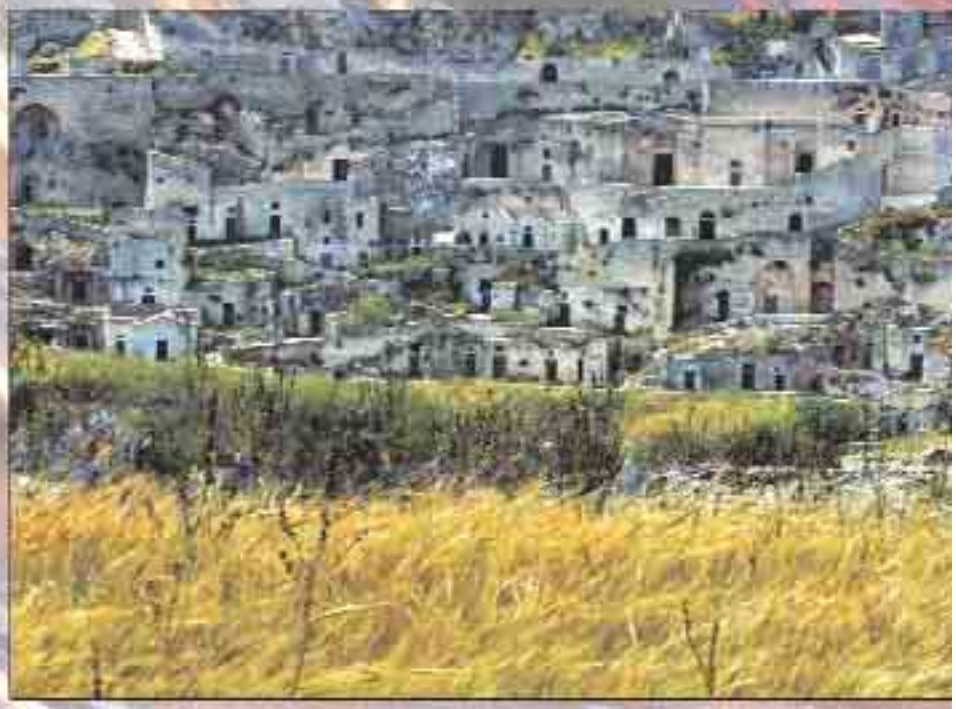
APAT
Agency for Environmental Protection and Technical Services

2004 edition
SUMMARY

ENVIRONMENTAL DATA YEARBOOK



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Agency for Environmental
Protection and Technical Services

ENVIRONMENTAL DATA YEARBOOK

SUMMARY

2004 Edition

Environmental Protection Agencies
of Regions and Autonomous Provinces (ARPAs and APPAs)

SISTAN NATIONAL STATISTICS SYSTEM

APAT – Agency for Environmental Protection and Technical Services
Via Vitaliano Brancati, 48 - 00144 ROME
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…ut potius multis communia corpora rebus
multa putes esse, ut verbis elementa videmus,
quam sine principiis ullam rem existere posse.[1]

Titi Lucreti Cari - De rerum natura
(I,196-198)

1 - …this points to the conclusion that many elements are common to many things, as letters are to words, rather than to the theory that anything can come into existence without atoms.

PRESENTATION

For yet another year, I have the pleasure of presenting the new edition of the APAT's Environmental Data Yearbook, which, over the years, has proved itself capable of combining scientific accuracy, exhaustiveness and a user-friendly presentation of information on the environment.
These characteristics have been the hallmarks of the Yearbook from the start.
The authoritativeness of the data sources and processing precision, in fact, are significant guarantees of reliability. Decisive, in this respect, is also the selection of the most suitable indicators to effectively describe the environment and its dynamics. The indicators have always managed to provide an accurate and exhaustive picture of the topics addressed in the Yearbook.
Lastly, the yearbook gives a special focus on the adoption of innovatory environmental reporting techniques, capable of clearly and concisely communicating the wealth of information made available to the Agency.
In this year's edition all these aspects have been admirably combined in a technical-scientific work of unquestionable value.
A work capable of providing a valuable information contribution, not just to policymakers and experts, but also to those members of the public desiring to further investigate environmental issues and how environmental resources are employed. All too often, in fact, public opinion is based not on hard fact but on "emotional" fiction, so to speak, unsupported by evidence. From this point of view, the Environmental Data Yearbook published by APAT is a significant tool for spreading correct environmental information.
There are a number of reasons for its success, but they all depend on the effective and efficient management of the resources that constitute and support the Environment Agency system set up by the regional and autonomous provincial governments (APAT, ARPA, APPA). Of particular significance, in this respect, are the actions put into place by the competent bodies, with a view to promoting the sharing of knowledge among all the system stakeholders, which system has now been extensively tested and has proved its reliability.

I would like to express my sincere appreciation to all those who have made this work possible and thank them for the excellent job done.

Hon. Altero MATTEOLI
Minister for the Environment and Territory

INTRODUCTION TO THE 2004 EDITION OF THE ENVIRONMENTAL DATA YEARBOOK

The 2004 Environmental Data Yearbook is tangible proof of the regular and organic activity of circulation of environmental data and information in Italia.
Like past editions, the 2004 Yearbook is the result of a complex process of refinement of data collection tools and reporting mechanisms, promoted by APAT and implemented with the fundamental collaboration of the regional and autonomous provincial Environment Agencies, essentially as part of the National Topic Centers (CTN) project, conducted in partnership with numerous other technical and scientific institutions (the so-called IPRs or Main Reference Institutions).

Compared to the 2003 Yearbook, this year's edition features a number of improvements both from content and editing point of view.
The chapter on Agriculture has been broadened to include Forestry issues; the chapter on Environmental Control also includes environmental monitoring processes; there is a new chapter on Environment and Health; while the chapter dedicated to Promoting and Spreading an Environmental Culture features an initial set of indicators, which will be further investigated in the following editions.
It has also been possible to further improve the now familiar DPSIR model, especially with regard to "Impacts" and "Responses".

The significantly enhanced communication of metadata (characterization of the indicators) has been achieved through the reorganization of the information contained in the indicator fact sheet; in particular, by better distinguishing between "indicator qualification" and "indicator performance".
In order to fairly present the actual efficacy of each indicator, the item "Limits" has been associated with the item "Aim".
With regard to the section dedicated to explaining the data supplied it has been deemed preferable to replace the item "Notes to the tables and figures" with "Comments on the tables and figures", in order to broaden the observations aimed at facilitating comprehension of the contents.

Globally, about 230 indicators have been customized and represented, compared to about 180 in the previous edition, many of which are characterized by both geographical elements and time series.
To mention only a few of the innovations introduced this year, the indicator "Carbon fixed by forests in Italia", which provides an estimate of the carbon dioxide fixing capacity of forests and their role in mitigating climate change, and the indicator relating to specific emissions by the paper industry, which provides useful information on another branch of the "Manufacturing" sector.
Of course, the previous years' indicators have been upgraded, when necessary.

With regard to the Yearbook's formal aspects, a further effort has been made to improve the level of harmonization and communication effectiveness of the instruments (graphs, tables, theme maps) used to represent the indicators.

In order to address the information requirements of various types of users, and to enhance the overall user-friendliness of the work, four different versions have been prepared of this year's edition. The unabridged version (in Italian) containing all the indicators selected for the 2004 edition, aimed at providing in-depth and detailed information of present environmental

conditions and future trend, in terms of “driving forces”, “pressures”, “state”, “impacts” and “responses”, according to a pattern that has now become familiar. Only a limited number of printed copies of this version of the Yearbook will be produced, which, however, will be available in pdf format.

The hypertext version will be posted at the APAT website, http://www.apat.it.

In consideration of its considerable success in the past years, an abridged version of the Yearbook (in Italian and English) has also been prepared. This is an abridged version containing a selection of the total 230 indicators. This version is aimed at providing an accurate and effective overview of the key environmental issues, with an added advantage of easy consultation.
In selecting the indicators an attempt has been made to privilege, as far as possible, those most easy to understand (even for non-specialists) and those with a well-defined “objective value”, such as the *per capita* production of waste or the limits to climate-change gas emissions to be achieved within a certain timeframe.
About 20,000 copies of the Italian version have been produced, to be widely circulated beginning with the central and local government bodies and authorities.
The English-language version will be widely circulated internationally, in order to continue the regular communication, abroad, of the environmental situation of this country, which activity began in 2002 and continued in 2003.

In order to promote the broad circulation and comprehension of the information, a multimedia version of the Yearbook has been made, which will be posted on the Agency’s website http://www.apat.it, and distributed on about 5,000 DVDs.

Another important innovation this year is the making available of the Agency’s Yearbook Database to outside APAT users. This tool, which has been implemented to streamline and improve the processing of the data and metadata, will allow users to search the available indicators and to access, if need be, other information not contained in the final version of the Yearbook or contained in past editions. A very versatile tool, which will allow the realization of customized abridged versions, according to users’ needs.

Giorgio CESARI
Directore General of APAT

CONTRIBUTORS

The Yearbook is one of the activities programmed by the Agency for the protection of the environment and technical services (APAT) for circulating information and data on the present state of and future trend in the environment.
Like the previous editions, the Yearbook is the result of complex analysis activities by a large number of APAT technical units directly involved in the environmental reporting process (Departments: State of the Environment and Environmental Metrology; Marine and Inland Waters Protection; Land Resources and Soil Protection; Nature protection; Nuclear, Technological and Industrial Risk; Library, Documentation and Information. Interdepartmental services: Environmental Emergencies; Guidance, Co-ordination and Control of Inspection Activities; Environmental Certification), with the support of the ARPA/APPA agencies, through the network of National Topic Centers (CTN) and the Main Reference Institutions (IPR) collaborating in the CTN.
The coordination of the Yearbook design and implementation phases has been edited by the Interdepartmental Service for Environmental Information (IAM).

Contributions have also been provided by experts, other central government departments and agencies, local government bodies and authorities, and technical-scientific institutions.

Among the central and local government departments and bodies mention must be made of all the Directorates of the Ministry of the Environment, the Ministry of Production Activities, the Ministry of Culture, the Ministry of Infrastructures and Transport, the Ministry of Agriculture and Forestry, the Ministry of Health, law enforcement bodies such as the Environment Protection Service of the Carabinieri, the Forest Police, the Operator of the National Transmission Network, the Marine Environment Service of the Harbour Police, the National Fire Brigade, the regional and provincial governments, the PMP, and the local authorities; the public and private sector technical-scientific institutions include, ICRAM, National Statistics Office, Higher Health Institute, the River Basin Authorities and River Authorities, the National Research Centre (IIA, IRSA, ICT, IMAA, III), ACI, ENEA, Italian Glaciological Committee, ENEL, European Soil Bureau of the Common EU Research Centre of Ispra, EUROSTAT, Agecontrol S.p.A., Biobank, Database ITHACA, the National Register of Organizations EMAS, ODYSSEE, TELEATLAS.

Contributors are specifically detailed in the unabridged version of the 2004 Environmental Data Yearbook.

Thanks are due to all those, single experts or organizations and institutions, who have made it possible to accomplish this Yearbook and are helping to consolidate initiatives for a more organic and effective circulation of environmental information in this country.

We apologise for anyone not expressly mentioned in the acknowledgements. A few names may have been left out considering the enormous amount of data handled.

Lastly, we would be very pleased to receive observations and recommendations from users. This feedback will be used to produce a continuously improved version of the Yearbook.

INDEX

STRUCTURE OF THE YEARBOOK SUMMARY

As in the unabridged version of the Yearbook, the Summary comprises nineteen chapters and an appendix.
In particular, the first five chapters (*Agriculture and forestry, Energy, Transport, Tourism and Manufacturing)* represent the core of the work dedicated to the *production sectors*, naturally examined in terms of their interrelation with the environment and, in particular, with relation to the driving forces (**D**) of the environmental pressures, to the direct factors of pressure (**P**), and to environmental performance (**P**).
Chapters 6 to 9 primarily highlight the indicators relating to the principal institutional and non-institutional activities aimed at preventing, monitoring and remedying any situations of environmental deterioration and which, therefore, basically belong to the class of responses (**R**).
Chapter 6 deals with the *environmental quality of organizations, undertakings and products*.
Chapter 7, considerably improved compared to last year's edition, contains *monitoring and control* information, with respect to reporting on the progress made and any further deterioration of the environment.
Chapter 8, dedicated to *promoting and spreading an environmental culture,* has also been expediently improved, providing a selection of indicators that will be further developed and investigated in future editions of the Yearbook.
Chapter 9 is entirely new and is dedicated to the delicate relationship between the *environment and health*; it primarily features impact indicators **(I)**, i.e. indicators aimed at describing the consequences of a specific pressure.
The last 10 chapters (10-19) give the indicators relating to *environmental conditions*, described primarily through the present (qualitative and quantitative) state and future trend of the environmental resources (**S**), the pressure factors (**P**) tending to change this state and the ensuing effects (**I**) on human beings and the ecosystem. The chapters concern: *atmosphere, biosphere, hydrosphere, geosphere, waste, ionizing radiations, non-ionizing radiations, noise, natural risks, anthropogenic risks*.
For each topic area a brief description of the principal environmental issues is given, which are also represented through certain themes. For each of these themes, a selection of significant indicators has been made from the overall set in the unabridged Yearbook. In the case of the *biosphere*, for example, the focus is on 4 key issues: biodiversity, monitoring the level of threat to animal and plant species; the effects of climate change, through changes to glacier fronts; protected areas, measuring their extension; wetland areas, measuring the pressures interfering with their conservation; and forests, by representing the state and trend of forest land, and extent of forest fires.

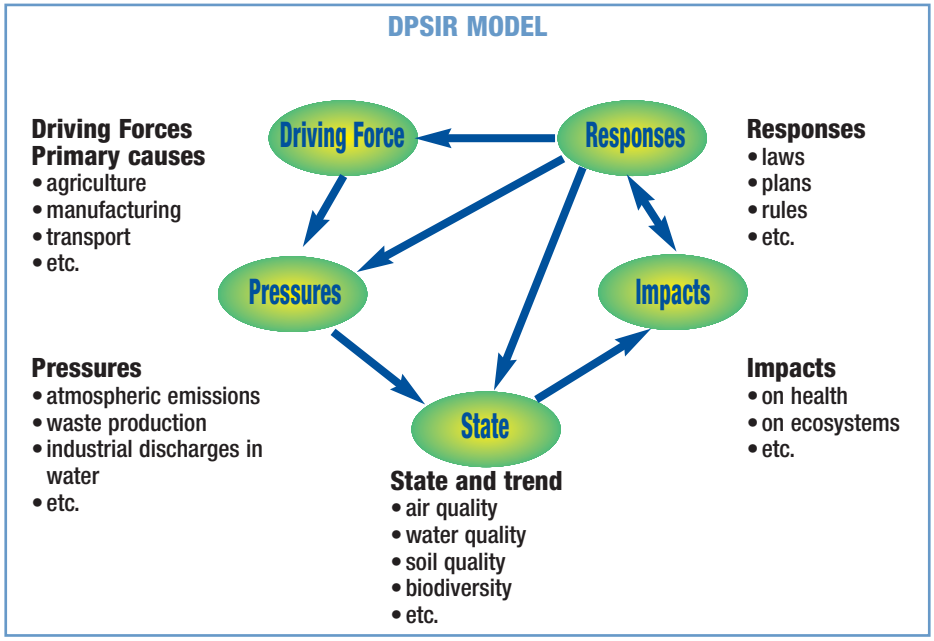
The indicator selection process, for this Summary, was based on the following criteria:

- high quality and availability of the information;
- availability of well-defined and objective references for a more effective interpretation of the trend; for example, with respect to the atmosphere, climate-changing gas emissions have been selected, with respect to which targets must be achieved between 2008 and 2012;
- high communication impact, meaning that preference is given to indicators relating to phenomena (global climate) or issues (water treatment), relating to which public expectations for information are highest.

To represent the indicators, with the aim of providing clear and effective information, graphs and theme maps have been preferred, and tables added only in a limited number of cases.
The appendix features an overview of the complete set of indicators detailed in the unabridged version of the Yearbook.
In particular, the overview is arranged according to topic areas and themes. Each theme comprises the relevant indicators and characteristic information, such as name, position in the DPSIR diagram, aim, quality of information, spatial and temporal coverage, and Chernoff icon for State and trend. The indicators selected for the Summary are bold-faced.

STRUCTURE OF THE YEARBOOK SUMMARY

The *DPSIR* framework, developed by the EEA (European Environment Agency) and based on an earlier framework (PSR) by the OECD (Organization for Economic Cooperation and Development), has been adopted by APAT to build the environmental fact-finding system. As shown in the figure below, the *DPSIR* framework organizes environmental data and information according to 5 categories linked by specific case-based relations.



The *state*, that is the set of physical, chemical and biological qualities of the environmental resources (air, water, soils, etc.), is altered by the *pressures,* which comprise everything and anything that tends to deteriorate the environment (air emissions, waste production, industrial discharges, etc.), most of which are caused by human activities (called *driving forces*), such as industry, agriculture, transport, but which can also be caused by natural phenomena. These alterations produce effects (*impacts*) on the health of human beings and animals and on the ecosystems, economic damage, etc.. The impacts may be addressed and contrasted by means of *responses*, such as laws and regulations, action plans, aimed at acting on all the other categories.

The quality of information may be determined based on the elements as follows:

- Relevance: compliance of the indicator with the information demand relating to environmental issues.
- Accuracy: this can be given by elements, such as data comparability, reliability of information sources, indicator coverage, data validation.
- Comparability in time: completeness of the timeseries, consistency of the methodology in time.
- Comparability in space: number of regions represented, use or the same or similar methodologies, reliability within the region itself.

Each component (relevance, accuracy, comparability in time and comparability in space) is given a grade from 1 to 3 (1 = no problem, 3 = maximum reservations).

The result of the sum with equal weight of the grades given to relevance, accuracy, comparability in time and space, defines the quality of information, according to the ranking table below:

Definition quality of information

Grade	Quality of information	Sum
★★★	HIGH	Between 4 and 6
★★	MEDIUM	Between 7 and 9
★	LOW	Between 10 and 12

The grading process is not yet definitive, wherefore the quality levels must be considered experimental.

With regard to the determination of current State and trend, two cases have been taken into account:
a) availability of benchmark targets set out in regulations and programmes, relating, for example, to GHG emissions, proportion of separate waste collection, or *per capita* waste production;
b) no available benchmark targets.

In case (a) the following grading rules apply:

☺	the targets will reasonably be achieved
😐	the indicator subject-matter is moving in the right direction, but the targets will hardly be achieved within the established timeframe
☹	all other cases

In case (b), a judgement is expressed based on personal experience, on the knowledge of the subject-matter, and on equivalent benchmarks (targets) drawn from literature or by consulting experts:

☺	decidedly favourable trend: positive for state and response indicators; negative derivative for driving force, pressure and impact indicators
😐	unfavourable trend: negative for state and response indicators; positive derivative for driving force, pressure and impact indicators
☹	all other cases

1. AGRICULTURE AND FORESTRY

INTRODUCTION

In Italia, agriculture and forestry, besides representing an important source of food, fibres and timber, and allowing the economic diversification of rural communities - providing a much higher contribution than portrayed by the national accounts - also constitute a key component of land use and natural resources management. Covering over 20 million ha, about two-thirds of the country's area, farmland and forests provide important habitats for thousands of species and a variety of environmental and cultural services and goods; in many cases they also provide opportunities for depollution and environmental rehabilitation, as well as options for combating the greenhouse effect (through the production of renewable energy capable of replacing fossil fuels, and by fixing carbon emitted by other sources).

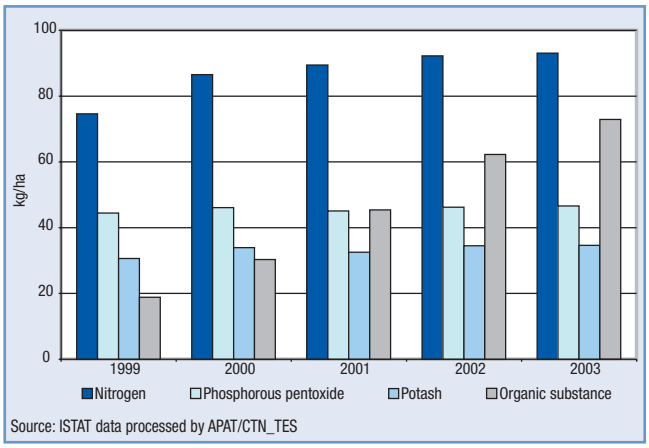
On the other hand, from an environmental viewpoint, forestry and, above all, agriculture are often accused - especially where they are most intensive, concentrated and highly specialized - of being responsible for water pollution, soil erosion and soil pollution, the accumulation of greenhouse gases (GHGs) in the atmosphere, the destruction of natural habitats and biological diversity, the simplification of the landscape and for the poor condition of animal and livestock welfare.

This is why, for several decades now, rural development policies have been shifting the focus of agriculture and forestry: from the simple increase of productivity to the capacity to integrate productivity and the protection of natural areas and resources, by reducing the use of fertilizers and pesticides and developing ecologically sustainable farming and forestry techniques.

Four indicators are given here to describe the relationships between agriculture and the environment. One of these combines (in the form of aggregate indices) several of the indicators discussed in greater detail in the unabridged version of the Yearbook.

DISTRIBUTION OF FERTILIZERS IN FARMING (INCLUDING SOIL IMPROVERS AND CONDITIONERS)

INDICATOR - D02.002



Source: ISTAT data processed by APAT/CTN_TES

Figure 1.1: Types of fertilizers used per hectare of available cropland

In 2003, over 5.2 Mt of fertilizers were used for farming purposes, up by 3.4% compared to the previous year. Of these, 3.5 Mt were mineral fertilizers, almost half of which were nitrates. To these we must add about 0.3 Mt of organic fertilizers, 0.4 Mt of organic-mineral fertilizers and 1 Mt of soil improvers. The breakdown by region shows that, in 2003, Lombardia (796,065 tonnes) and Veneto (778,782 tonnes) topped the rankings of fertilizer use.

Figure 1.1 shows the trend, over the years, in the quantities of the main types of chemical fertilizers marketed for farming purposes, namely nitrate, phosphate and potassium compounds, expressed as units of N, P_2O_5, K_2O per ha of cropland available for fertilization. The total area is given by the sum of arable land (excluding fallow land), woodland for agricultural use (excluding chestnut orchards), permanent fodder areas (excluding pastures), and family vegetable gardens. In 2003, an average of 270.7 kg of nutritional substances per ha of cropland

available for fertilization were used, up by 12.3 kg compared to the previous year. This rise was due primarily to the increased use of organic substances and meso-elements, but also concerned nitrogen-based compounds (approx. 93.0 kg/ha), phosphorous pentoxide (46.6 kg/ha) and potash (34.6 kg/ha). With regards to regional distribution, the use of nutritional substances is greater in the North, where it is generally over double the figures surveyed in the southern regions; furthermore, the use of organic substances in the South is less than a quarter of that used in the North. Friuli Venezia Giulia is the region that features the highest use of fertilizers per hectare of land (203 kg/ha of N, 104 kg/ha of P_2O_5 and 122 kg/ha of K_2O).

FARMS IMPLEMENTING ECOLOGICALLY FRIENDLY AND ORGANIC FARMING TECHNIQUES

INDICATOR - D02.006

Figure 1.2 shows that, in Italia, organic farming has undergone a slight drop in the last two years, after over a decade of continuous growth peaking in 2001 (with over 1,238 thousand hectares of Utilized Agricultural Areas (UAA) and 56,440 farms): in 2003, the area used for organic farming, and the conversion of UAA for organic farming purposes, dropped to 1,052 million hectares, while the number of farms dropped to 48,475. This is the result of a widespread move away from organic farming in many southern regions (primarily Puglia, Calabria, Sicilia and Sardegna), due to delays by the regional governments concerned in implementing the EC Council Regulation No. 1257/1999. However, despite these setbacks, organic farming in Italia is now consolidated and mature.

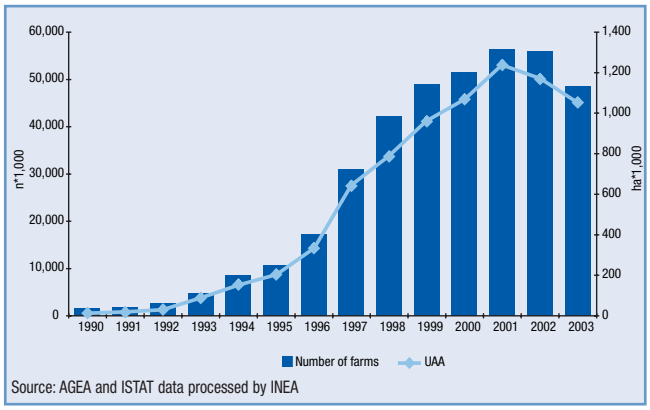


Figure 1.2: Development of the number of controlled farms and Utilized Agricultural Area according to the organic farming method – Council Regulation (EEC) No 2092/91

ECO-EFFICIENCY IN AGRICULTURE

INDICATOR - D02.007

GHG emissions in agriculture (methane and nitrogen oxides, primarily due to livestock breeding and rice growing) account for less than 10% of the domestic total, a trend that has remained practically unchanged over the years.

Among the substances contributing to acidification, the only significant one for the agricultural sector is the production of ammonia, accounting for between 20% and 30% of total national acid emissions; in this case too the trend has remained practically unchanged.

Non-methane volatile organic compounds (NMVOC) and nitrogen oxides are classed among the precursors of tropospheric ozone. The contribution of agriculture to the total production of these gases is very small (accounting for less than 0.5%)

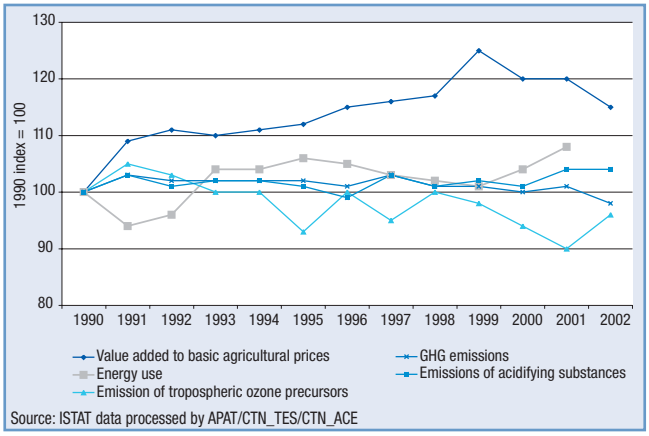


Figure 1.3: Eco-efficiency in agriculture, value added to basic agricultural prices and pollutant emissions

and there seems to have been a gradual downward trend until 2001, with a slight increase in 2002.

Energy consumption in agriculture featured a variable trend pattern in the last decade. After a considerable rise at the beginning of the 90s, energy consumption stabilized until 1999, and then started rising again in the last two years.

WOOD AND NON-WOOD FOREST PRODUCTS

INDICATOR - D02.019

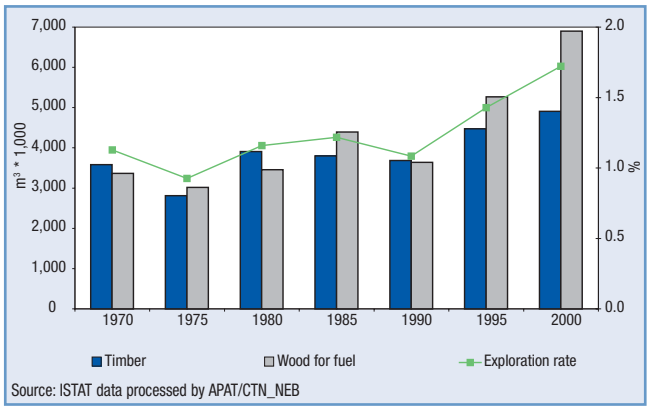


Figure 1.4: Trend in timber, wood for fuel and exploitation rate

After a rather long downward trend from the mid-70s, timber consumption started to rise again and picked up speed in the last decade. Recently, the consumption of timber, primarily for energy production purposes, has increased considerably and accounts for 58% of total timber production. As regards non-wood forest products, urbanization and the disappearance of many local traditions have contributed to a drop in consumption. In the last few years, however, there has been a noticeable increase of demand for certain products, which may be considered recreational rather than commercial goods.

The drop in the exploitation rate (the ratio of timber felled to forest area) may be interpreted as a drop in the pressure on forest ecosystems. However, a rise in production - if appropriately carried out - might also mean a reverse trend in the abandonment of forests and their improved management, with positive effects on their preservation. Another positive aspect relates to the average felled areas, which figure may be drawn from the ISTAT data and which means that timber-felling activities are having a progressively lower impact on the environmental conditions.

