WWF

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arbor*vitæ*

FUTURE FIRES
PERPETUATING PROBLEMS OF THE PAST

Contents

The Burning Issues

Disturbance is present in all natural ecosystems. Forest management therefore needs to be able to accommodate chance episodes of natural disturbance, including fire. Managers also need to distinguish between harmful and harmless or beneficial fires. Fire is sometimes essential for forest regeneration, or provides tangible benefits for local communities: in other cases it destroys forests and has dire social and economic consequences.

Recent large-scale fires

throughout the world have demonstrated the high social, economic and ecological costs of uncontrolled fires. Unfortunately, government responses to forest fires have tended to focus on suppression and costly technological solutions to fight fires. But rather than alleviating forest fire problems, these measures have not solved the problem – and in some countries have even increased the scale and magnitude of forest fires.

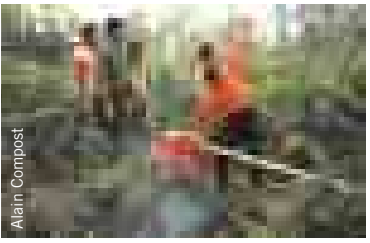
There is a growing need to develop more strategic responses to forest fires. There are no 'magic bullets' or 'instant solutions'. The issues to be addressed are complex and cut across many interests, sectors, communities, nations and regions.

In 1998, IUCN and WWF joined forces to develop a Global FireFight Programme to strengthen national, regional and international networks for forest fire prevention and management, world-wide. As part of this Programme Project FireFight South East Asia was developed and started work in 2000. The project works at the national and regional level across South East Asia to support and advocate the creation of suitable legislative and economic conditions that will help stop harmful man-made forest fires. WWF and IUCN now plan to use the South East Asia model as a basis to extend the Global FireFight Programme to South and Central America, Russia, the Mediterranean and sub-Saharan Africa as funds and capacity becomes available.

This arbor*vitæ* special looks at the sources of man-made fire and at the range of solutions available from community fire management initiatives to the wider economic and legislative issues, which are often the underlying cause of fire. It highlights work that the Global FireFight Programme has undertaken and looks towards the initiatives which still need to be developed to further this work and help move the debate forward on how to reduce the ever growing number of harmful forest fires.

An overview of forest fires

Throughout the world, forest fires are out of control – not just because of the conflagrations that regularly feature on our televisions, but more fundamentally because governments and agencies have failed to agree on how fires might be controlled. The resulting lack of clarity, further muddled by the fact that fires and the risks of fires are used to promote a plethora of narrow vested interests, means that forest fires will remain a source of bitter controversy, expense and damage into the future.



Two of the world's

richest and most technically advanced countries, the USA and Australia, are both facing crises of fire management: if fires can't be controlled in the lower 48 of the United States there appears to be little chance of getting fire management right in the poorest countries of Asia and Africa. But perhaps not: as we argue elsewhere, managing fires can have as much to do with agreeing aims and ways of cooperation as with technological sophistication or the size of fire-fighting teams.

Good fires/bad fires

Forest fires are a natural part of ecosystems in many but not all forest types: in boreal and dry tropical forests for example they are a frequent and expected feature, while in tropical moist forests they would naturally be absent or at least rare enough to play a negligible role in ecology. Fires become a problem when they burn in the wrong places, or in the right places but at the wrong frequency or the wrong temperatures. Fires in forests that are supposed to burn also become a problem when we decide we wish to use those forests for particular purposes that are upset by fires, such as settlement or timber production.

Globally, most forest fires are probably now directly or indirectly influenced by humans. In a few places, such as the vast, uninhabited areas of boreal forest and tundra in Russia and Alaska, many fires are still natural, caused by some of the thousands of lightning strikes that take place every year and burning unchecked to create the region's characteristic vegetation mosaics. In the wet tropics, most fires are set by humans. But even more significant, in many areas that are hot and dry for part of each year, where frequent fires would be expected, human influence has now become so pervasive that most fires are 'unnatural' – it is estimated that only 1-5 per cent of fires in the Mediterranean countries of Europe now start through natural causes.

We influence fires in two ways: deliberately *starting* them for land clearance, game management etc and deliberately *suppressing* them in a way that creates fuel build-up and less frequent, hotter and more destructive fires. Objectives and aims are not synchronised or thought through leading to unwanted and wanted fires, which can result in both beneficial and damaging effects. The geographical spread, frequency and intensity of fires are all changing. While short-term peaks and troughs of fire frequency are often due to factors outside managers' immediate control (drought, wind or the effects of El Niño), long-term trends are for greater interference with fire ecology, often through poor forest managment, in ways and with implications that remain poorly understood.

