

WATER, WETLANDS AND CLIMATE CHANGE

Building Linkages for their Integrated Management

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Italy Country Base Line Study

Climate, Water, and Wetlands

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Preface

The Global Water Partnership (GWP), the Dialogue on Water and Climate Change, and IUCN - The World Conservation Union, have joined forces to facilitate an exchange of views on the common challenges faced by Mediterranean societies in adapting to climate change.

Scientific consensus is that climate change will have a pervasive influence on the future demand, supply and quality of fresh water resources in the Mediterranean, and add pressure to water and environment resources, and coastal systems in the region currently under stress. All sectors of the economy, environment and society may be vulnerable to one degree or another, to greater hydrological variability, more frequent flood and drought extremes, and to the longer-term effects of gradual mean temperature and sea level rise.

Under Article 4 of the UN Framework Convention on Climate Change (UNFCCC-1992), it was agreed that all Parties would develop short, medium, and long-term strategies for climate change mitigation and adaptation in a phased manner, taking into account the different socio-economic contexts. A number of Mediterranean countries have already taken preliminary steps to identify strategies and integrate responses to climate change in their current water resource management policies and activities. Other countries have yet to initiate processes to enable steps to moderate the significant vulnerabilities, or to benefit from the opportunities associated with climate change.

This document is one of twelve country base-line studies and thematic papers prepared as background material for a Roundtable meeting in Athens, Greece in December 2002 on the linkages between climate change, water and wetlands resource management in the Mediterranean region. While the primary aim is to exchange views, perspectives and experience on possible directions and priorities for climate change adaptation planning, the discussion would also explore opportunities to enhance synergies in the responses to the UNFCCC and Ramsar Conventions.

Eight country base-line studies were prepared for:

- | | |
|----------|-----------|
| ✍ Cyprus | ✍ Morocco |
| ✍ France | ✍ Spain |
| ✍ Greece | ✍ Tunisia |
| ✍ Italy | ✍ Turkey |

The four crosscutting thematic papers are:

- ✍ Mediterranean Water Resource Planning and Climate Change Adaptation
- ✍ National Approaches to Drought Preparation in the Mediterranean
- ✍ Adaptation Strategies for Improved Flood Management in the Mediterranean
- ✍ Biophysical and Socio-Economic Impacts of Climate Change on Wetlands in the Mediterranean

Electronic copies of the reports and papers noted above may be downloaded from the web page of The IUCN Centre for Mediterranean Cooperation at www.uicnmed.org. Project funding for this initiative was provided by the Global Dialogue on Water and Climate Change. The IUCN Centre for Mediterranean Cooperation receives core funding from the Spanish Ministry for Environment and the Junta of Andalucia.

Disclaimer:

The information, views, conclusions, and recommendations contained herein are those of the authors, and are not necessarily the views of the Governments of the countries concerned, the GWP, the Dialogue on Water and Climate Change, or the IUCN.

SUMMARY

The water and wetland resources in Italy are affected by climate change caused by the additional greenhouse effect.

Although the effects and the extent of these changes are uncertain yet and can not be easily quantified not foreseen, a certain consensus however exists over the biggest climate contrast. A drier climate is probable in the 21st century in the Southern part of Europe, and it will have dual effect of reducing resources and of increasing water demands, by intensifying evaporation and by aggravating droughts.

In fact, while such complex interactions exist also under so-called “stationary” climatic conditions it has been established, the “there are stronger evidences that most of the warming observed over the last 50 years is attributable to human activities” and there is compelling scientific evidence that climate changes will pose serious challenges to the water and wetland system.

According to the above, this country baseline study will examine which policies and management practices Italy has already considered and is planning to carry out to respond to climate change effects to water and wetland resources.

In particular, the study will point out and suggest feasible climate change adaptation strategies for water and wetland resources, lined up to national and regional priorities.

After a brief analysis of the country context and the identification of key vulnerabilities components of water and wetland resources to climate change (Part A), the study focuses on the national institutional system dealing with climate change, water management and wetlands (Part B), the level of integration of water and wetland resource management and climate change (Part C), and finally the possible adaptation strategies (Part D).

A noteworthy climate variability has been observed during the last decades through the analysis of historical series and scientific data: according to these figures, temperature has increased and rainfall decreased on the overall national territory, giving as overall result drier conditions.

Therefore, water remains a critical factor in Italy in terms of vulnerability of both hydrological cycle and ecological systems as wetland resources, which are closely interrelated.

Part A identifies the key vulnerabilities components to water and wetlands resources to climate change such as water consumption by agriculture, coastlands resources and typical Mediterranean ecosystems.

Part B shows that, if on the one hand the institutional framework of climate change, water resource management and wetlands sectors, taken individually, is broad and well organized, on the other, taking into account the strong inter-connection among the three sectors, a closer collaboration would be desirable. The recent reform of the Ministry for the Environment and Territory represent a further important step toward a better coordination among all environmental sectors. With the new structure, the Ministry has both an ecosystem protection function, through the definition of sustainable development models, and a new role in planning policy, with the aim to protect the environment.

Nonetheless, other Ministries, National Administrations, Regional and Local Authorities have also a fundamental role in the management and implementation of defined environmental policy areas.

Part C illustrates that adaptation policies and measures must be identified in the sectoral legislation regarding:

- ? the soil defense;
- ? the remediation of contaminated site;
- ? the extractive activities;
- ? the hydrological vulnerability;
- ? the protected areas;
- ? the natural habitat;
- ? the water resources and water defense.

The research conducted for this study brought to the conclusion that Italy does not have a specific legal framework where adaptation to climate change is expressly mentioned.

The recent climate change National Action Plan, prescribed by law 120/2002 ratifying the Kyoto Protocol, which defines guidelines for greenhouse gases reductions, has not changed this approach.

Emphasis is given to the energy and transport sectors, nonetheless, its approach has a broad, indirect effect on the entire water sector, integrating the existing national and local provisions on water and wetlands.

Hence, the National Action Plan can be seen as a natural step toward the achievement of the goals set by the 2002 Environmental Action Strategy for Sustainable Development.

Thus, if on the one hand planned measures and policies demonstrate that Italy is moving to comply with the UNFCCC climate change commitments, major efforts must be undertaken to strengthen water and wetland adaptation instruments to climate change policies.

In fact The UNFCCC includes clauses to the effect that that all Parties shall formulate, implement, publish and regularly update national and regional programs containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change (Article 4, Section 1 (b)). The Convention further records agreement to the effect that all shall take climate change considerations into account, to the extent feasible, their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessment, formulated and determined nationally, with a view to minimizing adverse effects on the economy on public health, and on quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change (Article 4, Section 1 (f)).

An appropriate step towards implementation of the above mentioned commitments is the draft of the Third National Communication to the UNFCCC where adaptation planning measures for water and wetland resources are also considered. In fact Italy is one of the first countries beside the wider-EU to prepare the Third National Communication to the UNFCCC including a specific chapter with concrete adaptation measures and actions on sea level rise, desertification, agriculture, and forests.

The proposed actions of the National Action Plan and the Third National Communication would suggest that climate change needs to be taken into account in sectoral legislation - as well as policy, planning and management activities in those sectors, at all levels of government, where it is relevant.

Finally, **Part D** presents different opportunities to reduce the risk of climate variability and change for Italian water and wetlands resources.

A number of key assumptions for developing adaptation responses for water and wetland resource sectors is presented. In addition a series of suggestions are offered to integrate adaptation responses into the water, wetland and climate sectors.

Since it is difficult to predict far in advance how climate change will affect a particular site, the study suggests that it should be better to avoid adaptation measures that could fail or have unanticipated social or economic consequences if climate change impacts turn out to be different than anticipated (IPCC 1998). More appropriate would be “no regrets” adaptation measures that would be justified even in the absence of climate change. Examples of least-regret measures include data and information collection, training and other forms of capacity building, scientific research and institutional development. Another type of least regret measures involves the additional investment in infrastructure with long turnover times to take anticipated climate change into account.

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PART A THE COUNTRY CONTEXT – SOME BACKGROUND FIGURES

Italy is a peninsula extending into the central Mediterranean Sea and includes two major islands, Sicily and Sardinia. The total area covered by the national territory is 301,230 km² and the almost 77% of the total² is covered by mountains and hills, with the highest mountain at 4,807 m/on sea level. This geo-morphological profile, within a predominantly Mediterranean climate, allowed the formation of river and lake basins, which cover 7,210 km² of the total territory and are particularly present in the northern part of Italy.

Regarding national boundaries, the coastline amounts to 7,600 km, which represents a very high percentage of 80% of the total³. Therefore, coastal wetlands, which includes estuaries, seagrass beds and mangroves, are among the most significant wetland resources in Italy.

Water and wetland resource situation in Italy

Coastland resources and sea

Italy, with a coastline of 7,600 km, developed social and economic structures closely dependant on marine environment. The pressures on Italian seas and costs have continuously grown during the last decades, triggering heavy marine environment declining conditions. To date, only a little portion of national coasts is under protection, as the establishment of marine protected areas started very recently⁴. Although if climate changes strongly influence this phenomenon, human activities are the major cause of coastal decline. Beach water quality index, which was developed to investigate the sanitary risks related to urban discharges, is usually adopted as an indirect measure to assess the quality of coastal environment. In 2001, 96.1% of samples respected all the legal standards⁵.

Freshwater

In spite of the high freshwater availability, estimated to be one of the highest in Europe, the national fresh water resource is stressed by an excessive and sometimes irrational exploitation, reflected in the high and increasing uptake level and the high leakage affecting the water supply systems. The non-homogeneous supply of the resource within the territory causes water shortages in places where supply is lacking, especially in the South Regions and Islands.

Notwithstanding, the improvement in the last decade, surface water quality still remains not satisfactory. One important obstacle that affects the definition of the status of water resources in Italy is represented by the inadequacy of monitoring systems⁶.

Water quantity and use

Compared with the average of others European countries, Italy has a much wider theoretical availability of renewable water resources: 980 m³/per year pro capita. The water availability shows evident macro-regional gradients: in the North it is concentrated more than 65% of the total amount. At regional level the exploitation presents critical elements in the South, where scarcity occurs⁷. According to the elaboration of ISTAT⁸ Census 1991, at the national level, about 73% of resources are withdrawn⁹: in particular groundwater withdrawal are still consistent and may locally cause scarcity of water availability, due to the

² 30 millions of hectares.

³ ISTAT, 2000.

⁴ The 16 established AMP (Marine Protected Areas) cover a surface of almost 167,500 ha. Only 6,244 ha are under integral protection, whilst 58% of the total area is under partial protection.

⁵ Tropic level for coastal waters table 1 in the Annex.

⁶ The legislative decree n° 152 enforced in 1999 states environmental objectives and a series of specific instruments to overcome this critical issue: it define a core set of new water quality integrated indexes which combine relevant quantitative, chemical and biological data according to the EU water framework directive 2000/60/CE.

⁷ Some drought episodes in the year 2002, especially in the South, shifted the situation of water availability to drama.

⁸ National Institute Statistics.

⁹ Withdrawal of freshwater: table 2 in the Annex.

inefficient management of water resources which represents one of the causes of the expansion of desertification in the South of Italy and in the Islands. The National Conference on Water estimates that the availability of useful water is about 52 billion of m³, at the net of the total amount. With regard to the availability of groundwater the estimates vary from 5 to 13 billion of m³ with evident macro-regional gradients between North and South¹⁰.

Water Quality

During the last decade, the pollution loads derived by urban centers have not been reduced significantly. In 1998 wastewater treatment plants served 63% of the population, compared with 61% in 1990. The impact of agriculture¹¹ on water quality is also relevant: although the use of fertilizers and chemical products has been reduced, it represents a real threat for surface and ground waters. The evaluation of quality levels of ground waters, that represents 85% of drinking water, is strongly limited by the inadequate monitoring systems¹².

Ecosystems – wetland and water protected resources

Following Ramsar Convention, in Italy 597 wetland sites were located, 103 of which selected as areas of national and international relevance. At present 47 sites are designated as Ramsar areas. Italy showed also a strong engagement for the protection of wetlands by endorsing the “Venice Declaration of Mediterranean Wetlands”, adopted in 1996 by 32 Mediterranean countries.

In the last update (2000) the number of protected areas amounts to 670 representing 9.1% of the national territory. Marine Nature reserves and some National Parks are responsible for the protection of marine ecosystem; total protected marine area (about 260,000 ha), although currently representing less than 3% of national coastal water, is well-managed.

Climate variability and change in Italy

Italy has a Mediterranean climate, characterized by hot, dry summers and cool, wet winters. Both altitude and distance from the sea, with geo-morphology and prevailing winds give local weather variations. In particular rainfall is lower in the south, and much lower in the summer than in the winter.

A noteworthy climate variability has been observed during the last decades through the analysis of historical series and scientific data: according to these figures, temperature has increased and rainfall decreased on the overall national territory, giving as overall result drier conditions.

In particular studies of the historical series¹³ point out that:

- the min and max monthly temperatures increased in a heterogeneous way at regional level;
- the max temperature increased in the last century of 0.6°C in the Northern area and 0.8°C in the South;
- the min temperature increased of 0.4°C in the North and 0.6°C in the South;
- winter is the most sensible season for increasing temperatures.