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INTRODUCTION

The proposed set of indicators has been drawn from the "*Energy and Environment in the European Union*" report by the European Environment Agency (EEA), aimed at providing policy makers with the necessary information for assessing how far the environmental and energy policies have been integrated, thus furthering the process started at the Cardiff European Council of 1998.

The Agency's approach is based on the *Energy and Environment Reporting Mechanism* (EERM) launched in 1998 by the joint Energy-Environment Council. With regards to Italia, the recently surveyed set of indicators highlight, (i) the confirmation of several structural characteristics of the national energy system, characterized by above-average performance, at European level, in terms of energy intensity and the ratio of final to total energy consumption, and (ii) a series of changes under way in energy supplies, such as the increased use of natural gas, compared to oil products, the increase of renewable energy and cogeneration, and, from 2001, a rise in solid fuel consumption. This performance has been affected by both the international fuel market trend and regulatory developments, with the liberalization of the energy markets and the introduction of new kinds of incentives for the production of electricity from renewable energy sources, each electricity producer being required to produce a minimum amount of electricity by means of these sources. With regards to final energy consumption, between 2002 and 2003 there was a considerable increase in the services sector and by households, due to essentially climatic factors. Even though some of the abovementioned trend entail a reduction in national emissions of greenhouse gases, they are nevertheless probably insufficient to allow Italia to comply with its reduction targets under both the Kyoto Protocol and the European Burden Sharing Agreement, without resorting to the carbon absorption by forests and land use and the international cooperation mechanisms introduced by the Protocol. On the contrary, the sulphur dioxide and nitrogen oxide emission trend pose less of a problem, with respect to compliance with the emission reduction commitments under the international Protocols on cross-border pollution.

GREENHOUSE GAS EMISSIONS IN TOTAL AND FROM ENERGY-RELATED PROCESSES

INDICATOR - D03.009

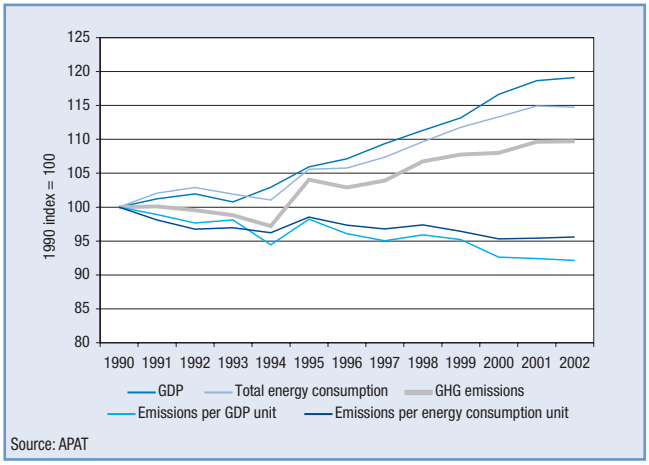
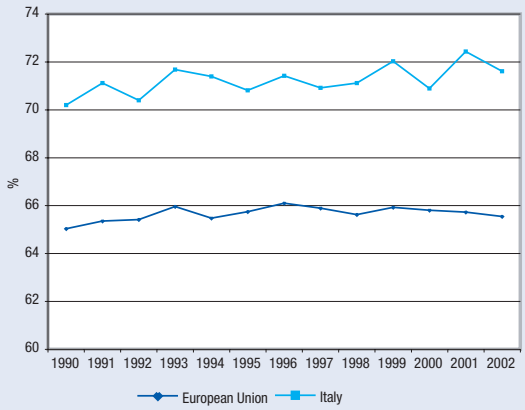


Figure 2.1: Economic and energy-related indicators and GHG emissions

This indicator concerns GHG emissions into the atmosphere affecting climate balances. The Kyoto Protocol takes account of anthropic emissions of six gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). Carbon dioxide is produced primarily by burning fossil fuels (energy production plants, transport), but also by certain industrial processes and deforestation. Methane emissions are due to agriculture,

livestock breeding, waste disposal and the use of fossil fuels. Nitrogen oxide is produced by agriculture and by industrial processes. The so-called F-gases (HFCs, PFCs, SF_6), control of which is not provided for under the Montreal Protocol, come primarily from industrial processes (e.g., refrigeration systems) and are not energy related.
Energy-related GHG emissions have increased constantly from 1995 (+9.7% in 2002, compared to 1990); based on this trend, Italia will probably be unable to comply with its reduction targets under both the Kyoto Protocol and European Burden Sharing Agreement, without resorting to carbon absorption by forests and land use and the international cooperation mechanisms set out in the Protocol. In 2002, energy-related processes produced 94.5% of carbon dioxide emissions, 19.9% of methane emissions and 24.6% of nitrous oxide emissions, while they did not contribute to F-gas emissions; 83.1% of overall GHG emissions, however, are energy related.

RATIO OF FINAL TO TOTAL ENERGY CONSUMPTION
INDICATOR - D03.015



Source: ODYSSEE data processed by ENEA

Figure 2.2: Ratio of final to total energy consumption

The ratio of final to total energy consumption in Italia, which is higher than the EU average, has grown slightly in recent years; enhanced efficiency in the conversion of primary energy sources, due, for example, to the increased overall production of electricity by cogeneration plants (from 1999), in fact, is set off by the growing weight of secondary energy sources (electricity, oil derivatives) in final energy consumption.

TOTAL ENERGY CONSUMPTION BY PRIMARY SOURCES
INDICATOR - D03.019

The market share of natural gas, with respect to total energy consumption, rose from 23.9% in 1990 to 32.9% in 2003, that of oil products dropped from 56.6% to 46.8%, while primary electricity (imports + production from renewable sources) rose from 9.8% to 10.7%. The share of solid fuels, which had dropped from 9.7% in 1990 to 7.2% in 1993 and 7.4% in 1996, has increased again to 9.6% in 2003.
For many years, Italia's energy supply structure was characterized by the prevailing role of oil products, besides one of the

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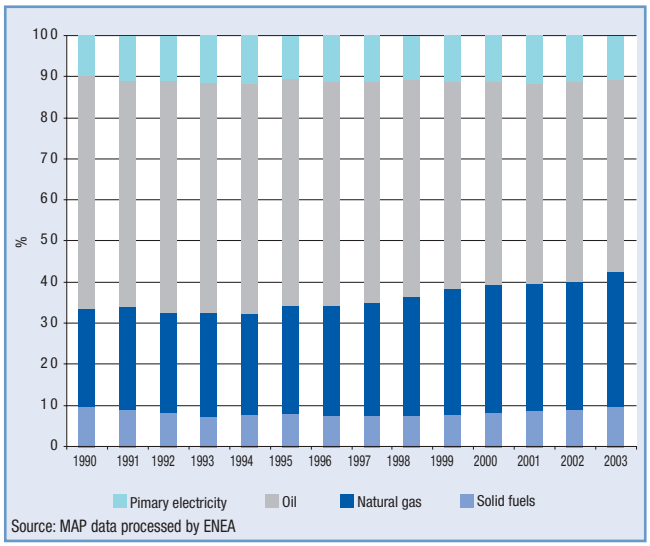
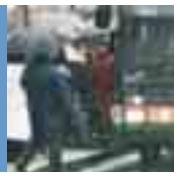
lowest energy self-sufficiency levels among developed countries. This picture, however, is now partially changing, with the gradual contribution of natural gas and renewable energy sources and, in more recent years, of coal. Overall, the outlook is rather positive, in terms of both diversification of supply and the reduction of GHG emissions, although the liberalization of the energy market is increasing the use of more polluting and high carbon content fuels (such as coal).



Source: MAP data processed by ENEA

Figure 2.3: Overall energy consumption by primary sources

3. TRANSPORT



INTRODUCTION

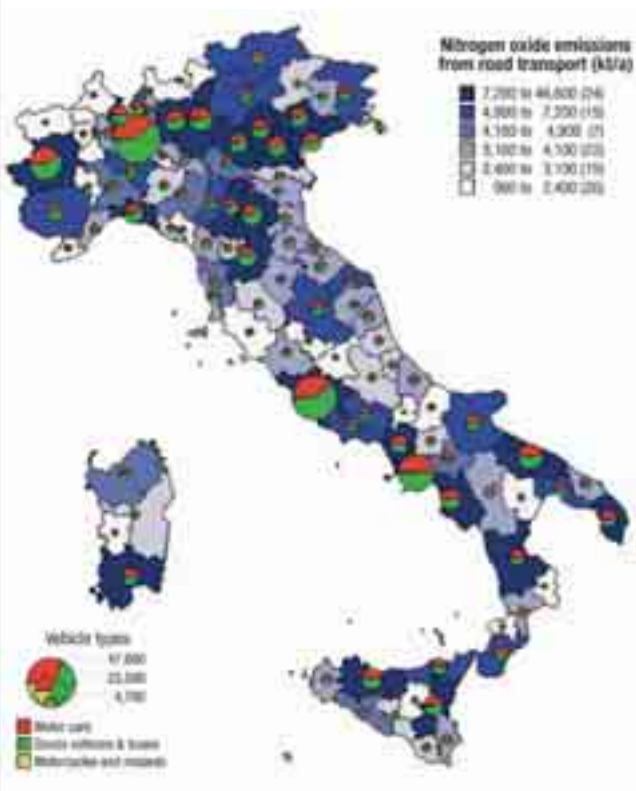
The transport sector is fundamental for social and economic development, but its "non-sustainable" development comes with a significant price tag for society, in terms of its impact on the environment and health.
At present, the two main trend in the transport sector, i.e. the growth of the demand for mobility and the increase of road transport, entail a series of direct and indirect impacts on the environment, such as the consumption of energy resources from non-renewable sources, global warming, air, noise, water and soil pollution, land consumption and fragmentation, visual intrusion, and damage to the historical and artistic heritage. The improvements achieved in the reduction of the environmental impact of vehicles and infrastructures are currently counterbalanced by the enormous growth in transport demand. The present situation, therefore, shows improvements with regard to the overall emissions of several harmful substances (sulphur and nitrogen oxides, benzene and particulate) and waste recycling, while energy consumption, GHGs, noise and the impact on the land as a whole are on the rise.
Increased transport volumes is the result of a complex combination of economic, social, demographical, land-related and technological factors, such as higher incomes, technological development, internationalization and the removal of barriers to international trade, falling transport costs, the perception of these costs, changes in production and consumption patterns, increased leisure time, changing lifestyles, urban sprawl, the growth of the third-sector economy and the new organization of production processes, the limited coordination of decisions relating to transport and urban development.
The decoupling of transport demand from economic growth, and the stabilization of the modal split to the levels of 1998 by 2010, are important objectives of the new Common Transport Policy and of the European Strategy for Sustainable Development. However, in recent years mobility in Italia has featured a constant rise of both passenger and freight transport demand, at an often higher rate than the GDP growth rate. In the period between 1990 and 2002, passenger transport demand rose from 728 to 948 bn passengers*km, up by 30%. This demand has been increasingly satisfied by private transport, which now accounts for 83% of it. In the same period, freight transport demand also rose sharply (+21.4%), from 215 to 262 bn tonnes*km. In this edition of the Yearbook freight transport demand has been estimated according to the Eurostat method; therefore, care should be taken in making comparisons, given the lack of uniformity of the data in the period in question. Due to the fragmentation of the physical flows, the development of logistical services along third-sector lines, and the increased demand for service quality, freight transport demand is also met primarily by road transport, which accounts for 74% of total domestic and international freight traffic.
The energy efficiency of road passenger transport has improved slightly over the last twenty years, entailing a reduction of the average specific emissions of carbon dioxide; the voluntary agreements entered into with the car industry, with a view to cutting these emissions in new cars, is gradually achieving its goal, although further efforts are needed. However, the technological improvements in fuel efficiency have been largely counterbalanced by the growth of traffic and by low vehicle occupancy rates; the technological measures alone are inadequate to stabilize or reduce global emissions of carbon dioxide by road transport. With regard to freight transport, there have been no improvements in fuel efficiency, partially due to the low load factor; trucks consume much more energy per tonne/km, compared to rail or maritime transport. The energy efficiency of rail transport has remained stable in recent years, although railways are the most efficient means of transport while, despite the improvements in the 80s, air transport is the less efficient and the most polluting, in terms of specific emissions, and maritime and rail transport are the less polluting, especially over short distances. Specific emissions of nitrogen oxides for all modes of transport, except air transport, have dropped considerably in the last twenty years, primarily because of technological and fuel improvements; this trend is set to continue in the future.
The spread of low environmental impact fuels in Italia, such as natural gas, LPG and biodiesel, is noteworthy, if compared to other European countries, but still greatly insufficient to counterbalance the increase of emissions. Harmful

3. TRANSPORT

emissions in this sector are largely related to the manner of combustion of the energy sources. The use of appropriate technologies can considerably cut emissions, although there have been contrasting trend in recent years: emissions feature an upward trend due to the growth of the vehicle fleet and the length of journeys, but they are also dropping as the fleet is gradually renewed. In particular, nitrogen oxides and volatile organic compounds feature significant rates of reduction in the period after 1995.

EMISSIONS OF THE MAIN AIR POLLUTANTS (NO_X, NMVOC, PM_{10}, LEAD AND BENZENE)

INDICATOR - D03.003

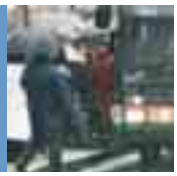


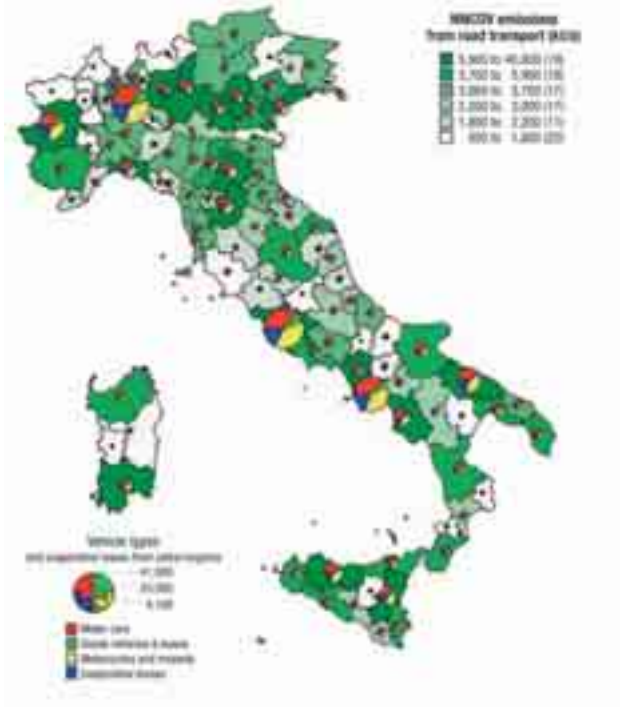
Source: APAT
Note: the regional breakdown is estimated, in first approximation, according to the methodology set out in the EMEP-CORINAIR guidelines; the estimated emissions are based on a national average fleet

Figure 3.1: Nitrogen oxide emissions by region and type of vehicle (2002)

The indicator takes into account emissions of nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOCs), particulate (PM10), lead (Pb) and benzene (C_6H_6). Nitrogen oxides play a key role in the formation of photochemical smog and the acidification of the soil and water; furthermore, acid rain damages buildings and monuments. They are produced primarily in connection with high-temperature combustion, such as takes place in motor car engines. NMVOCs are the precursors of photochemical smog and contribute to the formation of ozone. Particulate is, currently, the pollutant that most heavily affects human health in towns and cities. Benzene is a carcinogenic substance present in traces in petrol and is currently produced primarily by exhaust gases of motor vehicles.

Nitrogen oxide emissions and non-methane volatile organic compound emissions recently feature contrasting trend: emissions are up due to the





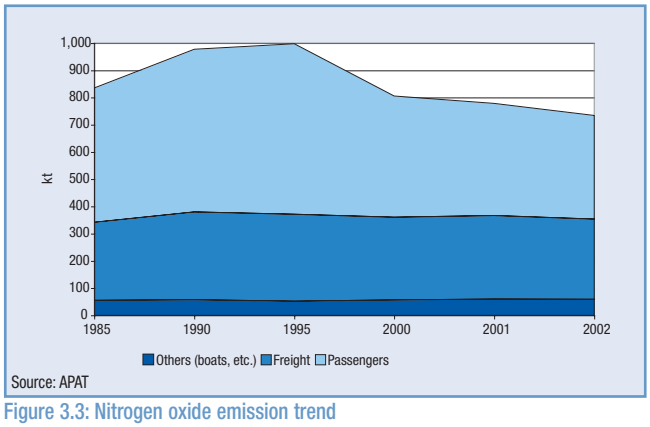
Source: APAT
Note: the regional breakdown is estimated, in first approximation, according to the methodology set out in the EMEP-CORINAIR guidelines; the estimated emissions are based on a national average fleet

Figure 3.2: Non-Methane Volatile Organic Compound emissions by region and type of vehicle (2002)

increase of the vehicle fleet and the milage travelled, yet they are also down because of the renewal of the fleet itself. In particular, nitrogen oxide, non-methane volatile organic compounds and benzene emissions have all dropped noticeably in the period after 1995, primarily due to the renewal of the vehicle fleet. The emissions of these compounds are related to the manner of combustion of the energy sources and they may be considerably reduced by using the appropriate technology.

Two-stroke engines produce a large amount of NMVOCs, hence the relevance of mopeds (about 37% in 2002), with regards to passenger transport and "other sectors", compared to the total; the latter category also includes, in particular, boat engines and other small motors used for various purposes (gardening, gensets, chainsaws). With regard to the other harmful compounds, particulate emissions, the principal source of which are heavy trucks, are slightly dropping, while benzene emissions have dropped considerably, due to the reduction of the percentage of this substance in petrol.

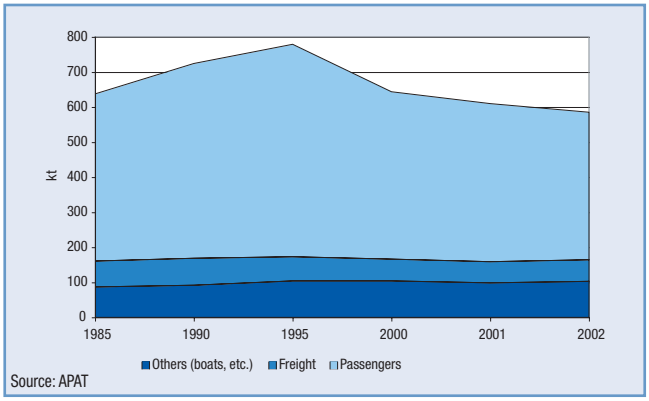
The downward emission trend of lead, of course, is due to the phasing out of leaded petrol.



Source: APAT

Figure 3.3: Nitrogen oxide emission trend

3. TRANSPORT

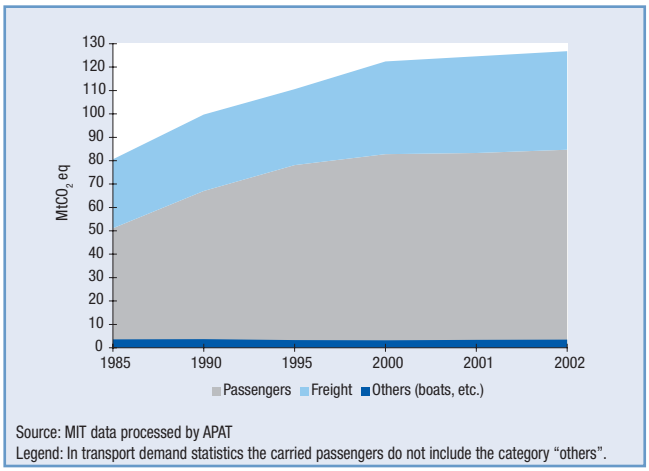


Source: APAT

Figure 3.4: NMVOC emission trend

GHG EMISSIONS FROM THE TRANSPORT SECTOR BY TRANSPORT MODE

INDICATOR - D03.002



Source: MIT data processed by APAT

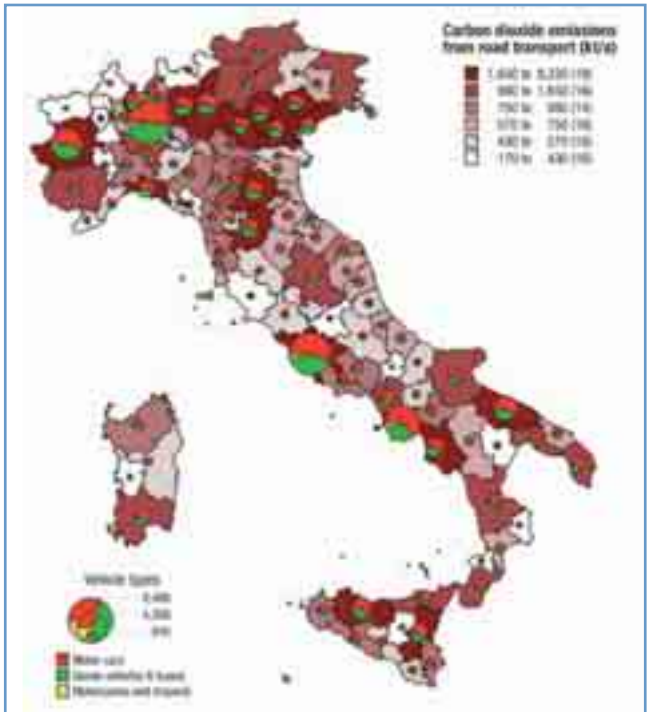
Legend: In transport demand statistics the carried passengers do not include the category "others".

Figure 3.5: Carbon dioxide emissions by type of transport

The transport sector depends almost entirely on the consumption of oil products and accounts for 1/3 of all emissions into the atmosphere of climate-changing substances, at national level. Overall emissions are on the rise and the enhanced efficiency of vehicles is unable to compensate the increased activity and average capacity of motor vehicles (see the *Transport energy efficiency* indicator). The rising emissions of GHGs produced by the transport sector, especially those produced by road and air transport, are jeopardizing the achievement of the Italia's Kyoto Protocol targets. The increased use of low-carbon fuels (such as LPG, natural gas and biodiesel) may bring some benefits, but they are still insufficiently widespread.

The national emissions of GHGs by transport increased by 23.9% between 1990 and 2002; carbon dioxide accounts for 96% of GHG emission from transport. Carbon dioxide emissions are directly related to energy consumption, while methane and nitrous oxide emissions also depend on the technology used. Methane emissions are related to non-methane volatile organic compound emissions. On the contrary, nitrous oxide emissions are present in small quantities

as the by-products of combustion and, to a larger extent, as the by-products of catalytic exhausts; given the increase of motor vehicles fitted with catalytic exhausts, they too are increasing. The importance of passenger transport accounts for over two-thirds of the total and road traffic, in particular, accounts for 95% of the total.



Source: APAT
Note: the regional breakdown is estimated, in first approximation, according to the methodology set out in the EMEP-CORINAIR guidelines; the estimated emissions are based on a national average fleet

Figure 3.6 Carbon dioxide emissions by region and type of vehicle (2002)

FREIGHT AND PASSENGER TRANSPORT DEMAND AND INTENSITY

INDICATOR - D03.010 and D03.004

With regard to freight transport, the transport intensity by income unit and per capita has increased in recent years. The growth of freight transport is still heavily coupled with economic growth. The growth and structure of production and consumption processes determines an increase of freight transport, which is increasingly by road; this, in fact, absorbs 67.6% of freight transport demand, considering only traffic over distances in excess of 50 km. In 2002, the percentage of domestic freight transport by rail (excluding oil pipelines) was merely 11.6%, while coastal trading was 15.9%.
The ratio of freight mobility to income featured an upward trend until 1995, after which it started fluctuating. On the contrary, the figure relating to vehicles/km shows a constant growth of vehicle mobility. In this edition of the Yearbook reference is made to the overall freight transport demand, according to Eurostat; in particular, all domestic transport carried out with trucks featuring a useful carrying capacity in excess of 3.5 tonnes (excluding distribution alone) and international road transport have been taken into account, in respect of the percentage of domestic transport carried out by the national

3. TRANSPORT

carriers.

In the last few decades, passenger transport demand too has grown constantly, at a rate that was often higher than the GDP growth rate. In the period in question the intensity of transport by income unit and *per capita* featured an upward trend until 1995, after which it dropped slightly. The same figure, measured as vehicles/total km, instead, features a constantly increasing trend, also due to the increasing use of motorcycles and mopeds. In the 1992-2002 period passenger transport demand rose by 41% (almost doubling compared to 1985), up from 728 to 947 bn passengers*km, based on the data reported in the Conto Nazionale dei Trasporti (CNT); this demand was met primarily by private transport, which now accounts for 83.3% of the total.

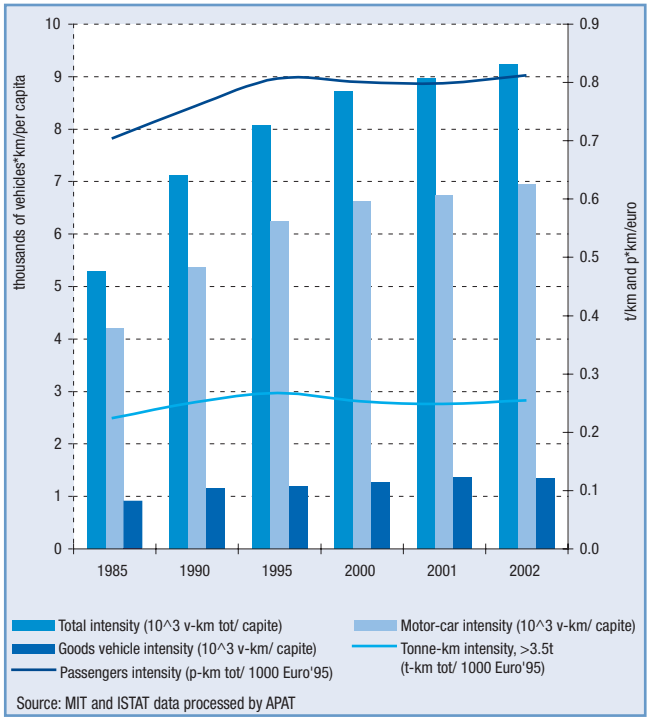


Figure 3.7: Mileage travelled and intensity: total values and by mode of transport

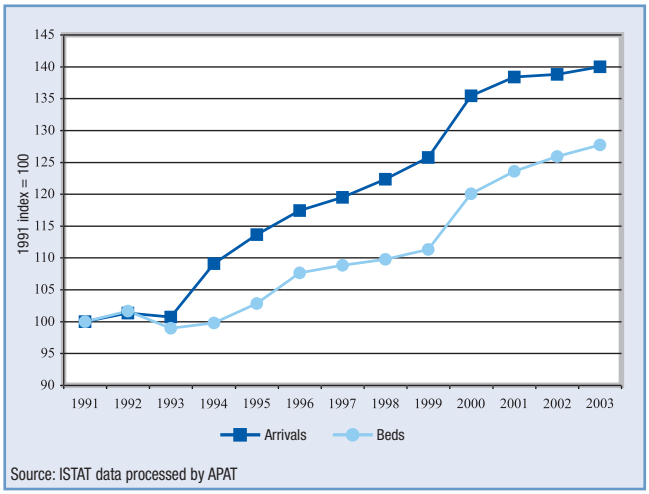
Data reported in the CNT feature the stabilization of demand in the last three years; however, it is deemed that this figure is primarily the result of variations in the statistical surveys, therefore, in order to ensure the uniformity between the time series of the GDP and the estimates of carried passengers, it has proved necessary to re-calculate the estimates of the number of passengers*km transported by motor cars based on the vehicle journey estimates and using constant occupancy factors (as supplied by ISTAT). Based on the analysis of the data, it is evident the constant growth of the number of passengers carried, due to a complex combination of economic, social, demographical, land-related and technological factors, such as higher incomes, technological development, internationalization and the removal of barriers to international trade, falling transport costs, the perception of these costs, changes in production and consumption patterns, increased leisure time, changing lifestyles, urban sprawl, the growth of the third-sector economy and the new organization of production processes, the limited coordination of decisions relating to transport and urban development. In the 1990-2002 period rail transport rose by 22% and bus transport by 16%, while air transport was the transport mode that rose fastest (+134%).