Fire is used as a management tool because it is cheap, simple to apply (particularly important if use is illegal) and sometimes the only option available for poorer people and smallholders. The vegetation patterns of the Australian bush and the African savannah provide testimony that fire has been used for millennia and slash and burn agriculture has been practiced in many wet tropical forests for similar periods. Large-scale forest change in the wet tropics is more recent; driven by changes in land use to allow plantation establishment or ranching, reflecting the influence of global markets and loss of traditional land rights.

But the management tool is not working very effectively. In the USA, where huge efforts have gone into fire management, fires are estimated to have cost US$1.6 billion to fight last year. Most governments are in denial about the scale of the problem and the failure of current approaches. As shown vividly in the USA recently, with arguments that fire risk justifies logging old-growth forests to remove fuel accumulations where the ecology may or may not be consistent with this approach, science is repeatedly over-simplified and distorted by politics. Thus fire becomes another pawn in the never-ending chess match over control of natural resources. Fire control technology has manifestly failed to solve the fire 'problem'. Much of the technology is in any case not applicable, nor available to the poorer countries.

There are some aspects of forest fires that people cannot control. Climatic factors such as wind, humidity, temperature and rainfall remain beyond our influence. Similarly governments can't stop all fires: some are necessary, some are useful and accidents or deliberate fire-raising will always occur to some extent. The major influences on fires are undeniably within the role and responsibility of governments where the underlying causes relate to land use, poor forest management, lack of planning and enforcement capacity.

Governments and others with responsibility for land management can help manage the ways and extent to which people create conditions that encourage fire, particularly the build-up of flammable material: for example a change in fuel availability such as caused by destructive logging is a major factor in increasing tropical fires. We can also reintroduce fire to landscapes where its short-term absence will lead to larger scale and more intense fires in the future. (Such interventions need careful management – a 'controlled burn' that went wrong threatened the nuclear research institute at Los Alamos in New Mexico last year, with potentially disastrous results). We can also separate people and their assets from areas where fires will occur, or ensure that if people choose to live in fire-prone areas they understand the risks and take appropriate responsibility (similar arguments are being used about people who choose to live on flood plains).

Governments can also address issues of governance and the breakdown of the rule of law: many fires are set in, for example, Indonesia, the Mediterranean and Brazil because those behind the fires are reasonably sure that they won't suffer consequences from their actions. Perhaps most important of all, governments need to decide exactly *what they are trying to achieve*, in terms of amounts of fire, zoning of fires and levels of risk. Until we know where we are going, we are unlikely to get there.

Clockwise from left:
A peasant farmer using fire during a period of drought and heightened risk of forest fires in the Amazon

Fire plays an important role in the ecosystems of the northern forests - this picture shows smoke from forest fires (left) spreading across northeastern Russia, and over the Bering Strait and Alaska. Image courtesy the SeaWiFS Project, NASA/Goddard Space Flight Center, and ORBIMAGE

A community fire danger rating information system in South Africa

Fighting fire in a peat swamp in Kalimantan (2 pictures)

Rethinking fires

The world has two problems with forest fires: an increase in unwanted fires and a parallel reduction in necessary fires. Each year fires affect huge areas of forest, grasslands and scrub that would not burn under natural circumstances. Conversely, each year many fires are suppressed, which will have negative impacts in the long-term. Which are which and what should we be doing about them?

Clockwise from left:
Forest underbrush is burnt to prevent forest fires in Australia

An army helicopter airlifts civilians to safety during a forest fire

Deforestation and settlement patterns cut through the rainforest Brazilian state of Acre – the plume of smoke is roughly parallel with the Rio Abuna. Image courtesy NASA/GSFC/LaRC/JPL, MISR Team.

Fire problems are increasing. Tens of millions of hectares have burnt in the last three decades, affecting hundreds of millions of people and costing thousands of millions of dollars. The last decade has been the worst yet. These problems have caught the attention of governments, donors and NGOs who have made large investments in fire management projects: for example over 30 projects were funded following the 1997/98 fires in Indonesia and enormous efforts were devoted to the US National Fire Plan. Yet this reaction can itself become part of the problem. Dealing with fires has frequently been interpreted as putting out fires or adding capacity to put out fires, yet this is often not what is most needed.

Part of the confusion arises because reactions to fires often lack a logical construct: i.e. there is no theory or frame of reference that enables systematic analysis. Instead, it is assumed that fire 'problems' are created by lack of capacity to extinguish fires. Consequently fire management efforts focus on enhancing professional fire-fighting capacity, largely ignoring the potential role of communities and overlooking analysis, prevention and restoration.

To develop a measured response to fires we need to think through all components of fire management, as summarised in the accompanying diagram. While many of these issues are known to fire managers they are generally not considered together as an integral whole.