These results have been confirmed from the analysis of the rainfall trends in the last 50 years¹⁴:

- the rainfall decreased in the national territory, with most significant reductions in the South of Italy;

¹⁰ More than 65% is concentrated in the North.

¹¹ Irrigated lands cover 27,000 km², which amounts to 8% of the Italian territory.

¹² Main river distribution in quality classes, table 3 in the Annex.

¹³ Buffoni L, Maugeri M, Nanni T. 1999: Precipitation in Italy from 1833 to 1996. *Theoretical and Applied Climatology*.

¹⁴ Brunetti M, Colacino M, Maugeri M, Nanni T., 2001: Trends in the daily intensity of precipitation in Italy from 1951 to 1996. *International Journal of Climatology*.

Brunetti, M., Maugeri, M., Nanni, T. Navarra A., 2002, Droughts and extreme events in regional daily Italian precipitation series, *Int. J. Climatol.*, in press; Precipitation trends/number of raining days during the four seasons - table 4 and 5 in the Annex.

- the numbers of raining days/year decreased of 14%, in particular during the winter season;
- the intensity of precipitation increased;
- drier seasons both during winter (North Italy) and summer (South Italy).

As an overall consequence of warmer winter, hotter summer and increasing frequency of extreme meteorological events, the hydrological cycle's balance changes and an additional burden to water availability and supply are foreseen.

Nevertheless, looking at climate change in terms of GHG emissions in the atmosphere, the current Italian situation shows an increasing of these emissions in the last ten years¹⁵. According to the Kyoto Protocol¹⁶ commitments, the amount of GHG gases to be cut down amounts at 11.5% on the 2000 value (547,000 Gg). The main responsible of this rise is the transport sector, which has increased of 20% in 2 years, with an additional production of GHG gases of 121.000 Gg.

Vulnerability of water use and hydrological and ecological systems to climate variability and change

As from the above overview, water remains a critical factor in Italy in terms of vulnerability of both hydrological cycle and ecological systems as wetland resources, which are closely interrelated to this element. In the following section, key vulnerabilities components of water and wetland resources to climate change will be pointed out and analyzed, in order to identify the most sensitive elements to be tackled in Italy.

Nevertheless, the pressure from the atrophic exploitation due to high population density¹⁷ in Italy and economic use of these resources needs also to be taken into account, namely industrial production, fisheries, tourism and maritime transport.

Water use

Consumption by agriculture

Intensity of water use for agriculture at the national level remains among the highest in the OECD area. Currently there are water shortages in the South, where locally abstracted groundwater is used intensively during the summer, and excessive groundwater abstraction for irrigation still occurs, in particular in the Puglia region and in Sardinia.

Moreover, the use of available groundwater has not been efficient up to now, due to slowness in the implementation of the Galli act¹⁸: before that Act groundwater was considered part of landowners' rights and thousands of private abstractions need to be identified and monitored. Therefore, the use of water for agriculture is a key vulnerability element to climate variability, with a major impact in the Southern part of Italy, where starting conditions are already critical.

Consumption by households and industry

Household water use has remained at about 200 liters per capita per day, placing Italy in the middle/high-range group among OECD countries. However, with the drought episodes taken place this year, almost 17 million of people among 58 did not have adequate water supply, mostly of them in the Southern Italy.

¹⁵ Emission of GHGs in Italy - table 6 in the Annex.

¹⁶ The Kyoto Protocol has been recently ratified by the Italian Parliament (law 120/2002). This law specifies policy measures to reduce the greenhouse gas production and allocates 25 MEuro/year for the period 2002-2004 to fund pilot programmes for GHG reduction and forest sinks implementation.

¹⁷ 180 inhabitants/km².

¹⁸ Act 36/1994, which states that all water abstraction, including use of groundwater, must be licensed.

Regarding industrial use, the majority of industrial users abstract surface or groundwater directly and pay abstraction charges. Both in the North and South of Italy collective water supply networks have been created and efforts have been made to introduce water-saving technologies in the industry sector.

In comparison with the scarce efficiency of water use in the agricultural sector, we then may argue that households and industry have less prioritizing action needed. On the other way around, they both can be regarded as the major causes for the production of GHG gases to climate change effects.

Hydrological and ecological systems

The vulnerability of hydro and ecosystem to climate change in Italy is closely correlated to the geomorphologic characteristics and the level of sensibility of the natural ecosystems. Undoubtedly, the local economic development and the potential degree of adaptation influence their vulnerability.

According to recent studies¹⁹ undertaken at national level, the key vulnerability elements to climate change are the following:

- Coastlands, due to the increasing level of the sea;
- Agricultural lands, due to the soil erosion and acidification process;
- Biodiversity in general for the shift of the ecosystem from South to North;
- Productive sectors highly dependent from water supply;
- Superficial and underground hydrological systems for water supply and drinking use.

Although it is not directly responding to the question above, there is no doubt that coastlands and most feeble ecosystems as lagoon and swamp forests will suffer. For instance the Venice lagoon situation is sadly known. The major vulnerable area to sea level growth are the flatland called Pianura Padana in the Northern Italy, the Versilia in Tuscany, and the Pontina flatland in Lazio.

Regarding ecosystems shift, it has been estimated that they can be shifted of 150-300 km from South to North and 100-200 m in altitude. This would mean losing typical Mediterranean ecosystems, with additional burden due to firing events and drier climate in the South and due to geomorphologic characteristics in the North.

Finally, both superficial and underground hydrological systems represent a key vulnerability aspect in particular in the South, where 96% of the total water availability is used and water use is constantly increasing. Water resources for both agricultural and drinking use are largely provided by artificial basins in the South and recent drier climate events shifted the situation to critical levels²⁰.

¹⁹ Ministry for the Environment and Territory, (2002), *Third National Communication of Italy to UNFCCC*, working document.

²⁰ For instance, the evolution of water supply through artificial basins in Sicily (1989/1990) shows the critical outcome due to dryer climate variability. See table 7 in the Annex

PART B INSTITUTIONS / PROCESSES AND NETWORKS WORKING ON WATER, WETLAND AND CLIMATE CHANGE ISSUES

Key institutions, processes and networks directly involved in climate change impact, vulnerability assessment or adaptation, and policy matters

Ministries, National Administrations, Regional and Local Authorities have a fundamental role in the management and implementation of defined environmental policy areas.

The following section considers the major actors involved into emission reduction processes while the institutions in charged of the implementation of the adaptation measures are referred to in table 8 of the Annex.

Who and what centers in the country are responsible for climate change matters?

Climate change policy implies a strong co-ordination among the environmental, energy, industrial, transport, agricultural, research, and economy sectors.

The Ministry for the Environment and Territory plays a leading role within the Interministerial Working Group for the Implementation of the Kyoto Protocol, which defines guidelines for national policies and measures to reduce GHG emissions.

The Working Group was established by deliberation of the Interministerial Committee for Economic Planning (CIPE) in 1997²¹, in order to achieve a higher level of integration in the elaboration and implementation of programs to reduce GHG.

The Working Group is chaired by the Ministry for the Environment and Territory. Members of the Working Group are the Ministry for the Productive Activities (former Ministry for Industry), the Ministry for Public Works, the Ministry of the Economy, the Ministry of Agriculture, the Ministry of Transport, the Ministry for Education, University and Research, the National Agency for New Technologies and Environment (ENEA), the National Agency for the Protection of the Environment²² (ANPA), the Regions, and the Autonomy Provinces.

In 1998 a new deliberation was issued by CIPE²³, which strengthened the collaboration between the national administrations involved into the national climate change policy as follows:

- ? the Ministry for the Productive Activities, in collaboration with the Ministry for the Environment and Territory, defines standards and guidelines for the reductions of the energetic consumes in the industrial and services sectors, in order to achieve the objective of the 1998 CIPE Guidelines.
- ? the Ministry for the Productive Activities, in cooperation with the Ministry for the Environment and Territory, and the Ministry of Public Works, decides about the instruments for the reduction of CO₂ emissions in the transport sector.
- ? the Ministry for the Environment and Territory, in collaboration with the Ministry for the Productive Activities and the Ministry of Agriculture, adopts the instruments for the emissions reductions of non-energy sectors.

On June 1st 2002, Italy ratified the Kyoto Protocol with law n. 120/2002.

According to that, the 1998 “Guidelines for Italian Policies and Measures to Reduce GHG Emissions” were recently revised by a new CIPE deliberation, issued by the Ministry for the Environment and Territory last October.

²¹ CIPE Deliberation n. 211, 3rd December 1997, “*Convention on Climate Change*”.

²² With a recent decree of the President of the Republic n. 207, 8th August 2002, ANPA changed its mandate becoming the National Agency for the Protection of the Environment and Technical Services (APAT)

²³ CIPE Deliberation n. 137, 19th November 1998, “*Guidelines for Italian Policies and Measures to Reduce Greenhouse gases emissions*”.

Among the other provisions, the deliberation states that the Prime Minister establishes, by decree, an Interministerial Committee for the Implementation of law 120/2002, chaired by the Ministry for the Environment and Territory. Members of the Committee are the Ministry of Economy, of the Productive Activities, of Infrastructure, of Agriculture, of Education, University and Research, and the Ministry for Foreign Affairs, and the Conference of the Presidents of the Regions.

Furthermore, in order to assure the implementation and the coordination of CDM and JI projects²⁴, the Ministry for the Environment and Territory, in conjunction with the Ministry of Economy, of the Productive Activities, of Infrastructure, of Agriculture, for Foreign Affairs, will establish an Italian Office for JI and CDM Mechanisms.

Have discussions on adaptation policies and measure to climate change begun? If so how?

Law 120/2002 prescribes the duty for the Italian Ministry for the Environment and Territory to submit to the Interministerial Committee for Economic Planning a “*National Action Plan to Reduce GHG Emissions*”²⁵.

The Plan integrates the 1998 strategy and measures to reduce GHG emissions²⁶ focusing in policies aimed to:

- ? improve the efficiency of the Italian economy;
- ? promote the energy sources differentiation and the energy security;
- ? increase the share of renewable in the energy portfolio;
- ? promote the technology innovation in the energy and transportation sectors;
- ? promote the sustainable agricultural and forestry activities, and the related carbon sinks;
- ? add value, and to improve the international technology cooperation supporting the participation of the Italian companies in the “Clean Development Mechanism” and “Joint Implementation”.

Based on the guidelines of the National Action Plan, the Third National Communication of Italy to the United Nations Framework Convention on Climate Change has been elaborated.

Great emphasis is given to the enhancement of energy efficiency, of clean fuels and engines, of carbon sinks, and to support projects in the developing countries aimed to greenhouse gases emissions reduction, and to promote the adaptation to the adverse climate change effects.

In particular the National Communication updates:

- ? the assessment on vulnerability and climate changes impacts and on related adaptation measures;
- ? the information on bilateral and multilateral cooperation in technology transfer, and on the related Italian financial aid;
- ? the Italian activities on research and systematic observation on climate change, both at regional and global level;
- ? the Italian initiatives on education, training and public awareness, both at national and local level, promoted by governmental, regional and local authorities, private companies, universities and scientific institutions, non Governmental Organizations

The key institutions providing data and policy analysis on climate change impact, vulnerability and assessment to the policy makers

The entire Italian institutional framework dealing with climate change is supported by a monitoring system that involves several scientific institutions and research bodies.

²⁴ Clean Development Mechanisms and Joint Implementation.

²⁵ The National Action Plan was submitted by the Ministry for the Environment and Territory to the Interministerial Committee for Economic Planning on 30th September 2002.

²⁶ See CIPE Deliberation n. 137, 19th November 1998.

Some of them are directly linked with the Ministry for the Environment and Territory, providing expertise during the negotiations within the international climate change fora²⁷ and the implementation of the decisions and measures binding Italy.

On the monitoring, observation and measures climate change activities five main entities carry out studies and researches on climate change matters.

Since 1982, the National Agency for New Technologies and Environment (ENEA)²⁸ collects historical data on temperature and salinity of Mediterranean Sea. The data collected represent one of the major data-base set in the Mediterranean region with more of 12,000 collected profiles, included in the Mediterranean Oceanographic Data Base. ENEA is also the Italian focal point to the IPCC.

Furthermore, ENEA with the Atmospheric and Climate Science Institute (ISAC) of National Research Council (CNR) analyses sea surface temperature data. These data allow to study seasonal and inter-temporal variability. In 1991, the collaboration between ENEA and CNR was strengthened with a program focused to the GHG concentrations on the atmosphere.

The Italian Experimental Electric Centre (CESI) is responsible for a research project on the relation between the electric system (production, transport and distribution) and climate change.

Finally, since 1979, the Meteorological Service of the Air Force measures carbon dioxide in the atmosphere.

Some Italian working groups are recognized at international level for their activities on climate numerical simulation. Among them the National Institute for Geophysics and Vulcanology (INGV) is one of the major actors involved in that field with many simulations at global, international and regional level on climate system, with particular focus on atmospheric response to CO₂ emissions and to its variability.

The development of a marine-ecosystem simulation modeling focused on population dynamics is also interesting. The modeling is a fundamental tool on the study of the climate change effects on ecosystems: INGV is particularly active in the global simulation on atmospheric-oceanic modeling.

Collaborations with the Ministry for the Environment and Territory on climate change issues is also guaranteed by several Universities such as the University of L'Aquila, the University of Venice, the University La Tuscia (Viterbo) and the ENI Foundation Enrico Mattei (FEEM).