4. TOURISM

INTRODUCTION

The relationship between tourism and the environment is a rather complex one, because they tend to mutually affect each other along social, historical and cultural lines. The environment is a key component of tourism supply and this is why the tourism industry is increasingly concerned with safeguarding its quality.
Overall, 2003 was a bad year for the tourism industry, especially at European level, with signs of recovery in 2004.
In Italia, in 2003, the general tourist flow (as recorded by accommodation facilities) featured a slight increase in terms of the number of arrivals (0.8%), while the number of overnight stays dropped slightly (-0.2%).
This slowdown was due to the negative trend of visitors from abroad, which contrasted the growth of domestic tourism.
Social, demographical and cultural changes are setting in, as reflected in the different manner of viewing the tourism experience; tourists are increasingly in search of a quality experience and tend to prefer spending their holidays in natural beauty spots or locations with a cultural heritage, besides non-traditional forms of holidaymaking.
Over the years, however, the seasonal character of tourism has been maintained, alongside the use of the motor car as the preferred means of transport when going on holiday. These factors, accompanied by a high tourist concentration in certain areas and growing urbanization, may alter or even destroy the environmental resources on which tourism depends, but on the other hand the development of tourism can also help preserve and protect the environment, thanks to the flow of financial resources that comes with it.
The following indicators can give an overview of the driving forces of the tourism sector: *tourism intensity* and *tourist flows by mode of transport*.

TOURISM INTENSITY
INDICATOR - D01.003

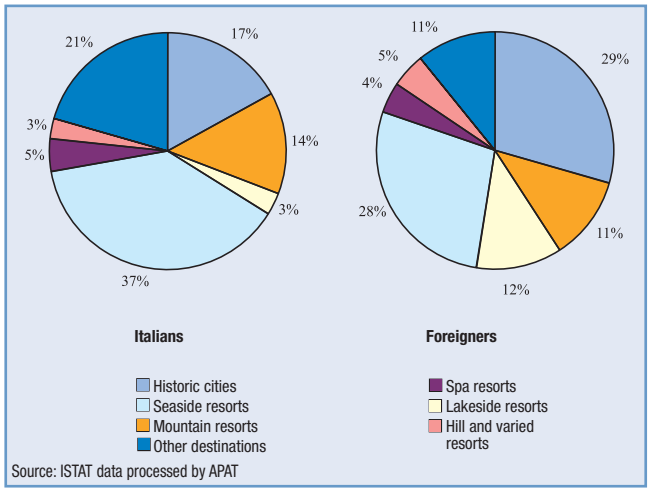


Source: ISTAT data processed by APAT

Figure 4.1: Tourist intensity variations in terms of arrivals and number of beds

Between 2002 and 2003, tourist intensity rose slightly - in terms of arrivals and number of beds - and especially in 2003 arrivals increased by 0.8% and number of beds by 1.4%.
The "carrying capacity" of a certain location is given by the maximum number of tourists that can be accommodated there without damaging the physical environment or the peculiarities of the location. Too high population inevitably leads to the deterioration of the quality of life, negatively affecting living standards, safety, transport,

4. TOURISM



Source: ISTAT data processed by APAT

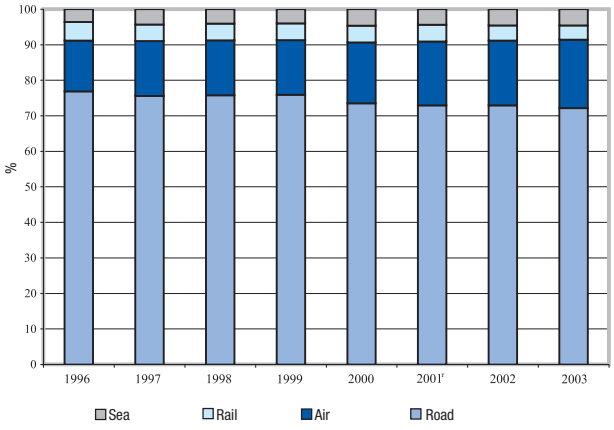
Figure 4.2: Overnight stays by domestic and foreign tourists and type of resort (2002)

water treatment, waste disposal, etc. In 2003, the regions of Trentino Alto Adige and Valle d'Aosta featured the highest ratio of both, (i) arrivals to residents (7.7 and 7.1, respectively), well above the national average, and (ii) overnight stays to residents (41.1 and 28.7, respectively).
Seasonal tourism remains the typical feature, in summer, of seaside resorts and historic cities, despite the general drop in overnight stays from 2002 (-1.4%).

TOURIST FLOWS BY MODE OF TRANSPORT

INDICATOR - D01.002

The upward trend in the use of polluting means of transport, such as motor cars and aircraft, continues, significantly increasing the pressure on the environment. In 2002, the number of foreign visitors to Italia rose by 3.5%, especially as regards arrivals by sea (7.8%). On the contrary, in 2003 there was a drop in tourist flows at border entry points, with the sole exception of airports (+4.2%). However, the preferred means of transport for holidaymaking purposes remains the motor car (72.2%), followed by transport by air (17.2%), sea (4.6%) and rail (4%).



Source: UIC data processed by APAT
Legend: "r", the 2001 data relating to border entry points by road and air have been revised, following the introduction of more sophisticated survey methodologies

Figure 4.3: Percentage distribution of foreign tourists at border entry points into Italia

5. INDUSTRY

INTRODUCTION

Environmental issues are playing an increasingly important role in development policy-making, in the wake of industrial and economic growth, and notions such as "sustainable and environmentally friendly development" may also be applied to the criteria for selecting industrial processes and technologies.

One of the goals of this new development outlook is to reconcile growth and competitiveness, on the one hand, and environmental compatibility, process and product safety, and protecting the health of people and the surrounding ecosystem, on the other hand. To achieve this goal it is necessary to integrate economic, social and industrial policies with the appropriate environmental policies.

The principal objective, therefore, is to prevent industrial pollution. This may be achieved by optimizing manufacturing processes and implementing techniques for abating/removing environmental impacts and enhancing the use of natural resources (raw materials and energy), in accordance with the principles of prevention, by (a) preventing or abating the production of pollutants; (b) effectively employing energy resources and raw materials, and (c) cutting waste production, and, if possible, re-utilizing the waste within the manufacturing process.

The Council Directive 96/61/EC, also known as the IPPC Directive (translated in Italia into Legislative Decree 372/99), aims at introducing the abovementioned principles of prevention. It envisages measures for preventing or - if this is not possible - abating the production and release of emissions into the air and the soil, including measures relating to waste, with a view to achieving high standards of protection of the environment as a whole.

Industry is responsible for a wide range of environmental problems, such as the consumption of resources, emissions of chemical and physical pollutants into the air and water, soil contamination, and waste production.

With regard to this sector, and despite the difficulties in finding the data and determining sufficiently concise and representative indicators, it has been possible to feature 10 indicators in the Yearbook. The following figures and tables provide a succint overview of the meaning of several of them.

INES REGISTER: NUMBER OF IPPC REPORTS AND REPORTED ACTIVITIES

INDICATOR - D02.013

Source: APAT

Figure 5.1: INES Register – Number of reports by region (2002)

This indicator is based on the INES 2003 reports, relating to emissions in 2002, presented by the IPPC installations that feature, for one or more pollutant, emissions into the air and/or water in excess of the threshold value set out in the regulations, thus enabling the identification of the most significant sources of emissions. Figure 5.1 shows the total number of reports per region. The highest number of reports being received from the northern regions (64% of all reports), with Lombardia alone accounting for 22% of them.

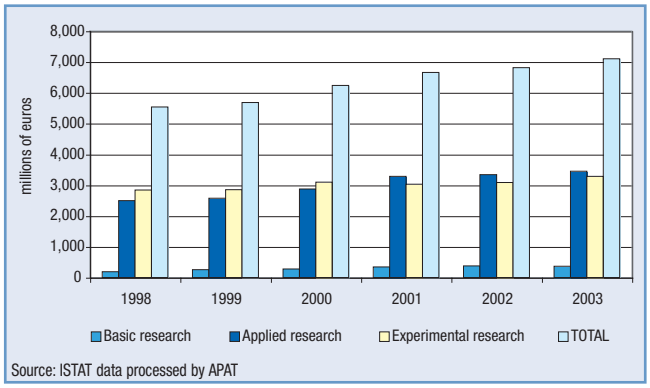
5. INDUSTRY

R&D EXPENDITURE IN INDUSTRY

INDICATOR - D02.010

This indicator gives the annual outlays by enterprises for R&D. R&D expenditure shows the industry's trend towards technological development, which is a prerequisite for improving the environmental efficiency of its plants and installations.

Figure 5.2 shows the annual R&D outlays broken down by basic, applied and experimental research, and the relative total figures. All feature a continuous upward trend; in particular, the industry is investing primarily in applied and experimental research, with a slight prevalence of applied research from 2001.



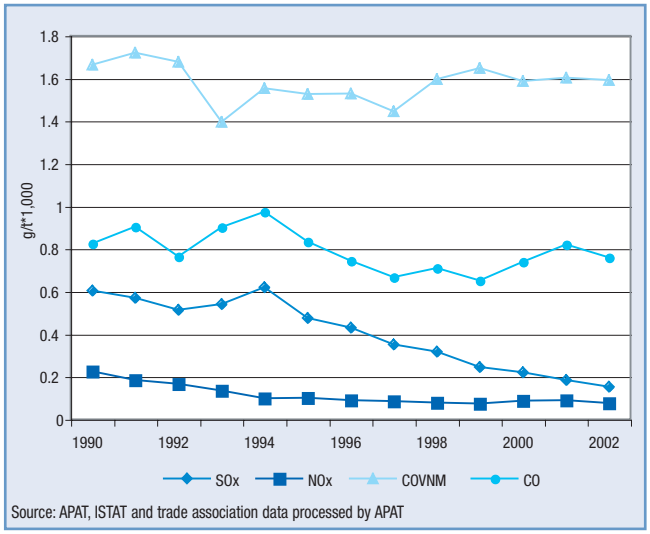
Source: ISTAT data processed by APAT

Figure 5.2: R&D expenditure in industry

SPECIFIC EMISSIONS IN THE CHEMICAL INDUSTRY

INDICATOR - D02.014

This indicator shows the relationship between the types of emissions and the overall volumes produced by the chemical industry, resulting in specific emissions (by unit mass of product). The types of emissions employed to calculate the indicator have been estimated according to the CORINAIR method and updated on an annual basis. Given the level of aggregation, the indicator provides information on the environmental performance of the sector as a whole, and not of the single production processes. Significant percentage variations can be highlighted in 2002, compared to 1990, for SO_x (-75%) and NO_x (-66%), while the variations of NMVOCs and CO are much smaller: -4.4% and -8%, respectively.



Source: APAT, ISTAT and trade association data processed by APAT

Figure 5.3: Specific emissions in the chemical industry

SPECIFIC EMISSIONS IN THE PAPER INDUSTRY

INDICATOR - D02.018

Table 5.1: Specific emissions in the paper industry and other industry data

Sector	Unit of measurement	2000	2001	2002
Plants	n.	201	200	200
ISO 14001 certified plants	n.	12	19	24
Paper and cardboard production	$t*10^6$	9.13	8.93	9.27
Use of virgin fibres	$t*10^6$	3.4	3.49	3.64
Use of waste paper	$t*10^6$	5.06	5.09	5.19
Use of water per product unit	M^3/t	35	35	34
COD emissions per product unit	kg/t	3.2	3.3	3.3
Suspended solids per product unit	kg/t	0.9	0.8	0.8
Waste production	kg/t	98	101	106

Source: Assocarta data processed by APAT

The indicator establishes a relationship between the principal specific emissions produced by the papermaking processes and the overall quantities of paper produced and number of operational plants. Emission calculations are based on the actual emission data from a very representative sample, with respect to both the number of plants and the amount of paper produced. Table 5.1 also shows that the number of ISO 14001 certified plants doubled over a two year period. Overall production does not feature any significant variations, while the figure concerning the use of waste paper is highly significant.

6. ENVIRONMENTAL QUALITY OF ORGANIZATIONS, FIRMS AND PRODUCTS

INTRODUCTION

Five years on from their implementation, the EMAS and Ecolabel regulations have shown their worth as instruments for environmental prevention and improvement, and the key objective of the Sixth Action Programme, and the Integrated Product Policy (IPP), can be identified in the development and consolidation of a number of measures which, by applying environmentally friendly production and ecologically aware consumption, can determine the creation - in a medium-to-long term perspective - of a "green market". Since 1997 (year in which the EMAS and Ecolabel schemes were effectively implemented in Italia), the two schemes have become increasingly widespread, featuring a significant annual growth rate. This chapter illustrates the characteristics of these instruments (EMAS, Ecolabel and UNI-EN-ISO 14001) and state of their implementation in this country.

ENVIRONMENTAL QUALITY IN ORGANIZATIONS AND FIRMS

The EMAS Regulation (2001/781/EC) was introduced to enhance environmental protection. The implementation, by organizations, of the environmental management system required by EMAS leads to increased performance efficiency and the reduction of costs deriving from the incorrect management of production processes.
EMAS is accessible to all types of organizations, irrespective of the products and services they deliver, and this makes it a particularly valid system for achieving the goals of sustainability, because it may activate considerable synergies among the different stakeholders (enterprises, consumers, government).
The initial environmental analysis, the first step in obtaining EMAS registration, is aimed at helping organizations pinpoint the more environmentally critical aspects of their activities, while at the same time enabling them to recognize statutory non-conformities and how resources can be wasted due to careless or incorrect management processes. On completion of this complex analysis, the organization concerned will be able to determine its criticalities, adopt an *Environmental policy* and develop an *Environmental programme*, with a view to constantly improving its performance. The organization is then required to provide conclusive proof of the achievement of the programme objectives, by submitting an *Environmental Report*, setting out the relevant data and indicators, besides general information on the enterprise, the truthfulness of which is attested by an accredited environmental auditor.
In Italia, the competent body for both registration and environmental auditor accreditation purposes is the Ecolabel Ecoaudit Committee, with the technical support of APAT.
Among the voluntary systems, important benchmarks for the development of eco-management are provided by the international UNI-EN-ISO 14000 standards issued by the *International Organization for Standardization*. UNI-EN-ISO 14001 is a standard that may be implemented by any organization desiring to reduce the environmental impacts of its activities, by adopting an environmental management system; hence its incorporation into the new EMAS Regulation.
In Italia, to date, there are 214 EMAS-registered organizations (at 30 June 2004). These include many non-manufacturing firms, such as third-sector companies and government authorities. In Europe, there are about 3,000 EMAS-registered organizations.

NUMBER OF EMAS-REGISTRATIONS

INDICATOR - R02.001

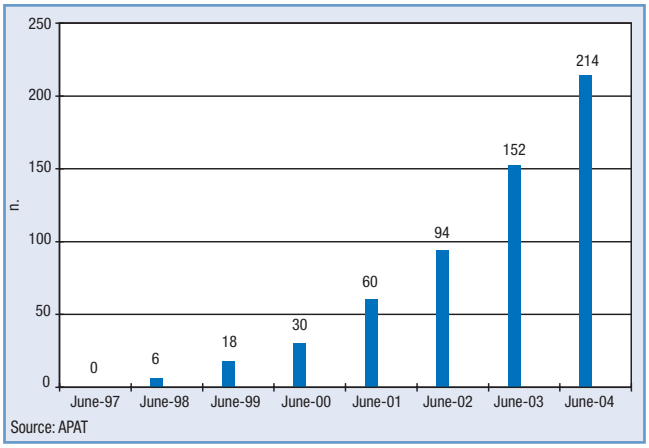


Figure 6.1: Trend in EMAS registration in Italia

The number of EMAS registrations may be viewed as an indicator of the environmental sensitivity and awareness of organizations; by adopting the EMAS Regulation, in fact, they express their intention to ease the pressure that their activities, products and services may have on the surrounding ecosystems. Being a voluntary measure it envisages no specific targets. The number of registrations is an important indicator employed by the European Commission to measure the degree of penetration of the scheme at EU level, and to monitor the implementation of the environmental prevention and improvement programmes.

The analysis of trend in EMAS registration in Italia (1997–2004) shows that the environmental awareness of organizations is growing by the year (figure 6.1).

NUMBER OF UNI-EN-ISO 14001 CERTIFICATES

INDICATOR - R02.002

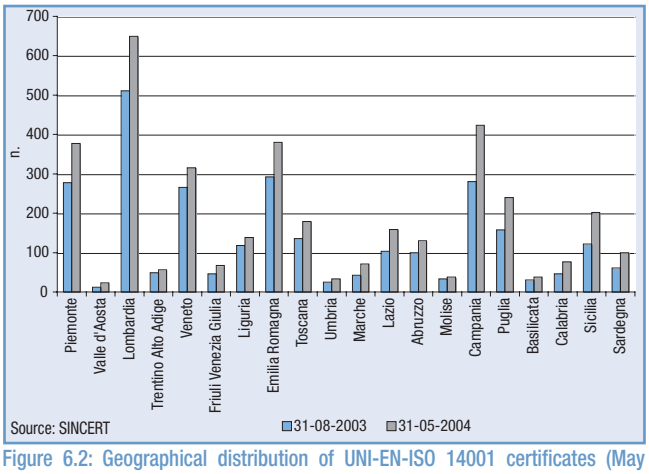


Figure 6.2: Geographical distribution of UNI-EN-ISO 14001 certificates (May 2004)

The number of UNI-EN-ISO 14001 certificates may be considered a further indicator of the environmental awareness of firms and organizations.

The widespread presence of environmental management systems indicates awareness of the issue of sustainable development, to the full advantage of the quality of the environment. Instead, the number of certificates indicates the extent to which organizations have achieved the objectives and, therefore, are

complying with the standard's requirements. The information provided by the indicator should, therefore, be interpreted as a response to the environmental pressure and impact problems generated by manufacturing-related pollution.
The benchmark standard envisages no targets, because compliance is entirely voluntary. The information is updated periodically by SINCERT, based on the number of certificates issued.

ENVIRONMENTAL QUALITY OF PRODUCTS

The Ecolabel (Regulation 1980/2000/EC) is the European label of ecological quality, which rewards the most environmentally friendly products and services, distinguishing them from their competitors on the market, while at the same time maintaining high performance standards. The label, in fact, certifies that the product or service has a low environmental impact throughout its life-cycle.
Ecological criteria are defined through a Life Cycle Analysis (*LCA*) of the product, highlighting its environmental impacts (air and water quality, waste abatement, energy saving, ozone layer protection, etc.), generated during the various phases in the life of the product. The ecological criteria are aimed at reducing these impacts and the products and services must comply with the criteria laid down for each product class.
Labels can be assigned to consumer products (except foodstuffs, beverages and drugs) and services. To date, 21 product classes have been defined. These include: various types of detergents (for dishwashers, washing-machines, multipurpose and dish-washing by hand), footwear, household appliances (washing machines, dishwashers, refrigerators, television, vacuum cleaners), tissue-paper products, photocopy paper, paints, soil improvers, personal computers, portable computers, textiles, light bulbs, mattresses, hard floor coverings, tourism accommodation services.
Many advantages accrue to both producers and consumers, because the Eco-label mark is based on a voluntary system; it is selective (only the most environmentally friendly products are labelled), it provides immediate and reliable information on the environmental characteristics of the product and the label is valid throughout Europe. Moreover, Ecolabel's credibility is further enhanced by the awarding process, according to which the label is awarded by an independent authority (the Ecolabel Section of the Ecolabel-Ecoaudit Committee) with the technical support of APAT.

NUMBER OF ECOLABELS AWARDED

INDICATOR - R02.003

The number of Ecolabels awarded may be viewed as a response indicator. It represents the degree of environment-friendliness of manufacturers and, consequently, of consumers too, thus highlighting the environmental "awareness" of the manufacturing industry.

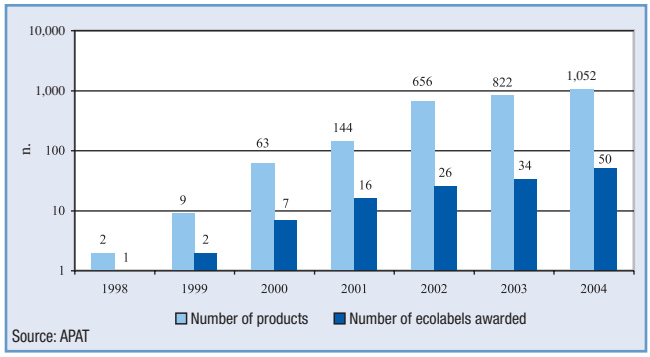


Figure 6.3: Ecolabel awarding trend (at 31 July 2004)

The indicator may, therefore, be considered an expression of the awareness - by contemporary society as a whole, manufacturers and consumers - of the importance of preserving the natural heritage and of safeguarding the environment, in accordance with the principles of "environmental sustainability" set out in the Sixth European Action Programme for the environment.

In Italia, between 1998 and 2004 (figure 6.3), 50 Ecolabels were awarded to a total of 1,052 products belonging to 11 different product groups (paints, detergents, footwear, textiles, photocopy paper, tissue paper, soil improvers and hard floor coverings).

The efficiency of this voluntary instrument is reflected in the approx. 60% increase of the Ecolabels awarded between 2003 and 2004 in Italia, which has now become the EU member country with the highest number of Ecolabels awarded, followed by France (36) and Denmark (33).

The figures show that textiles (8 labels), hand washing detergents (7) and footwear (6) are the product groups with the highest number of Ecolabels. Some differences may be seen at European level: the product groups with the most Ecolabels are textiles (55), followed by paints (38) and multipurpose detergents (17).

The ultimate aim of the Ecolabel Regulation is to guide consumers and, consequently, the market, towards "cleaner" products, capable of reducing environmental impacts without, however, setting any targets.

7. MONITORING AND CONTROL

INTRODUCTION

One of the principal tasks of the Environment Agency system is to conduct control and monitoring activities, indispensable tools for achieving environmental objectives. These activities have a twofold aim: they provide information support to environmental policy-making, and verify compliance with the statutory prescriptions and requirements (under Community, national and regional law). The enforcement of regulations is one of the action strategies identified by the Sixth European Action Programme for the Environment. APAT, on the one hand, and the ARPA/APPA (Regional and Provincial) Environment Agency system, on the other hand, primarily manage the technical facilities for carrying out the environmental monitoring and control activities, for which, however, other institutions are also responsible (law enforcement authorities, port authorities, river and river basin authorities). In consideration of the lack of coordination among these stakeholders, a joint working group has been set up by APAT and ARPA (under Law 14/2003) which, in accordance with the principle of integration set out at European level, is currently developing regulations aimed at streamlining inspection activities.

MONITORING

The Aarhus Convention (1998) defines the key elements of environmental democracy, based on, (i) the access of all citizens to environmental information, (ii) public participation in the decision-making process, and (iii) access to justice. Access to environmental information must be guaranteed, and the necessary data for describing the quality of the environmental variables must be accurate and comparable, regardless of the issuing party.

Monitoring, which is essential to ensure the development of suitable fact-finding and regulatory tools for safeguarding the environment, generally requires intense and complex laboratory activities, with a growing number of chemical and physical tests and an increasingly broader use of new instruments and techniques. Monitoring includes all the test phases: sampling, transporting and preserving the samples, preparation, pre-analytical treatment, and instrumental analysis. The large-scale analytical effort thus produced, however, must be accompanied by the constant improvement of the techniques, which must ensure the increasing comparability of the test results. At national and international level, in fact, comparability of environmental test results is one of the prerequisites for building a uniform picture of the quality of the environment, and a goal to be actively pursued by the scientific community and the operators concerned.

APAT, therefore, has been assigned the task of harmonizing the quality of the monitoring and control data, in order to ensure the comparability, over the years, of the data produced by the different national laboratories, by means of periodical exercises using internally produced materials and benchmarks, which are circulated among all the laboratories of the Agency system.

The indicators used to illustrate data quality, with respect to the monitoring activities carried out by the Environment Agency laboratories, have been defined based on, (a) a questionnaire sent out to all the Agencies - in connection with the project financed by Law 93/2001 - and, through the participating regional laboratories, (b) information exchange activities organized by APAT.

With regard to the monitoring of environmental radioactivity, in accordance with the applicable statutory requirements, APAT collects the data from the national RECORAD (REte di COntrollo sulla RADioattività) network for controlling environmental radioactivity, by means of specifically equipped facilities, bodies and institutions (under article 104 of Legislative Decree 230/95, as subsequently amended), based on a digital format developed by APAT.

NUMBER OF SAMPLES ANALYSED BY THE ARPA/APPA LABORATORIES FOR INFORMATION REQUESTS

INDICATOR - R06.005

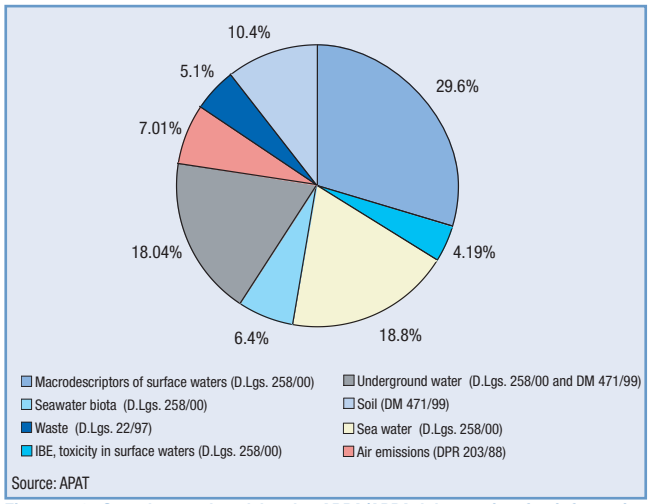


Figure 7.1: Samples analysed by the ARPA/APPA laboratories for information requests (2001)

This indicator measures the number of samples, relating to the various environmental matrixes, analysed by the chemico-biological laboratories of the ARPA/APPA system, in connection with requests for information. It must be stressed, in this respect, that the samples analysed for one matrix cannot be compared with another, because the scope of the sampling and testing is different. The indicator allows an assessment of the level of implementation of the regulations envisaging different application phases, based on the characteristics of the area concerned. Therefore, the indicator is closely related to the local situation, in terms of both the environmental matrixes examined and the regulatory provisions applied.

MONITORING RADIOACTIVITY IN THE ENVIRONMENT

INDICATOR - R06.009

This indicator comprises the number of activity concentration measurements, relating to a number of different environmental and food matrixes, conducted in 2003 by the Environment Agency system laboratories and the RECORAD (REte di COntrollo sulla RADioattività) network. The data is grouped according to sampling location, pursuant to the Commission Recommendation 2000/473/Euratom, which recommends a model of national network suited to the present monitoring needs, based on an architecture broken down into high-sensitivity sampling locations within a “sparse monitoring network” (at least one for each of the macro-regions into which Italia has been divided) and ordinary sampling locations within a “dense monitoring network”. The indicator provides a snapshot of the situation, with respect to the absolute number of measurements carried out and the type of matrixes used.

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7. MONITORING AND CONTROL

NUMBER OF ACCREDITED ARPA/APPA LABORATORIES

INDICATOR - R06.007

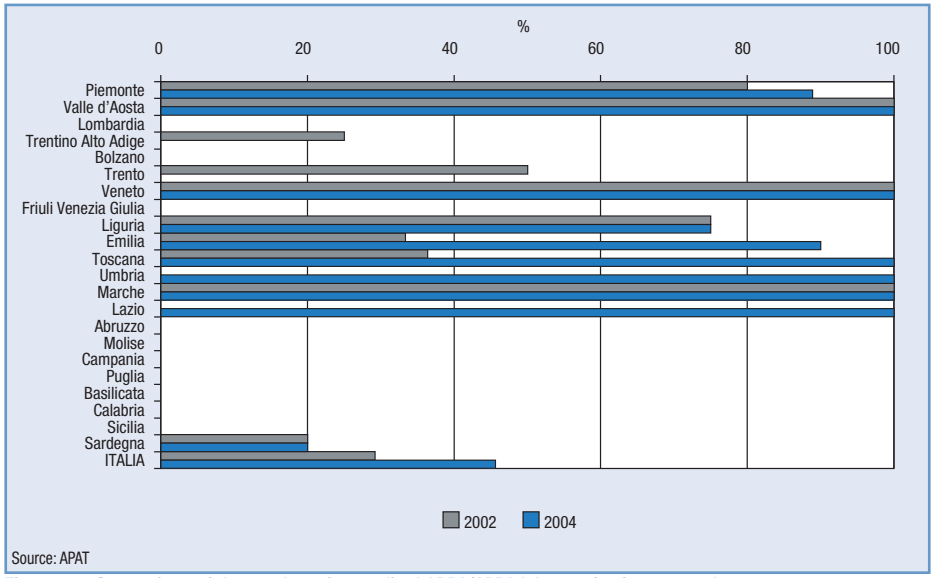


Figure 7.2: Comparison of the number of accredited ARPA/APPA laboratories in 2002 and 2004

This indicator verifies the effectiveness, over the years, of the environmental measures implemented by the ARPA/APPA system, and the impact of the statutory measures (Law 93/2001) enacted to strengthen the laboratories of the Environment Agency system. The quality of our environment also depends on the capacity to make accurate and reliable laboratory measurements. Many environmental policy decisions, in fact, require appropriate analytical data, especially in the case of data of critical importance for the community at large, such as air quality in built-up areas. The EU regulations also require the production, by the member States, of comparable environmental data, and one of the methods for ensuring good quality data is precisely the accreditation of the laboratory tests.