At present, analysis is often done only when a fire starts, and is then mainly influenced by the political pressures created by dramatic images of fires and by the immediate responses needed to protect people and their assets. A better response would be to start analysis before a fire begins, work out the amount of effort, thinking and resources that have been applied to the entire fire management system and consider re-balancing management if indicated. Although understood in theory, this is not often carried out for various reasons:

- In most cases no overall fire management framework is available for people to consider and apply.
- There is a widely-held view that fires are a simple suppression problem rather than a symptom of complex underlying management problems.
- The most dramatic part of fire management to see, photograph or be associated with is response. Fires are an obvious 'enemy' and clear consensus about addressing burning fires is more socially and politically attractive than long-term prevention. This leads to a mutually reinforcing cycle of reaction to fires without clear analysis and without addressing complicated social and environmental questions involved in fire prevention.
- Arguments often take place without reference to scale. The sources of ignition, fuels and people who suffer are present at local scale. The systems and frameworks of fire management are often best established, managed and administered (but not necessarily operated) at provincial or perhaps national scale. The system monitoring, standards and analysis are usually best dealt with at national scale. International actors also hold major global concerns, including species and ecosystem impacts and emissions of greenhouse gases. Yet discussion and debate are often held in a 'no-man's-land' without reference to scale.

A Framework for Fire Management

System Tools	System Process Components
Maps (vegetation type, topography, land tenure, assets, roads, landscape features, ignition distribution etc) **Fire behaviour prediction tools** **Spatial databases** **Demographic information** **Cultural and social context of fire**	**Analysis of the fire problem** **1. Fire Likelihood (Ignition history)** **2. Consequence of** → Economic, Social, Environmental **Fire on** → Intensity, Spread Rate, Duration **Assets** → Value, Vulnerability
• Fire use laws/regulations, enforcement programmes • Planning controls • Education programmes • Fire behaviour guides, ignition and control resources, planning and reporting tools • Firebreak construction guides • Building construction codes	**Prevention** **Ignition Reduction Strategies** • Regulate fire use, educate fire users, technology improvements, development planning controls **Impact Mitigation Strategies** • Fuel reduction (e.g. by burning, grazing and other means) • Reduce asset vulnerability (e.g. through building construction standards) • Establish/maintain containment features (e.g. roads, firebreaks fuel breaks etc)
• Climate and weather monitoring and prediction • Fire Danger Rating (FDR) system • FDR public notification means • Detection and suppression resource needs assessment • Fire detection, suppression and communications resources • Fire training systems and tools	**Preparedness** **Strategies** • Early Warning/Predictive systems • Community warning mechanisms • Detection and response infrastructure • Communications systems • Mobilisation and co-ordination plans • Response triggers and levels • Competent fire control staff
• Response mobilisation plans • Operational responsibilities and procedures • Strategic information access tools • Decision support tools • Operational management systems	**Response - fire fighting operations** **Detection and reporting** **First response** **Containment and control** **Mop up and patrol** **Command and control**
• Damage assessment tools • Recovery assistance plans and infrastructure	**Post fire recovery** **Community welfare assistance** **Economic loss reduction (e.g. salvage logging and replanting, infrastructure repair)** **Environmental repair and restoration**

System Improvement Review Monitoring

Source: Metis Associates, Strategic Analysts


Alain Compost

Community involvement in fire management

The search for improved approaches to forest fires has led for calls to revisit traditional forest fire management regimes that emphasise prescribed burning and prevention. Many of these systems and approaches have potential to be effective in tempering uncontrolled burns, beneficial to local ecosystems and, in the long-term, cost efficient.

Communities manage fire in forests in a variety of ways.

For the development and implementation of fire management strategies to take place this diversity needs to be evaluated to determine how, when and why local communities use and manage forest fires. Project Firefight has been documenting and analysing examples of successful Community Based Fire Management (CBFiM) in South East Asia since 2000. From this work it is clear that CBFiM is most effective as part of an overall community based resource management strategy and should if possible be included in community based forest management programmes. Most importantly, a community's motivation to manage fire will depend on the degree to which they have rights to use and access forest resources, or are dependent on them for subsistence. Successful community involvement however depends on many other factors, including those listed below.

- Resource allocation needs to be carefully planned to ensure that poor communities are not overburdened, especially if the benefits will only be felt in the future.
- To be sustainable, incentives for fire management must be related to the community's needs. This means that when people are interested in managing fires their objectives have to be understood.
- It is important that the government supports fire prevention and balanced fire management.
- The absence of conflict and disputes over resources is crucial as inter-community cooperation is needed for effective fire management.
- CBFiM requires an institutional structure within the community, possibly supported by government.
- For effective fire management, sanctions are equally as important as incentives. Generally, community-enforced fines and other penalties work better than government legislation.

