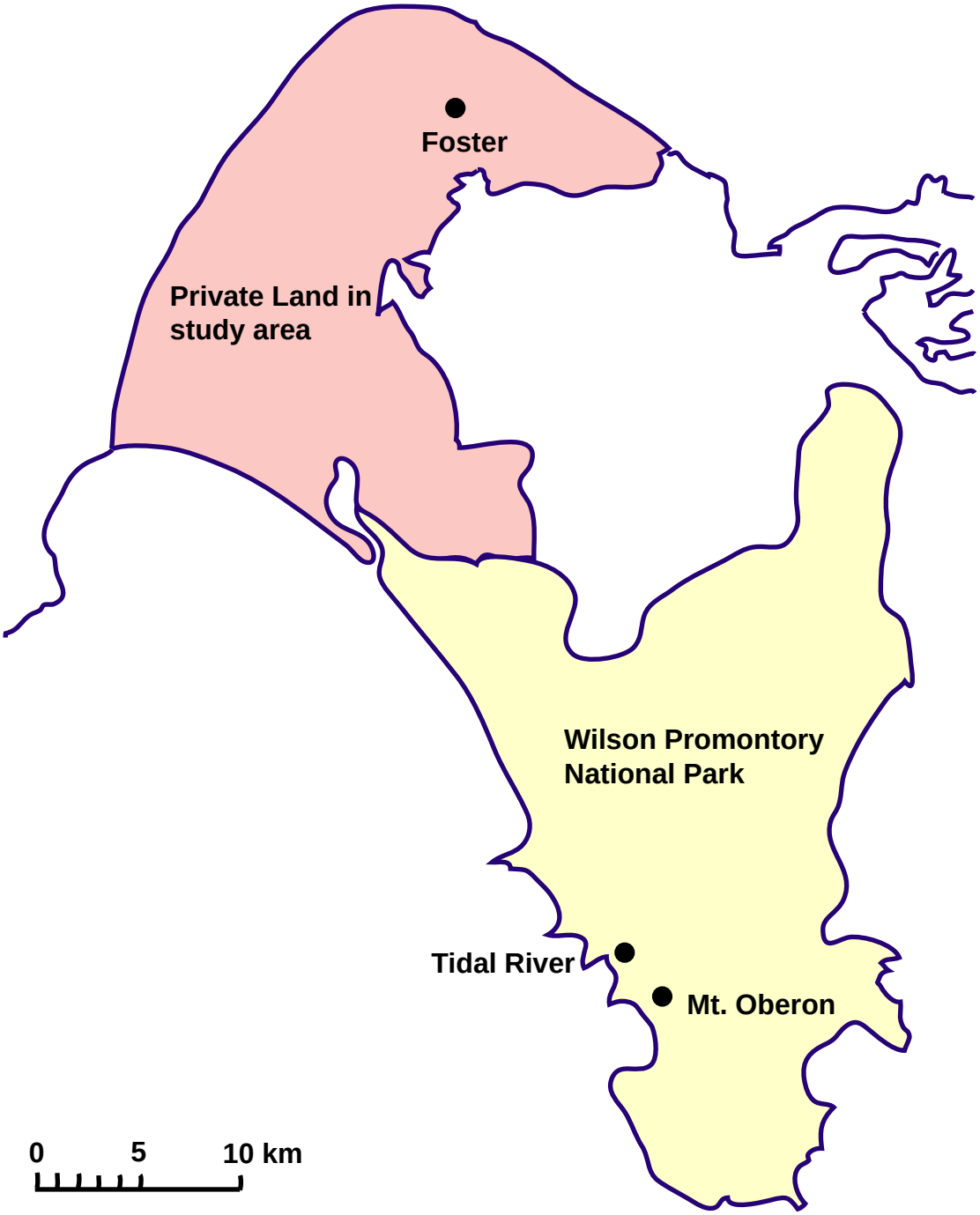