NUMBER OF LABORATORIES TAKING PART IN THE DATA EXCHANGE PROGRAMME ORGANIZED BY APAT

INDICATOR - R06.001

Table 7.1: Participation of ARPA/APPA laboratories in the APAT exchange networks

Region/ Autonomous Province	2002 1° exchange		2003 1° exchange		2003 2° exchange	
	n.	%	n.	%	n.	%
Piemonte	8	80	1	10	3	30
Valle d'Aosta	1	100	1	100	1	100
Lombardia	1	8	2	17	5	42
Trentino Alto Adige	1	25	2	50	1	25
Bolzano	*1*	*50*	*1*	*50*	*0*	*0*
Trento	*0*	*0*	*1*	*50*	*1*	*50*
Veneto	6	75	6	75	7	88
Friuli Venezia Giulia	1	25	1	25	3	75
Liguria	3	75	0	0	3	75
Emilia Romagna	3	33	3	33	4	44
Toscana	6	55	7	64	8	73
Umbria	1	50	1	50	1	50
Marche	2	50	1	25	2	50
Lazio	0	0	0	0	3	60
Abruzzo	2	50	2	50	0	0
Molise	2	67	1	33	0	0
Campania	2	40	0	0	2	40
Puglia	0	0	0	0	2	20
Basilicata	1	50	0	0	0	0
Calabria	0	0	0	0	1	17
Sicilia	1	11	1	11	7	78
Sardegna	0	0	0	0	2	40
ITALIA	**41**	**35**	**29**	**25**	**55**	**47**

Source: APAT – Environmental Metrology Service

The indicator gives the number of laboratories of the Environment Agency System taking part, on a regional basis and from 2002, in the data exchange programmes organized by APAT. The exchanges are analytical exercises which, through the objective assessment of analytical results, compared to benchmark material of known concentration, allow the verification and improvement of the quality of the measurements over the years.

The indicator makes it possible to assess - in absolute and percentage terms, compared to the total number of existing agency laboratories - the degree of participation by the ARPA/APPA agencies in specific projects aimed at improving the quality of analytical measurements at national level.

7. MONITORING AND CONTROL

CONTROL

Environmental controls meet the twofold aim of, (1) verifying compliance with the applicable statutory requirements and, in the case of default, (2) promoting the necessary actions for achieving compliance.
These actions may consist in the application of either administrative measures or penalties, and constitute a deterrent for illicit behaviour in the environmental sector.
Controls, therefore, are the Institution's response, aimed at preventing and reducing pollution and environmental impacts.
Responsibility for conducting the controls lies with the Environment Agency System, and other institutional parties, such as the law enforcement authorities, port and river authorities, and other central and local government bodies.

CONTROL ACTIVITIES BY ENVIRONMENTAL MATRIX

INDICATOR - R06.001

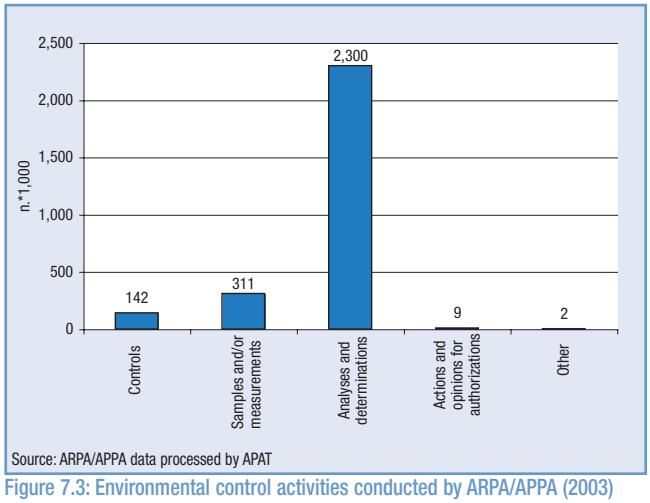
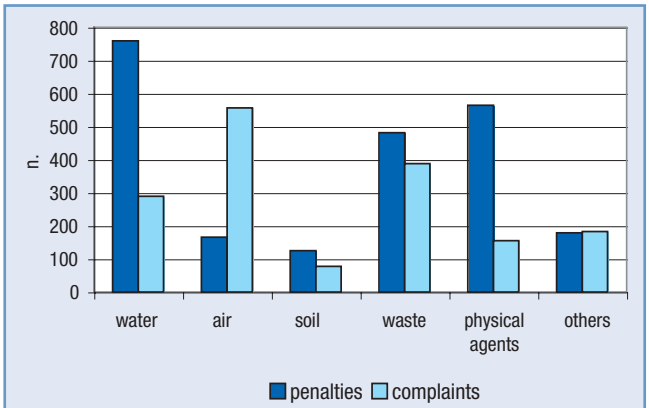


Figure 7.3: Environmental control activities conducted by ARPA/APPA (2003)

Environmental control is a complex set of activities, due to the large number of competent authorities, the increasingly stringent requirements introduced at European Community level, and the integrated approach in conducting the controls, which is of a more specialist and interdisciplinary nature.
The control system's effectiveness and efficiency depends on the implementation of suitable programming activities and on the various stakeholders adopting a consistent behaviour.

MEASUREMENTS AND PENALTIES FOR ILLEGAL ACTIONS

INDICATOR - R06.002

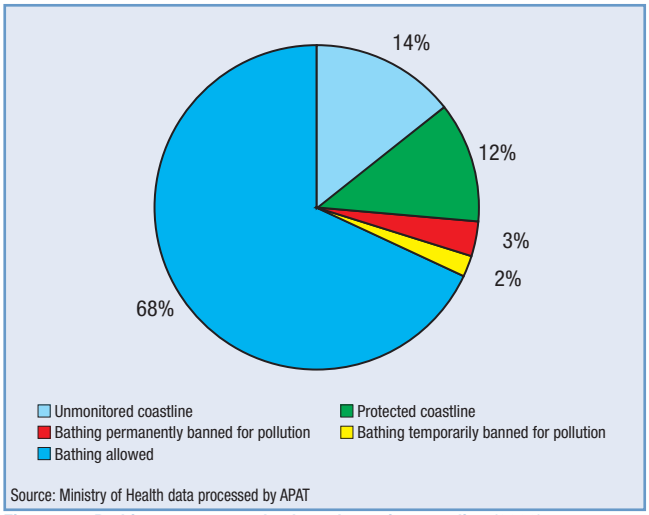


Source: ARPA/APPA data processed by APAT
Note: The item "others" includes asbestos, industrial hazards, bathing water quality, GMOs, etc.

Figure 7.4: Penalties and complaints by the ARPA/ APPA by thematic area (2003)

BATHING WATER CONTROLS

INDICATOR - R06.003



Source: Ministry of Health data processed by APAT

Figure 7.5: Bathing water controls along the entire coastline (2003)

With regard to seawater, the situation is essentially unchanged compared to 2002; there has been an (albeit slight) increase of the length of the coastline where bathing is allowed (5,018 km, compared to 5,001 in 2001).

8. PROMOTING AND SPREADING AN ENVIRONMENTAL CULTURE

INTRODUCTION

The aim of an "environmental culture" is to indicate the objective of the complex and composite activities that the competent environmental authorities must develop, in order to ensure that the relevant scientific and technical knowledge at their disposal, and which they make available to the various social groups, may have a positive effect on the lifestyles and conduct of the community at large (according to the needs and attitudes of each social group).

Promoting and spreading an environmental culture is not included among the basic issues generally analysed by the principal Community and supranational environmental bodies, so that no acknowledged methodological benchmarks are available in this respect.

In the Yearbook, the issue is broken down into 4 SINAnet thematic areas: environmental information, communication, capacity building and education. To date, progress is being made - in each of these areas - with respect to data collection (although the data is not yet wholly exhaustive and only concerns the APAT/ARPA/APPA System), and building an initial set of indicators. A project is currently under way with a view to extending the 'catchment area' of the public authorities that need to be taken into consideration (with regard to their number and variety), in order to ensure the broadest possible data-collection base; hopefully, this will be completed in time for next year's edition of the Yearbook. The data is being collected primarily through the CIFE network (Environmental Communication, Information, Training and Education contact points within the Environment Agencies System). The data relating to the library services has been collected through the network of Agencies System Libraries (to date, 9 Agencies out of 21 have joined the project, namely all those with a documentation centre). A first proposal has been made for a total of 10 indicators: 4 covering *Environmental information* and 2 each for *Environmental Communication, Capacity building and Education*.

Environmental information relates to the complex activities of spreading environmental data/information by the public authorities, either because it is their institutional duty and/or in accordance with specific statutory requirements (the latest of which is the Directive 2003/4/EC). It is illustrated here with regard to several channels, deemed of considerable importance, such as publishing, library services, the mass media, the Web. It represents a specific type of response by society to the problems that need to be tackled in managing the environment. In 2003, topic reports and specialist technical documents were the technical-scientific editorial products published by the highest number of local Agencies. The services provided by the network of Environment Agencies Libraries were judged to be generally satisfactory. In 2003, APAT/ARPA/APPA received good publicity in the mass media. In the websites of the national and local Agencies visitors can access almost all the available environmental information.

Environmental communication, by APAT and the Environment Agencies System, is accomplished by means of a number of activities: organizing conferences and meetings, participating in events, publishing and circulating information materials, ensuring access to information, getting into touch with the mass media, promoting forms of specialized environmental communication (videos and films, comics, videogames, radio and TV systems, public opinion polls on environmental issues, etc.). Special importance, in this respect, can be assigned to the Environment Agencies' websites, aimed at assisting and guiding users in their search for environmental information, which is an enormously vast field, by providing the rational and scientific viewpoint of the competent public institutions.

Environmental capacity building activities are generally characterized by the promotion of initiatives aimed at encouraging the transfer of technical and scientific knowledge on environmental protection. These initiatives, of a predominantly methodological and instrumental nature, can be broadly applied, due to the development of basic and specialist skills, and to further investigation of the various subjects, and to interfacing with the world of the professions and businesses. Within the Environment Agencies System, environmental capacity building plays a key role, especially as a strategic tool for fostering and strengthening technical and scientific skills. It is the subject of incisive actions targetting both the staff of the Agencies and outside stakeholders. Currently, several Agencies have received accreditation at regional level for their activities. Methodologies of e-learning, recently introduced in the field of capacity building, will enable the development of an integrated system of web-based environmental capacity building, aimed at designing and spreading technical and scientific contents, also and primarily at regional and local level.

Environmental education is one of the components of education to sustainable development, which has become the focus of

international attention because it has been chosen by the United Nations as the topic for the next decade (2005 – 2014). UNESCO has recently developed a special strategy, which has already been implemented in the European region (UNECE Strategy). At national level, environmental education is one of the six subjects grouped together to form a new curricular subject called "Education to civil coexistence", under the recently enacted School Reform Law (D.Lgs. 59/04). The APAT/ARPA/APPA system is an integral part of this evolving framework and, with its specific technical and scientific knowledge and expertise, it can effectively support the development of educational activities, consistently with international and national standards.

NUMBER OF ENVIRONMENTAL INFORMATION PUBLICATIONS

INDICATOR - R03.001

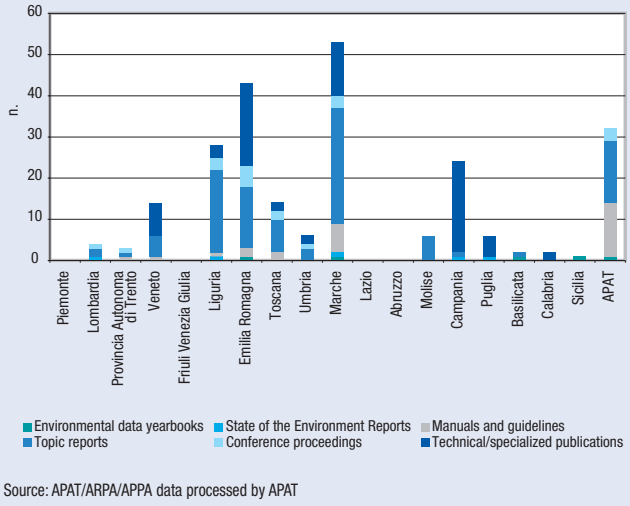


Figure 8.1: Environmental information by means of reports and publications (2003)

This indicator allows an estimate of the publishing products through which the public authority spreads environmental data/information.

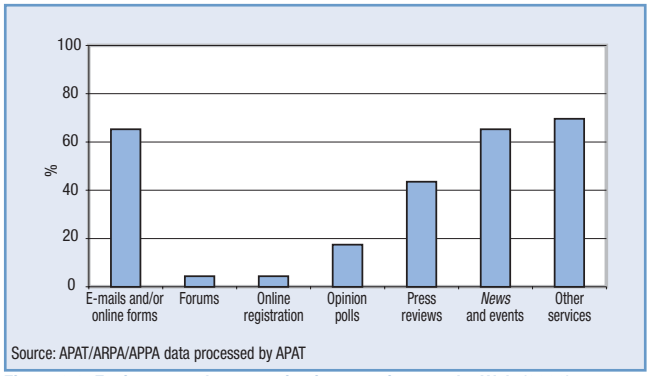
Among the institutional publications it emerges that, in 2003, the brochures on general and special subjects were the documents published by most local Agencies and, also for APAT, these typologies represent the almost totality of institutional publications. In the ambit of the publishing products of an environmental information nature, it can be relevated that the technical bulletins and environmental newsletters (including the products concerning weather conditions) are published by a limited number of Agencies, but they represent, in these cases, an important share of the overall production of environmental information materials.

From figure 8.1 it can be envinced that the scenario relating to environmental information by means of reports and publications is rather varied: thematic reports and specialist documents are the products of this publishing line realized, in 2003, by the most regional Agencies. For APAT the production of manuals and guidelines was a noteworthy as that of thematic reports.

ENVIRONMENTAL COMMUNICATION ON THE WEB

INDICATOR - R03.006

This indicator allows to estimate the willingness of the Institutions about the communication with users, by means of services encouraging interaction at various levels. In particular, this indicator refers to the presence of the services provided on the website, such as direct contact between users and the competent offices *via* e-mail, discussion forums and/or mailing lists, opinion polls, environmental news reviews, news and events.



Source: APAT/ARPA/APPA data processed by APAT

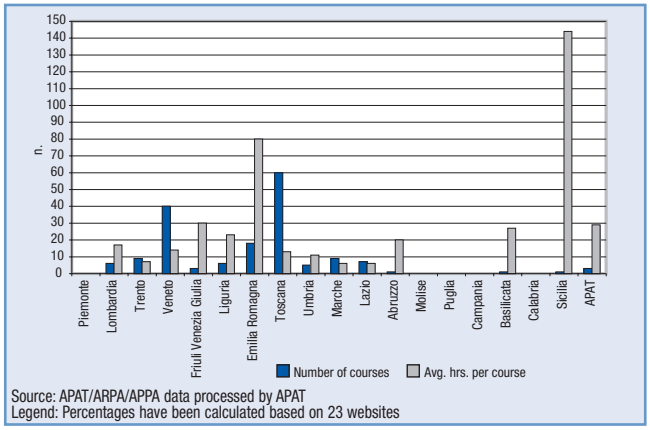
Figure 8.2: Environmental communications services on the Web (2003)

This survey, carried out on 23 websites (15 by CIFE and 8 by APAT) highlights that one-way communication services are much more widespread than interactive services (with the exception of e-mail contact services). Figure 8.2 shows that about 43% of the websites feature a press review, 65% provide information relating to news and events of an environmental nature, and 65% give the e-mail addresses of its offices; among the remaining interactive services, only 4% feature discussion forums, 17% make opinion polls, and 4% provide the possibility of online registration. It is probably due to the fact that these services depend on more advanced technology that they still enjoy hardly no consideration in the administration's communication culture.

ENVIRONMENTAL CAPACITY BUILDING SUPPLY

INDICATOR - R03.007

This indicator provides a benchmark with respect to the environmental capacity building activities put into place by the Environment Agencies System, and targets both System operators and outside stakeholders; the indicator is based on the number of courses held, the corresponding number of hours, and the number of participants per Agency, at national, regional and local level. Comparing the overall number of hours to total course attendance figures, the result is an average attendance of 21 persons per course. Furthermore, figure 8.3 shows, for each Agency, that the average number of hours per course is 21.

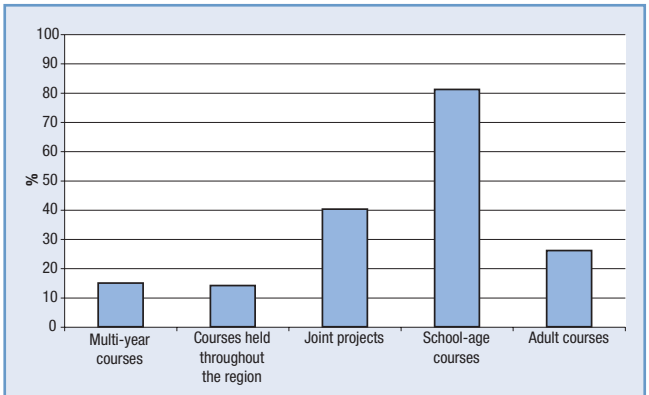


Source: APAT/ARPA/APPA data processed by APAT
Legend: Percentages have been calculated based on 23 websites

Figure 8.3: Environmental capacity building supply: average per course (2003)

ENVIRONMENTAL EDUCATION SUPPLY

INDICATOR - R03.009



Source: APAT/ARPA/APPA data processed by APAT

Figure 8.4: Environmental education projects by type (2003)

This indicator enables the description of the state of the art of environmental education projects promoted by the Environment Agencies System, at national, regional and provincial level. The initiatives concern both teaching activities and educational projects carried out in 2003 (and totaling 2,306 and 202, respectively).

With regard to educational projects, the data collected has provided specific information on the type of projects and their target groups (schools/adults).

Figure 8.4 shows that out of the 202 educational projects put into place - of variable length and providing for a series of integrated theoretical and practical activities - about 81% targetted schoolchildren and 26% adults; furthermore, 15% were multi-year projects, 14% covered the entire region/province, and 40% were implemented as joint projects.

9. ENVIRONMENT AND HEALTH

INTRODUCTION

The World Health Organization (WHO) defines "environment and health" as including *"both the direct pathological effects of chemicals, radiation and some biological agents and the effects (often indirect) on health and well-being of the broad physical, psychological, social and aesthetic environment, which include housing, urban development, land use and transport"*. This definition of environmental health is at the basis of the policies implemented by the EU member States as well, and leads to the identification of different - albeit complementary - strategies, *preventing disease* and *promoting health*, with respect to policy-making in other - not necessarily health-related - sectors. The time spent behind a driving-wheel and motor vehicle use, the quality of human dwellings, and the distance from the workplace are all conditions of exposure to risk factors that concur in determining the state of health of the population, in its more modern meaning, with global impacts on sustainability.

The effects of health determinants on planning in a number of sectors carry a considerable economic and social weight. Making "informed" decisions today, with respect to planning alternatives and/or land management projects, and the subsequent monitoring of their effectiveness, cannot disregard the integrated assessment of their environmental, social and economic impacts, especially in support of cost/benefit analyses for regional planning and land management purposes.

Globally speaking, the cost - at local and global level - of the social and environmental impact of transport (in terms of congestion, accidents, air pollution, *global warming*, infrastructures, noise pollution) has been estimated by the EEA (1999) to be in the region of 7.1% of the European GDP, road accidents and the impact of congestion alone accounting for about 50%.

In particular, road accidents, besides their direct impact on health (in terms of the number of deaths and injuries), have a social cost, at European level, which has been estimated by the European Commission as equal to 2% of the GDP of the European Union. This estimate, *inter alia*, does not take account of non-pecuniary damages.

At national level, in 2002, the estimated social cost of road accidents was 34,108 million euros, equal to 2.7% of the GDP. Among the factors determining direct and indirect costs there are:

- *loss of production capacity:* namely, any present and future loss of production, due to the ensuing partial or total disability of the accident victims;
- *human costs:* namely, non-pecuniary damage substantially comprising breaches to the mental and physical integrity of the accident victims and/or their relatives; these costs can be broken down into so-called "moral damage" (loss of life) and "biological damage" (sustaining bodily injuries);
- *health costs:* namely, expenses incurred for emergency transport and treatment, hospitalization and rehabilitation costs;
- *pecuniary damage and other costs:* namely, costs relating to property damage (motor car repairs, etc.), legal costs (costs incurred by the judicial authorities, in connection with motor vehicle liability disputes, etc.), and administrative expenses (insurance management costs, costs relating to services provided by public authorities, etc.).

Road deaths primarily concern the younger segment of the population. The Potential Years of Life Lost (PYLL) highlights how road accidents account for the highest number of deaths among young people, compared to other causes, with the consequent loss of many years of life and higher social costs.

The road accident death rate, in fact, is equal to about 1.3% in recent years, in Italia, compared to the total number of deaths, while the PYLL is about 4% of the total. This depends on the fact that when a 20-year old person dies the resulting PYLL is 60, while, in the case of an 80-year old person, it is only 8.

ROAD ACCIDENT CASUALTIES

INDICATOR - A09.004

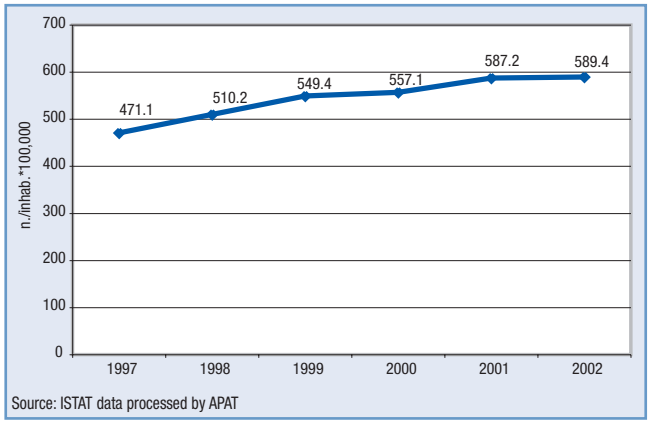


Figure 9.1: Trend in road accident rates at national level

The national average of road accident rates is continuously rising - between 1997 and 2002 it was up by 25% - although this trend is not always confirmed at regional level.

In 2002, the police recorded 237,212 road accidents, with about 337,878 more or less serious casualties. About 652 accidents a day are reported, with 926 injuries.

The percentage weight of road accidents in general, in terms of their social costs for the country as a whole, requires adequate monitoring to objectively and realistically assess its direct and indirect socio-economic impact on the health and well-being of the population.

In the light of the new guidelines (Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment) in support of the development of integrated planning activities, according to which, when having to choose between different alternatives, the environmental aspects of a proposal must carry the same weight as the socio-economic and technical feasibility ones, the results of these estimates shall become guiding elements and benchmarks for planning and management purposes, in respect of the transport and regional mobility systems.

ROAD ACCIDENT DEATH RATE

NDICATOR - A09.005

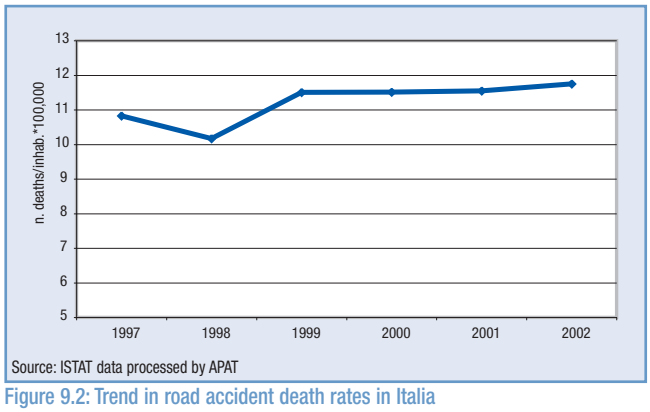


Figure 9.2: Trend in road accident death rates in Italia

In the period between 1997 and 2002, the number of road accident deaths in Italia, compared to the number of residents in the area concerned, rose by 8.3%.

The indicator provides useful information for environmental and land management analyses, in the field of regional and transport planning, especially with regard to:

- infrastructure supply system management;

- active/passive vehicle safety;
- the efficiency of health facilities;
- traffic management;
- safety regulations and guidelines.

Changes to the value of the indicator, in fact, are support parameters for assessing and selecting the priority strategies to be adopted in the transport and land management systems, in order to implement sustainable regional planning and programming processes, in agreement with the EU guidelines on the integrated assessment of impacts (Directive 2001/42/EC and the Commission Communication COM (2002) 276 on impact assessment).

POTENTIAL YEARS OF LIFE LOST (PYLL) FOR ROAD ACCIDENTS

INDICATOR - A09.006

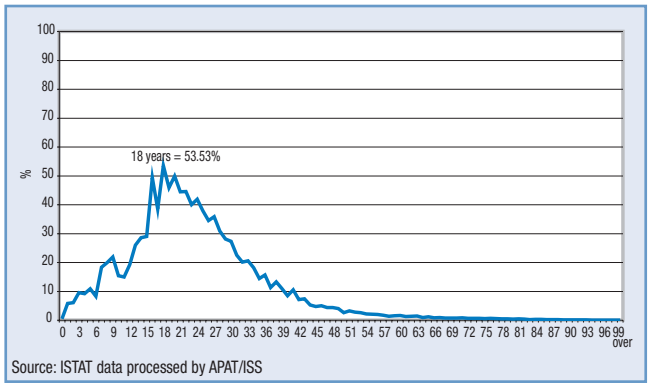


Figure 9.3: Percentage (%) of PYLL for road accidents, compared to the PYLL for all other causes of death, by age group (2001)

The PYLL indicator (*Potential Years of Life Lost*) focuses the potential number of years - i.e. the life expectancy - lost for different causes of death (e.g. disease, accidents). This indicator is calculated as the number of deaths occurring at a certain age multiplied by the life expectancy figure at the same age.

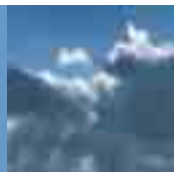
This indicator quantifies the PYLL for road accident deaths.

The PYLL for road accident deaths peaks at 18 years, accounting for over 50% of all deaths at that age.

The PYLL is an indicator of premature mortality because it assigns greater weight to premature death by means of the introduction (weight) of the notion of life expectancy, which is obviously higher the younger the age group.

Therefore, the PYLL indicator highlights the role of road accidents *vis-à-vis* ordinary mortality. In absolute terms, road accidents account for about 1.4% of total deaths, while in terms of the PYLL the percentage rises to 4%.

10. ATMOSPHERE



INTRODUCTION

Air pollution is defined as any change in the composition of the atmosphere due to the presence of one or more substances, in quantities and characteristics that may alter the normal environmental conditions, and presents a direct or indirect danger for human health, ecosystems and material goods. The pollutants released into the atmosphere are produced by human activities (industrial activities, power plants, household heating, transport) or of natural origin (sea spray, volcanic emissions, decomposition of organic materials, forest fires).
Problems related to air pollution involve various space and time scales. On the one hand, air quality in the urban environment has strictly local relevance and is characterized by processes taking from several hours to days. On the other hand, emissions of acidifying substances and of ozone precursors may have cross-border effects and, generally speaking, continental extension, and the emission of substances that contribute to climate change and variations to the layer of stratospheric ozone also has global relevance, with time scales, in this case, in the region of several years.
The indicators relating to the air environment are organized around two issues: emissions (pressure indicators) and air quality (state indicators). The quantification of air emissions, their sectoral distribution and development over time are based on estimates. Instead, the knowledge of the levels of pollutants at ground level comes from the air quality monitoring networks, administered by various control bodies, most of which belong to the public sector.

EMISSIONS

The substances released into the atmosphere contribute to the following occurrences: climate change, stratospheric ozone depletion, acidification, photochemical smog, the deterioration of air quality. The assessment of emissions is made through suitable processes of estimation, based on emission factors and activity indicators. With regard to GHGs, the benchmark methodology is the one indicated by the Intergovernmental Panel on Climate Change (IPCC). For the other pollutants, the methodology used is the one indicated by the CORINAIR project (COoRdination-INformation-AIR) implemented by the European Environment Agency, according to the Selected Nomenclature for Air Pollution (SNAP97).