Communities are of course only one part of a holistic approach to fire management, which needs to involve all parties managing land, particularly the government and the private sector.

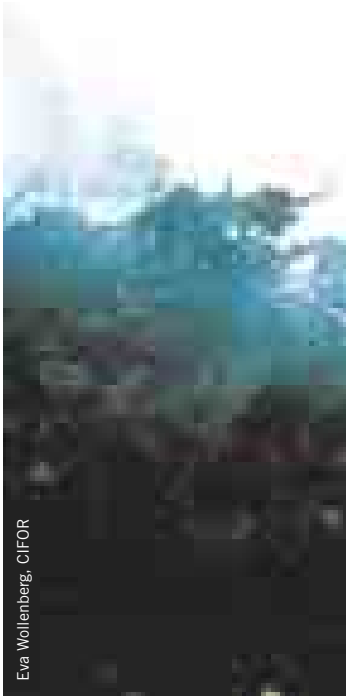
The way forward

As people clarify and contribute to the body of knowledge on communities and forest fire, there is the potential to identify some general models of CBFiM for others to experiment with in their own countries. The challenge is to learn the lessons and identify the common principles without getting lost in the tremendous diversity of approaches.

In order to transfer lessons between communities in different provinces, nations, and regions, there is a need for improved education and training. This should recognise the technical and organisational capacity of communities in relation to managing fire, historically and culturally. Integral to this education and training, is the need to evaluate the effectiveness of community based approaches with some sort of consistency and rigor. This is especially necessary to raise the awareness of fire management issues and the effectiveness of CBFiM approaches to those agencies that do not recognise and support it.

The South East Asian environment presents a unique set of forest resource management scenarios that requires further research to characterise CBFiM approaches that can then be tailored to specific situations. This diversity can be captured by action research, which will promote people working together to research, adapt and implement CBFiM systems in situations where there is uncertainty about the context and/or the best approach to take.


Alain Compost


Eva Wollenberg, CIFOR

Case Studies

Collaboration in Thailand

Villagers from the Mae Khan watershed used fire as part of a traditional cultivation system. In the early 1990s, fire started to become a problem, spreading from one village to another and putting valuable forest catchment areas at risk. In response, communities came together to form a collaborative fire protection network around their forest. Today the villages have a coordinated system to protect the Mae Khan watershed.

Swidden in Cambodia

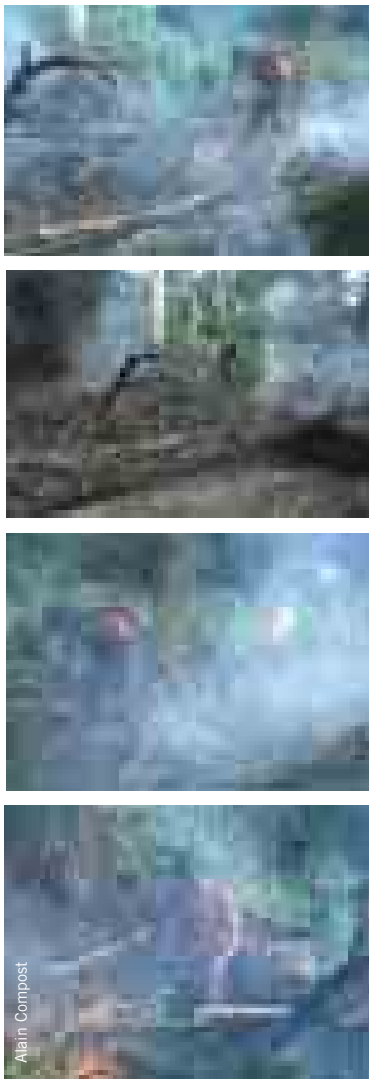
In communities of the Kui people, all plant debris is piled in the middle of the fields and burnt to ensure that fire from swidden fields (chamkar) does not spread to other fields or surrounding forest. Field perimeters are swept about 5 meters into the forest to remove any flammable materials. Burning of the debris is carried out against the wind for thorough burning and to prevent the fire from spreading beyond the burn area. Burning is carried out in the afternoon during the dry season, as it is hotter and a better burn is achieved. Usually old people are in charge of the burning because they are more experienced. Other villagers are warned in advance so that they can take precautions to protect their fields. (Information from a Kui woman, 2000)

Buffers in Eastern Kalimantan

When clearing a field the Wehea Dayaks of Diak Lay, gather the slashed vegetation into small piles to isolate the burn. In addition, they reserve natural buffer strips 20-30 meters wide alongside the fields that also serve as a seed source for regeneration, a corridor for the movement of animals, humans and birds, and as a microclimate to slow pests from other swidden fields.