What degree of coordination is there between institutions involved in climate change and water and wetland policy and management?

Is there coordination between the Convention focal points (e.g. UNFCCC, UNCCD, Ramsar)?

Italy is Party of the UNFCCC, UNCCD, and Ramsar Convention.

As in the previous section the Italian institutional framework dealing with climate was analyzed, in this section the attention will be focused on UNCCD and Ramsar Convention Italian institutions.

For the UNCCD a Committee was established²⁹ to study the situation and the evolution of the desertification in the country and to define strategies and plans to combat desertification in four main areas:

1. soil protection;
2. sustainable management of water resources;
3. impact reduction of productive activities;
4. re-balance of the territory.

Members of the Committee are the Ministries for the Environment and Territory, for Foreign Affairs, of Public Works, of International Trade, of Agriculture, of Education, University and Research, and

²⁷ UNFCCC, IPCC, EU Environment Group, OECD.

²⁹ National Committee to Combat Desertification; Decree of the President of the Council of Ministers of 26th September 1997.

representatives from the Presidency of the Council of Ministers, of the Conference State-Regions, and National Scientific Institutions such as ENEA, ANPA³⁰, and CNR.

A National Council for Protected Areas was also established to deal with the commitments of the Ramsar Convention³¹. Members of the Committee are the Ministries for the Environment and Territory, of Agriculture, of Cultural Heritage, of Public Works, of Education, University and Research, of Autonomy Regions and Provinces, and of the Conference State Regions.

Nonetheless, taking into account the strong inter-connection among climate change, water, and wetlands matters a closer collaboration would be desirable.

This need was also expressed by the Italian Committee to Combat Desertification in its National Communication to UNCCD, where it was clearly stated that *“One could foresee that, with the implementation of Environmental Global Conventions, the need for a better coordination both at national and international level will emerge, through and integrate approach of the three issues [climate, desertification, biodiversity]”*.³²

However, even if the national focal points of UNFCCC, UNCCD, and Ramsar Convention, do not have an institutionalized and direct dialogue, coherence in the implementation of the international commitments is given by the Interministerial Committee for Economic Planning, whose Sustainable Development Commission (Six Commission) assures coordination among the public actors involved. Furthermore a step forward to strengthen and to have more coherence among climate, desertification, and wetlands policies is given by the recent reform of the Ministry for the Environment and Territory.

Decree of the President of the Republic n. 178 of 27th March 2001 organizes the Ministry into four departments. The Department for Sustainable Development has a fundamental tool in the Directorate for Global Environment, International and Regional Conventions for the achievement of a better coordination among the different committees, groups, focal points involved into the environmental policy.

In particular art. 4 a) of the above decree expressly states that the Directorate has a pivotal role in the coordination and development of the Italian policy within all regional, international and global organizations dealing with environmental matters.

Thus, once the new institutional system will be fully operational, Italy would have an effective, punctual, and dynamic structure where synergies, information, policy goals and implementation policies among environmental areas would be coherently designed, developed, and managed, in line with the decisions taken at international level by the governing bodies of UNFCCC³³, UNCCD³⁴, CBD³⁵ Conventions

Is there coordination with water resource policy and development agencies?

Law n. 183 of 18 May 1989 entitled “Regulations on the organizational and functional reform of land protection” is the major law currently in use ensuring coherent planning of intervention for environment protection and restoring of the hydro-geological balance. It has been used to introduce new planning models for protecting the land, cleaning the water, using and managing water resources for rational economic and social development and protecting related features of the environment.

The instruments for protection deriving from the law are implemented in homogeneous areas through “basin planning” regulations, considered as the regulatory, information and operational instruments for planning intervention and practical rules for the conservation, protection and improvement of the land and the direct use of resources. The “basin plan”, as the local planning instrument to which the other local planning and environmental measures must be adapted, lays down binding rules for the public administration and for the private individuals.

The country is divided into watershed areas or basins on the national, inter- regional and regional scale.

³⁰ Now APAT (see note 22).

³¹ Framework Law on Protected Areas n. 394, 6th December 1991.

³² Ministry for the Environment, (1998), *First National Communication to UNCCD*, Chapter 2.3, Rome.

³³ 16th SBSTA Conclusions, June 2002.

³⁴ CoP 5, Decision ICCD/COP(5)/6.

³⁵ CoP 6, Decision VI/20.

A Basin Authority has been established for each national basin with the main function of drawing up forecasts and plans for determining the main trends for environmental protection and planning, checking of the implementation of the basin plans and the corresponding measures for implementation.

The Basin Authority provides for co-operation and co-ordination of intervention by the central and regional authorities.

The Basin Authority has the following internal structure:

- ? the Institutional Committee, for political decision making and co-ordination of the central and peripheral organizations having jurisdiction;
- ? the Technical Committee, a body of experts;
- ? the Secretary General as the organizational and operational point of reference for implementing the decisions of the Institutional Committee;
- ? an operational and technical Secretariat.

Besides the local structure described up to now, Law n. 183 also calls for a central structure composed of the following:

- ? the National Committee for the Defense of the Land with the task of making proposals and providing consultancy to the Ministry of Public Works;
- ? department for the Defense of the Land of the Ministry of Public Works, assigned with the task of providing basic guidelines and co-ordination for the implementation of the law;
- ? the National Technical Services (water resource and oceanographic service, seismic service, dams and the geological service) that will be reorganized at the Department of the Presidency of the Council of Ministers.

The services have the task of reorganizing, managing and coordinating a single information service and a national survey and supervisory network in the sector of the defense of the land.

In 1994, Law n. 36 entitled “Regulations on water resources” was issued³⁶. The law provides an organic, overall framework for the management and protection of water resources. Some of the general principles inspiring Law n. 36/1994 are:

- ? acknowledgement of the public character of water resources;
- ? affirmation of the priority of drinking water over the various types of uses;
- ? conservation and renewal of water resources, which must be used without harming the environment;
- ? water supply charges ensuring that local utilities companies are economically efficient.

What type of coordination?

Law n. 36 further defines the sharing of tasks at various institutional levels.

The central government has the task of defining methodologies and guidelines concerning: inventories of water resources, regulation of water use and protection of water from pollution.

The central government also defines:

- ? planning, that includes the completion of works for the transfer of water between different regions;
- ? the revision of the General Plan for aqueducts;
- ? identification of areas risking a water crisis;
- ? management of the new water supply service .

³⁶ The so called Galli's Act.

Art. 21 of Law n. 36/1994 likewise calls for the central government to set up a “Committee for the Supervision of Water Resources Use”. This body should enhance the efficiency, effectiveness and economic efficiency of the service, propose a standardized charging method and protect the interests of consumers . The Committee would make use of the Observatory for Water Services, which would collect and process statistical data and information after setting up and managing a database.

The regions likewise have responsibilities for water resources planning and management. The local authorities are assigned tasks regarding the organization of the service. In the context of the functions set forth in Law. n. 183/1989 on the defense of the land, the regions have the task of identifying “suitable areas” in order to overcome the fragmentation of the current management system and to guarantee a suitable size of the utilities.

With regard to the organization of water services, Law n. 36/1994 adjusts the mechanisms for rationalizing the existing utilities to the by setting up a single water service. These activities are mainly concentrated in the tasks of the river basin authorities, the Po Magistracy, the Venice Waters Magistracy, the regions, the National Forest Service and the park authorities.

Finally, the increase in the frequency and intensity of extreme weather phenomena, and the likely increase of flooding and harm to the soil require the combined efforts of various local and national authorities to strengthen the “natural infrastructures” for defending and safeguarding the land.

To this end, a joint committee will be set up between the central and regional authorities for monitoring exceptional climatic events and the co-ordination of annual prevention programs.

PART C INTEGRATION OF WATER AND WETLAND RESOURCE MANAGEMENT POLICY AND PRACTICES AND CLIMATE CHANGE

Issues and opportunities for the integration of water and wetland resource management policy, and climate change

The policies for water and wetland resource management

Climate change will act in conjunction with a range of other non-climate pressures, many of which may pose far greater immediate concern for aquatic ecosystems and wetlands in the short to medium term. These pressures include human activities that have severely modified many aquatic ecosystems with actions such as diversion, draining of wetlands for other land uses, groundwater pumping and water pollution, all of which have modified natural processes. Cumulatively, these alterations fragment the aquatic landscape and increase vulnerability to the additional stress associated with climate change, limiting autonomous adaptation.

From a water resource planning perspective, the important issue is that wetlands habitat and processes are critically dependent on their hydrological functions, specifically, the nature and variability of the hydroperiod and the number and severity of extreme events. Healthy ecosystems and the services they provide are fundamentally dependent on receiving appropriate amounts of water, of a certain quality, at certain times – either as river flows, groundwater, or a combination. While ecosystems may be resilient to normal climate variations, the extremes outside normal variability coupled with human response pose the main threat.

Broadly the incremental impacts of climate change on wetland include:

- ✗ alter hydrologic characteristics from changes in seasonal patterns of precipitation and runoff;
- ✗ increased water temperature and altered evapotranspiration affecting productivity;
- ✗ further deterioration of water quality from climate-human induced effects such as pollution concentrations in low flow periods, released from deep reservoirs, altered amounts and patterns of suspended sediment loadings, and oxidation of organic sediments;
- ✗ physical effects of change in river morphology and wave energy in lakes and coastal areas (increased storms), and
- ✗ rising sea levels would also inundate coastal wetlands and lead to their loss by salinity and inability to “retreat”, particularly due to blockage by human land use.

Generally, aquatic ecosystems and freshwater wetlands sustain and even flourish in extreme flood conditions. The main vulnerability is in periods of sustained drought, where humans will also be acting to ration water. The actual degree of vulnerability depends on the sources of water supply: - precipitation, surface flows, or groundwater discharge. New environmental flow methodologies are required to ensure that water management activities do not further stress these systems, and move them beyond critical thresholds – counter to national conservation policies³⁷.

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Identifying regions where water resources are likely to be vulnerable to changes in climate will help water managers to plan and prepare for such changes.

Italy does not have a specific legal framework where adaptation to climate change is expressly mentioned.

As mentioned in Part B, Italy has ratified the Kyoto Protocol on June 1st 2002. The ratification law prescribes the duty for the Italian Ministry for the Environment and Territory to submit to the Interministerial Committee for Economic Planning a National Action Plan, to reduce GHG emissions, which is the base of the Third National Communication of Italy to the United Nations Framework Convention on Climate Change.

³⁷ http://www.ramsar.org/cop8_doc_11_e_fig.pdf

The National Communication³⁸ does not provide any direct policy for water and wetlands management related to climate change although it includes a specific chapter with concrete adaptation measures and actions on sea level rise, desertification, agriculture, and forests.

Nonetheless, its approach has a broad, indirect, effect on the entire water sector, integrating the existing national and local provisions on water and wetlands.

To this end, the National Communication could be seen as a natural step toward the achievement of the goals set by the 2002 Environmental Action Strategy for Sustainable Development³⁹, which also defines three key water management priorities :

- ? conservation or replenishment of water resources to fulfill productive, environmental and recreational functions;
- ? acceptable chemical quality for all (surface and ground) water bodies by 2008 and good quality by 2016;
- ? economic sustainability of water pricing to finance infrastructure development, taking social conditions into account.

The Sustainable Development Strategy also sets these operational objectives:

reducing leakage in water supply systems, reducing water consumption and re-using treated waste water, particularly in agriculture;

reducing the pollution load, particularly through waste water infrastructure development, and developing separate systems for waste water and rain water;

implementation of full cost recovery, particularly for sewerage and waste water treatment; moving towards more targeted social pricing of water; amortization of investment over the long term; and ensuring that household water prices are independently regulated and that other types of water use are compatible with sectoral policy objectives.

Furthermore, the Strategy presents a detailed list of actions that should be undertaken for the conservation and protection of the water ecosystems.

It is interesting to note that even if a specific environment flow policy is not expressly mentioned all the above priorities, objectives and actions are oriented to ensure a sustainable use of all water resources through specific projects facing water flows.

This is a considerable approach as it is not focus only on a particular sector but it considers all the interrelations and linkages between water, ecosystems, land protection, and climate change.

In order to strengthen and develop the integration among climate change, wetlands and water a number of suggestions could be made to enhance the linkage between the climate change water and wetlands policies:

1. further analysis and documentation of the linkages between wetlands, biodiversity and climate change;
2. production and broad dissemination of synthesized information on the relationships between wetlands, biodiversity and climate change;
3. a targeted information dissemination program focused at the focal points for the CBD, UNFCCC and the Ramsar Convention and other related key decision makers;
4. enhancement of dialogue between the national decision makers responsible of the respective conventions to identify and implement mechanisms for enhanced cooperation and information exchange;
5. specific discussion in relation to the elaboration of then Kyoto protocol and the inclusion of appropriate incentives to support the protection or restoration of wetlands and other ecosystems.

³⁸ Ministry for the Environment and Territory, (2002), *Third National Communication of Italy to UNFCCC*, working document.

³⁹ CIPE Deliberation n. 57, 2nd August 2002, "*Environmental Action Strategy for Sustainable Development*".

6. development of a series of cross cutting projects and initiatives to demonstrate, country and site level the mechanisms and advantages of co-implementation including River basin management; conservation and restoration, adaptation of coastal ecosystems to sea level rise etc;
7. organization workshops to facilitate linkages between convention focal points and other key decision makers and to develop options for linkage and co-implementation.