10. ATMOSPHERE

GHG EMISSIONS (CO_2, CH_4, N_2O, HFCs, PFCs, SF6): TREND AND SECTORAL BREAKDOWN

INDICATOR - A01.001

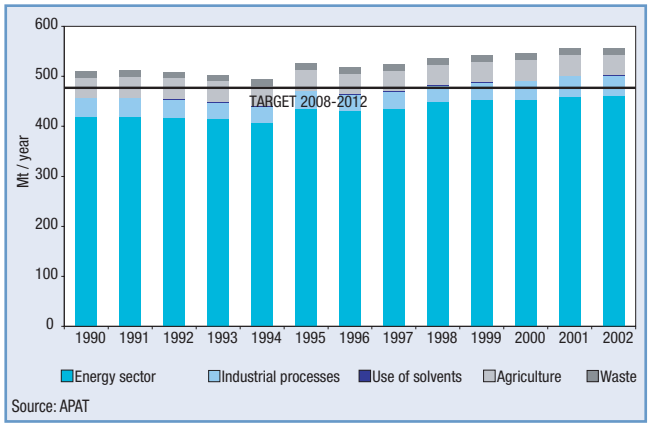


Figure 10.1: National emission of CO_2 equivalent GHGs

In the context of the Convention on Climate Change and, in particular, of the Kyoto Protocol, which entered into effect on 16 February 2005, Italia has undertaken to reduce overall national emissions of GHGs - between 2008 and 2012 - by 6.5%, with respect to the base year. The base year for carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) is 1990, while in the case of fluorinated gases (hydrofluorocarbons HFCs, perfluorocarbons PFCs, sulphur hexafluoride SF_6) it is 1995. The total emissions of GHGs considered by the Kyoto Protocol in 2002, in CO_2 equivalent terms, are 7% higher than the base year. Emission trend are closely related to energy consumption.

PRODUCTION OF STRATOSPHERIC OZONE DEPLETING SUBSTANCES (CFCs, CCL_4, HCFCs)

INDICATOR - A01.002

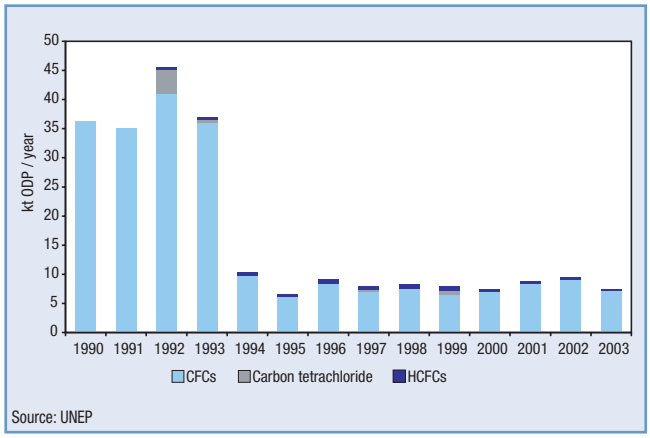
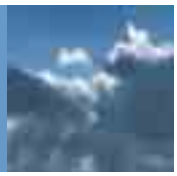


Figure 10.2: National production of stratospheric ozone depleting substances

The Montreal Protocol commits the signatories to stabilize, reduce, and ultimately ban the production and use of ozone (O_3) depleting substances in the upper atmosphere (stratospheric ozone), according to a scheme defined by targets and timeframes. In Italia, Law 549/1993 as subsequently amended and supplemented, sets out procedures for reducing and, ultimately, ceasing the use of ozone-depleting substances. In particular, the use, marketing, import and export of such substances must cease within 31 December 2008.



EMISSION OF ACIDIFYING SUBSTANCES (SO_X, NO_X, NH_3): TREND AND SECTORAL BREAKDOWN

INDICATOR – A01.003

Under the Council Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants, translated into Italian law through Legislative Decree 171/04, Italia is obliged to reduce its national emission of sulphur dioxide to 0.475 Mt by 2010, which means a 28.6% reduction compared to 2002. The emission of sulphur dioxide dropped in Italia by 48.5% between 1980 and 1990, and by 62.6% between 1990 and 2002.

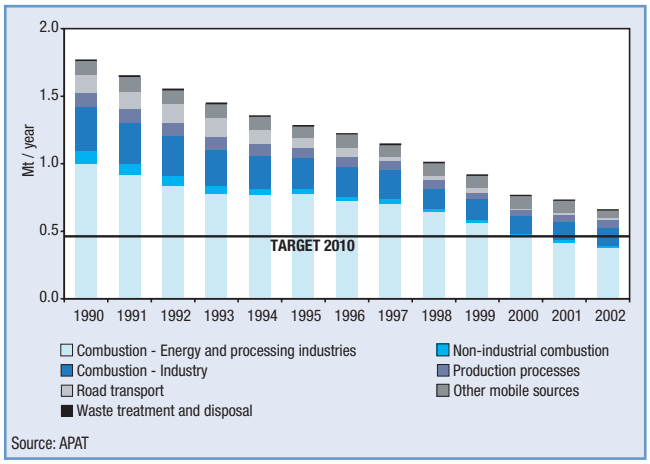


Figure 10.3: National emission of sulphur oxide (SO_X)

Under the Council Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants, Italia is obliged to reduce its national emission of nitrogen oxides to 0.990 Mt by 2010, which means a 21.9% reduction compared to 2002. The emission of nitrogen oxides rose in Italia by 26.2% between 1980 and 1992 (the peak year), and then dropped by 36.7% between 1992 and 2002.

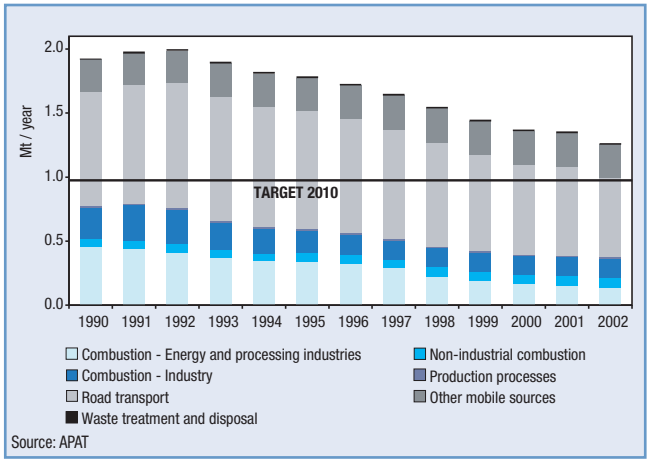


Figure 10.4: National emission of nitrogen oxides (NO_X)

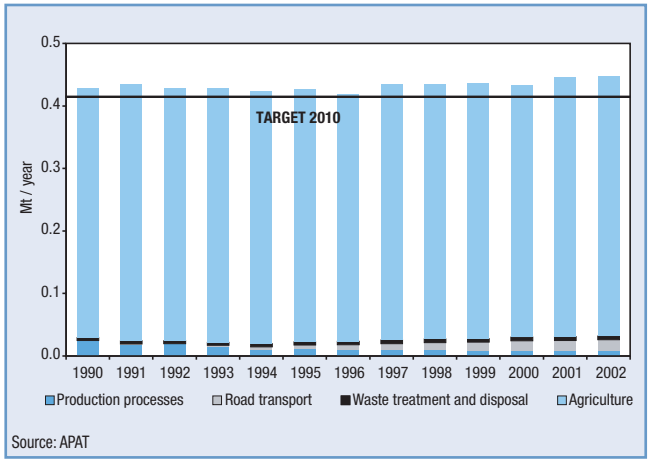


Figure 10.5: National emission of ammonia (NH_3)

Under the Council Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants, Italia is obliged to reduce its national emission of ammonia to 0.419 Mt by 2010, which means a 8.3% reduction compared to 2002.

EMISSION OF TROPOSPHERIC OZONE PRECURSORS (NO_X AND NMVOC): TREND AND SECTORAL BREAKDOWN

INDICATOR - A01. 004

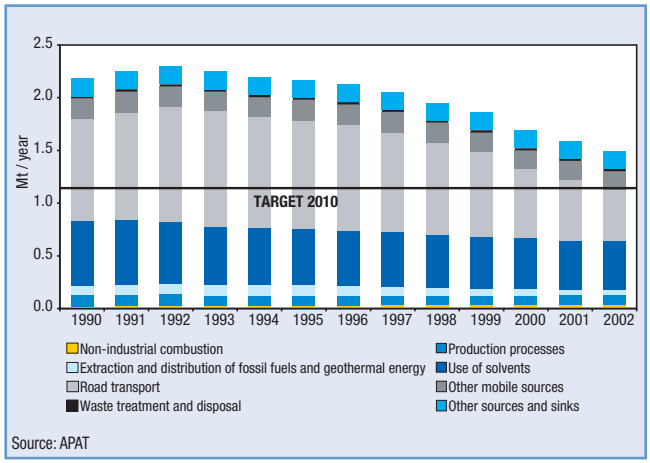
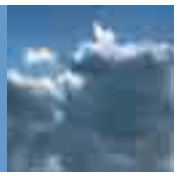


Figure 10.6: National emission of non-methane volatile organic compounds (NMVOC)

Under the Council Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants, Italia is obliged to reduce its national emission of NMVOCs to 1.159 Mt by 2010, which means a 15.5% reduction compared to 2002. The emission of NMVOCs rose in Italia by 6% between 1980 and 1992 (the peak year), and then dropped by 37.6% between 1992 and 2002.



EMISSION OF BENZENE (C_6H_6): TREND AND SECTORAL BREAKDOWN

INDICATOR - A01.007

Benzene emissions are largely due to the use of petrol in road transport and, secondly, to several production processes and to fuel storage and distribution systems (petrol stations, deposits).

With regard to road transport, most of this pollutant (about 95%) comes from vehicle exhausts, where benzene is present as both an uncombusted fraction and as the product of the rearrangement of the aromatic hydrocarbons present in the petrol. The remaining 5% originates from evaporation from fuel tanks and carburettors, even when the vehicles are standing still. The high rate of motor vehicle use in city centres and its ascertained carcinogenicity render benzene one of the most important pollutants in urban areas.

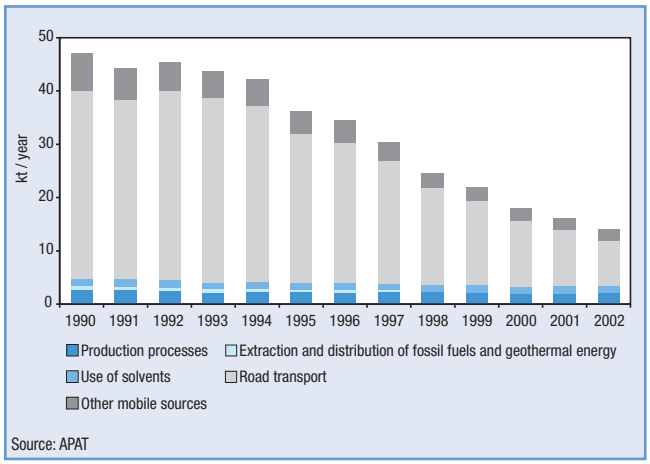


Figure 10.7: National emission of benzene (C_6H_6)

EMISSION OF PM_{10} PARTICULATE MATTER: TREND AND SECTORAL BREAKDOWN

INDICATOR - A01.005

Particles with a diameter of less than 10 µm may be either natural or of man-made origin. Man-made particles are mainly due to traffic and combustion processes (manufacturing plants and household heating systems). Natural particles generally originate from soil erosion, seaspray, biogenic aerosol production (plant fragments, pollen, spores), vulcanic emissions and the long-distance transport of sand (Sahara dust). A large part of the particles present in the atmosphere is of

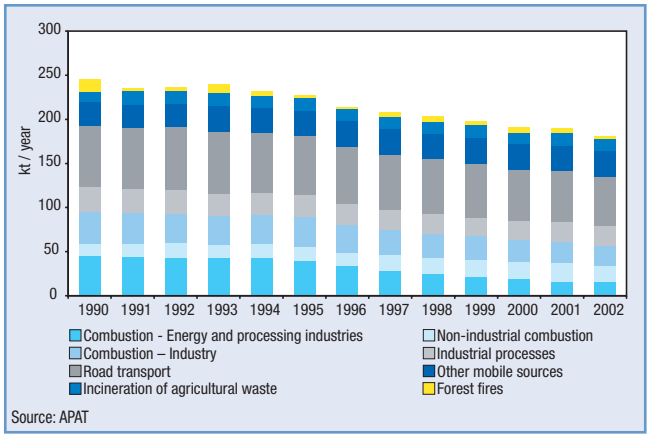
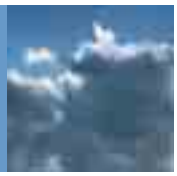


Figure 10.8: National emission of PM_{10} particulate matter

secondary origin and is due to the reaction of gas compounds, such as nitrogen oxide, sulphur oxides, ammonia and organic compounds. Among the other constituents of particles are compounds such as polycyclic aromatics and heavy metals.
The indicator represents a national estimate and the corresponding sectoral breakdown of PM_{10} emissions. Emission reductions may be observed primarily in the energy production and manufacturing sectors and, to a lesser extent, in transport.

AIR QUALITY

The indicators for air quality developed for this year's environmental data Yearbook are based on the information collected by the Agency in 2004 and relating to 2003, according to, (i) the Council Decision 97/101/EC establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States (EoI Decision), as amended by Council Decision 2001/752/EC, and (ii) Council Directive 92/72/EC and DM 16/05/1996 on air pollution by ozone. At the time of drafting this Yearbook, it was impossible to apply the criteria and assessments laid down by the new regulations to the information collected under the abovementioned EoI process, due to the upgrading and streamlining of the monitoring networks under way at regional level, based on the new European regulations on air quality that have been implemented in Italia (see, in particular, DM 60/2002 and D.Lgs. 183/2004, besides the *Guidelines for implementing air quality monitoring networks* published by APAT in November 2004).
Consistently with the air quality data processing procedures under the EoI Decision, the following graphs show the arithmetic mean, the median, the percentiles (98 and 99.9) and the maximum for the years 2002 and 2003 for the pollutants as follows: PM10 particulate matter, nitrogen dioxide (NO_2), benzene (C_6H_6) and sulphur dioxide (SO_2), for each monitoring station.
With regard to tropospheric ozone, in continuity with last year's edition of the Yearbook, for the years 2002 and 2003, the graphs show the results of the data processed in accordance with DM 16/05/1996 (number of days where in the warning limits and the protection levels for human health and plants are exceeded).
There are 332 stations providing information for EoI and ozone purposes, broken down by location (urban, suburban, rural and unknown) and type (traffic, industrial and base).

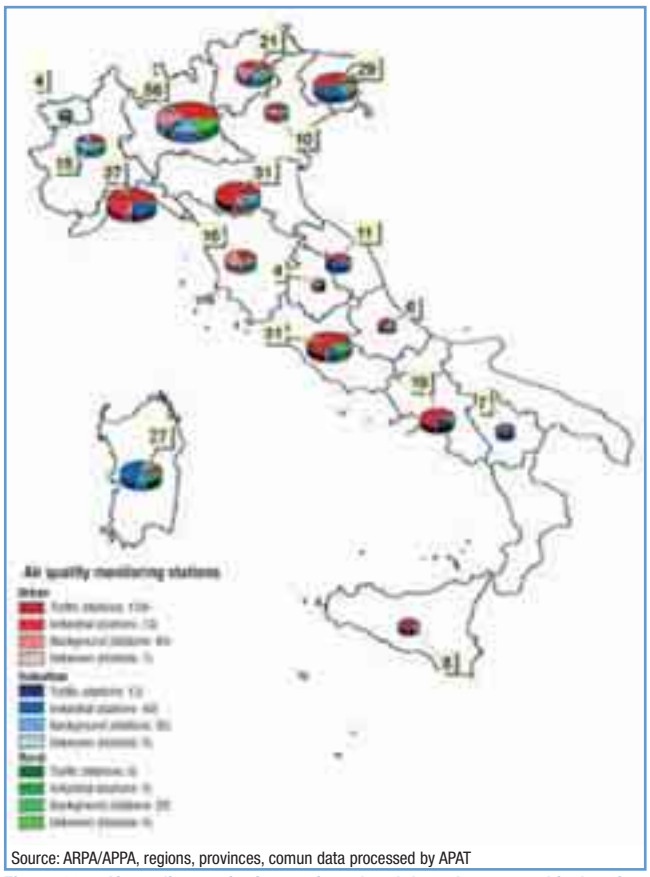


AIR QUALITY: MONITORING STATIONS

INDICATOR - A01.009

Generally speaking, the monitoring stations do not appear to be uniformly distributed throughout the country. Coverage is mostly sufficient and even, in many cases, redundant in the North (where 62% of all the stations are located), adequate in the Centre (20% of stations), but still rather scanty in the South, where only 18% of stations are located, and where data collection gaps make it impossible to paint an overall picture of air quality. The distribution of the stations by type is also sometimes too inadequate to draw a truly representative picture of the situation in the country (the map highlights the abundancy of some types and scarcity of others).

With regard to metadata and data, there has been an increase of the amount of information for all pollutants from 2002 to 2003. Despite the shortage of figures especially for the South of the country, this indicates a general upward trend and improvement of monitoring and data collecting, from local to national level.



Source: ARPA/APPA, regions, provinces, comun data processed by APAT

Figure 10.9: Air quality monitoring stations: breakdown by geographical region, location and type of station (total number of stations: 332) – (2003)

AIR QUALITY: TROPOSPHERIC OZONE (O_3)

INDICATOR - A01.012

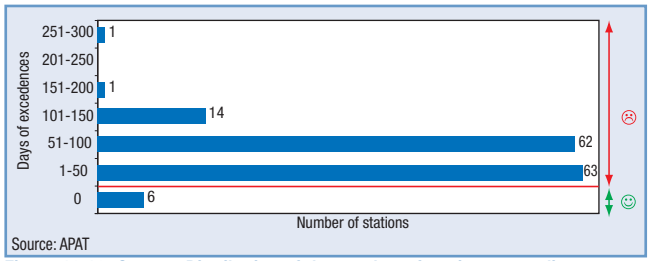


Figure 10.10: Ozone - Distribution of the number of stations according to number of excedences (in days) for health protection purposes (110 µg/m^3 average over a period of 8 hrs) (2003)

Tropospheric ozone is a secondary pollutant produced by the reaction between solar radiation and primary pollutants such as nitrogen oxides (NO_x) and volatile organic compounds (VOCs). The set of compounds thus formed in the atmosphere, by means of complex photochemical reactions, of which ozone is the principal component, is called "photochemical smog".

Photochemical pollution is a cross-border phenomenon: in certain weather and emission conditions, in fact, photochemical pollutants may be carried over distances of hundreds or even thousands of kilometres.

For each monitoring station, observations were made for the years 2002 and 2003, based on the provisions of DM 16/05/96, with regard to the number of days of excedence of the information threshold (180 µg/m^3, average hourly concentrations), of the threshold for the protection of human health (110 µg/m^3, average concentrations over a period of 8 hrs) and plants (65 µg/m^3, average daily concentrations).

Moving on from 2002 to 2003, one can observe a higher increase in the number of days of excedence for all the thresholds taken into account. In particular, considering a 50% increase, this is recorded in 24% of the stations for the thresholds of protection of human health and plants and in 73% for the information thresholds.

The excedences of O_3 thresholds in 2003 may be ascribed to the peculiarities of the climate that year.

The information thresholds and level of protection of human health in 2003 were exceeded in most stations: about 78% of the stations taken into account recorded excedences of 180 µg/m^3; excedence of the level of protection of human health were reported in 96% of the stations.

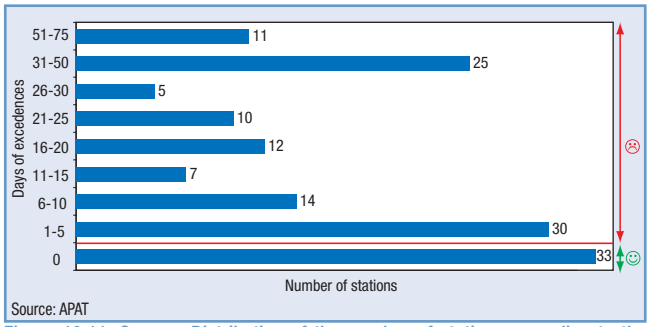
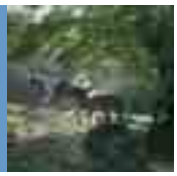


Figure 10.11: Ozone - Distribution of the number of stations according to the number of excedences (in days) periods of excess pollution, with respect to the information thresholds (180 µg/m^3) (2003)

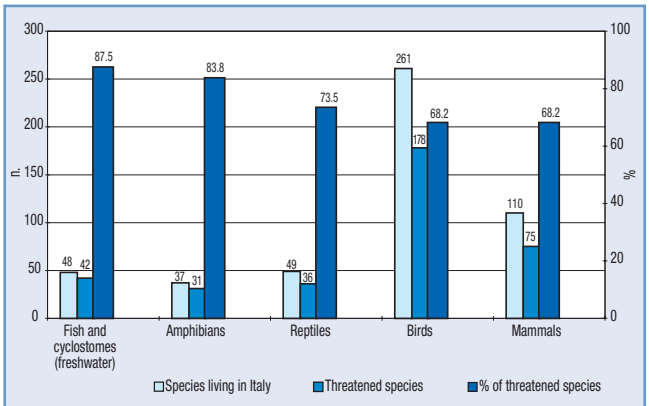
11. BIOSPHERE



INTRODUCTION

The biosphere is the product of interactions between soil, rocks, water, air and the living organisms they contain. It constitutes a complex system - the terrestrial ecosystem - in dynamic balance with the Earth's other components. In tackling its problems, it would not be a good idea to adopt a reductive approach (i.e. to investigate only a part of the system, while keeping the surrounding conditions unchanged), but it is necessary to adopt a holistic survey method, aimed at understanding the complexity of the system.
Therefore, given the close inter-relations both within and with the other thematic areas, the biosphere indicators presented here concern different issues, only apparently distant and unrelated. In particular, in selecting these indicators, an effort has been made to represent the main problems related to the conservation of biodiversity, the effects of climate change, the establishment of parks and nature reserves, the protection of forests and the landscape.
In short, the indicators show that there is still a high level of threat facing animals, plants and natural habitats, as a result of numerous criticalities, pressures on the environmental matrixes, land fragmentation. Numerous direct and indirect regulatory measures have been implemented, in an attempt to remedy these problems, at national and international level, with a view to combating the loss of biodiversity. Direct measures are those directly protecting species and ecosystems, while indirect measures are aimed at reducing the sources of pressure. The gradual, albeit constant, increase of forest areas in Italia may represent a valid example of the positive effects of a lower environmental pressure, combined with effective protective measures.

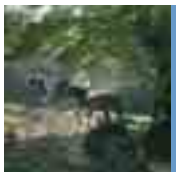
LEVEL OF THREAT FOR ANIMAL SPECIES
INDICATOR - A02.001



Source: Data processed by APAT and drawn from Zerunian S., 2002, *Condannati all'estinzione? Biodiversità, biologia, minacce e strategie di conservazione dei Pesci d'acqua dolce indigeni in Italia;* Ministero dell'ambiente e della tutela del territorio - DCN, 1998, *Checklist of Italian animal species;*
http://www.minambiente.it
Calvario E., Sarrocco S., (Eds.), 1997, *Lista rossa dei vertebrati italiani*

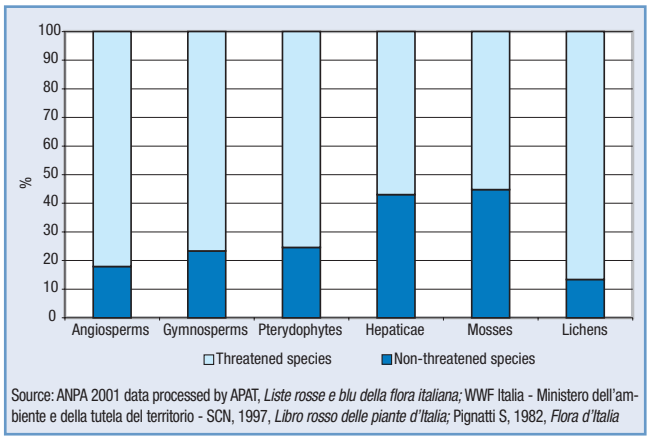
Figure 11.1: Vertebrate species living in Italia and contained in the so-called "Red Lists"

Figure 11.1 highlights the particularly high level of threat affecting Vertebrate species living in Italia; the conservation problem is particularly serious for freshwater fish and amphibians, although it is necessary for the other groups too. This is probably due, in the former case, to the bad condition of internal waterways, and in the latter case, to the deterioration and disappearance of the wetlands, the humid habitats where amphibians spend most of their lifecycle.



LEVEL OF THREAT FOR PLANT SPECIES
INDICATOR - A02.002

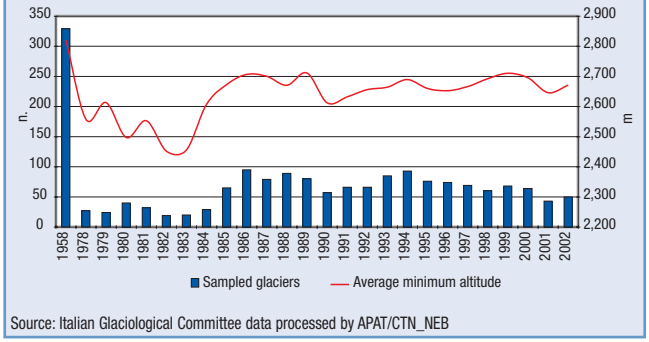
The plant groups shown in figure 11.2 are threatened, as a whole, at national level, for 20.3% of the species concerned. At national level the threat is particularly high for the Bryophytes (Hepaticae and Mosses, forming 43% and 44.7% of the species, respectively), which is probably related to the deterioration of the wetlands in which they grow, but also with the intensification of agriculture and forestry, and to pollution.



Source: ANPA 2001 data processed by APAT, *Liste rosse e blu della flora italiana;* WWF Italia - Ministero dell'ambiente e della tutela del territorio - SCN, 1997, *Libro rosso delle piante d'Italia;* Pignatti S, 1982, *Flora d'Italia*

Figure 11.2: Percentage distribution of the threatened and non-threatened Italian plant species, by plant groups

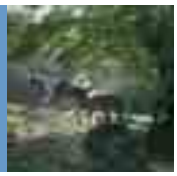
CHANGES TO GLACIER FRONTS
INDICATOR - A02.008



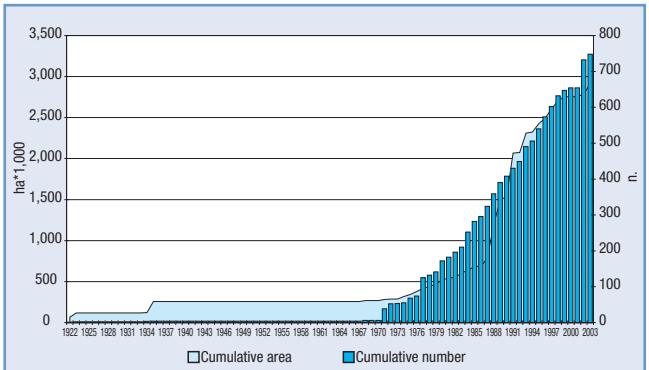
Source: Italian Glaciological Committee data processed by APAT/CTN_NEB

Figure 11.3: Trend in the average minimum altitude of glacier fronts in the Western Alps

Changes to the length of glaciers highlight an overall retreating trend of the glacier fronts and consequent melting of the ice. More recent trend may be observed in the three Alpine sectors: in the Western Alps this retreating trend to higher altitudes appears most clearly (figure 11.3), the trend becomes less clear in the Central Alps, while in the Eastern Alps it becomes obvious once again.



PROTECTED LAND AREAS
INDICATOR - A02.009



Source: Ministry of the Environment (EUAP, 2003) data processed by APAT/CTN_NEB

Figure 11.4: Annual variation of the cumulative area and cumulative number of protected land areas

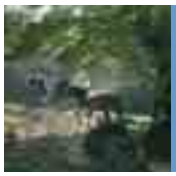
In Italia, protected land areas cover 9.7% of the country's land. Figure 11.4 shows a significant increase of the area and number of protected land areas from the mid-1970s, promoted mainly by the regional governments which, in those years, began exercising their institutional functions. The various measures enacted - before and after the 1991 National Framework Law on protected land areas - have constantly encouraged the implementation of protection activities, and from the second half of the 1990s to the designations of regional competence, the central government too has been involved in setting up many new protected areas.