Customary law in Indonesia

Villagers of Tenganan in Bali follow customary law or 'awig-awig desa', which includes a provision for punishment for fire damage: "if one of the villagers burns bush or garbage that causes other trees to be burnt he will be fined in accordance with the damage done and he should also perform a religious purification ceremony".



A series of pictures from Kalimantan, Indonesia, showing ladang making after fire and field burning, normally a prelude to rice cultivation by the Dayak people

Any analysis of forest fires needs to take into account the underlying causes of forest destruction, including financial and economic impacts as well as policy and legislative factors that have to be identified and understood before solutions can be found for more responsible fire use.

The economics of fire use

Controlled use of fire carries the risk that fire will escape. Fire is a cheap management tool that can, if misused, cause huge socio-economic costs creates major market and institutional challenges.When fire strikes the social and economic effects are direct: buildings, crops and plantations are destroyed and lives can be lost. For companies, fire can mean the destruction of assets; for communities, fire can lead to environmental degradation through impacts on water cycles, soil fertility and biodiversity; and for farmers, fire may mean the loss of crops or even livelihoods. In August 2000, for example, the Island of Samos in Greece lost all of its Brutia pine stands, which provided islanders with their only alternative income to tourism, and following the fires more than 50 per cent of tourists' bookings for 2001 were cancelled.

Masking out the smoke from forest fires in Central Kalimantan

Alain Compost

The haze that is often associated with large fires also has social and economic effects. Haze can last for several weeks and can disrupt transport, affect health and reduce tourism. The 1997/98 hazes across South East Asia affected 70 million people in several countries and are estimated to have cost US$9.3 billion.

One course of action, and the most likely to have immediate effects, is to encourage the users of fire to prevent wildfires. Commercial operations, for example, can choose to use alternative methods, such as 'zero-burning', for land clearing (see below). Smallholders generally do not have the resources to invest in zero-burning techniques. Instead, establishing appropriate institutions and clearly defined tenure will help to promote responsible fire use among local communities (see pages 6 and 7).

A major draw-back in efforts to promote prevention as a sound economic practice is that laws and regulations penalising irresponsible fire use are seldom enforced and there are few rewards for responsible fire use. There are also perverse incentives for letting fire escape. Areas damaged by fires, for example, can be purchased at lower prices and are more easily converted to agricultural or development use.

The way forward

Some of the projects and activities which can be used to reduce irresponsible and dangerous use of fire include:

- Researching the costs and benefits of using and managing fire.
- Promoting responsible fire use in land clearing and hunting among local communities and smallholders.
- Promoting the zero-burning method for commercial plantations as a cost-effective long-term approach.
- eveloping a system to sanction dangerous practices and reward good behaviour.
- Ensuring that land use policies incorporate responsible fire use at all levels.
- Identifying key locations for potential large fires.
- Setting up a monitoring system to prevent irresponsible fire use, and provide training and incentives for responsible fire use.

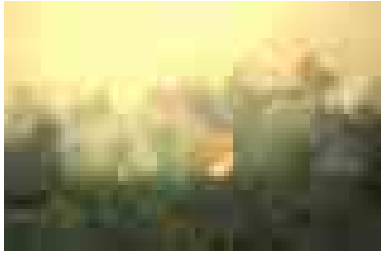
Case Studies

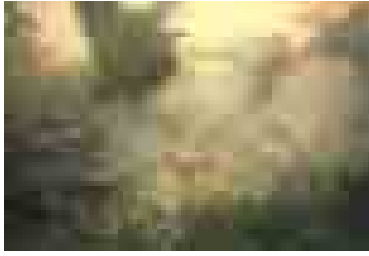
Indonesia: Zero-burning a real option

The practice of zero-burning restricts, but does not completely bar, the use of fire for clearing land or replanting of industrial tree crops. A study by Project FireFight South East Asia has reviewed existing knowledge on the financial costs and benefits of using fire in agriculture and forestry in Indonesia – especially for clearing land. The financial analysis of the costs and benefits indicate that zero-burning methods are not more expensive, and may be more cost effective in the long-term, than burning. However, where biomass is high, i.e. when clearing large-volumes of forest debris, burning remains cheaper, thus necessitating some form of subsidy or support to persuade companies to implement non-fire regimes.

Malaysia: Addressing the issue

Malaysia amended its Environmental Quality Act (1974) in 2000 to address problems related to open burning and to ensure the policy of 'zero-burning' was implemented. The amendment abolished the Department of Environment's powers to issue contravention licences for burning but instead provided a specific list of authorised prescribed activities for open burning. The industry, including those involved in palm oil and wood and pulp plantations, are now required to apply zero-burning methods when clearing land as the Act has effectively banned open burning on vast plantation areas.