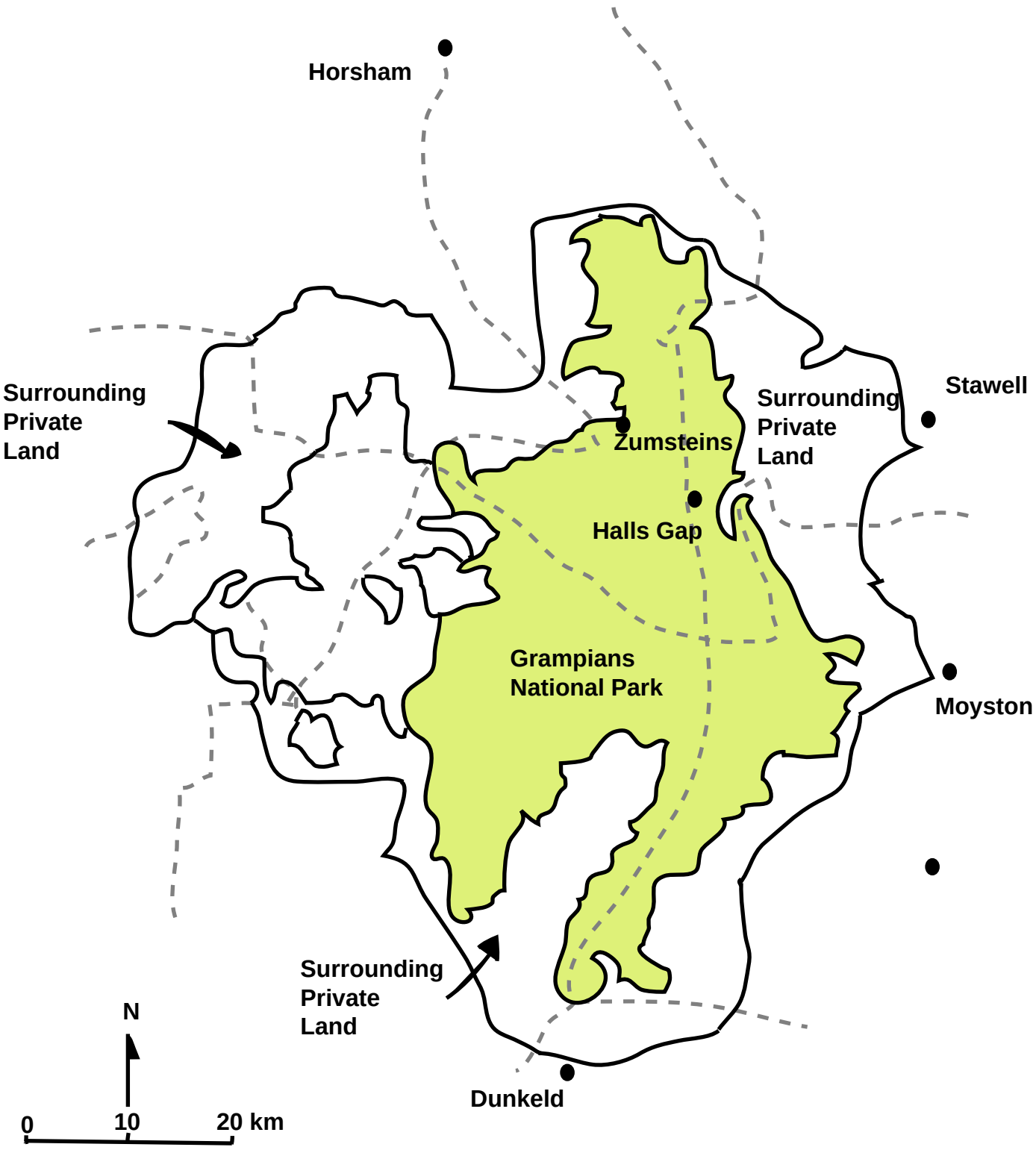