HUMAN PRESSURE ON WETLANDS OF INTERNATIONAL INTEREST
INDICATOR - A02.016

The index shown in figure 11.5 summarizes the main pressure factors on wetlands protected under the 1971 Ramsar Convention (namely, urbanization, farming and infrastrutures). The index of human pressure mainly features high or very high values (classes III and IV, concerning 68% of all wetlands), particularly due to extensive farming, because ponds and marshes are primarily located in flat areas. This highlights the precarious balance in which these highly sensitive environments, due to their internal dynamics, now find themselves, under continuous threat from the surrounding human activities.

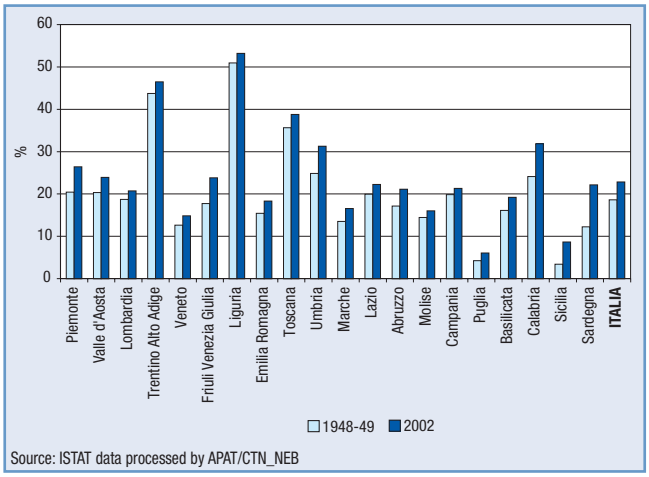
Source: Data supplied by MATT (2003), CORINE Land Cover (1996) and TELEATLAS (1999) and processed by APAT/CTN_NEB

Figure 11.5: Index of human pressure on Ramsar areas



FOREST AREA: CURRENT SITUATION AND TREND

INDICATOR - A02.016



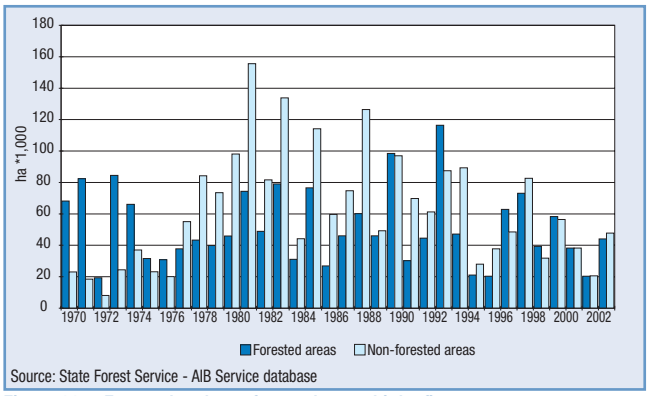
Source: ISTAT data processed by APAT/CTN_NEB

Figura 11.6: Regional forest area index

The "regional forest area index", meaning the ratio of overall forested areas to the total area of the region concerned, has undergone a generalized increase since after World War II. The national figure has risen from 18.6% in 1948/49, to 22.8% in 2002, proof of a gradual - yet continuous - increase of total forested areas in Italia.

EXTENT OF FOREST FIRES

INDICATOR - A02.017

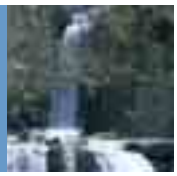


Source: State Forest Service - AIB Service database

Figure 11.7: Forested and non-forested areas hit by fires

The overall examination of the data from 1970 to 2003 features an up and down trend of forest fires, with peaks and troughs. The key highlights, however, are a highly critical period in the 1980s, followed by a number of years in which forest fires peaked, a slight downward trend in 2001 and 2002, and a new upsurge in fires in 2003.

12. HYDROSPHERE



INTRODUCTION

The hydrosphere covers two-thirds of the Earth's surface, it plays a fundamental and continuous geomorphological role and is an essential medium for the life of man and all other animals and plants.

Water resources are a key element for the socio-economic development of human populations, and the best possible use of these resources should concern the renewable share of the resource in the annual water cycle, to ensure the sustainability of their exploitation.

Water is subject to changes that are both quantitative, due to harvesting and consumption, and qualitative, descending from natural and human activities, which determine increasing and, often irreversible, forms of pollution.

The state of the water resources is illustrated here by means of a select group of indicators relating to three environmental issues: the quantity of water resources, the quality of the water resources, and the use of water. The indicators chosen for this overview refer to inland waters, coastal seawaters and ground water.

A more effective management of the quantitative aspects of water resources is expected following the enactment of DM 185/03, a measure regulating the technical standards for the reutilization of waste water, and DM of July 28th 2004, which lays down the criteria for defining the "minimum vital outflow" of rivers, and calculating the "basin water balance"; a key component for assessing this balance is precisely the measurement of the outflow of rivers downstream towards the mouth.

The trophic state of coastal seawater in the period between June 2002 and June 2003 proved generally good: most of the sampled stations featured a high (61%) or good (32%) trophic state. Trophic-related problems were found in the remaining 7% of the sampled stations, where, however, the deteriorated situations now account for 1% of the sampled sites, compared to 2% in the previous survey season, while fair rankings have risen from 5 to 6%. Along the Adriatic coast, Emilia Romagna is the most critical region, while the most critical trophic states on the Tyrrhenian coast can be found in Campania (ranking poor at the mouth of the Sarno and fair at Portici) and in Lazio (Fiumicino and Minturno). On the Ionic coast and the coast of Sardegna all the sites featured low trophic levels.

The presence of micro-organisms in bathing areas - which is expressed by means of the Index of Bacteriological Quality (IQB) - is responsible for 90% of the cases of excess pollution. With regard to 2002, the best bacteriological quality was found in Calabria, Sardegna, Toscana and Emilia Romagna (with 90% of the sites ranking in class 1), followed by Veneto, Friuli Venezia Giulia, Lazio, Sicilia, Puglia and Marche. On the contrary, critical conditions were found in Liguria, Abruzzo, Molise and Campania, with over 30% of the sites featuring high levels of contamination. In particular, the highest concentration of highly contaminated areas can be found in Campania, along the coastline between the provinces of Caserta and the gulf of Napoli, and in provinces with large residential and industrial areas and ports (Genova, Bari, Pescara and Palermo). Other provinces with sites in critical conditions are Ascoli, Macerata, Chieti, Potenza and Lucca.

Transition waters, which comprise the final sections of rivers and coastal ponds, lagoons and lakes, whose waters are influenced by the coastal seawater, are highly variable ecosystems with a large degree of biodiversity. The state of the largest European lagoon, the Venezia Lagoon, although highly deteriorated and heavily affected by urban and industrial pressure, and despite the large-scale contribution of organic pollutants and metals from the surrounding catchment basin, nevertheless features a sufficient state of oxygenation without any significant conditions of anoxia.

In 2003, the Ecological State of Rivers (SECA) was confirmed fair, like in the previous three-year period: 7.8% of the sampling stations (concerning 186 rivers and a total of 618 sampling sites) ranked good (36%) or sufficient (42%), i.e. an ecological state corresponding to the interim (sufficient by 2008) or final (good by 2016) environmental objectives fixed under the current law.

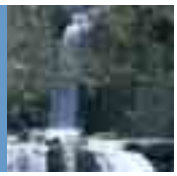
The Ecological State of Lakes (SEL) has been monitored in 11 regions and 99 lakes, totalling 109 monitoring sites. Among the monitored lakes, 78 ranked sufficient (environmental target for 2008), good (environmental target for 2016) or high (environmental objectives for 2016).

This overview shows the chemical quality conditions of ground-water, expressed by the SCAS factor, for 13 Italian regions,

3 more than the previous year's edition. Although the geographical coverage of the network has increased, the overall picture of the chemical state has not changed compared to 2000-2002. The general situation appears hardly satisfactory because, although 50% of cases feature good hydrochemical conditions, with a scarce or limited human impact, the other 50% of the cases show a considerable human impact and poor hydrochemical conditions, due to both widespread pollution and natural geological conditions. The principal pollutants in this case are nitrates, heavy metals such as manganese and iron, arsenic, cadmium, mercury, chrome, boron, chlorides and sulphates, pesticides and organic chlorinated compounds.

WATER RESOURCES AND SUSTAINABLE USES

The local availability of this precious resource depends on the natural water cycle, from rainfall to the rivers flowing in the drainage basins, evaporation and the distribution of water in the various types of (surface and underground) water bodies, according to the climate and weather conditions and the nature of the soil.
Only a part of the (theoretically available) water is actually renewable. The sustainable use of water requires that, in the long term, the harvested water must not exceed this renewable fraction.
River outflows, besides representing a key element for estimating the availability of water, are also a fundamental information for assessing the amount of pollutants rivers carry with them to the bodies of water they eventually flow into, such as lakes or the sea. This information is also necessary to ensure compliance with the statutory provisions under D.Lgs. 152/99 as subsequently amended and supplemented, and the framework Directive 2000/60/EC.
The discharge of rivers is measured by the former local offices of the *SIMN - Servizio Idrografico e Mareografico Nazionale* - whose functions have now been taken over by the regional governments, in accordance with the standards and procedures set out by SIMN in the publication "Technical guidelines for collecting and processing hydrometeorological data - Part II", consistently with the standards set out by the World Meteorological Organization (WMO).
Measuring the discharge of a river is a very complex activity, because it requires highly skilled personnel and the surveying of the cross-section of the river through which the flowing volume of water is to be measured. For this reason, when it is deemed that the cross-section (and, therefore, the related river hydrograph) will not undergo any significant changes, the operation is not carried out and the threshold level measurements are used instead. Geographical coverage is lower compared to last year because the transfer of the SIMN offices to the ARPA/Regions has required the reorganization of the data surveying and validation activities.



DISCHARGES
INDICATOR - A03.013

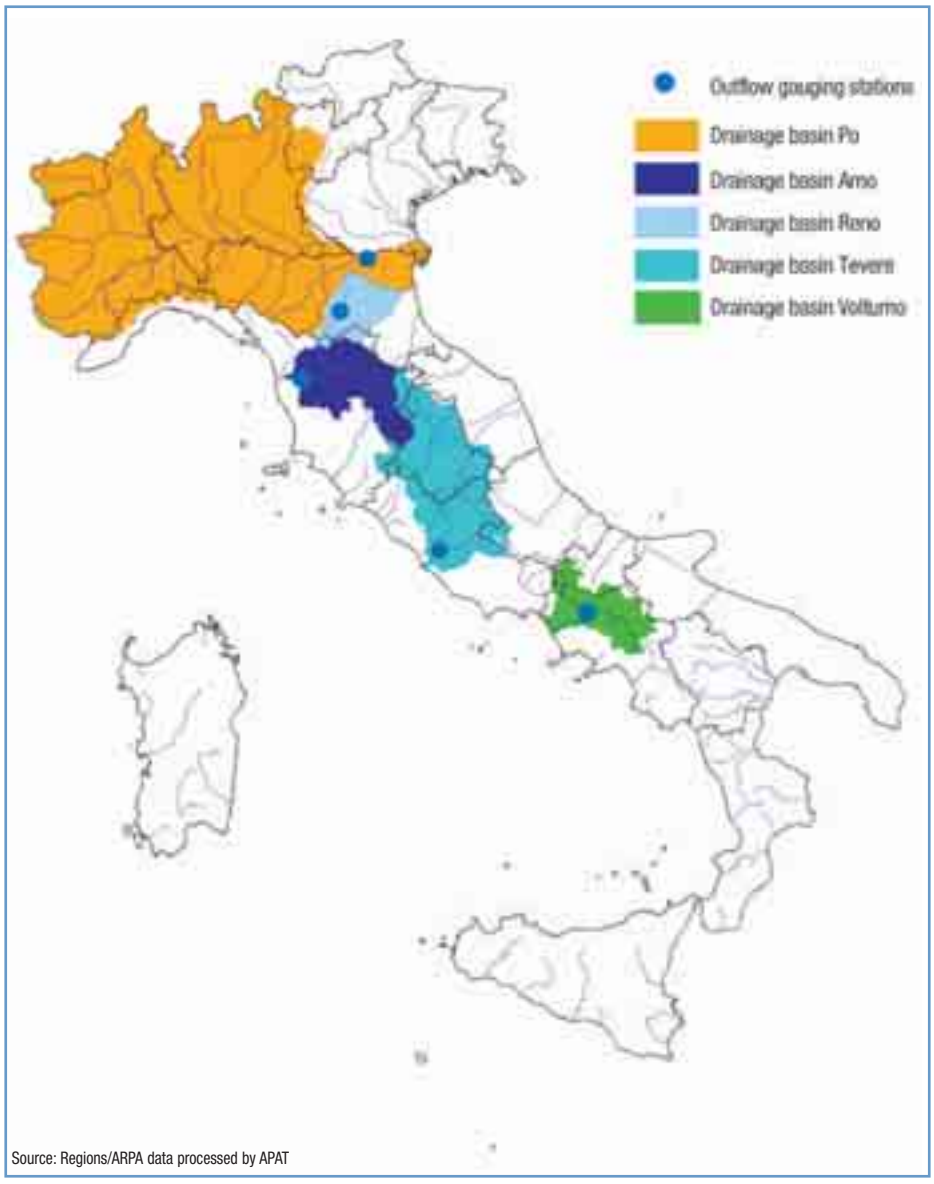
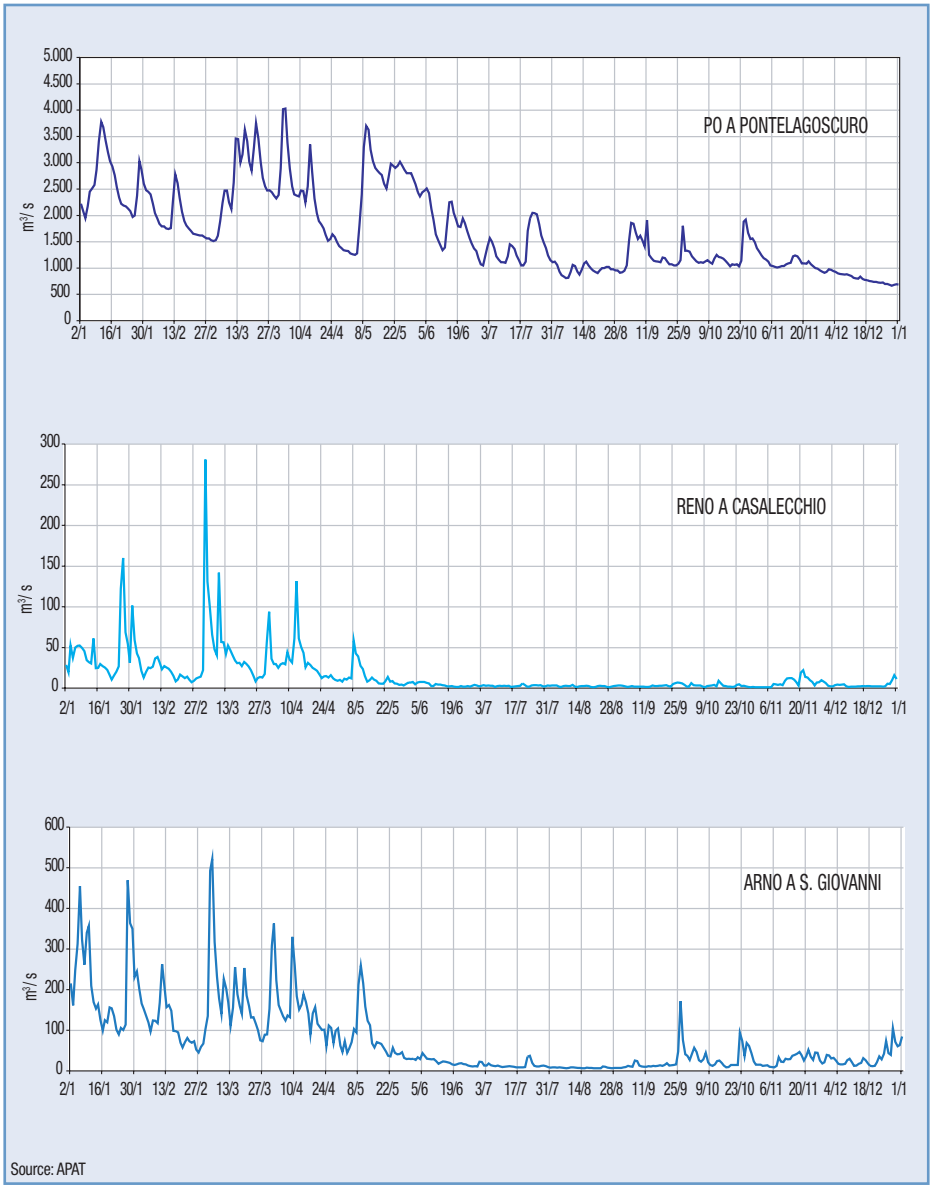
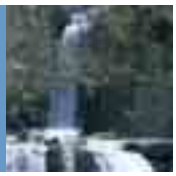


Figure 12.1: Gauging stations located at sites near the mouths of several important Italian rivers (2001)



Source: APAT

Figure 12.2: Daily outflows (m^3/sec) of several Italian rivers (2001)



This indicator measures the volume of water flowing through a cross-section of a river in a given time (a second). The regular gauging of the discharge of a river is of fundamental importance, because it allows:

- the assessment of the drainage basin's capacity to respond to a certain meteorological event, which is absolutely necessary for soil protection purposes;
- the determination of the amount of water available in the period, which is necessary to assess the hydrological balance of the river and define its quality parameters.

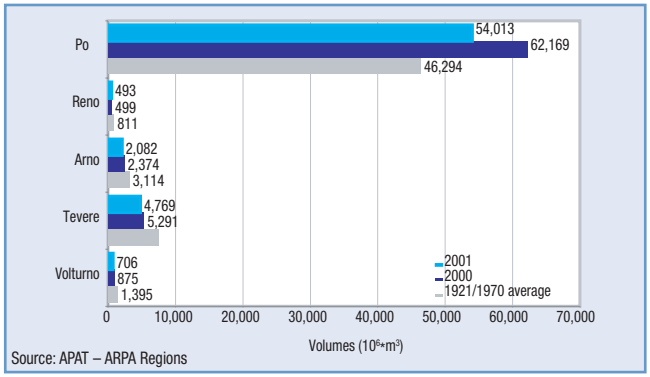


Figure 12.3: Annual flow volumes of several Italian rivers

The daily discharges are given in Part II of the Hydrological Yearbooks.

Figure 12.1 shows the location of the gauging stations, near the mouths of the most important Italian rivers, for which data is available for 2001. Figure 12.2 shows the daily discharge graphs for 2001 for several Italian rivers. Figure 12.3 compares the annual flow volumes for 2000 and 2001 with the benchmark period (1921-1970). The volumes for 2001 are lower than those for 2000. For a more significant comparison with the benchmark period, it would be expedient to take account of the human activities affecting the water regime, such as water harvesting, channelling, damming, which have considerably changed in recent years. If these effects are subtracted from the dicharge figures it might be possible to obtain figures taking account of the climate and weather conditions alone.

WATER QUALITY

Quality of coastal seawater and transition water

The importance of coastal seawaters for Italia is the direct consequence of its geographical position: an 8,000 km long coastline, which is densely inhabited and concerned by economic (industrial plants and transport infrastructures) and socio-cultural (tourism) activities. The coastal seawaters, and the transition waters, are the principal interface between the pressure factors located along the coastline, or just inland from the coast, and the great oceans, into which the rivers and the sea currents eventually discharge their contents and display their effects. Moreover, it is in this narrow belt of seawater that the most complex marine systems develop (Posidonia prairies, coral reefs, etc.) and where fundamental stages of the processes that regulate ocean life take place (reproduction areas, upflow of deep underground waters, etc.), and which feature the highest levels of biodiversity and environmental variety; all these factors make these waters particularly interesting and sensitive to change. The Environmental Data Yearbook presents the following three indicators for coastline seawaters: *the marine trophic index (TRIX)*, *bathing quality standards,* and *the Index of Bacteriological Quality (IQB)*, and, with regard to transition waters, an analysis of the state of the Venice Lagoon. Lastly, the indicator *waters capable of sustaining shellfish life* concerns both types of water habitats.

MARINE TROPHIC INDEX (TRIX)

INDICATOR - A03.001

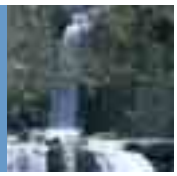
Source: Si.Di.Mar. Ministry of the Environment data processed by APAT

Figure 12.4: TRIX, average annual quality ranking of coastal seawater (June 2002 - June 2003), within a 500 m range from the shore

The trophic state of the coastal seawater (i.e. the quantity of biomass, phytoplankton and nutrients) is represented by the TRIX index (figure 12.4).

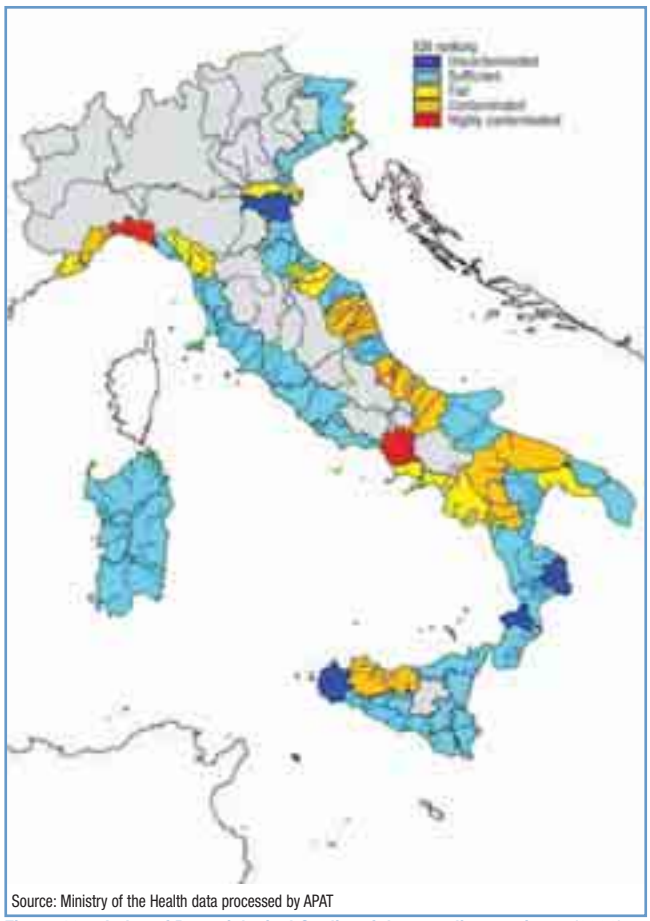
The figures, surveyed along the entire Italian coastline, from Imperia to Trieste, concern the following seas: Ligurian, Tyrrhenian, Ionian, Adriatic and the two seaboards of Sardegna. According to the trophic scale of coastal seawater, blue is excellent, light blue means good, yellow means fair and red means poor.

Examining the figures relating to the period between June 2002 and June 2003, it can be seen that 61% of the sampled sites are classed excellent, 32% good, 6% fair and only 1% poor. Emilia Romagna is the region featuring the highest trophic levels; with the exclusion of Cattolica, in fact, most of the sampling stations along the region's coastline feature a fair ranking, which becomes poor in the area of Goro. With regard to the Tyrrhenian coastline, the regions worst off are Campania and Lazio. In the former, the ranking is poor at the mouth of the Sarno river (province of Caserta) and poor in the area of Portici. In Lazio, the sites with poor grading are located at Fiumicino (province of Roma) and Minturno (province of Latina). In the case of the Ionian Sea and Sardinian coastline, all the sampling sites feature scarce trophic ranking and, therefore, a high environmental grading.



INDEX OF BACTERIOLOGICAL QUALITY (IQB)

INDICATOR - A03.002



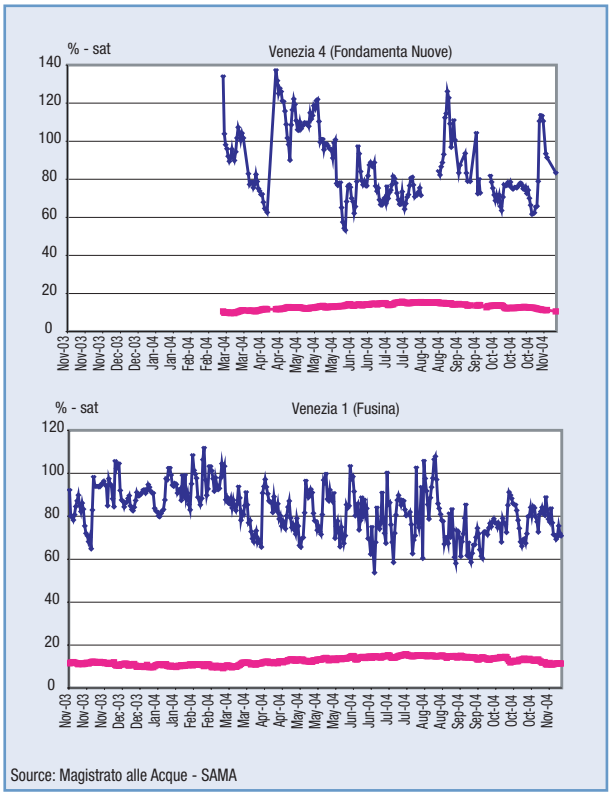
Source: Ministry of the Health data processed by APAT

Figure 12.5: Index of Bacteriological Quality of the coastline provinces (2002)

Microbiological parameters are responsible for almost 90% of cases of excess pollution of bathing waters (based on the statutory requirements set out in DPR 470/82). In particular, faecal coliforms, either alone or associated with faecal streptococcuses, are responsible for 82% of excess pollution and are, therefore, the privileged means of contamination. These micro-organisms are not normally present in seawater and have such characteristics (resistance, average life, origin), which gives them a precise meaning and different weight, according to the frequency with which they appear in the samples, their absolute quantities and their compliance with the statutory values.

Based on the analysis of the situation updated to 2002, the regions with the best quality seawater are Calabria, with 90% of grades in class 1 and none in class 4 or 5, Sardegna, Toscana and Emilia Romagna, with over 90% of grades in class 1 and 2 and few grades in the lower classes. Lower down still there are Veneto, Friuli Venezia Giulia, Lazio, Sicilia, Puglia and Marche, with over 85% of grades in classes 1 to 3, with a predominance of the higher classes. Lastly, the worst quality seawater was found in the regions of Liguria, Abruzzo, Molise and Campania, with a third of grades in classes 4 (contaminated) and 5 (highly contaminated). In particular, Campania features the most polluted coastline (the highest number of class 5 sites), and alone accounts for half the national total and one fifth of its coasts (concentrated in the area between the coastline of the province of Caserta and the gulf of Napoli). These areas feature a persistent state of deterioration in the course of the years, with a slight improvement of 2002. The same situation applies to provinces with large residential and industrial areas and/or ports, such as Genova, Bari, Pescara, Palermo, or in areas that are less developed, but which nevertheless feature shortcomings, with regard to the management of certain water treatment facilities, such as water treatment plants, sewage works, etc. (Ascoli, Macerata, Chieti and, to a lesser extent, Potenza and Lucca).

NUMBER OF DAYS OF ANOXIA IN TRANSITION WATERS



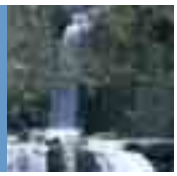
Source: Magistrato alle Acque - SAMA

Figure 12.6: Average daily values of oxygen dissolved in the water of the Venezia Lagoon (% of saturation) – (Nov 2003 - Oct 2004)

This indicator gives the number of days of anoxia per year, i.e. the situation in which the concentration of oxygen dissolved in the deeper waters is between 0-1 mg/l, concerning over 30% of the surface of a body of transition water. Under current law it is considered an indicator for classifying the quality of lagoon water and coastal lakes. This year's edition of the Yearbook does not feature the index of anoxia because of the lack of a significant set of data, however, due to the importance of bodies of transition water in Italia, the case of the Venezia Lagoon is nevertheless presented. The water oxygenation data, surveyed by the automatic stations under the control of the Magistrato alle Acque Authority, highlight how no conditions of anoxia occurred in the period concerned (Nov 2003 - Oct 2004). These results are confirmed by the annual averages surveyed on a monthly basis, in the same period, by the 48 monitoring stations scattered throughout the Lagoon, which show a good degree of oxygenation of the water, even in the areas most heavily polluted by human activities.