The enabling planning systems and instruments

In the last century, water has progressively abandoned the nature of “free good” to enter the public domain.

This process of development of public rights on water resources has witnessed a substantial acceleration in the last two decades, in particular due to the increased role of the EU as a driver of environmental policy. In fact, the largest part of environmental legislation in Italy can be regarded as a consequence of the implementation of European Directives.

However, although the Italian legislative and institutional framework of water policy is now broadly coherent with the rest of Europe, the distance between paper legislation and proper implementation is very large, partly due to the delay in the development of environmental policy, partly because of structural difficulties.

Before 1994, the public property of water resources needed to be explicitly declared by the public authority, on a case-by-case basis. In practice, this meant that all surface waters of some importance were considered as public, and therefore required an abstraction and use license from the competent authority. The use of underground resources, on the contrary, was free and considered as a part of the rights of landowners.

Just in 1994 this dual regime has ended: the law 36/1994 (Galli act) states that all water uses, including abstractions from the underground, need to be licensed.

According to the law, water abstraction licenses are released in order to meet demands; arising conflicts were traditionally left to the discretionary power of the licensing authorities, that had the right to decide which use could better serve the public interest. Nowadays, this discretionary power is constrained by a number of rules: the need to respect the water balance planned at the basin level; the need to release minimum flows; the need to respect a priority ladder that poses drinking water supply first, than agriculture – in case of a water stress – and finally all other productive uses.

The competent authorities were originally the peripheral administrations of the Ministry of Public Works. From the 70s on, with the creation of Regions, these acquired competences on many issues, including a part of water policy. They have newly gained full competence to the whole water abstraction license matter. Water balance issues concerning more than two Regions are dealt with in the Basin Authorities, that are a board in which all Regions included in a river basin and some State ministries are involved.

A similar regime characterizes the water quality issue. Regions are now free to regulate discharges into watercourses according to a plan that individuates water quality objectives and use destinations. Regional water quality plans can introduce special measures in order to protect the water environment from pollution; the approach based on “water protection zones” – eg nitrate vulnerable areas, sensitive areas for eutrophication – is newly foreseen in the legislation, following the input of European Directives.

Pollution control and environmental monitoring have been reorganized under the Regional Environmental Agencies.

Even in the case of water quality, however, the approach dominated by final use requirements is a recent achievement. So far the water quality policy has meant basically the enforcement of a discharge regulation, based on emission standards set up at a national level and the financing and construction of the baseline sewage-treatment network started in Italy just after 1976.

The level of development of water policies at Regional level is very differentiated: especially in the South, the records of environmental protection are very poor.

According to this picture, the Italian regime of water resources management entails different levels:

- ? State (whose competence is mainly that of frame legislation and implementation of European directives);
- ? Regions (competent for water resources planning, pollution control and for all administrative issues; issues of interregional interests are dealt with in Basin Authorities)
- ? Local authorities, that are in charge of the organization and management of water services, increasingly under inter-municipal organizations, even imposed by the legislation
- ? Other uses, when not self-supplied, are often served through corporatist institutions, like users associations and syndicates, often with the involvement of some level of public administration and sometimes with the acknowledgment of a public status (that means in particular entitlement to public subsidies and right to impose/forbid, according to decisions of elected representatives)

While water management systems are often flexible, adaptation to new hydrologic conditions may come at substantial economic costs. Water agencies should begin now to re-examine engineering design assumptions, operating rules, system optimization, and contingency planning for existing and planned water-management systems under a wider range of climatic conditions than traditionally used⁴⁰.

The inclusiveness of options and measures considered

Options and measures developed for water and wetland resources are described in the two sections above as being investigated and developed in particular through the Environmental Action Strategy for Sustainable Development that sets up clear objectives to be reached by Italy.

These Policies are applied to specific sectors, for instance soil defense, water defense and water resources, protected area and adaptation to climate change is not specifically mentioned. This is reflected in the Third National Communication of Italy, where direct policies related to water and wetlands are not mentioned.

On the other hand, Italy has already identified specific climate change policies both domestically and in cooperation with other countries.

In order to identify domestic emission-reduction measures, an open “set” of programs and initiatives has been defined in the sectors of the energy, transportation, industry, agriculture and in the international economic and technological co-operation. Those options have been identified to optimize the environmental effects of measures whose priority objective is to increase the energy efficiency of the Italian economy.

Activities and resources to fulfill the objectives of UNFCCC concerning financial resources and technology transfer have been allocated at multilateral and bilateral level:

- ? On the multilateral level, the Italian commitment in environmental protection activities has gained continuity and coherence through the definition and implementation of more efficient co-operation strategies with the major international environmental bodies and institutions. There is now a full commitment on the need for synergy among the activities of the Global and Regional Conventions for Environmental Protection, as well as on the need to integrate such activities in wider international co-operation objectives, in particular for the fight against poverty. An important, new and additional resource for global environmental issues is the Italian contribution to the Global Environment Facility – GEF. Italy’s contribution to GEF equals 90.5 million US\$, ranking sixth among all contributors. It has recently subscribed the third replenishment of the GEF confirming its 4.39% share of total contributions⁴¹.
- ? On the bilateral level, new and additional resources favoring technology transfer activities in the environmental sector, have been made available, stimulated by the anticipation of the ratification of the Kyoto Protocol. Such activities respond to the overall objectives of the Convention on Climate Change while also addressing preparatory actions for the Kyoto mechanisms. Such resources were provided by the so called carbon tax law, establishing also that all national actions reducing greenhouse gas emissions must be accompanied by a series of international co-operation programs.

⁴⁰ Frederick K.D., Gleick P.H., (1999), *Water & Global Climate Change: Potential Impacts on U.S. Water Resources*, Washington D.C.

⁴¹ Ministry for the Environment and Territory, (2002), *Third National Communication of Italy to UNFCCC*, working document.

In particular, one of the most important activity of the Italian Ministry for the Environment and Territory, among several cooperation programs with developing and transition countries, is the environmental co-operation program with China. Totalling approx. 14 Million euros, it aims to stimulate other multilateral funding for environmental protection and for renewable energy sources.

These planned measures and policies demonstrate that Italy is moving to comply with climate change commitments of the Kyoto Protocol, but simultaneously point out the lack of integrating instruments that can clearly demonstrate a strong interrelation to water and wetland policies.

Additional effort is therefore foreseen in their integration, as suggested in the first section of PARTC.

The flexibility of institutional and participation arrangements

Environmental NGOs have an important role in promoting environmental awareness, education, training and public participation. Environmental authorities often confer with NGOs as civil society representatives, for instance the Ministry for the Environment and Territory commissions annually reports on the state of the environment and environmental indicators to environmental NGOs

Furthermore, the most representative NGOs express their views either on the implementation of the Ramsar Convention or on climate change policy to the Ministry for the Environment and Territory. In particular, NGOs are represented in the National Council for Protected Areas concerning the Ramsar Convention, and provide expertise (e.g. drafting strategies, programs and new legislation) playing a fundamental role on awareness campaigns on climate change.

Therefore, NGOs' participation and collaboration among other environmental actors would help strengthen a better synergy between planning activities and implementation action.

The right of access to environmental information is embodied in the national law and recognized as enforceable in the courts. The legal framework is provided by Law n.39/97, the 1990 EU directive on public access to environmental information, and the Aarhus Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters.

Italy was the second OECD country (after Denmark) to ratify the Aarhus Convention. All public authorities and semi-public bodies holding environmentally related information are asked to provide this information to the Ministry for the Environment and Territory and under request to the public. Access can be denied for reasons of commercial or industrial confidentiality, national security, and the confidentiality of certain public decisions. For instance information that cannot be accessed at company level includes raw data on pollutant emission measurements and natural resource use (which must be aggregated before being released) and reports of public enquiries held as part of licensing procedures for hazardous installations. Some environmental information (e.g. environmental impact assessment of power stations) are accessible to the public during a limited period of time.

Very little information is available on the actual implementation of these legal provisions. While Italy is pursuing an active policy with respect to publication and dissemination of major environmental reports, its policy on access to information is not fully operational.

At national level public access to environmental information held by environmental administrations is relatively well-organized:

- ? a guide outlining applicable procedures and ways and means of obtaining environmental information has been issued;
- ? an environmental information office has been opened under the Ministry for the Environment and Territory's premises.

At the regional and local levels access to information is uneven, reflecting a lack of coordination procedures. In fact access often depends on the local community's level of environmental awareness, its commitment to providing information to the public, and the sensitivity of the issues involved. Even information on urban air quality is not systematically made available: while some cities have on-line displays, others provide information within one or two days. There is also a general lack of knowledge about the type of information available and where to find it and citizens and consumers are often not aware of their rights to access it.

Public participation in decision making remains relatively low, though participation has increased as a result of Local Agenda 21 initiatives. Projects undertaken by municipalities are discussed in a consultative forum where a variety of stakeholders are usually represented. A Local Agenda 21 association has existed since 1999. It aims at facilitating exchange of best practices among the over 330 local bodies taking part in the Local Agenda 21 process. Many Local Agenda 21 projects are concerned with reviving the urban environment. Preparation of the National Strategy on Sustainable Development has involved all interested stakeholders⁴².

The influences and benefits of regional collaboration and cooperation

Concerning influences and benefits of regional collaboration and cooperation, the issue has been already analyzed and discussed at point B of the paper. Moreover we must underline that all the international initiatives regarding climate change policy are implemented at national level rather than at a regional one in Italy.

The adequacy and availability of research, data and information systems

As already mentioned in Part B, Italy has a well recognized and developed research and monitoring system that involves different scientific institutions and research bodies.

The Italian research on anthropogenic effects on climate, variability and environmental impacts has recently improved further.

Since 1999, Italy has a National Plan on Climate Research⁴³.

The Plan identifies priorities area of research. Among the others, attention is given to:

- ? the variability on the Mediterranean sea level due to climate change,
- ? the development of simulation models;
- ? the impacts of climate change in the Mediterranean region.
- ? Part of the research activities are also finalized to:
 - ? study the terrestrial and aquatic ecosystems;
 - ? the variability of the glaciers and snow extension;
 - ? the soil erosion, the sea level rise, the alteration of wetlands.

Furthermore, attention is given to water resources management and water distribution, to the response strategies and mitigation measures.

Italy focused its climate research activity on monitoring, observation, measurements, numeric simulation with the involvement of ENEA, CNR, CESI, the Air-force Meteorological Service, INGV, the Italian Space Agency, and a number of universities.

Reporting activities are well established at national level: since 1986 “state of the environment reports” have been required by law to be presented to the Parliament. and are regularly published by the Ministry for the Environment and Territory.

Environmental statistics are published by ISTAT and a report on environmental data is already available (ANPA⁴⁴), but a report on environmental indicators has not been published as yet.

Progresses have been made on waste management reporting (2001 report by ANPA, the National Observatory on Waste), GHG and air emission inventories⁴⁵.

⁴² OECD, 2002 *Environmental Performance Review of Italy*, working document

⁴³ CIPE Deliberation n. 226 of 21st December 1999, “*National Plan on Climate Research*”.

⁴⁴ See note 22.

⁴⁵ Reports to the UN Framework Convention on Climate Change and the Convention on Long-range Transboundary Air Pollution

Nonetheless, a number of inefficiencies are still to be overcome:

- ? Environmental monitoring is not consistent and up to date in all areas;
- ? there are weaknesses in data quality and availability, as well as a lack of data on particulate emissions (to air), waste water discharges and the state of coastal waters;
- ? information is unavailable on environmental expenditure data and other environmentally related economic information (e.g. environmentally related taxes, subsidies, prices);
- ? integration of regional data into meaningful national level statistics is problematic since there is inadequate co-ordination of collection methods, data characteristics and data flows at local, regional and national levels;
- ? there are long delays in producing data and the data released lack timeliness.

According to the Environmental Action Strategy for Sustainable Development the following measures are planned:

- ? to improve the communication among researchers, decisions makers, and public;
- ? to promote the environmental education at university, and research centers levels;
- ? to develop analysis instruments and methodologies;
- ? to increase the expenditure on environmental and sustainable development research;
- ? to improve the integration of national and regional data among the technical bodies⁴⁶.

⁴⁶ OECD, 2002 *Environmental Performance Review of Italy*, draft.

PART D TOWARD ADAPTIVE STRATEGIES – DISCUSSION POINTS FOR THE REGIONAL ROUND TABLE

Key assumptions for developing adaptation responses for water and wetland resource sectors

There are many opportunities to reduce the risks of climate variability and change for Italian water and wetland resources. Many of the approaches for effectively dealing with climate change are little different than the approaches already available to manage risks associated with existing variability. Tools for reducing these risks have traditionally included supply-side options such as new dams, reservoirs, and pipelines, and more recently, demand-management options, such as improving efficiency, modifying demand, altering water-use processes, and changing land-use patterns in floodplains. This work is going on largely independently of the issue of climate change, but it will have important implications for the ultimate severity of climate impacts.

Sole reliance on traditional management responses is a mistake: first, climate changes are likely to produce – in some places and at some times – hydrologic conditions and extremes of a different nature than current systems were designed to manage; second, climate changes may produce similar kinds of variability but outside of the range for which current infrastructure was designed and built; third, relying solely on traditional methods assumes that sufficient time and information will be available before the onset of large or irreversible climate impacts to permit managers to respond appropriately; and fourth, this approach assumes that no special efforts or plans are required to protect against surprises or uncertainties.