Legal and regulatory aspects of forest fires

Relevant legislation

and regulations, combined with a proactive fire policy, are important prerequisites for any fire management activities. However, even when these are in place the capacity to enact policies and legislation is often hindered by the ability and/or the willingness to monitor and enforce them. There is also a lack of adequate policies providing for fire risk assessment in the more general policy and legislative environment. For instance, in many Mediterranean countries fire is being used as a tool to convert land from forest to urban use due to unclear land use planning policies. Similarly, laws or administrative tools to punish those responsible for forest fires or to ensure that the costs for damage are recovered tend to be inadequate or ineffectively applied.

A study carried out by Project Firefight South East Asia has identified some of the main constraints, weaknesses and problems that exist in the implementation of laws and regulations on fire management. Although relating specifically to South East Asia, the issues raised can be applied far more generally. They include:

- Lack of political will from government at all levels.
- Unclear and weak policies and regulations.
- Overlapping and conflicting roles and responsibilities of different agencies and institutions.
- Bureaucratic procedures and poorly coordinated activities at all levels.
- A sectoral approach mainly focused on suppression instead of prevention.
- Vested interests that marginalise issues relating to fire and haze to favour a particular sector.
- Inadequate resources (finance, technology, manpower, skills and data) to enforce laws and regulations.

The way forward

To overcome these problems and to create the conditions necessary for the effective management of forest fires some basic requirements include:

- Participation of all relevant stakeholders at all levels in comprehensive and integrated programmes and activities.
- The confusion and conflict within and between laws (and objectives) for forestry and other land uses must be resolved.
- Development of land-use management planning with clear definition of land ownership and appropriate land allocation based on balanced consideration of economy, ecology and social factors.
- Rigorous law enforcement against violation.
- Development of incentive schemes.

Extensive land clearing for palm oil plantations in South Sumatra

Case Studies

Indonesia: No trial by fire

Following the severe fire outbreaks in Indonesia in 1997/98, 176 forest concessionaires, plantation companies and transmigration area developers were accused of using fire for land clearing activities. The authorities investigated 13 companies and took five to court. However, to date no company has been punished. In 1999, 22 companies were identified as using forest fires in their concession areas – three were investigated, three warned and two received administrative sanction from the Ministry of Forestry. In 2000, six companies were under police investigation for the same offences. Four companies were warned and Timber Utilisation Permits were temporarily revoked for four plantations and six forest concessions. In 2001, five plantation companies were brought to court for using fire to clear concession areas. Two cases were dismissed due to the technical difficulties, two cases are still pending and so far, just one company has been found guilty. Despite this seemingly poor record, Indonesia does have the legal and institutional tools to regulate and manage forest and land fires – however they are clearly not functioning effectively.

Italy: Fire framework

A turning point in the fight against forest fires was marked by the 'framework law on forest fires', passed in November 2000 by the Italian Parliament. The framework law includes several important innovative elements, such as the judicial definition of 'forest fire' and the harmonisation of the many laws related to forest fires, as well as an increase of fines and penalties.

WWF-Canon / Hartmut JUNGIUS

Priorities for stakeholder action

Decision-makers have shown themselves to be better at reacting to short-term crises than at focusing resources on long-term and sustainable solutions to recurring problems. This has led to a distorted view of fires and their causes as well as of what are effective solutions. New ideas and directions are now needed.

Fire management

is a critical component of sustainable forest management. Through this arbor*vitæ* special IUCN and WWF are advocating a more integrated approach to fire management (see diagram on page 5). Such an approach places greater emphasis on seeking sustainable solutions that incorporate five essential elements of forest fire management:

- **Analysis** – a thorough evaluation of the fire issue is required prior to heavy investment in fire control and management efforts
- **Prevention** – focusing on ignition reduction, impact mitigation and fire use strategies (n.b. controlled burns are a beneficial and appropriate management tool in many cases)
- **Preparedness** – focusing on early warning systems and ways to improve readiness of key actors to respond appropriately to fires as they occur
- **Response** – ensuring appropriate responses to inevitable wildfires.
- **Restoration** – restoring fire-damaged ecosystems, and over the long-term re-establishing ecosystem function, structure, productivity and natural fire regimes.

Forest departments need to invest more in the promotion of management systems that mimic natural fire regimes or take advantage of well-established fire use or natural fire; develop tactics to prevent recurring harmful fires; establish reliable fire monitoring programmes and strengthen the involvement of key stakeholders, especially local communities, in fire management planning. To do this, resources need to be redirected to support research that improves the understanding of fire causes and effects and identifies existing management practices that predispose ecosystems to harmful fires. Finally a concerted effort is required to build awareness amongst policy-makers, the public and the media and develop compatible and mutually reinforcing land-use laws for appropriate fire use.