Figure 27-3. Grampians National Park Study Area



The Wilsons Promontory data (Table 27–5) show no decisive patterns except to demonstrate some increase in all three indicators from 1984 to 1988. The Grampians data (Table 27–6) show a substantial increase in the number of planning permits issued per year since 1984. The number of building approvals shows a variable pattern with no clear trend, while the number of subdivisions has increased rapidly from a low base in 1984, although a similar rate had occurred in 1978 and 1979.

The Wilsons Promontory data include the town of Foster, while Stawell and Ararat (much bigger towns) were excluded from the Grampians data; this probably explains the difference in absolute number. In the period 1984 to 1988, the number of planning permits in the Promontory area increased approximately 50 percent while in the Grampians the increase was over 100 percent. Consequently, the declaration of the Grampians National Park may have had some influence on these figures, but the data would need to be rechecked and reanalyzed to substantiate this.

If the deaggregated data for the Grampians are examined for the number of planning permits issued by locality, the rise shown from 1984 to 1988 can be almost entirely attributed to increases in the Halls Gap area and, to a lesser extent, the Dunkeld area. Again the influence of the declaration of the national park is apparent, although further study is warranted.

Conclusion

The various indicators of economic activity for the Wilsons Promontory study area, the long established national park, show little change for the period 1978 to 1991 except for a moderate increase in day visitors and in planning applications lodged. As the increased number of day visitors have apparently not been responsible for any noticeable increase in accommodation or building approvals in the surrounding areas, it appears that these people are on day trips to the park but are not living or staying in the area.

When these figures are used as a “control” for the recently established Grampians National Park, there is some evidence from the Grampians study area’s figures to suggest that declaration of the park has brought an increase in economic activity to the surrounding area. Despite the recorded visitation rate increasing little (Table 27–1), there has been a significant increase in both planning permits granted and the number of hotel/motel beds available surrounding the park. This growth has been concentrated in the township of Halls Gap and the immediate surrounding area. Incidentally, this increase does draw into question the accuracy of the Grampians park visitation figures.

Overall this study has shown, within a limited scope of preliminary indicators, that there has been some economic benefit in terms of increased tourism corresponding to the declaration of the Grampians National Park. This improvement was built on an already solid base and so it is tempting to suggest that the declaration of the Grampians as a national park has accelerated the rate of increase. To confirm or deny this hypothesis, a more comprehensive study is to commence shortly with a greater range of indicators, an extended number of parks, and an attempt to begin to attach dollar estimates to these indicators.

Table 27–1. Actual Visitation Rates to Grampians National Park 1977/78–1990

Year	*Visitor days*
1977/78	932,650
1979	936,850
1980	1,027,403
1981	N/A
1982	1,209,870
1983	N/A
1984	N/A
1985	N/A
1986	1,301,730
1987	1,369,582
1988	1,356,080

Year	*Visitor days*
1989	1,411,453
1990	1,442,956

Estimated from calibrated traffic counter; T. Le Gassick, pers. comm.

N/A = Not available.

Table 27–2. Number of Accommodation Establishments for Tables 27–3 and 27–4

	Area									
	Wilsons		*Grampians*							
Year	*Prom. surrounds*		*Northeast*		*West*		*North*		*Total*	
1978	8	(135)	16	(240)	1	(6)	5	(66)	26	(312)
1979	4	(76)	15	(239)	1	(6)	8	(93)	24	(338)
1980/81	5	(131)	16	(261)	1	(6)	9	(123)	26	(390)
1981/82	5	(124)	16	(303)	2	(18)	10	(166)	28	(487)
1982/83	4	(66)	19	(269)	1	(6)	12	(129)	32	(404)
1984	6	(121)	19	(340)	3	(18)	14	(212)	36	(570)
1985	7	(133)	22	(333)	3	(18)	15	(244)	40	(595)
1986	9	(127)	21	(314)	4	(25)	17	(266)	42	(605)
1987	10	(127)	23	(299)	4	(25)	18	(268)	45	(592)
1988	9	(124)	26	(324)	4	(21)	24	(349)	54	(694)
1991	10	(188)	27	(407)	6	(31)	27	(402)	60	(840)

Note: Figures in parentheses show the number of rooms.