The first situation could require that completely new approaches or technologies be developed. The second could require that efforts above and beyond those currently planned or anticipated be taken early. Complacency on the part of water managers, represented by the third and fourth assumptions, may lead to severe impacts that could have been mitigated or prevented by cost-effective actions taken now.

As a result, we make the following key assumptions for developing adaptation responses for water and wetland resource sectors to climate change:

- ? Considering that, in spite of the high freshwater availability, estimated to be one of the highest in Europe, the national fresh water resource is stressed by an excessive and sometimes irrational exploitation, reflected in the high and increasing uptake level and the high leakage affecting the water supply systems⁴⁷, prudent planning requires that a strong national climate and water monitoring and research program should be maintained, that decisions about future water planning and management be flexible, and that expensive and irreversible actions be avoided in climate-sensitive areas .
- ? Natural disasters and hydro-geological risk remain aspects critical for the country: over 15% of the territory and 26% of the population are subject to very high hydro-geological risk. The particular geological and geo-morphological formations and the presence of young and high mountains play an important role, but the causes of the high frequency of disasters should be searched in the global climate change but mostly in the wrong use of the territory⁴⁸. As a consequence, better methods of planning under climate uncertainty should be developed and applied. Governments at all levels should re-evaluate legal, technical, and economic approaches for managing water resources in the light of potential climate changes.
- ? Improvements in the efficiency of end uses and the intentional management of water demands must now be considered major tools for meeting future water needs, particularly in water-scarce regions. The non-homogeneous supply of the resource within the territory causes water shortages in places where supply is lacking, especially in the South Regions and Islands. In the year 2002 some drought episodes provoked a widespread public opinion movement, that requested a drastic intervention of the Government trying now to face the problem by an extraordinary funding of the

⁴⁷ Ministry for the Environment and Territory, (2002), “2002 Country Profile - Environmental Aspects of Sustainable Development”, p. 38.

⁴⁸ Ministry for the Environment and Territory, (2002), “2002 Country Profile - Environmental Aspects of Sustainable Development”, p. 82.

water management initiatives, especially in the South. The influence of the climate changes is becoming evident, also for the influent lobby of environmental skeptical⁴⁹. We note the IPCC conclusion that "water demand management and institutional adaptation are the primary components for increasing system flexibility to meet uncertainties of climate change."

- ? Water managers should begin a systematic reexamination of engineering designs, operating rules, contingency plans, and water allocation policies under a wider range of climate conditions and extremes than have been used traditionally. For example, the standard engineering practice of designing for the worst case in the historical observational record may no longer be adequate.
- ? The timely flows of information among the scientific global change community, the public, and the water-management community are valuable. Such lines of communication need to be developed and expanded. Cooperation between water agencies and leading scientific organizations can facilitate the exchange of information on the state-of-the-art thinking about climate change and impacts on water resources.
- ? Traditional and alternative forms of new supply, already being considered by many water districts, can play a role in addressing changes in both demands and supplies caused by climate changes and variability. Options to be considered include wastewater reclamation and reuse, water marketing and transfers, and even limited desalination where less costly alternatives are not available and where water prices are high. None of these alternatives, however, is likely to alter the trend toward higher water costs.
- ? Prices and markets are increasingly important for balancing supply and demand. Because new construction and new concrete projects can be expensive, environmentally damaging, and politically controversial, the proper application of economics and water management can provide incentives to use less and produce more. Among the new tools being successfully explored are tiered rates, water banking, and conjunctive use of groundwater. Even without climate change, efforts are needed to update and improve legal tools for managing and allocating water resources.

Key issues in prioritizing adaptation responses in these sectors

Climate is not static and assumptions made about the future based on the climate of the past may be inappropriate. Assumptions about the probability, frequency, and severity of extreme events used for planning should be carefully re-evaluated.

Climate changes will be imposed on top of current and future non-climate stresses. In some cases, these changes will be larger than those expected from population growth, land-use changes, economic growth, and other non-climate factors.

Certain threshold events may become more probable and non-linear changes and surprises should be anticipated, even if they cannot be predicted.

The time lags between identifying the nature of the problems, understanding them, prescribing remedies, and implementing them are long. Waiting for relative certainty about the nature of climate change before taking actions to reduce climate-change related risks may prove far more costly than taking certain pro-active management and planning steps now. Methods must be used that explicitly incorporate uncertainty into the decision process.

Records of past climate and hydrological conditions are no longer considered to be reliable guides to the future. The design and management of both structural and non-structural water-resource systems should allow for the possible effects of climate change, but little professional guidance is available in this area. Further research by hydrologists, civil engineers, water planners, and water managers is needed to fill this gap, as is broader training of scientists in the universities.

More work is needed to improve the ability of global climate models to provide information on water-resources availability, to evaluate overall hydrologic impacts, and to identify regional impacts.

⁴⁹ Ministry for the Environment and Territory, (2002), "2002 Country Profile - Environmental Aspects of Sustainable Development", p. 39.

Substantial improvements in methods to downscale climate information are needed to improve our understanding of regional and small-scale processes that affect water resources and water systems.

Information about how storm frequency and intensity has changed and will change is vitally important for determining impacts on water and water systems, yet such information is not reliably available. More research on how the severity of storms and other extreme hydrologic events might change is necessary.

Increased and widespread hydrologic monitoring systems are needed. The current trend in the reduction of monitoring networks is disturbing.

Information on economic sectors most susceptible to climate change is extremely weak, as is information on the socioeconomic costs of both impacts and responses in the water sector.

More work is needed to evaluate the relative costs and benefits of non-structural management options, such as demand management and water-use efficiency, or prohibition on new floodplain development, in the context of a changing climate.

Little information is available on how climate changes might affect groundwater aquifers, including quality, recharge rates, and flow dynamics. New studies on these issues are needed.

The legal allocation of water rights should be reviewed, even in the absence of climate change, to address inequities, environmental justice concerns, and inefficient use of water. The risks of climate change make such a review even more urgent.

Key responsibilities and roles to initiate processes (or to further existing process)

As deepen in Part B, Italy recently has adopted a federal institutional structure and a large reform has been carried out transforming the structure and competencies of the central administration. At national level the Environment Protection and Sustainable Development is actually driven by the Ministry for the Environment and Territory. Ministries of Economy, Health, Public Works and Transports, Industry, Agriculture and Forestry, Cultural Activities, Foreign Affairs share the same partnership. The Central Governments co-ordinates the sustainable development activities by means of the Interministerial Committee for Economic Planning (CIPE), and its VI Commission (Sustainable Development Commission).

The technical support to the administration is in charge of some scientific and technical agencies: the National Agency for the Protection of the Environment and the National Technical Services (APAT)⁵⁰, the National Institute for Sea Protection and Fisheries (ICRAM), the Agency for New Technologies, Energy and Environment (ENEA), the Agency for Sustainable Development (hosted by ENEA), the National Research Council (CNR), the Public Health Institute (ISTISAN), the Agricultural Research Centres and the National Geographic Institute;

The monitoring, control and inspection functions are assigned to APAT, to Ecological Task Force of *Carabinieri* (State Police), to Forestry State Corps, to Port Districts Authorities, to Civil Protection, to Fire Fighters, etc.

At local level the regulation, management and control functions belong to Regions, Autonomous Provinces, Provinces and municipalities that operate by means of Sector territorial agencies like River Basin Authorities and Park Agencies. Monitoring, Control, Vigilance are delivered by the Regional Agencies for the Protection of the Environment (ARPA) and Forestry State Corps.

Monitoring, control and application of the norms are under the responsibilities of provinces and municipalities; planning activities, and in particular strategic planning, is entirely in the hands of the regions. The Central State has general competencies on regulation and general planning criteria. Table 9 in the Annex⁵¹ shows the main competence of the State, Regions, Provinces and Municipalities with regard to the pressure factors on the environment like air quality and the control of air pollution, noise, water resources, soil and subsoil, nature, landscape and biodiversity. These functions are strictly connected with the implementation of the National Environmental Action Strategy for Sustainable Development.

⁵⁰ See note 22.

⁵¹ Ministry for the Environment and Territory, (2002), "2002 Country Profile - Environmental Aspects of Sustainable Development", pag. 61.

A coordination body for the implementation of the sustainable development strategy is planned, either at governmental level or at regional and local levels.

The “low hanging fruit”, what type of measures are they, or what ways are best to determining initial “no regrets”, low-cost, no-cost measures

In deciding, which measures to pursue on specific projects it is important to consider the relative benefits of the different measures.

The “low hanging fruits measures” are one of the several adaptation measures that shall be considered in the framework of the so called low-cost measures.

The question is determining which adaptation measures are best in the face of uncertain future impacts.

Harvesting low hanging fruit may end up with the loss of the mitigation opportunity itself in the future as its value may get lost in the meanwhile due to technical change. The technical progress factor may be incorporated through appropriate choice of discount rate in any analysis.

Since it is difficult to predict far in advance how climate change will affect a particular site, it should be better to avoid adaptation measures that could fail or have unanticipated social or economic consequences if climate change impacts turn out to be different than anticipated (IPCC 1998). More appropriate will be “least regret measures” or “no regrets” adaptation measures that would be justified even in the absence of climate change.

Good examples of least-regret measures include data and information collection, training and other forms of capacity building, scientific research and institutional development. Moreover, another type of least regret measures involves the additional investment in infrastructure with long turnover times to take anticipated climate change into account. When the investment is relatively small compared to the cost of retrofitting the infrastructure at a later stage (*e.g.*, for a bridge or a sewage system) this would be a prudent and justifiable strategy.

On the other side, give priority to no regrets measures, such as water resource management, which would be beneficial even in the absence of climate change. Structural measures which provide few benefits other than protection require a high degree of certainty about the impact at a particular site. If climate change impacts turn out to be different than expected, investments in these measures could have been wasted.

No regrets adaptation measures include, for example, sound management of coastal areas and water supplies, control of pollution, and investment in preventive health. A “no-regrets” adaptation strategy need not involve large investments of public resources - but it would require strong political will, as adaptation measures may face stiff competition from other development activities for scarce funds. Yet it is important to understand that the short-term economic gains of a 'do nothing' strategy could be easily dissipated by the impact of future climate events.

The challenge will be to find an acceptable level of risk, an intermediate solution between investing in high cost solutions and doing nothing, and start adapting long before the expected impacts occur.

Other aspects concerning processes, responsibilities, options and measures, scale or timing of adaptation strategies

Following the Agenda 21, signed in Rio, Italy began to introduce some new policy objectives in order:

- ? to secure a responsible economic growth with respect to the society and the future generations protecting the natural resources and the environment;
- ? to integrate the environmental dimension in all the decision and the planning processes;
- ? to create control and monitoring institutional instruments for sustainable development;
- ? to promote public awareness and participation of the major groups and of the stakeholders.

The first formal act was the adoption, at the end of 1993, of the “National Plan for the Implementation of Agenda 21” in order to give more operational substance to these principles. The Plan, approved by the Inter-ministerial Committee for Economic Planning (CIPE), was conceived for assessing the economical development with essential reference to the environmental effects. The document recognised the main driving forces of environmental hazard in the economic sectors of Energy, Transport, Industry, Agriculture, Tourism and Waste.

The actions invoked to achieve a better sustainability were:

- ? implementation of instruments for the sector integration of the environment in decision making;
- ? change of impacting production patterns to reduce natural resources use, pollution and wastes and to improve eco-efficiency;
- ? promote innovation also by new taxes, tariffs, incentives and the bad externalities reduction;
- ? development of sustainability indicators;
- ? promotion of a new science of the environment and of an extensive knowledge of the processes concerning sustainability.

The former institutional approach to sustainable development lacked to define procedures to assess and verify progresses and drawbacks. However, 2002 Environmental Action Strategy for Sustainable Development changed the approach issuing, between others, some positive traces of the country evolution in the decade. In the ANNEX are summarized the main accomplishments and the failures in achieving Sustainable development, making use of the key indicators listed in the 1993 Plan.

In general, the objectives of Italian environmental policies for sustainable development are fundamentally related to three main tasks:

- ? restoring environmental deficit;
- ? promoting sustainable growth;
- ? carrying out innovative environmental policies.

To these ends the promotion of sustainable development and the implementation of Agenda 21 at national level is basically attributed to the Ministry for the Environment and Territory, Sustainable Development Department. It aims to:

- ? promotion and co-ordination of programs and projects for sustainable development, including local Agenda 21;
- ? funding interventions to protect and restore the environment;
- ? drawing up and management of program documents for European co-financing;
- ? formulation of proposals for inter-ministry meetings on economic planning, environmental tax regulation and tariff mechanisms setting;
- ? promotion of voluntary agreements with single and/or associated enterprises for sustainable development;
- ? promoting initiatives for developing employment in environmental fields;
- ? promoting research in sustainable development areas;
- ? reporting to UN CSD, EC and to the Parliament on the state of the environment and sustainable development;
- ? information to the citizens, public and private institutions, on environment and sustainable development;
- ? negotiating and carrying out regulations, as well as community and international decisions on sustainable development policies.