The model developed through Project FireFight South East Asia provides an example of working with stakeholders to build constructive relationships and strong communications. WWF and IUCN have identified a number of stakeholders and important issues to work with on these issues.

Governments

Confusion and conflict within and between laws and objectives for forestry and other land uses must be resolved, if the problems associated with forest fires are to be addressed. Furthermore, bureaucratic capacity and support for the rule of law must be increased. Laws and regulations have to be known and understood by those expected to enforce them. To do this, authorities should better educate their employees about the importance of the rule of law and laws and regulations relating to fires in particular.

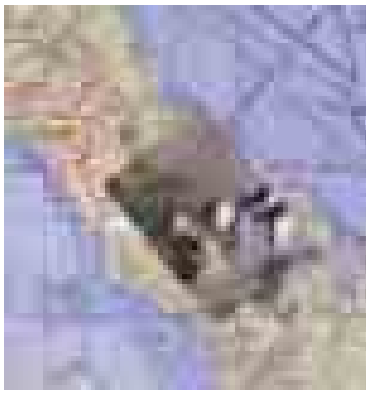
IUCN and WWF have prepared balanced reviews and analyses of the legal and regulatory reality for fires in South East Asia. This approach will be integrated with the efforts of other stakeholders on related issues, such as illegal logging and protected area management, to promote sustainable forest, land and agricultural practices through sustainable fire management.

Private Sector

It is often assumed that private sector operators have no alternative but to use fire for land clearing, or that the alternatives that do exist are too costly. This is yet another myth about forest fires that is hard to banish. In reality, fire use is often based more on habit and historical practice than on calculation of its costs and benefits. For example, the indications are that for low volumes of biomass (i.e. less than natural forest) land clearing methods not using fire may be more effective than burning (see page 8). In the future, IUCN and WWF intend to work more closely with those private sector companies that are willing to assume their legal responsibilities concerning fire management, encouraging them to become more pro-active in researching, developing and implementing new, zero-burn land clearing methods.

Communities

Local people may in some circumstances have extensive knowledge about fire management, which is well adapted to the local environment and therefore may be in a position to manage or prevent fires at the local scale. However, in the case of very large fires, communities often have inadequate training and experience and professional expertise is required. Clear land rights are a strong incentive for communities to engage in fire management (although fire may continue to be used for hunting even in these conditions). WWF and IUCN intend to work with grassroots organisations, in cooperation with the private sector and government agencies, to actively support Community Based Fire Management. This includes capacity building based on existing community practice supplemented by more information (i.e. weather, maps etc), and securing land rights.



Clockwise from left:
Steppe forest regenerating after fire in Mongolia

A vivid representation form KidSat, NASA JPL of the fires that raged out of control across Sumatra in 1997

Case Studies

Fires and Restoration

Forest Landscape Restoration is defined as: *'a planned process that aims to regain ecological integrity and enhance human wellbeing in deforested or degraded forest landscapes'*. It focuses on re-establishing functions and key ecosystem processes across a whole landscape rather than just planting or restoring individual sites. As such, it necessarily addresses the causes of forest loss and degradation. In many regions, one of these is fire.

Fire is a powerful tool to create, change or destroy landscapes. While in some cases fire is an integral part of the ecosystem, in others it clearly is not. In many degraded ecosystems, amongst other imbalances, the natural fire ecology has been disturbed. This can lead to increased susceptibility to fire. Changing land use conditions (e.g. urbanisation, plantation forestry) have often caused fire to become a dangerous and destructive force.

Forest Landscape Restoration looks at a mosaic of land uses including agricultural lands and forest types ranging from plantations to natural forests. It can be a tool to reduce the impacts of fires and a response to destructive fires. Conversely, Forest Landscape Restoration can sometimes involve the re-introduction of controlled fires to reduce fuel build-up and to recover natural ecological processes (for example prescribed burning has been re-introduced in parts of European Lapland to restore more natural forest ecosystems). Addressing the causes of destructive fires will also be another avenue to achieve forest landscape restoration.

Clear understanding of the 'natural' role of fire in an ecosystem is important in making decisions to apply fire where it is needed, to prevent fire and to address its root causes (e.g. policies) where it is harmful, as a wrongly used or unnatural fire regime can destroy years of restoration efforts.

WWF and IUCN have recently come together with The Nature Conservancy (TNC) to work proactively with multi-lateral agencies, governments, the private sector and local communities to develop integrated fire management approaches that address underlying causes and develop long-term sustainable solutions.