Table 27–3. Number of Camps and Caravan Areas (number of sites)

	Area									
	Wilsons		*Grampians*							
Year	*Prom. surrounds*		*Northeast*		*West*		*North*		*Total*	
1978	5	(795)	5	(519)	2	(52)	8	(1,172)	15	(1,743)
1979	5	(765)	5	(519)	2	(52)	9	(1,190)	16	(1,761)
1980/81	5	(815)	5	(529)	2	(52)	8	(1,097)	15	(1,678)
1981/82	6	(890)	5	(544)	3	(58)	8	(1,104)	16	(1,706)
1982/83	6	(890)	5	(544)	3	(58)	8	(1,104)	16	(1,706)
1984	6	(905)	5	(544)	2	(52)	8	(1,137)	15	(1,733)
1985	6	(885)	5	(544)	2	(52)	9	(1,195)	16	(1,791)
1986	7	(875)	5	(448)	2	(52)	9	(1,111)	16	(1,611)
1987	7	(870)	5	(463)	2	(52)	9	(1,165)	16	(1,680)
1988	6	(790)	6	(604)	2	(52)	11	(1,316)	19	(1,972)
1991	7	(794)	5	(544)	2	(46)	11	(1,272)	18	(1,862)

Note: Figures in parentheses show the number of rooms.

Table 27–4. Total Number of Establishments (no. of units/sites)

	Area									
	Wilsons		Grampians							
Year	Prom. surrounds		Northeast		West		North		Total	
1978	13	(930)	21	(759)	3	(58)	13	(1,238)	41	(2,055)
1979	9	(854)	20	(758)	3	(58)	17	(1,283)	40	(2,099)
1980/81	10	(946)	21	(790)	3	(58)	17	(1,220)	41	(2,068)
1981/82	11	(1,014)	21	(847)	5	(74)	18	(1,270)	44	(2,193)
1982/83	10	(956)	24	(813)	4	(66)	20	(1,233)	48	(2,110)
1984	12	(1,026)	24	(884)	5	(60)	22	(1,349)	51	(2,303)
1985	13	(1,018)	27	(877)	5	(60)	24	(1,439)	56	(2,386)
1986	16	(1,002)	26	(762)	6	(77)	26	(1,377)	58	(2,216)
1987	17	(1,017)	28	(762)	6	(77)	27	(1,433)	61	(2,272)
1988	15	(914)	32	(928)	6	(73)	35	(1,665)	73	(2,666)
1991	17	(982)	32	(951)	8	(77)	38	(1,674)	78	(2,702)

Note: Figures in parentheses show the number of rooms.

Table 27–5. Local Government Data for the Wilsons Promontory Study Area

Year	Number of planning permits lodged	Number of building approvals	Number of subdivisions lodged
1978	104	192	64
1979	98	230	66
1980	84	268	51
1981	123	217	51
1982	92	260	49
1983	71	329	55
1984	114	222	52
1985	121	349	48
1986	131	346	69
1987	143	306	66
1988	164	363	68

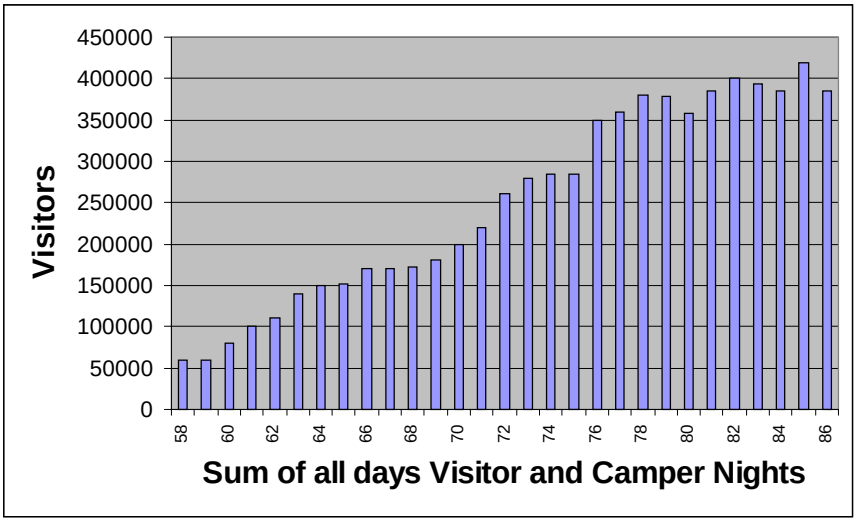
Table 27–6. Local Government Aggregated Data for the Grampians Study Area