A strategic sustainable practice in policy planning should become the basic instrument for the implementation of the sustainable development. This practice would allow Italy to abandon the emergency approach to the environmental protection, in particular in some areas like the hydro-geological risk (quite severe in Italy), the waste management, the protection of inland and marine waters, and the recovery of polluted industrial areas and sites.

In the sector of the protection of the land, we suffer the effects of many years of inaction and bad management, due to repeated, severe emergencies. A turning point has been the tragedy of *Sarno*, with caused the issue of an innovative legislative measure by the government – decree n.180/98 – that, together with emergency measures for the areas in *Campania* struck by the landslide, contains important news in the determining areas of major risk of landslide and flood in the whole country, in preparing various levels of tutoring and safeguard, and the strengthening of technical support.

In the waste sector, that has had to manage situations of real environmental emergency especially in southern Italy the reform, launched by legislative decree 22/97 has finally entered the operative phase that allows to include the waste sector in the industrial area with a new systemic vision of potentials and opportunities as well as of the needs for sustainability.

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ON LINE RESOURCES

<http://www.csis.org>

Center for Strategic & International Studies

<http://www.ieep.org.uk/>

The Institute for European Environmental Policy (IEEP) is a leading center for the analysis and development of environmental policy in Europe;

<http://www.okno.com/env/env-links.html>

Environmental links provided by OKNO Group;

<http://www.eionet.eu.int/>

European Environment Information and Observation Network (EIONET) Networking improving Europe's environment

<http://www.iisd.ca>

IISD is a multimedia resource for environment and development policy makers.

<http://www.ccrcc.sr.unh.edu/>

The Climate Change Research Center (CCRC) is devoted to the retrieval and interpretation of global change records that document climate (response and forcing), biogeochemical cycling, atmospheric chemistry, unique atmospheric phenomena (e.g. extreme events, volcanic events, biomass-burning) and the influence of human activities on our environment.

<http://www.minambiente.it>

Italian Ministry of Environment and Territory website.

<http://europa.eu.int/scadplus/leg/en/s15000.htm>

“Scadplus” gives a summary of the main legislative measures and procedures for each of the activities of the European Union.

<http://unfccc.int>

United Nations Framework Convention on Climate Change website.

<http://www.ipcc.ch/>

IPCC website. The IPCC is an intergovernmental body that provides scientific, technical and socio-economic advice to the world community, and in particular to the 170-plus Parties to the United Nations Framework Convention on Climate Change (UNFCCC).

<http://www.cbd.int>

United Nations Convention on Biological Diversity

<http://www.pewclimate.org/>

The Pew Center on Global Climate Change is a non-profit, and independent organization dedicated to providing credible information, straight answers and innovative solutions in the effort to address global climate change.

<http://www.climatechangesolutions.com/>

Climatechangesolutions.com is Canada's “megasite” of interactive tools and resources on actions to reduce greenhouse gas emissions. *Climatechangesolutions.com* draws on the real-world experience of Canadian industry, governments and individuals to highlight the many untapped “win-win” solutions available to address climate change. More importantly, the site provides easy access to the information, tools and resources needed to translate concerns about global climate change into concrete local actions that can reduce greenhouse gas emissions.

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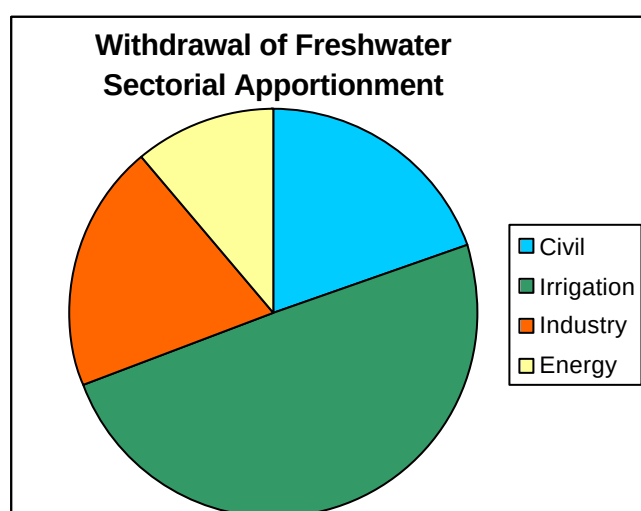
ANNEX

Table 1 Tropic level for coastal waters

TRIX	Environmental Status	Water Conditions
2 – 4	VERY GOOD	Good transparency of water. Absence of anomalous water color. Absence of under saturation of dissolved oxygen in benthic waters.
4 - 5	GOOD	Occasional darkening of water Occasional anomalous water color Occasional lack of oxygen in benthic water
5 - 6	POOR	Scarce transparency of water Anomalous water color Occasional lack and absence of oxygen in benthic waters Evidence of benthic ecosystems suffering
6 - 8	VERY POOR	High darkening water Common anomalous water color Common oxygen lack and absence in benthic waters Death of benthic organisms Alteration and simplification of benthic communities Economic, tourism, fishery and aquaculture damages

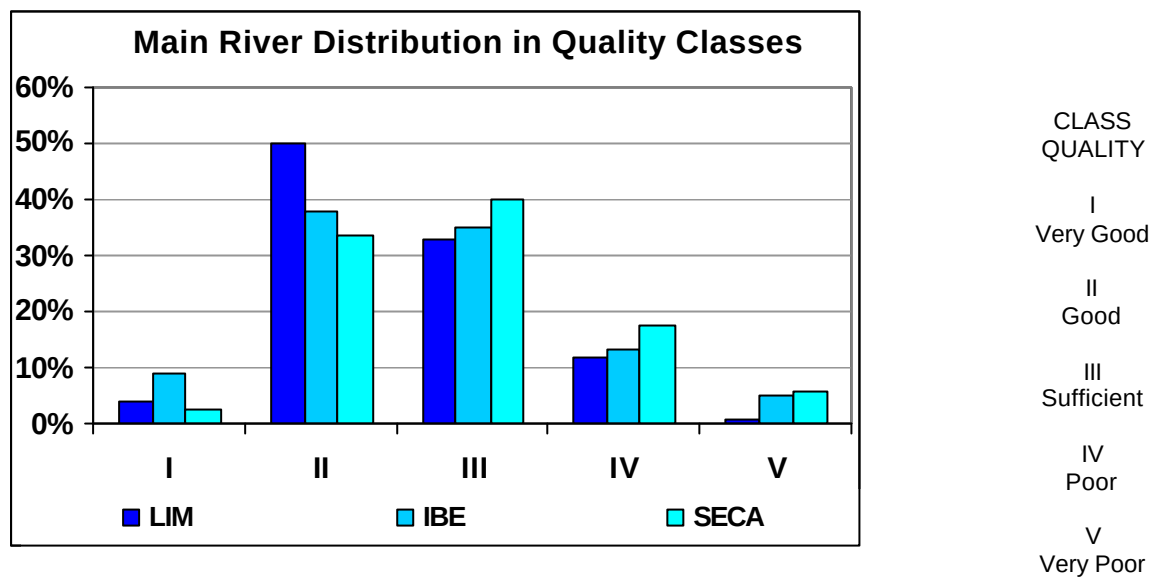
Source: ICRAM - single measure representative of the national situation is not available because the average of regional levels has not any conceptual meaning. 14 regions on 15 have been monitored: the water quality was rated poor in 2 cases, good in 7 regions and high in 5 regions

Table 2 Use of freshwater resources



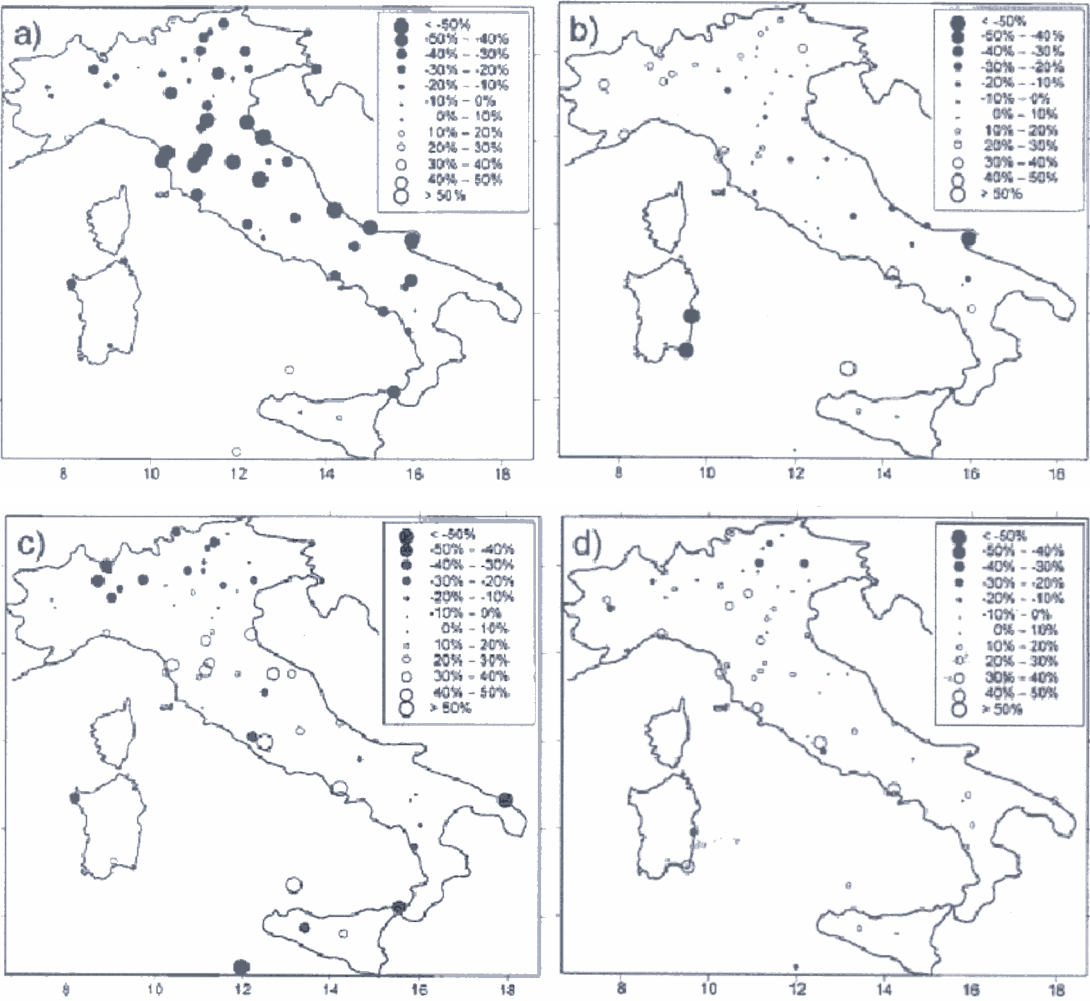
Source: ANPA – the figure shows the percentages of drawing calculated on the basis of ISTAT data (1991) and CNR-IRSA data (1999).

Table 3 Rivers quality



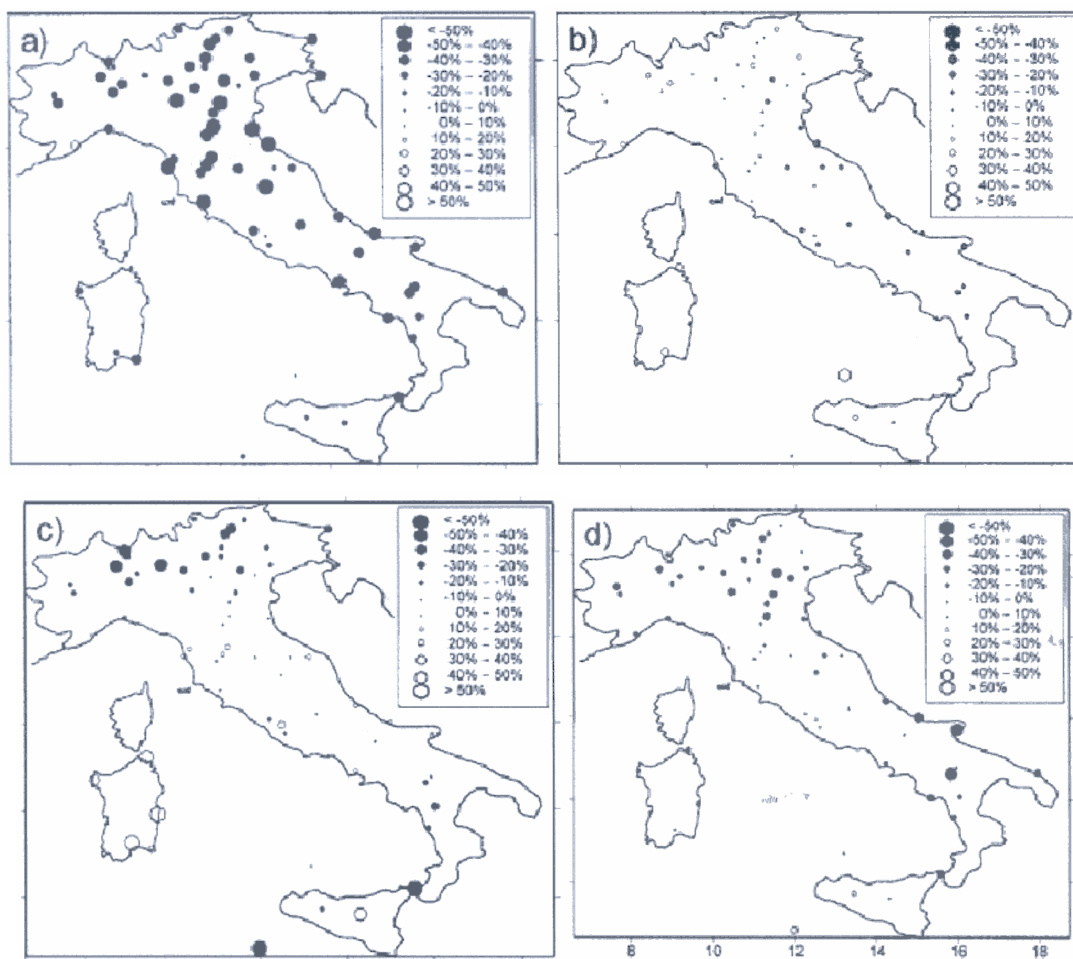
Source: ANPA. The national water decree 152/99 defines environmental ecological objectives for any water body typology in river basins and identifies instruments and procedures to classify water bodies according to their environmental quality status that will depend on biological, physical-chemical and hydromorphological parameters. The highest score (class V) corresponds to the worst status.