ITTO Pre-project FireFight

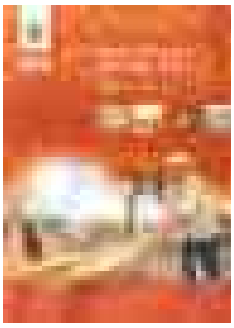
The International Tropical Timber Organization (ITTO) has a long history of work on fires – starting with the 1989 assessment of the Kalimantan fires. Recently, forest fires have gained renewed ITTO attention. As one of the outcomes of the November 2002 session of the ITTO Council, tropical countries will receive more ITTO assistance to improve the prevention and management of forest fires.

Together with the Swiss Government, ITTO is also providing financial support to a pre-project FireFight currently being implemented by IUCN, with the assistance of WWF. The pre-project will help IUCN and WWF to extend the FireFight initiative to a number of critical regions/countries. Scoping workshops will be held in West Africa, the Mekong Region and in the Northern Andes to bring together relevant actors from ITTO member countries in the three regions covered, to assist in the development of fire project proposals.

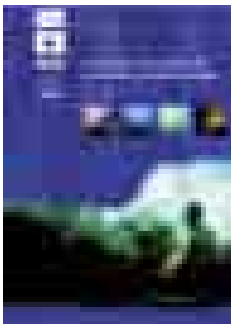
If you would like more information about the pre-project FireFight please write to Sonja Canger (forests@iucn.org).

Publications

For more information on Project FireFight South East Asia, visit http://www.pffsea.com. All publications listed below can be downloaded from the web in pdf format; if you require a hard copy, please email: n.haase@cgiar.org.

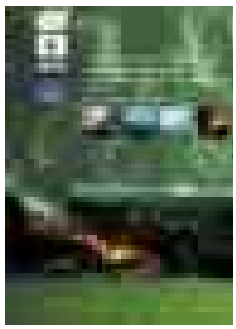


Global Review of Forest Fires, was published in 2000 as a follow-up to the 1997 WWF Discussion Paper *The Year the World Caught Fire*. The review outlines WWF and IUCNs belief that it is time to radically rethink our approach to fire and forest management, with a much greater emphasis on community involvement. The review also stresses the fundamental need to address the underlying causes of forest fires.



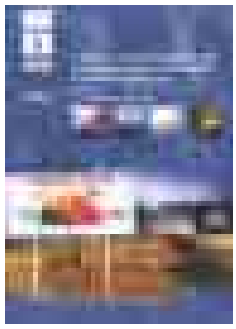
Community Management of Forest Fires in South East Asia, documents and analyses the common characteristics and diverse contexts for furthering community involvement in fire management.

Review of Community Based Fire Management in Lao PDR, produced in collaboration with RECOFTC and FAO, this publication is part of a series, including China, India, The Gambia, Honduras and Turkey (all forthcoming), of case studies on community based fire management.



The Economics of Fire Use in Agriculture and Forestry - A Preliminary Review for Indonesia, a comprehensive economic analysis of fire use. This report examines the state of knowledge about fires and their uses and associated costs and benefits, and then analyses the costs of responsible fire use.

Review and Analysis of Legal and Regulatory Aspects of Forest Fires in South East Asia reviews, analyses and compares laws and regulations relevant to forest and land fires in each country of South East Asia.



Review of Legal, Regulatory and Institutional Aspects of Forest and Land Fires in Indonesia, the first ever compilation, overview and analysis of Indonesian legislation relevant to forest and land fires.

Convicting Forest and Land Fire Offences – A Case Study of the Legal Process in Riau, Indonesia, documents the first successful conviction in Indonesia for forest fire offences.

Project FireFight South East Asia also publishes a periodical info-brief called **Burning Issues.**

Fire Resources in Brief

There are many web sites providing information on the history and current status of forest fires, some of the best identified by IUCN and WWF's Global FireFight Programme are listed below.

The Global Fire Monitoring Center provides a fire documentation, information and monitoring system, uni-freiburg.de/fireglobe/ or www.gfmc.org

The European Commission Forest Liaison Bureau funds research into the underlying causes of forest fires and several fire management projects, www.eu-flb.or.id

Fire-related information of the **International Tropical Timber Organization** includes its guidelines on fire management in tropical forests, www.itto.or.jp/policy/pds6/index.html

The Food and Agriculture Organisation forestry sections work on forest fires can be found at, www.fao.org/forestry

The Center for International Forest Research, is carrying out in-depth research on fire on Sumatra and Kalimantan, available at CIFOR's dedicated Fire web site, www.cifor.cgiar.org/fire-project/index.htm

The ASEAN Haze Action Online provides a variety of regularly updated information on fire and haze situation in the region and ASEAN's response in dealing with the issue, www.haze-online.or.id

Information on the UN Working Group on Wildland Fire, www.unisdr.org/unisdr/WGroup4.htm

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