Quality of inland surface and underground waters

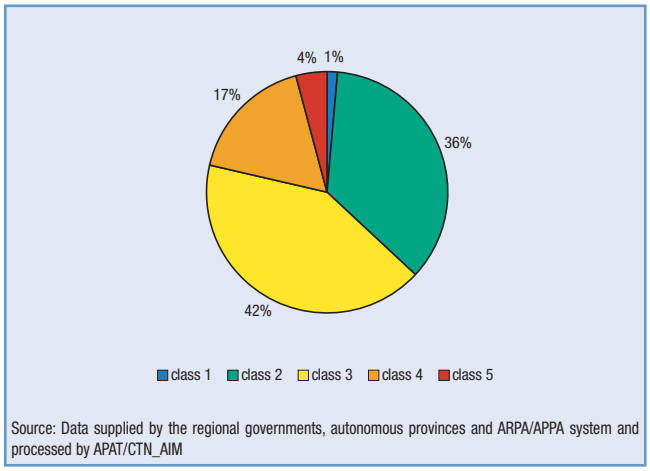
The quality of a body of water may be assessed based on a large number of specific indexes for the various categories taken into account: rivers, lakes and ground-water. The Yearbook features ratings based on the use of the water (*water supporting fish life*), as well as integrated indexes for waterways and lakes. With regard to the former, the indexes concern the *Level of Pollution by Macro-descriptors* (LIM), due to man-made pollution, to the biological state with the *Extended Biotic Index (IBE)* of the bentonic macro-invertebrates and the *Ecological State of Rivers* (SECA), besides indexes relating to Macro-descriptors and loads. In the case of lakes, the *Ecological State of Lakes (SEL)* is taken into consideration, while the *Chemical State of Underground Waters* (CSUW) applies to underground waters.



Ground-water are the principal source of water for human consumption, because 80% of all drinking water comes from aquifers, which are also an important source of groundwater for irrigation.
The overall environmental condition of ground-water is represented by the quantitative state, which measures the variance of this body of water from its recharge balance, and the chemical state, which is defined by the *Chemical State of Underground Waters* (SCAS), which takes account of both the presence of any natural pollutants (depending on the geological characteristics of the soil) and any pollutants produced by human activities (civil, industrial, agricultural).
This summary features the SECA, SEL and SCAS indicators.

ECOLOGICAL STATE OF RIVERS (ESR)
INDICATOR - A03.007

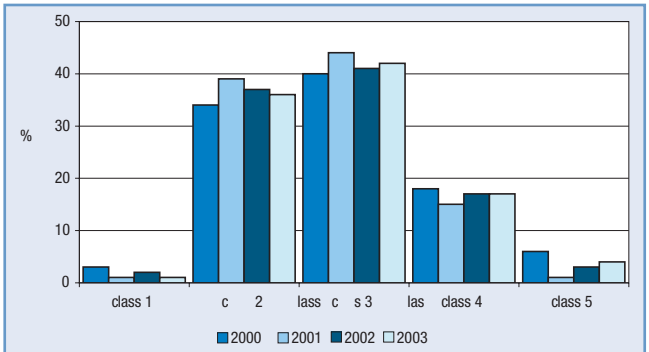
The Ecological State of Rivers (SECA) is determined by integrating the LIM (built on the parameters as follows: Dissolved Oxygen, BOD_5, COD, NH_4, NO_3, total Phosphorus, Inorganic Phosphate, Escherichia coli), with the IBE. The SECA ratings comprise five decreasing quality classes: class 1 = high, class 2 = good, class 3 = sufficient, class 4 = poor and class 5 = bad.
The statutory environmental target (D.Lgs. 152/99) for rivers and waterways is the achievement, by 2016, of a "good" rating, with a corresponding Level 2 LPM and class 2 (good) for EBI and ESR.



Source: Data supplied by the regional governments, autonomous provinces and ARPA/APPA system and processed by APAT/CTN_AIM

Figure 12.7: Percentage distribution of the quality classes of the ESR index (2003)

The monitoring sites on which the SECA was calculated in 2003 are 618 scattered throughout the country. The distribution by quality class indicates a general non-critical situation. The 2000-2003 trend features limited differences within each quality class. For the entire period concerned, in fact, there is a predominance of class 3 ratings, followed by class 2.



Source: Data supplied by the regional governments, autonomous provinces and ARPA/APPA system and processed by APAT/CTN_AIM

Figure 12.8: Percentage distribution of the quality classes of the SECA index

In 2003, 78% of the sites are classed between insufficient and high. In particular, 36% of the monitored sites are of good quality and 42% sufficient (figure 12.7).

As previously observed, the IBE, which represents the biological quality of the water, at 35%, is the index that most affects the determination the SECA classes.

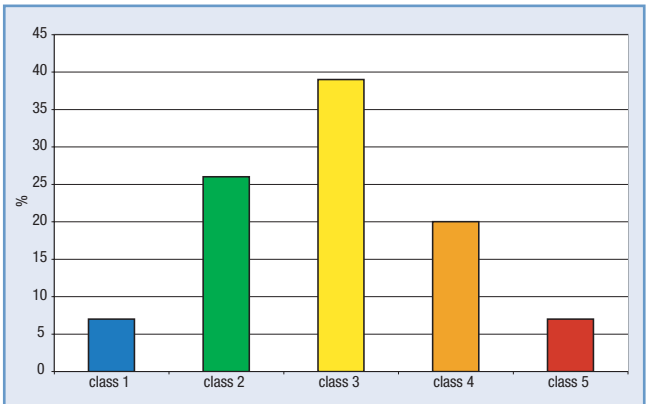
ECOLOGICAL STATE OF LAKES (SEL)

INDICATOR - A03.008

The SEL defines the ecological state of the lakes, based on the different trophic states.

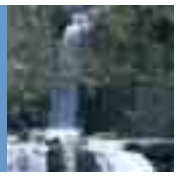
The SEL data, confirmed by those relating to the presence of special chemical pollutants, allow the assignment of the Environmental State of Lakes (SAL).

Considering a total of 109 stations concerned, representing 99 lakes (figure 12.9): 43 (39%) are ranked in class 3 (sufficient), 28 (26%) in class 2 (good), and 8 (7%) in class 1 (high). With regard to the SAL, the value of the supplementary parameters, available for 8 regions, has not determined the downgrading of the lakes concerned. The overall picture shows a rather good situation overall, because the sites ranking from sufficient to good account for 73% of all sites.



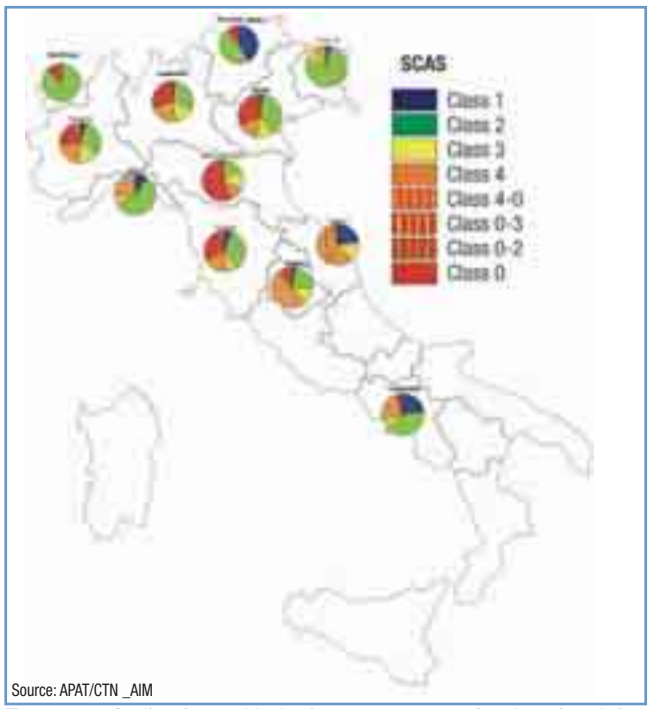
Source: Data supplied by the regional governments and ARPA/APPA system and processed by APAT/CTN_AIM

Figure 12.9: Distribution of the stations in the 5 ESL quality classes (2003)



CHEMICAL STATE OF UNDERGROUND WATERS (SCAS)

INDICATOR - A03.011



Source: APAT/CTN _AIM

Figure 12.10: Quality of ground-body of water, percentage of total monitored sites (2003)

The SCAS index highlights the areas featuring the highest quality-related criticalities. By indicating the degree of deterioration of the aquifers - for natural and human causes - the indicator allows the determination of the achievement of the targets set out in the applicable regulations: a good chemical and quantitative state by 2016. The SCAS index is based on the average concentrations of the basic parameters (electrical conductivity, chlorides, manganese, iron, nitrates, sulphates, ammonium), assessing which determine the worst conditions. The presence of dangerous pollutants in excess of the limit values set out in the regulations (schedule 1 to D.Lgs. 152/99: additional parameters) determines the downgrading to class 4 even in the case of pollution due to natural geological causes.

Figure 12.10 shows the gradual geographical extension of the monitoring programmes, which now cover 12 regions, compared to the 10 covered by the 2003 Yearbook. Major criticalities in the chemical quality of ground-water occur when nitrates exceed 50 mg/l (threshold for potable water), nitrates being the principal substances responsible for downgrading the water quality to class 4 in many of the regions concerned. Nitrates are highly soluble ions, hardly immobilized by the soil, which can easily penetrate into the ground and reach the underlying aquifers. The presence of nitrates in underground waters, and their increasing upward trend, is unquestionably worrying and affects all developed countries. Their presence is related to the most widespread forms of pollution, such as the use of nitrogenous fertilizers and the disposal of livestock breeding wastewater in excess of farming needs, bad sludge management and sewerage leaks, but also to punctual sources of pollution, such as urban and industrial wastewater effluents lacking denitrification treatments. Besides pollution by nitrates, some waters feature the excess presence of certain hazardous inorganic pollutants, such as Hg–Cr–pesticides–halogenated aliphatic compounds. The presence beyond the legal thresholds of certain parameters such as Arsenic, Iron, Manganese and Ammonia has been ascribed by various regions to natural causes, leading to a class 0 ranking. 50% of the sampling points features a chemical state that complies with the 2008/2016 targets. Another point that needs to be highlighted is the significant percentage of sampling points - 28% of the total - featuring low chemical quality for natural reasons.

The drop in the number of sampling points, from 3,141 in 2002 to 2,768 in 2003, is due to the overhauling of the regional monitoring networks (which, for example, dropped from 771 to 226 in Marche alone).

13. GEOSPHERE

INTRODUCTION

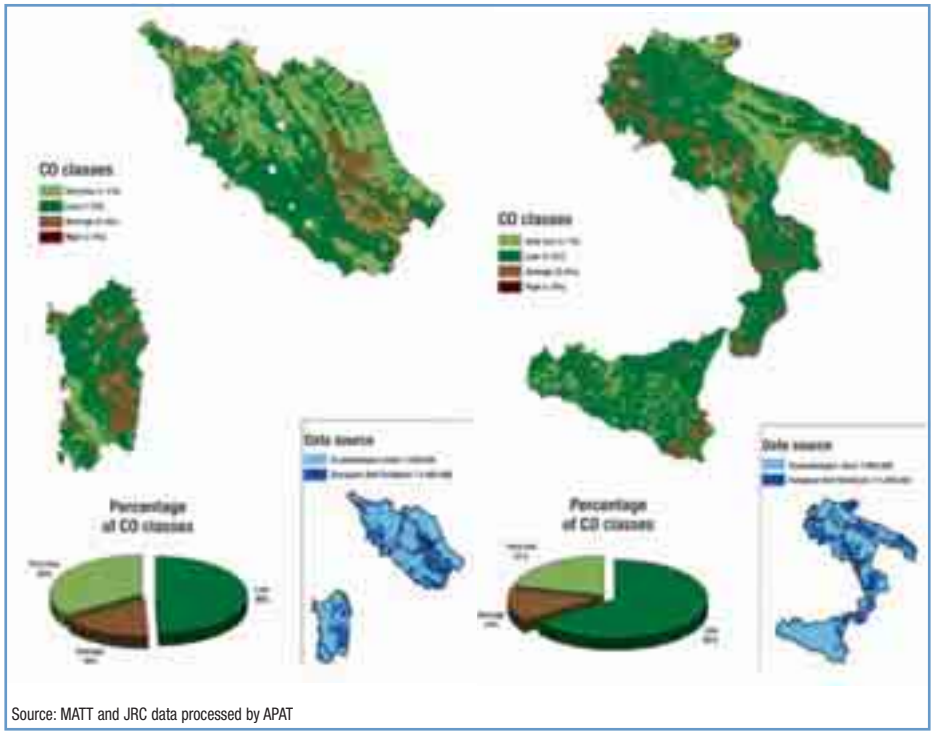
The geosphere is the solid surface of the Earth and consists of, (i) the soil, i.e. the uppermost layer of the Earth's crust formed by pedogenic processes, which makes life on Earth possible, (ii) the subsoil, i.e. the crustal strata of the Earth which lies immediately beneath the surface soil, up to a depth of several hundred to a thousand metres, where all primary resources are found, and (iii) the land, meaning the areas on which all human activities take place.
Determining the indicators relating to the subsoil and to land use is still in an initial stage, but those developed to date (with the exception of quarries) can rely on a great deal of information. The matter is entirely different with respect to the soil, for which the CTN_TES has long since identified all the useful indicators to illustrate current knowledge of the matrix, but which, in many cases, have been revealed to be non-customizable. Italia still features, in some cases, a significant shortage of useful data, and, in other cases, a wealth of information, especially at local level, although it is non-uniform and dispersed among the various competent organizations, almost all of which concerns the agricultural sector; this has hindered the development of nationwide indicators and prevented the building of a data collection framework capable of enabling the overall assessment of the environmental state of the resource. The close relationship between environment and agriculture is deemed inescapable, also in consideration of the recognition, at European level, of the fundamental environmental functions of soils, and in view of the future framework directive on the management, assessment and conservation of soils, based on COM (2002) 179, and on the following actions dedicated to the development of the *Soil Thematic Strategy*. Therefore, it appears necessary to improve the communication flow between the stakeholders possessing the information, exploiting the SINAnet network to the best, developing common and shared methodologies for harmonizing the existing data in line with the European guidelines (INSPIRE), developing synergetic projects aimed at filling the knowledge gaps and thus avoiding the useless duplication of data. A first step in this direction is the publication, within the year, of the "White paper on the state of the soil in Italia" by APAT, CTN_TES, Osservatorio Nazionale Pedologico, SISS, SIPE and regional pedological bodies.

QUALITY OF SOILS

The soil quality indicators, identified by the CTN_TES activities, are primarily state indicators representing the chemical, physical and pedological characteristics of the soil (pH, organic substances, texture, etc.), and are necessary to understand the processes occurring in soils and to provide reliable information on their environmental quality. Due to the lack of systematic nationwide monitoring, and to the non-uniformity and dispersion of the potentially available data at local level, with the consequent need to harmonize the information on soils based on a set of common benchmarks, it has been possible to provide a national overview only of the one relating to organic carbon.
Another set of indicators describes the levels of certain chemical elements, which can contaminate the soil and, through this, groundwater. These elements can build up in the soil also in consequence of farming activities, such as fertilization and anti-parasite treatments, or other human activities. Among these, the content of heavy metals in farmland can be given only for a limited number of regions, while interesting information on widespread contamination may be drawn from the econometric indicators, developed according to the ELBA model, on livestock breeding and related effluents and on the balance of soil nutrients, with the assessment of the surplus amounts of nitrogen and phosphorus, which can cause the contamination of surface and underground waters.

PERCENTAGE OF ORGANIC CARBON (CO) IN TOPSOIL LAYERS (30 CM)

INDICATOR - A04.018



Source: MATT and JRC data processed by APAT

Figure 13.1: Percentage of CO in the topsoil layers, in central and southern Italia (1988-2003)

Awaiting the use of available data at local level, after a data harmonization process, for which APAT and CTN_TES have already laid the foundations, a new indicator has been developed relating to the organic carbon content of topsoil which, although still rather approximate, nevertheless provides a sufficiently significant picture of the situation in Italia.

Organic carbon now accounts for about 60% of the total organic matter in soils, the reduction of which is considered a priority problem in COM (2002) 179, and it plays an essential positive role in many soil properties.

To ensure high soil efficiency, with respect to the supply of nutrients to plants and other important functions, the percentage of organic carbon in the first 30 cm of soil should be equal to 2%. Based on the adopted classification (very low: < 1%, low: 1-2%, average: 2-6%, high: >6%) the situation appears worrying: about 80% of Italian soils feature a CO content below 2%, while the “high” ranking class is practically absent in the country.

13. GEOSPHERE

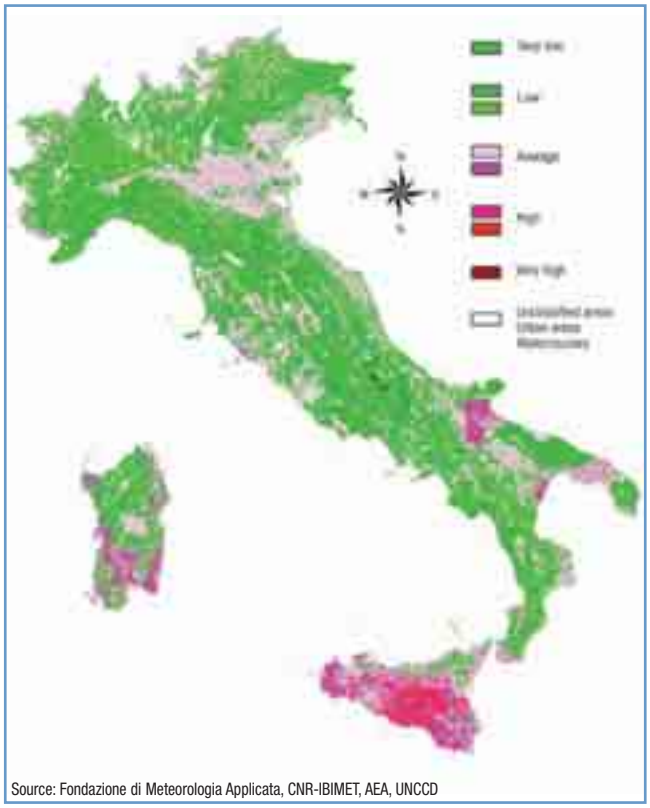
PHYSICAL AND BIOLOGICAL DEVELOPMENT OF SOILS

The various problems related to physical and biological degradation, affecting the soils of most densely inhabited areas (e.g., erosion, compaction, loss of organic matter, etc.), are a consequence of both, (i) the modernization of farming techniques, a fundamental process for improving crop yields but which is often unaccompanied by the application of basic soil conservation criteria, and (ii) town and country planning which, as a rule, is scarcely interested in taking these problems into account. The construction of the relevant indicators is largely hindered, on the one hand, by the serious shortage of analytical data, which allows either only a statistics-based modelling approach (e.g. compaction), or nothing at all (e.g. biological indicators), on the other hand, by the non-uniformity of the data available at local level, which, only after its sharing/harmonization would allow the representation, at an adequate level, of the real extent of the phenomena. An overview of the extent of this degradation is offered by the deliverables produced as part of projects relating to desertification.

DESERTIFICATION

INDICATOR - A04.003

The environmental sensitivity to desertification, or the ecosystems' degree of reactivity to the stresses produced by external agents (biological, geodynamic, climatic, human pressure, etc.), has been built by means of a methodology based on the processing of several environmental and socio-economic indices. The lack of a common methodology, at global and local level, hampers the assessment of the intensity and extension of desertification and, above all, does not allow for comparisons to be made. Among the tested methodologies, the most common one is called MEDALUS *(Mediterranean Desertification and Land Use)*, which identifies and classifies desertification sensitive areas as critical, fragile, potential and unaffected, through a combination of various parameters relating to four categories of indices (soil quality, climate, vegetation and land management).



Source: Fondazione di Meteorologia Applicata, CNR-IBIMET, AEA, UNCCD

Figure 13.2: National map of desertification sensitive areas (2004)

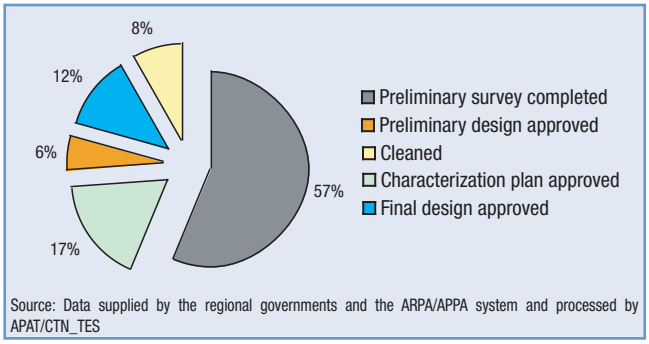
The map shown in figure 13.2, drawn as part of the international cooperation project called DISMed (Desertification Information System for the Mediterranean), is the first attempt made to apply a common methodology within the Mediterranean region, and highlights how sensitivity to desertification is taking on relatively alarming values in all the major farming areas in Italia, and especially in the South and in certain coastal areas. The problem has been investigated in greater depth in several regions (Toscana, Basilicata, Calabria and Sardegna), as part of the *Desertnet* project, based on the MEDALUS methodology modified according to the available data and adapted to the local situations, which has confirmed the high criticality of most of the areas of the regions.

CONTAMINATED SITES

Soil pollution due to point sources and, consequently, the presence of contaminated sites, represents a deterioration of soil quality such as to prevent the functions that the soil itself should carry out. Based on the applicable regulations, a contaminated site may be defined as an area found to be affected by the alteration of the natural characteristics of the soil/subsoil or ground-water by any type of pollutant, in excess of the threshold values (Schedule 1 to DM 471/99), as set out for each land use (residential, public/private greenland, commercial, industrial). The law itself provides for a system for collecting and updating the data on polluted sites, through the creation of "regional registers of contaminated sites", specifically envisaged by D.Lgs. 22/97 and by DM 471/99, subsequently enacted to implement the legislative decree. The state of implementation of these registers, however, is behind schedule, wherefore the currently available information allows the construction of indicators capable of only partially meeting the fact-finding requirements.

CONTAMINATED SITES
INDICATOR - A04.009

CONTAMINATED SITES OF NATIONAL INTEREST
INDICATOR - A04.010

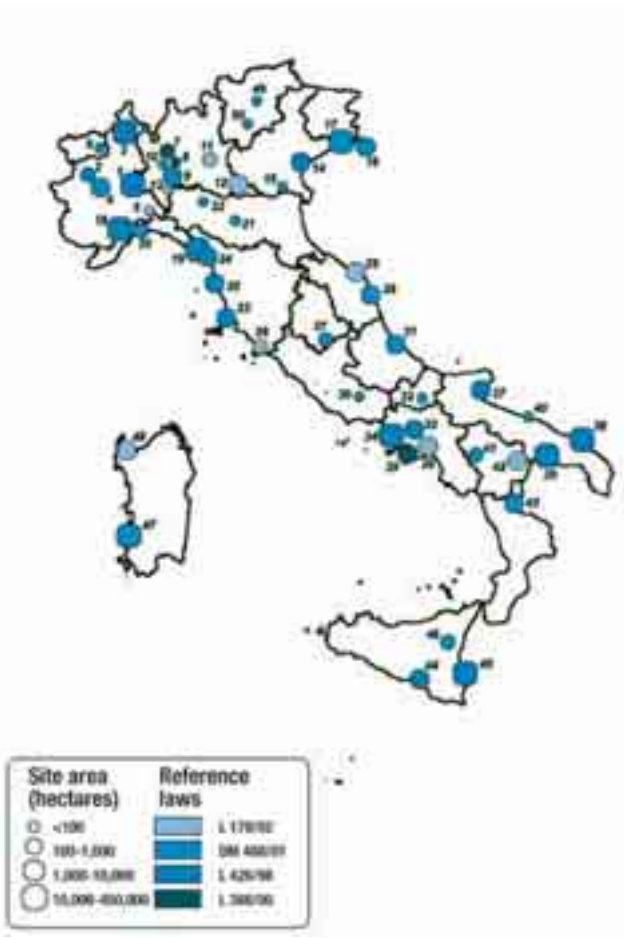


Source: Data supplied by the regional governments and the ARPA/APPA system and processed by APAT/CTN_TES

Figure 13.3: Sites entered in the regional registers – Breakdown based on progress of cleaning up operations (2004)

The regional registers envisaged by DM 471/99, although still in the commissioning phase, are already providing data on the number and characteristics of contaminated and cleaned sites. Important information on the matter also comes from the data on contaminated sites of national interest, included in the DM 468/01 (National programme for the cleaning up and environmental rehabilitation of polluted sites) and supplemented by Law 179/02 (Provisions on environmental matters).

Figure 13.3 shows about 4,600 sites that have already been entered, or may be entered, in the regional registers, and which are broken down according to the progress of the cleaning up operations; the data, relating to mid-2004, covers 16 regions. For most of the sites listed in the registers only preliminary information is available, although in a number of cases the characterization plan is under way. A third of the sites, however, are now being cleaned up, following the approval of at least one of the three documents envisaged by DM 471/99, namely, the characterization plan, the preliminary design and the final design. In 390 sites (8.5% of the total) the cleaning up process has been completed and the relevant provincial certificates issued. It must be noted, however, that in the case of another 750 sites, not taken into account in the figure, the cleaning up has been completed in recent years without a provincial certificate being issued, because the cleaning projects had been approved before the promulgation of the DM 471/99. To date, 50 contaminated sites of national interest have been identified (figure 13.4). Estimated costs (considering only the 41 sites listed in the DM 468/01) are 3,149.30 million euros, although the various laws passed to date provide for overall financial outlays (principal and interest) of only 547.34 million euros, equal to 17.4% of the total requirement.



Source: Data supplied by the Environment Ministry, regional governments and the ARPA/APPA system and processed by APAT/CTN_TES

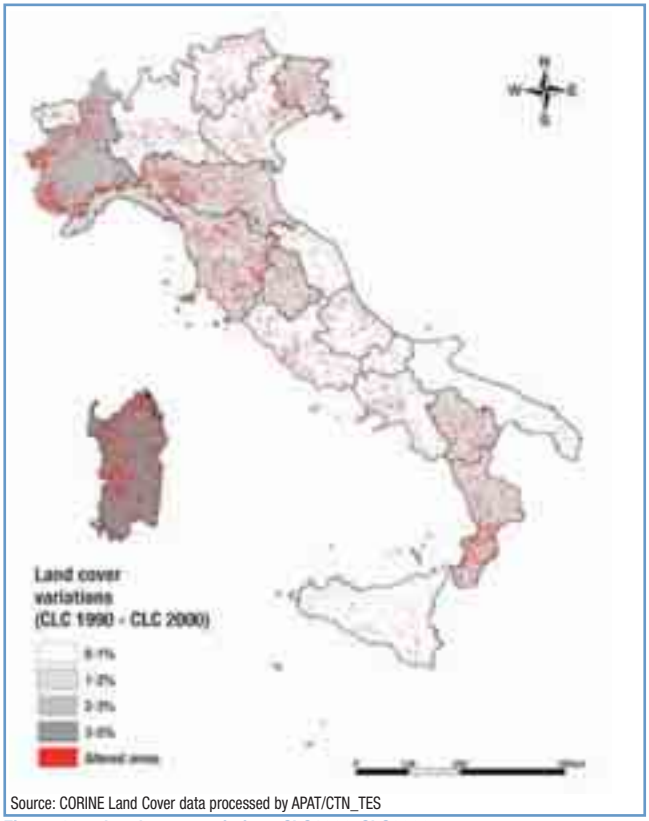
Figure 13.4: Location, dimensioning and law references relating to sites of national interest (2002)

LAND USE

This issue takes account of, analyzes and represents the data relating to land cover and use, and its trend over the years, attempting to integrate the basic local information with the information on production or services sectors. A number of indicators have been identified and the assessment of their actual customizability is still under way. Closely related to this issue are the indicators given in the chapters on "Anthropogenic risk", "Industrial risk", "Biosphere" and "Production sectors". The indicators, relating to the use of the soil and to the areas occupied by urbanization and infrastructures (sealing), describe the general use of the land, with a special focus on the forms of soil consumption characterized by irreversible, or hardly reversible, waterproofing. A second set of indicators concerns several activities with obvious environmental and land management impacts, such as category 1 mineral extraction sites (mines), sites used for extracting energy resources and water pumping sites.

LAND USE

INDICATOR - A04.015



Source: CORINE Land Cover data processed by APAT/CTN_TES

Figure 13.5: Land cover variations CLC1990-CLC2000

This indicator describes the quantity variations of various types of uniform areas (farmland, urban, industrial, infrastructures, recreational, natural and semi-natural, water bodies), at the survey scale used and according to the adopted methodology. With regard to the various types of areas taken into account, soil use variations can, for example, prove temporal trend in the economy based on crop changes, or the extension of industrialization processes or of areas set aside for infrastructures, etc.