Table 4 Precipitation trends during the four seasons



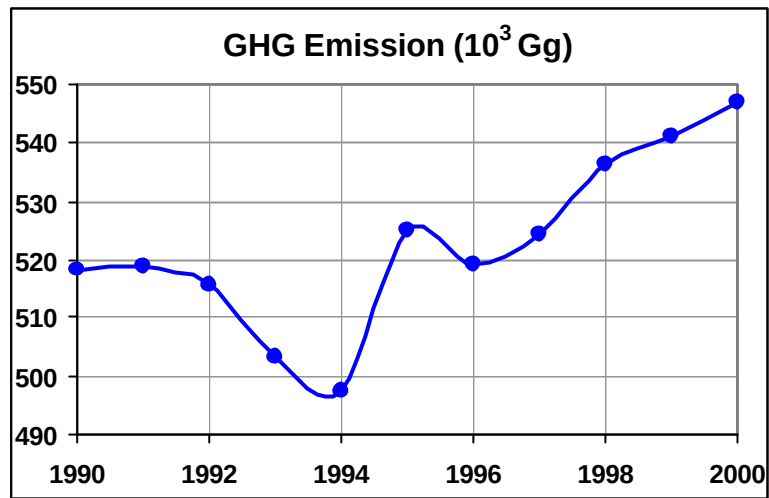
Source: Ministry for the Environment and Territory: *Third National Communication of Italy to UNFCCC*, working document.

Table 5 Trend number of raining days/year during the four seasons



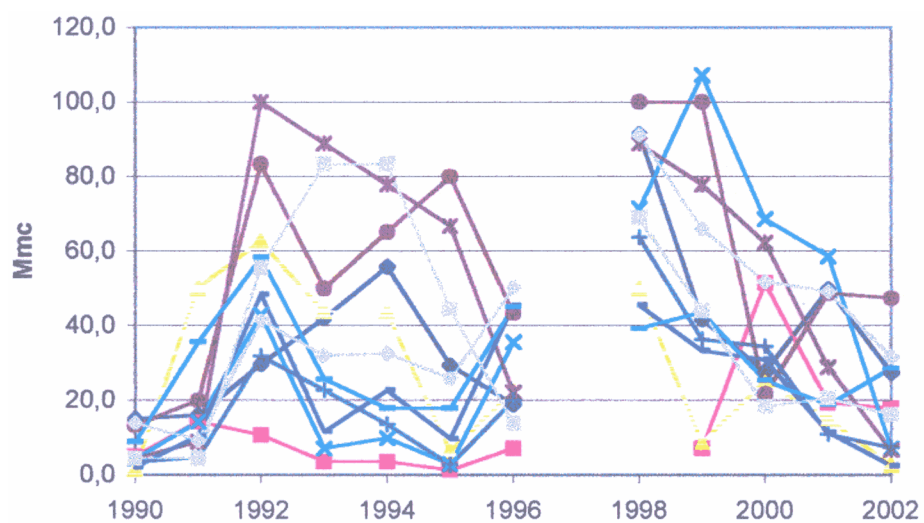
Source: Ministry for the Environment and Territory: *Third National Communication of Italy to UNFCCC*, working document.

Table 6 Emission of GHGs in Italy



Source: Ministry for the Environment and Territory: *Italy 2002 Country Profile*.

Table 7 Evolution of water supply through artificial basins in Sicily (1990/2002)



Source: Source: Ministry for the Environment and Territory: *Third National Communication to the UNFCCC*, working document.

Table 8 Objectives of quality, operating tools and regulatory acts

WATER RESOURCES

<u>Objectives of quality, Monitoring and inspection</u>	<u>Protection and management tools</u>	<u>Waste control and inspection</u>
Central Administration		
Definition of the requirements for the quality of swimming water	Definition of delimitation criteria for the Optimal Territorial Precincts of the integrated water service	Definition of general methodological criteria for the formation and updating of water and dangerous substances lists
Identification of minimum objectives of environmental quality for important bodies of water and of objectives of quality for each specific intended use for above-ground fresh water intended for the production of potable water, for fresh water that requires protection and improving to be fit for the life of fish, for water intended to sustain the life of mollusks and for water intended for swimming	Definition of criteria for managing the integrated water system	Definition of the maximum amount of phosphor allowed in washing products with the aim of reducing eutrophication
Protection service for the marine environment and monitoring, intervening in and preventing sea pollution	Definition of guidelines for the preparation of the water budget of the basin, complete with criteria for taking a census of the uses going on and for the definition of the minimum essential reflux	Definition of general methodological criteria for the formation and updating of the waste registry
Definition of inspection methods of the correspondence of detergents with the regulations on the biodegradability of surface-active agents	Drawing up of the national water budget	Definition of the conditions for and limits on using dangerous products, substances and materials
Definition of general criteria and of methodologies concerning the qualitative inspection of water and wastes	Definition of directives for the surveying and monitoring of water sources and methods for the rational planning of their use	Establishment of pollutant emission limits
Drawing up of the data and information on the quality of water for human consumption, on the disposal of dangerous substances, on the industrial disposal of dangerous substances	Carrying out of the Special plan for the completion of collection and purifying systems of refluent water	Definition of criteria and norms for sea dumping regulations. Authorization for sea dumping for ships and airplanes
Definition of criteria for the monitoring and inspection of the coastal strip	Definition of criteria and contents for the drafting of the Water protection plan	Definition and updating of the list of harmful substances whose emptying into the sea is forbidden
Carrying out of environmental inspections in case of the incompetence of the Regions	Preparation of the Plan for monitoring the state of eutrophication	Definition and updating of the criteria and methods for attaining water conservation
	Preparation of the General plan for the protection of the sea and the coast from pollution	Definition of criteria and methods for the agronomic using by small agroindustrial companies of farming effluents, of vegetation water from oil mills, and of refluent water assimilated by refluent domestic water
	Identification, during the first analysis,	Definition of technical norms for the

	of sensitive areas	reusing of effluent water
	Identification, during the first analysis, of the areas that are vulnerable due to nitrates of agricultural origin	Identification of criteria regarding the reduction of the impact on the environment resulting from activities related to hydroponics and fish-breeding Issuing of norms to regulate activities related to disposal of sewage and mud
Regions		
Identification, for each important body of water or part of it, of the class of environmental quality	Definition of optimal territorial precincts of integrated water services	For fresh water suitable for the life of fish and for water intended to sustain the life of mollusks, the adoption of specific and justified supplementary or restrictive provisions for disposal or rather for water use, if called for by special and urgent needs for protecting the quality of the water
Definition of higher objectives of environmental quality and identification of more eventual uses for the bodies of water and respective objectives of quality	Management of State water and the employment of administrative functions regarding the origins of public water; the search for, extraction and use of underground water; the protection of the underground water system	Adoption of necessary measures for avoiding the further deterioration of all bodies of water
Elaboration and starting up of tools for inspecting the effectiveness of the Obligatory plans of action for the protection and restoration of water from the pollution of agricultural nitrates	Designation of more sensitive areas or rather the identification inside the areas designated by the State of the bodies of water that are not sensitive areas	Adoption of norms and measures in favor of the recycling of water and the reuse of purified effluent water
Preparation and carrying out of a program for inspecting the concentration of nitrates in fresh water on the basis of criteria established on a national level	Designation of drainage basins in the sensitive areas that contribute to the pollution of these areas on the basis of criteria established on a national level	Identification of individual systems or other public and private systems that attain the same level of environmental protection (on the spot treatment plants) for settlements, installations or isolated buildings that dispose of domestic effluent water
Publication of a biennial report on the disposal activities of effluent urban water according to the methods established by the State	Identification of areas that are vulnerable due to phytosanitary products on the basis of the indications defined on a national level	Laying down of specific regulations for sewer system waste coming from conglomerations with a strong seasonal fluctuation of inhabitants
Drawing up of programs for knowing and verifying the qualitative and quantitative state of above-ground and underground water inside each drainage basin	Identification of more vulnerable areas or rather the parts that are not vulnerable areas inside the areas designated by the State	Definition of the official regimes for the disposal of effluent domestic water and sewer systems
Drawing up of programs for the acquisition of information on the characteristics of the drainage basin and for the evaluation of human impact	Definition or revision of obligatory programs of action for the protection and restoration of water from pollution caused by nitrates of agricultural origin	Regulation of the phases of temporary waste authorization for the purifying plants of effluent water for the necessary amount of time before their start
Classification of above-ground fresh water to be consumed on the basis of the three categories and the criteria established on a national level	Integration of codes of good agricultural practice; training-information interventions addressed to the farmers, in reference to the actions for the areas that are vulnerable due to nitrates of agricultural origin	Definition of the emission limits, different from those on appendix 5 both in maximum allowable concentration and in maximum quantity per unit of time with regard to each polluting substance and per group or family of similar substances. Limits less restrictive than those shown in tables 12 and 3/A and tables 3 and 4 cannot be established, while they can be to a limited extent

		for the substances indicated in table 5.
Preparation of the lists of bodies of water according to the specific intended use	Identification of the areas to be protected, divided into areas of absolute protection and areas of respect, and inside the drainage basins, of the areas of reloading the water table, the areas of protection in order to maintain and improve the qualitative characteristics of above-ground and underground water intended for human consumption, as well as for the protection of the state of the resources	Identification, from the wastes coming from plants treating affluent urban water situated inside the afferent drainage basins in the sensitive areas, of those wastes that, contributing to the pollution of such areas, are to be subjected to a treatment superior to the secondary one
	Preparation of norms and measures for the reduction of consumption and the elimination of wasting water and for the conservation of water in agriculture	
	Identification of the areas of coastal and brackish sea water to be protected and improved in order to allow for the life and reproduction of edible mollusks, on the basis of the requirements established on a national level Identification of water suitable for the life of fish and the classification of those that are "salmonicultural" and "cyprinoidicultural" on the basis of parameters established on a national level	
Provinces		
	Organization of the integrated water system and its management in a cooperative form	Issuing of authorizations for disposal when not in a public sewer system
		For fresh water suitable for the life of fish and for water intended to sustain the life of mollusks, the adoption of specific and justified supplementary or restrictive provisions for disposal or rather for water use, if called for by special and urgent needs for protecting the quality of the water
Municipalities		
Designation of the areas not suitable for swimming	Organization of the integrated water system	Issuing of the authorization for disposal in public sewer systems For fresh water suitable for the life of fish and for water intended to sustain the life of mollusks, the adoption of specific and justified supplementary or restrictive provisions for disposal or rather for water use, if called for by special and urgent needs for protecting the quality of the water

SOIL AND SUBSOIL

<u>Objectives of quality.</u> <u>Monitoring and inspection</u>	<u>Operating tools for restoration and protection</u>	<u>Emission limits</u>
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Central Administration		
Designation of national and interregional water basins.	Carrying out of the planning and financing of soil protection interventions.	Definition of urgent intervention programs for the reduction of the hydro-geological risk in areas of the highest vulnerability.
Drawing up and adoption of the Temporary programmatic plan for defining fundamental adjustment strategies for the territory in reference to the protection of the soil and to the basins.	Evaluation of the effects resulting from the carrying out of the plans, programs, and national projects for the protection of the soil.	Definition and publication of the priority list of contaminated sites to be reclaimed.
Identification of sensitive areas and vulnerable zones.	Adaptation of State-Region agreement and cooperation procedure with regard to soil protection.	Approval of the reclamation projects of national importance.
Definition, with ANPA, of the acceptability limits of the contamination of soils on the basis of the intended uses of the polluted sites.	Approval of the National basin plans, also for under-basins and extracts regarding functional sectors.	Definition of requirements for environmental readjustment projects for sites of admissible mining activities with subsidy from the State.
Definition of criteria, methods and standards for the collection and drawing up of data regarding the aspects of soil protection.	Adoption (such as Basin authorities) of protection measures in force until the approval of the Basin plans.	Definition, with ANPA, of the general criteria for the safeguarding of, the drafting of reclamation projects for, the carrying out of the reclamation of and the environmental restoration of the polluted sites.
Definition of policies for the research and study of the elements of the natural environment and of the general conditions of risk.	Adoption (such as Basin authorities) of Transitional plans for hydro-geological adjustment.	Employment of the policy and coordination functions with regard to the reclamation of polluted sites.
Preparation of the Report on the use of the soil and on the conditions of the hydro-geological adjustment.	Identification and designation (such as Basin authorities) of the areas at hydro-geological risk and the adoption of the respective protection measures.	Definition of general criteria and standards for the reclamation of polluted sites.
Organization, coordination and management of the only information system and of the national integrated network of surveying and surveillance (drainage, seismic, geological, dams).	Definition of the methods and criteria for the operations of planning and carrying out soil protection interventions.	Adoption (such as Basin authorities) of specific protection measures for areas vulnerable to desertification.
Definition, with ANPA, of the procedures of drawing and analyzing samples from polluted soil.	Definition of criteria for the identification of reclamation interventions of national importance.	
National mapping of the sites of the plants that produce and treat wastes and of the companies at risk of having an important accident, the purpose of the census foreseen by Minister's Decree 16.5.89.	Definition of the general criteria for the drawing up of the Regional plan for the reclamation of contaminated sites.	
	Adoption, in case of the incompetence of the Region, of the necessary provisions for the drawing up of the Plan for the reclamation of contaminated sites.	
Regions		
Designation of the drainage basins of regional importance.	Issuing of authorizations for the extraction of lithoid materials from the watercourses.	Employment of the administrative functions not explicitly listed as being of national importance.
Drawing up and adoption of the temporary programmatic plan for defining fundamental adjustment strategies for the territory in reference to the protection of the soil, for the	Planning and integrated management of the protection interventions of the coasts and of the inhabited coastal areas.	Employment of the administrative functions for the protection of the coasts (not included in national basins).