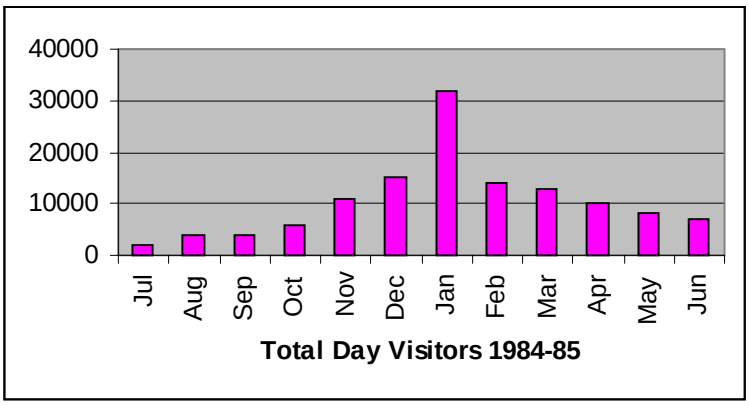
Year	Number of planning permits issued	Number of building permits issued	Number of subdivisions approved
1978	30	134	23
1979	41	101	18
1980	45	121	10
1981	30	119	14

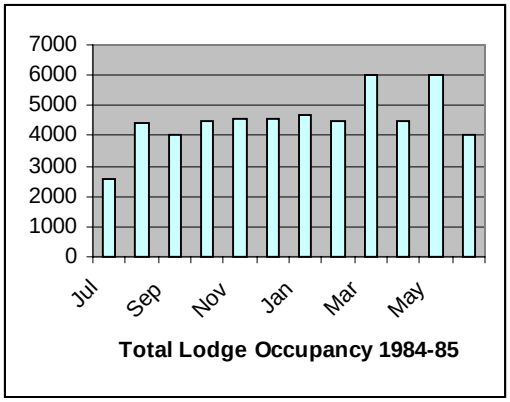
Year	*Number of planning permits issued*	*Number of building permits issued*	*Number of subdivisions approved*
1982	45	115	12
1983	48	137	11
1984	49	134	6
1985	62	144	12
1986	54	169	17
1987	74	147	21
1988	118	117	22

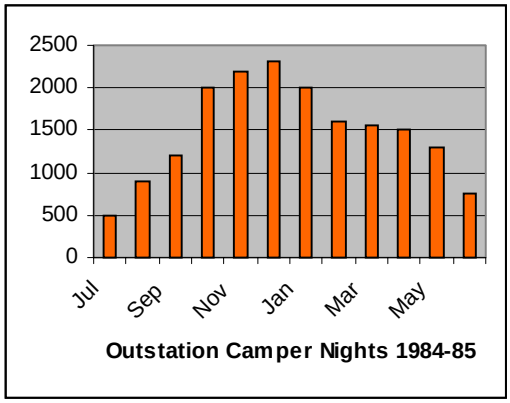
Cities of Ararat and Stawell have been omitted because the permits are probably not related to the establishment of national parks and the numbers were so great as to distort any trends in the shire data. Number of building approvals excludes nondwellings as far as possible (i.e., excludes machinery sheds, solid fuel burners, etc.).

Figure 27-4. Total Annual Visitors to Wilsons Promontory, 1958-87









Source : DCFL (1987)

Bibliography

Budge and Associates. 1991. Grampians Surround Strategy Discussion Paper. Bendigo, Victoria.

Ovington, D. 1980. “A National Perspective.“ In J. Messer and G. Mosley, eds., *The Value of National Parks to the Community*. Australian Conservation Foundation, Melbourne.

Shire of Stawell. 1989. Halls Gap Profile Report. Stawell, Victoria.

Victorian Department of Conservation, Forests and Land. 1985. Grampians National Park Management Plan. Melbourne, Victoria.

———. 1987. Wilsons Promontory National Park Management Plan. Melbourne, Victoria.

Victorian Land Conservation Council. 1988. Statewide Assessment of Public Land. Melbourne, Victoria.

Victorian National Parks Service. 1984. Grampians National Park Inventory of Resources and Uses. Melbourne, Victoria.

Wescott, Geoffrey C. “Australia’s Distinctive National Park System.” *Environmental Conservation* 18 (Winter 1991):331–40.

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