interregional and regional basins.		
Identification of the areas subjected to or threatened by phenomena of the deterioration of the soil and processes of desertification.	Approval of the Basin plans of interregional importance prepared by the respective Basin authorities.	Drawing up, approval and carrying out of projects, interventions and works to be completed in the interregional or regional basins.
Preparation of the Annual report on the use of the soil and on the conditions of hydro-geological adjustment.	Drawing up, approval and carrying out of the Drainage basin plans of regional importance.	Preparation and approval of Intervention programs for the water and forest maintenance of the interregional or regional basins.
Preparation of the Program for the development, coordination and management of the information base that supports basin planning.	Collaboration in the drawing up of the Basin plans of national importance and the formulation of proposals for the drafting of programs, studies and projects regarding these basins.	Employment of the administrative functions with regard to quarries and peat bogs.
Preparation of the registry of the polluted sites to be reclaimed.	Employment of the functions related to hydro-geological constraint.	Authorization for the excavating of sand and gravel in the beds of watercourses and on beaches under regional authority.
Identification and updating of seismic areas.	Adoption of Transitional plans for hydro-geological adjustment.	Approval of projects and authorization of interventions for the safeguarding and reclamation of polluted sites extended on the territory of more than one municipality.
	Issuing of the provisions for the carrying out of the Basin plan in the town-planning sector.	Definition of guidelines and criteria for the drawing up and approval of the projects for the safeguarding and reclamation of polluted sites.
	Designation of the areas at hydro-geological risk and respective measures of protection.	Drawing up and approval of the Reclamation plan for polluted sites.
	Adoption, through the Basin plans, of specific protection measures for areas vulnerable to desertification.	Definition of a priority list of contaminated sites to be reclaimed.
Provinces		
Definition (with PTC) of intervention strategies for water, hydro-geological, hydraulic and forest systems and the strengthening of the soil and the putting into a steady state of the water.	Participation in the employment of the regional functions with regard to soil protection.	Verification and affirmation of the completion and interventions of safeguarding, reclamation and environmental restoration of the polluted sites.
	Employment of administrative functions regarding soil protection.	Verification of the correct execution of the interventions of reclamation and preparation of the monitoring system.
Municipalities		
	Participation in the employment of the regional functions with regard to soil protection.	Approval of reclamation projects and authorization of interventions for polluted sites found on municipal territory.
		Identification of the parties responsible for exceeding the limits of site pollution and warning them to intervene for the safeguarding, reclamation and environmental restoration of them.
		Carrying out of interventions of safeguarding, reclamation, and environmental restoration in case of the incompetence of the parties

		responsible for site polluting.
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NATURE AND BIODIVERSITY

<u>Objectives of quality. Monitoring and inspection</u>	<u>Operating tools for restoration and protection</u>	<u>Emission limits</u>
Central Administration		
Foundation of the registry of protected areas in Italy.	Agreement proposal for the development of economic actions that can be met in the parks of the Alps, the Apennines, the islands and the protected marine areas.	Surveillance of compliance with the protection measures that include prohibitions and the temporary procedures regarding the established or planned protected areas.
Drafting of the Nature Charter.	Institution of national parks.	Surveillance of the management of the international and State protected areas.
Guidelines for the monitoring of the state of conservation of the Community species and habitats (to be defined).	Institution of natural State reserves.	Enforcement of protection measures to learn and proposing the establishment of them for protected areas.
Drafting of the Report of the carrying out of the regulations of Directive 92/43/EEC.	Institution of protected marine areas.	Enforcement of prohibitions and of temporary procedures for the established protected areas, until the approval of the regulations.
Census of the environmental heritage made up of the wild fauna (National Institute for Wild Fauna).	Identification of fundamental adjustment strategies for the territory with reference to natural and environmental figures.	Restoration of places or re-establishment of the animal and vegetable species damaged as a result of the non-observance of protection measures, of prohibitions and of temporary procedures, regarding the established or planned protected areas.
Definition of the compatible techniques and systems for the computerized mapping of the landscape and environmental resources.	Definition of the Triennial program of protected areas and of the Program for natural protected areas of international and national importance.	Approval of the regulations for the national park, the natural State reserve and the protected marine area.
	Approval of the Park plan for national parks in case of the incompetence of the Region.	Adoption of the Management and control plan for natural State reserves.
	Approval of the long-term socioeconomic plan for national parks in case of the incompetence of the Region.	Definition of the directives for the management of the areas with functional ecological connections.
	Formulation of the proposal to the EU of constituent sites of Community importance of the European ecological network Nature 2000.	Identification of conservation measures for the species of fauna of appendix D, Decree by the President of the Republic 357/97.
	Designation of sites, included in the European list of the Nature 2000 network, as Special conservation areas.	Definition of measures for maintaining a state of conservation of the species of wild fauna and flora in appendix E, Decree by the President of the Republic 357/97.
	Definition of criteria for hunting planning.	Issuing of authorization for the reintroduction of the species of appendix D, Decree by the President of the Republic 357/97 and of the non-local species.
	Integration of the lists and statements of the landscape and environmental resources that are of	Adoption of measures for the recovery and requalification of the landscape and environmental resources that are

	considerable public interest and that are under protection.	under protection.
	Drafting and approval of Territorial landscape plans or of Territorial town planning plans (with the aim of protecting the value of the landscape and the environment), regarding the landscape resources, in a substitutive way in case of the incompetence of the Regions.	Annulment of the authorizations issued by the Regions for projects and works regarding the landscape and environmental resources that are under protection or the employment of the provision in a substitutive way.
		Prohibition or suspension of works regarding landscape or environmental resources even if not under protection.
		Imposition of ordinances for the carrying out of works that concern landscape or environmental resources.
Regions		
Adoption of measures that guarantee the monitoring of the state of conservation of the species and of the natural habitats.	Institution of regional natural parks.	Surveillance of the compliance with the protection measures, the prohibitions and the temporary procedures regarding the established or planned protected areas.
Establishment of a continual monitoring system of the captures and accidental killings of the faunal species	Institution of regional reserves.	Surveillance of the management of regional protected areas.
Drafting of the Report on conservation measures and of the Report on the evaluations of the effect of territorial, town-planning, and sector projects regarding natural habitats and the habitats of species.	Formulation of proposals regarding the Triennial plan for protected areas and the Program for the protected natural areas of international and national importance.	Issuing of authorizations for projects and works regarding landscape and environmental resources that are under protection.
Drafting of the Report on the effects of the foundation of protection zones inside or adjacent to the migratory routes of bird life.	Approval of the Park plan for national parks.	Prohibition or suspension of works regarding landscape or environmental resources even if not under protection.
The wild fauna of 20-30 % of the forest pastoral territory of each Region must be protected, excluding the territory of the Alps which is a distinct zone where the protected surface area must be equal to 10-20%.	Approval of the long-term socioeconomic plan for national parks.	Imposition of ordinances for the carrying out of works that concern the landscape and environmental resources.
	Institution of regional protected areas.	Restoration of places or re-establishment of the animal and vegetable species damaged as a result of the non-observance of protection measures, of prohibitions and of temporary procedures, regarding the established or planned protected areas.
	Approval of the Park plan for regional natural parks.	Adoption of measures for avoiding the deterioration of the natural habitats and of the habitats of species for the areas designated as sites of Community importance.
Provinces		
	Approval of the Long-term economic and social plan.	Adoption of conservation or regulation measures for the Special conservation areas and for the Protection areas identified inside or adjacent to the migratory routes of bird life.

	Institution of areas adjacent to regional protected areas.	Definition of the exceptions for the protection of wild fauna and of the respective methods.
	Drafting of the plans or eventual compliance measures for the areas adjacent to protected natural areas.	Definition of protection norms for the characteristic Alpine fauna and of the control of hunting activities.
	Identification of the sites with natural habitats and habitats of species to propose as sites of Community interest.	Inspection of the wild fauna in the areas where hunting is forbidden with ecological methods or Selective shooting plans.
	Institution of protection areas inside or adjacent to the migratory routes of bird life.	
	Drafting of the Regional hunting plan and coordination of the Provincial plans.	
	Compilation of the lists and statements of the landscape and environmental resources of considerable public interest that are under protection.	
	Drafting of the Territorial landscape plans or of the Territorial town planning plans (with the aim of protecting the value of the landscape and the environment) regarding the landscape resources	
Municipalities		
	Formulation of proposals for the definition of the Triennial plan for protected areas and regarding the Program for the protected natural areas of international and national importance.	
	Participation in the institution process of a regional protected	
	Drafting of the Provincial hunting plan.	
	Drafting of the Environmental improvement plan for the natural reproduction of wild fauna.	
	Drafting of the Plans for introducing wild fauna	
	Institution of protection oases for wild fauna.	
	Institution of Repopulating and capture zones of wild fauna.	
	Formulation of proposals for the definition of the Triennial plan for protected areas and related to the Program for protected natural areas of international and national importance.	
	Participation in the institution process of a regional protected area	

Source: Ministry for the Environment and Territory: *Report on the State of the Environment, 2001*

Table 9 Goals indicators and achievements

<u>Driving forces</u>	<u>Goals</u>	<u>Indicators</u>	<u>Main achievements</u>
ENERGY	Energy saving Rational and efficient management	Per capita consumption Energy intensity Manufacturing industry intensity	Stable with GNP Decreasing Decreasing
	CO ₂ Emissions stable (1990-2000) Reducing atmospheric emissions	Total CO ₂ emissions Total atmospheric emissions CO ₂ intensity in primary energy	+5,4% Decreasing Decreasing
	Renewable fonts development	Primary energy Electrical energy Thermal solar diffusion	Biomasses and bio fuels Actuation of CIP 6/92 Decree 100 MW being installed
INDUSTRY	Ozone layer protection	ODS substances production ODS substances consumption	Montreal Protocol achieved
	Pollution reduction	Total atmospheric emissions Chemicals COv emissions from oil industry Heavy metals emissions	Improvement , but not for CO₂ ? Lacking data Decreasing Decreasing
	Prevention and reduction of industrial risk	Relevant risk industries	Seveso Law Updated
	Changing production and consumption models	Adoption of EIA Production environmental quality Production environmental quality	Fully implemented Slowly increasing ISO & EMAS Eco labels slowly diffusing
AGRICULTURE	Reduce the polluting substances	Fertilizers consumption Phyto-chemicals reduction N e P zootechnic loads reductions	Decreasing Decreasing Stabilising
	Biodiversity safeguard and natural resources enhancement	Bio agriculture diffusion Irrigated surfaces Forest fires	Rapidly increasing Desertification and drought in the south Not decreasing
TRANSPORT	Traffic emissions reduction	Atmospheric emissions Lead emissions	Improvement , but not for CO₂ Leaded gasoline phased out
TOURISM	Mobility demand reduction	Passengers mobility demand Goods mobility demand Transport intensity	Increasing more than GNP Increasing more than GNP Increasing

	Modal split	Passengers collective modes Goods by rail and sea Private cars share	Decreasing Decreasing Increasing
WASTE	Natural and cultural heritage protection.	Bathing waters protection Protected areas Building abuses	Sensible improvement Many new areas opened Better legislation and behaviours
	Changes on tourist distribution and patterns	Demand distribution Tourism transport uses Agricultural tourism	Some improvement but not in the south Increases the use of private cars Rapidly diffusing
	Quantity and hazard reduction	Urban wastes Packages production and consumptions	Stable with GNP Some incentives adopted
	Maximise the material and energy recovery	Wastes disposal Recycling Energy recovery	Land-filling still prevailing More differential household disposal Poor results
	Reduce environmental pressures from disposal	Dioxin and furan emissions	Reduction and increased controls

Source: Ministry for the Environment and Territory: *Report on the State of the Environment, 2001*