This indicator has been built based on data drawn from the CORINE Land Cover project (CLC 1990 and CLC Change - CLC 2000, published in 2004). This data has made it possible to outline the trend in soil use, which, at national level, highlight the gradual shrinking of farmland areas (-1.6 %), a slight increase of forested or semi-natural areas (+1.0 %),

and an increase of waterproofed areas (+0.6 %), which, with regard to urbanization in coastal areas, is typical above all of Sardegna and Calabria. In Italia, like in the rest of Europe, farmland is shrinking, due to the two-pronged effect of crop abandonment and urbanization, with a gradual tendency towards crop specialization and the reduction of the areas occupied by traditional promiscuous arrangements, while forest areas and, above all, urban areas, confirm their trend to expansion, with an increase of the various use types.

14. WASTE

INTRODUCTION

Generally speaking, economic development, in the last ten years, has produced an increase of waste. Waste management, including waste collection and treatment, has become a new economic sector. At the same time, the principal environmental impacts related to waste production/management have increased, such as water pollution, soil contamination, air emissions and the possible risk for human health related to the production of dangerous dust and gases.

The waste produced between 1998 and 2001 in 18 Western European countries totalled about 2.5 billion tonnes, and 550 Mt were produced in the other countries that joined the EU in 2004. The main source of waste comes from agriculture and forestry, followed by the building construction sector, mines and quarries.

Between 1998 and 2001, Western Europe produced about 210 Mt of municipal waste, which means an average of 550 kg/per inhabitant per year. It has been calculated that, in the same period, the new member countries produced 60 Mt of waste per year, for an average of 358 kg/per inhabitant per year.

In 2000-2003, in Italia, there was a significant drop in the overall urban waste growth rates, after the considerable increases of the previous years. Compared to an annual growth rate of 2.4% in 1995-2000, it dropped to about 1.2% between 2000 and 2003.

The waste production figure, in 2003, of 524 kg/per inhabitant per year is practically the same as the previous year's (521 kg/per inhabitant per year). Italia, therefore, is still above the European average.

Between 1999 and 2003, separate waste collection systems increased by 74% in Italia; in the same period the overall production of urban waste rose by 5.9%.

In 2003, separate waste collection accounted for 21.5% of all urban waste produced; therefore, the target set by D.Lgs. 22/97 for 2001 had not yet been achieved at national level.

Having regard to municipal waste management, in 2003 the overall amount of municipal waste disposed of in landfills totalled 51.7%; at the same time, the mechanical and biological treatment of mixed waste, equal to 20.7%, increased, and the composting of selected fractions as well, reaching 7.6% of all managed waste. The percentage of incinerated waste, although slightly rising, has not yet achieved appreciable levels when compared with other EU countries (8.8% in 2003, compared to the UE15 average of 19% in 2001).

In 2001, at European level, about 54% of municipal waste was disposed of in landfills. Incineration with energy recovery concerned about 19% of waste; other forms of recovery, such as recycling and composting, concerned about 27% of all waste.

The situation, therefore, is extremely diversified in the different EU countries; in some Member State landfill disposal is still the most widely used option for municipal waste disposal, accounting for 80% or more; in others, this figure drops to below 20%. The difference relating to the biodegradable fraction of urban waste is even larger.

In some countries, the landfill disposal of municipal waste with heating power above a certain threshold is banned (Sweden); in Austria the landfill disposal of waste with a net calorific value (NCV) > 6,000 kJ/kg is forbidden, while in Germany, this prohibition will enter into force in 2005; in Italia it will become effective only from January 2007, but for waste with NCV > 13,000 kJ/kg.

This will entail a significant increase of the waste used for energy recovery purposes.

In Western Europe, about 47 Mt of hazardous waste were generated between 1997 and 2001. On average, in Europe, about 6 kilograms of hazardous waste are generated for every thousand euros of added value (*Eurostat, European Commission, Waste generated and treated in Europe, 2003 Edition*).

In recent years a great number of laws have been enacted, at European and national level, profoundly transforming waste management systems.

Worthy of mention is the long consultation work, which is still under way, between the EU institutions and the waste management stakeholders, with a view to defining a "Thematic strategy of waste prevention and recycling": Directive

14. WASTE

2004/12/EC of the European Parliament and of the Council amending Directive 94/62/EC on packaging and packaging waste; the amendment proposal of Directive 91/157/EEC batteries and accumulators containing certain dangerous substances; the amending of Regulation 259/93 on the supervision and control of shipments of waste within, into and out of the European Community; the draft directive relating to waste from extraction activities. Besides, the process for amending Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture, and the directive on the biological treatment of biodegradable waste, is under way, and this will complete the European reference framework on waste treatment facilities

The European Commission has also commenced a series of consultations, with experts and representatives of the member countries, on the implementation, in the waste sector, of Directive 96/61/EC concerning integrated pollution prevention and control (the so-called IPPC directive), aimed at assessing the possible extension of the field of application of this directive to all waste management facilities.

At national level, the framework regulation is D.Lgs. 22/97, which sets forth general provisions for the organization of the waste management system, the central, regional, provincial and local competencies, in connection therewith, the authorization and control/monitoring procedures. However, the legal framework on waste management is still a rather complex one; among the measures deemed most important for implementing the integrated management system are: D.Lgs. 36/2003 transposing the Directive 1999/31/EC on the landfill of waste into Italian law, and the Decree of 13 March 2003 relating to the criteria of admissibility of waste to landfills.

Another two important measures are D.Lgs. 209/03 and D.Lgs.182/03, transposing Directives 2000/53/EC on end-of-life vehicles, and 2000/59/EC on port reception facilities for ship-generated waste and cargo residues, into Italian law. Furthermore, D.Lgs. 287/2003 transposes Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market into Italian law.

Lastly, among the measures currently being approved are: D.Lgs. transposing Directive 2000/76/EC on the incineration of waste into Italian law, and the one relating to the two directives on waste electrical and electronic equipment (WEEE) and on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

The indicators shown in the Yearbook have been chosen based on their importance, possibility of customization, and representation according to time series.

The data given refers to municipal waste, special waste (meaning both hazardous and non-hazardous waste arising from economic activities), and to hazardous special waste alone.

TOTAL WASTE GENERATION AND BY GDP UNIT

INDICATOR - A05.001

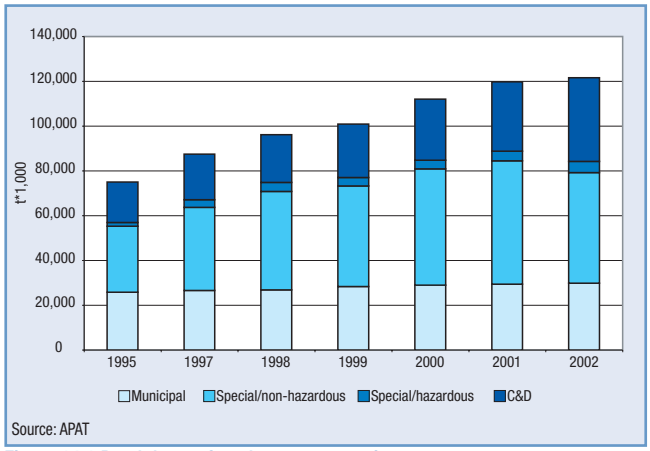


Figure 14.1 Breakdown of total waste generation

The total amount of waste generated in 2002 equalled about 122 Mt, including 54 Mt of special waste, 5 Mt of which was hazardous special waste, 29.8 Mt of municipal waste and 37.3 Mt of construction and demolition (C&D) waste. Examining the data, broken down by type of waste, it can be seen that, between 2000 and 2002 there was a drop in the overall growth rate of municipal waste production (average annual rate of +1.6%, compared to +2.4% in 1995-2000), a 10.4% increase of the total production of special waste (including C&D), a drop in non-hazardous special waste of 4.9% and a considerable increase of hazardous special waste (+28%). Of considerable importance is the drop of non-hazardous special waste in 2001-2002; this drop, however, was only apparent, because it was due to a more accurate analysis of the MUD data.

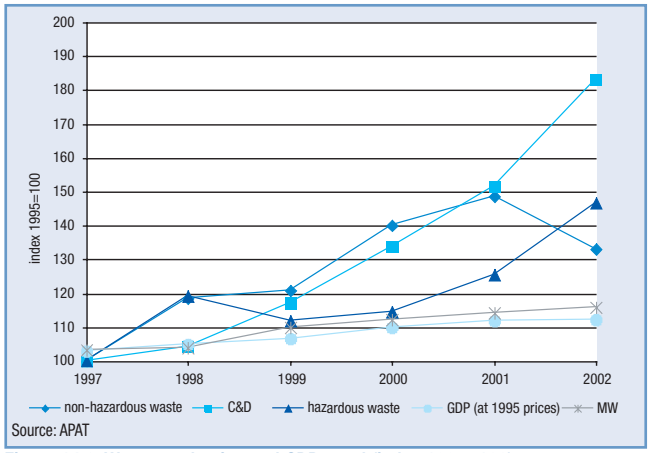


Figure 14.2: Waste production and GDP trend (index 1995=100)

Between 2000 and 2003, the GDP and household consumption rates rose by about 2.4% and 1.8%, respectively, against a growth of municipal waste of 3.8%.

With regard to hazardous special waste, production is closely related to economic growth until 2001. In 2002, the entry into force of the new list of wastes required the (re)classification of a large number of waste types according to their content of hazardous substances (specular items), thus broadening the range of hazardous-classified waste.

This entailed a 16.6% increase of hazardous special waste, compared to 2001, compared to a GDP growth, in the same period, of just 0.4%.

For the other types of special waste, including C&D, the rate of growth was consistently higher than the GDP in 1997-2002.

14. WASTE

In 2002, C&D featured a higher growth compared to 2001; the growth rate, in this case, appears to be unrelated to the GDP, because of the enormous difference (GDP +0.4%, C&D waste +17.1%); however, it can be related to the economic parameter represented by added value to the base prices, at 1995, in the building construction sector.

MUNICIPAL WASTE FROM SEPARATE COLLECTION

INDICATOR - A05.005

Between 1999 and 2003, separately collected waste rose, at national level, by 2.7 Mt, from 3.7 to 6.4 Mt (up 74%); in the same period there was an overall growth of municipal waste by almost 1.7 Mt (5.9%).
In 2002, waste from separate collection accounted for 19.2% of total municipal waste produced, up by 2.3% in 2003, to 21.5%. Therefore, the target set out in D.Lgs. 22/97 for 2001 has not yet been achieved in Italia.

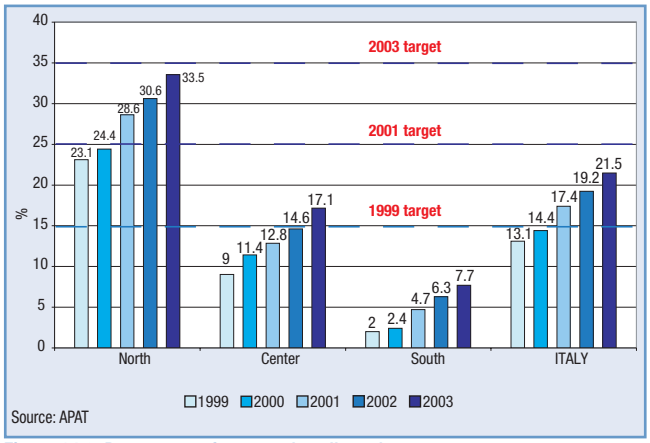


Figure 14.3: Percentage of separately collected waste

With regard to the three macro-areas in which the country is divided, the Centre, with a percentage of 14.6% in 2002 and 17.1% in 2003, for waste from separate collection, has achieved with a delay of 4 years the target of 15%, set by statute in 1999, while the North, which had achieved the 25% target in 2001, rose to 30.6% and 33.5% in 2002 and 2003, respectively; therefore, the 35% target set out in D.Lgs. 22/97 for 2003 has been almost but not quite achieved.
The separate collection rates in the South are decidedly lower, albeit constantly rising: 6.3% in 2002 and 7.7% in 2003.
In absolute terms, separate waste collection in 2003 totalled 4.6 Mt in the North, 1.1 Mt in the Centre, and slightly below 760,000 t in the South.

LANDFILL DISPOSAL, IN TOTAL AND BY TYPE OF WASTE

INDICATOR - A05.007

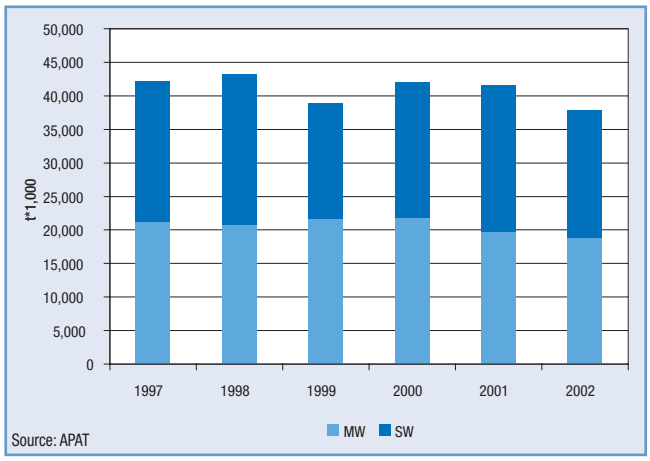


Figure 14.4: Waste disposed of in landfill by type

The examination of the data highlights that, in the period between 1997 and 2002, the tonnage of waste disposed of in landfill dropped by about 10%, from over 42 Mt to about 38 Mt, especially in the case of municipal waste (-11%). The percentage of municipal waste disposed in landfill accounted for 63% of all municipal waste in 2002, compared to 80% in 1997; this drop is partially due to the increase of separate waste collection and to the considerable amount of municipal waste disposed of by biological-mechanical treatment.

With regard to special waste, it must be stressed that landfill disposal, even though it is among the most widespread forms of disposal, is dropping year by year; in 2000, in fact, the tonnage of special waste disposed of in landfill - compared to the total - not including storage, was 30%, dropping to 28 and 27% in 2001 and 2002, respectively.

INCINERATION, IN TOTAL AND BY TYPE OF WASTE

INDICATOR - A05.009

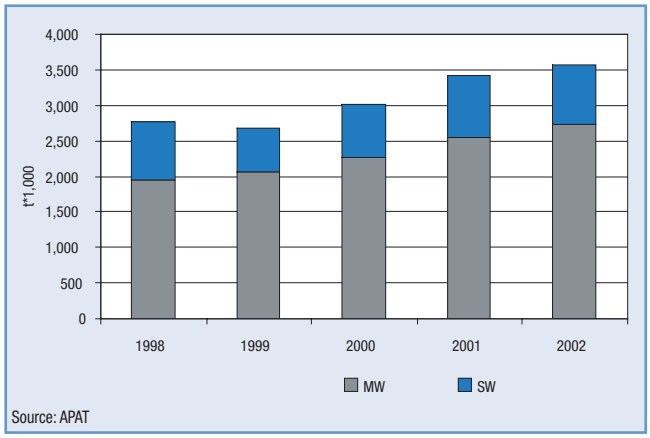


Figure 14.5: Incinerated waste by type

In 1998-2002, incineration of municipal waste increased by 40.3%. In the same period, there was a slight increase (about 3%) of non-hazardous special waste, while hazardous special waste dropped (-1%).

However, overall, the amount of incinerated waste is still a marginal percentage of managed waste.

The amounts given here are only of waste incinerated in dedicated facilities for municipal and special waste. Therefore,

they do not include waste treated in energy recovery or industrial plants, whose main purpose is the production of energy or goods, in which waste is used in the place of conventional fuels.
In 2002, about 3.6 Mt of waste were incinerated, of which 2.7 million of municipal waste and 843,000 of special waste.

PRODUCTION AND PLACING ON THE MARKET OF PACKAGING AND RECOVERY OF PACKAGING WASTE

INDICATOR - A05.011 - A05.012 - A05.013

Packaging recycling and recovery policies are taking on an ever increasing importance, due to the growing volume of packaging produced and placed on the market each year.
The European reference law on packaging and packaging waste is the Directive 94/62/EC.
The packaging waste management system, in line with the directive, must be based first and foremost on prevention, meaning the reduction of the quantity and of the harmfulness of the waste, and on recovery in all its forms, re-use, recycling, energy recovery, and, lastly, on disposal, which, having no function of further development of the resources and entailing a risk for the environment, must be the last option for any waste that cannot be otherwise recovered or treated.

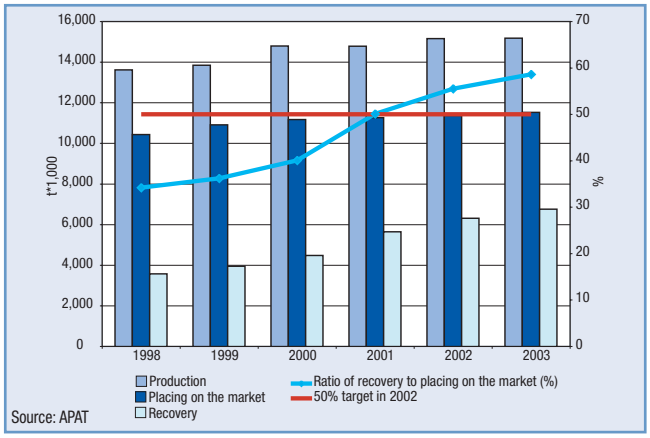


Figure 14.6: Quantity of packaging produced, placed on the market and recovered, and ratio of recovery to placing on the market (%)

The inspiring principles of the directive have been transposed into Italian law by D.Lgs. 22/97 (Section II), which identifies a series of targets to be achieved within a 5-year period, the end year being 2002, on which stock was taken of the packaging waste management policies.
The overall recovery targets for each type of material, set for 2002, have been achieved; so 2003 is a transition year, awaiting the transposition into Italian law of the Directive 2004/12/EC amending the Directive 94/62/EC, which sets the new targets for the next five-year period.
The new targets, to be achieved within 2008, are as follows: recycling for at least 55% and up to 80% in weight of packaging waste, and for the single materials the minimum recycling targets as follows: glass 60%, paper and cardboard 60%, metal 50%, plastic 23%, wood 15%.
Considerable progress has been made in the last few years, thanks to the awareness raising campaigns, voluntary agreements, agreements with the local authorities and the upgrading of the network of platforms for collecting packaging waste.
Between 2002 and 2003, the production of packaging was stable, with a growth rate of below 1% (from 15.157 to 15.178 Mt). Placing on the market also featured the same trend, with a percentage variation, in the same period, of just over one point.
The total amount of recovered packaging waste, in 2003, was about 6.7 Mt, corresponding to 58.6% of total packaging placed on the market, about 3 percentage points up compared to 2002. This figure is in line with the statutory requirements fixed for the next 5-year period, subject to the verification of the single materials.

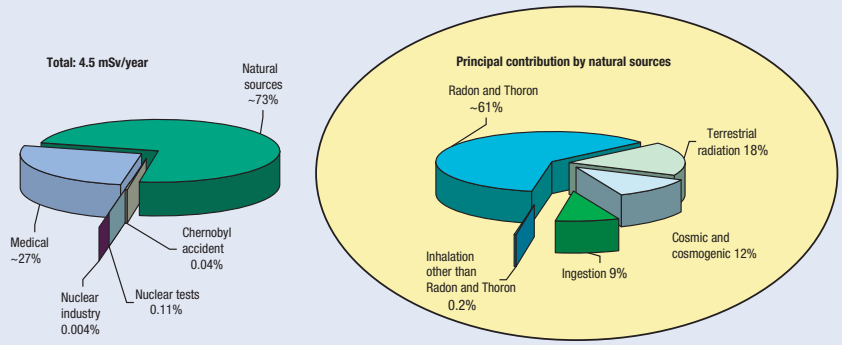
15. IONISING RADIATIONS

INTRODUCTION

Ionising radiations consist of particles and/or energy, capable of modifying the structure of the material with which they interact. In the case of biological tissues, such interaction may lead to cell damage. In most cases, this damage is repaired by the normal defence mechanisms of the organism, but in some cases, also according to the degree and period of exposure, the cells involved may undergo permanent damage with effects on the health of the people exposed. The likelihood of these effects is assessed by a specific magnitude, called "Effective dose", measured in Sievert (Sv), introduced to quantify the risk from exposure to ionising radiations. Certain effects, called "deterministic", are encountered above very high exposure thresholds, causing anatomic lesions and the loss of functionality of organs and tissues; other effects, due to more general exposure, have a "stochastic" occurrence, i.e. for the same dose received, the damage appears on a wholly casual basis from one individual to another. The stochastic effects are defined as "somatic" or "genetic", according to whether they occur in the exposed individual or in his or her descendants.
Besides the *annual average effective dose per person*, classified as an impact indicator, three other indicators are also given (two state indicators and a response indicator): *indoor radon activity concentrations*, as the main source of exposure to ionising radiation, *artificial radionuclide activity concentrations in the environment and foodstuffs*, relating to the presence of man-made radionuclides in the environment, and the *state of implementation of the monitoring networks on environmental radioactivity*, relating to the monitoring effectiveness of the national/regional/local networks.

ANNUAL AVERAGE EFFECTIVE DOSE PER PERSON

INDICATOR - A06.009



Source: APAT, ISS, CRR, ENEA, UNSCEAR, RC data processed by APAT

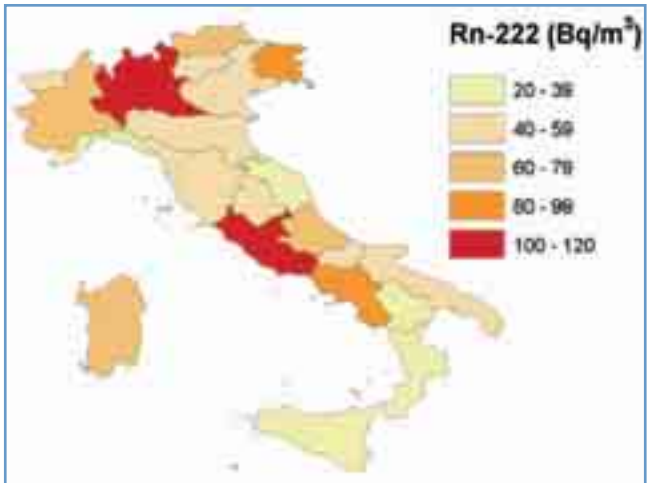
Figure 15.1: Distribution of contributions to the annual average effective dose per person

This indicator gives an approximate estimate of the impact of the principal sources of radiation on the Italian population. From figure 15.1, showing the estimated contributions to the effective dose, it emerges that 73% of the total is due to natural sources. The values shown refer to the averages for the entire population. Higher values, for individuals and groups of the population, may occur in relation to particular cases, for example, the presence of high concentrations of radon in dwellings or workplaces or exposure caused by natural materials in some particular work activities.

INDOOR RADON ACTIVITY CONCENTRATION

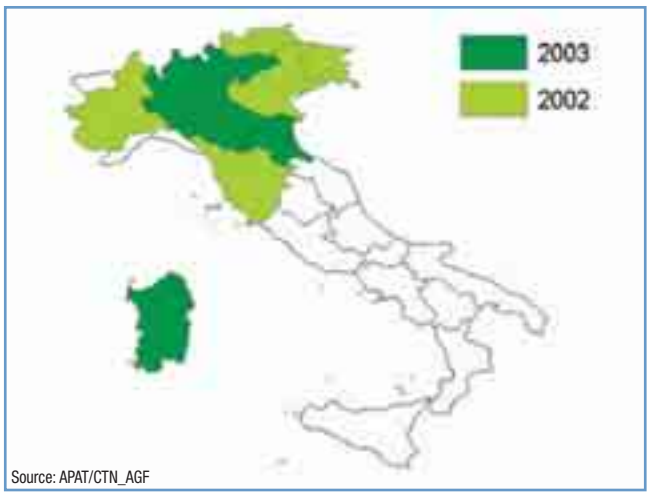
INDICATOR - A06.006

Radon is a natural radioactive gas that rises from the soil and accumulates in enclosed environments. It accounts for about 45% of the total effective dose. Radon exposure is associated with an increased risk of developing lung cancer. Figure 15.2 shows the results of a survey, conducted on a statistically representative sample, for determining the mean concentration of radon in dwellings (which are the environments where people spend most of their time) in all the Italian regions, while figure 15.3 highlights the regions where, until 2003, studies/actions were carried out to identify the high radon risk areas. European recommendation has fixed the indoor radon concentration reference values - defined as *action levels* - above which it is recommended to implement measures to reduce the associated risk. These thresholds are 400 Bq/m^3 for existing buildings and 200 Bq/m^3 for new buildings (as a design parameter). It has been estimated that, in Italia, there are about 800,000 homes with radon concentrations in excess of 200 Bq/m^3, and about 200,000 with concentrations above 400 Bq/m^3. In order to carry out a detailed assessment of the geographical distribution of radon, and to



Source: Bochicchio, F., et al.. *"Results of the national survey on radon indoors in the all the 21 italian regions"* Proceedings of Radon in the Living Environment Workshop, Atene, April 1999

Figure 15.2: Map of the activity concentrations of Rn222 in dwellings, by region and autonomous province (the choice of intervals is given only by way of example) (1989-1997)



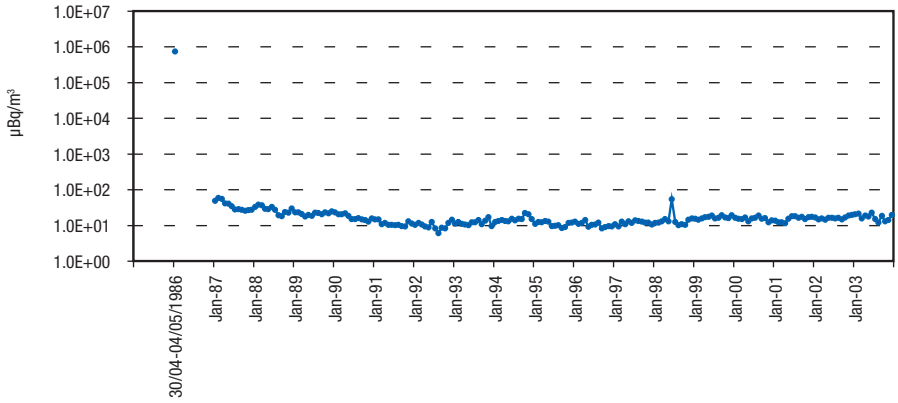
Source: APAT/CTN_AGF

Figure 15.3: Regions where studies/actions have been carried out to identify radon risk areas

rationalize resources for the implementation of remedial actions, it is necessary to map the country, i.e. to identify the areas with the highest likelihood of the presence of high radon concentration. The completion of this atlas is necessary to provide an effective response in terms of protection of the public, and it is acknowledged by D.Lgs. 230/95 as amended and supplemented, which provides that the map of the radon risk areas should be published by the Official Journal no later than 31 August 2005. With regard to the techniques for collecting and processing the relevant data, the most widespread method, applied internationally and for the surveys already carried out in several Italian regions (Veneto, Friuli Venezia Giulia, Toscana, Piemonte and the Autonomous Province of Bolzano), are indoor measurements, i.e. measurements made in enclosed environments, homes and schools above all. Survey campaigns are typically conducted by breaking down the geographical area concerned into a reference grid system and by also taking account of the geological features of the area.

ARTIFICIAL RADIONUCLIDE ACTIVITY CONCENTRATIONS IN THE ENVIRONMENT AND FOODSTUFFS (ATMOSPHERIC PARTICULATE MATTER, WET AND DRY AIRBORNE FALLOUT, MILK)

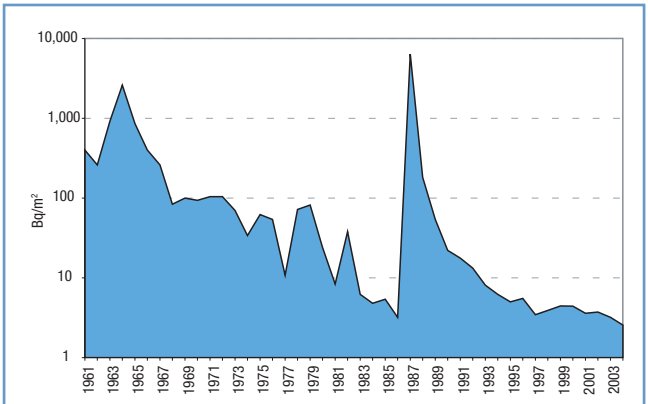
INDICATOR - A06.008



Source: Data processed by APAT and drawn from ENEA-DISP, *Rapporto annuale sulla Radioattività Ambientale in Italia, Reti Nazionali*, 1986-87, 1988, 1990; ANPA, *Rapporto annuale sulla Radioattività Ambientale in Italia*, 1991, 1992, 1994-97, 1998; APAT

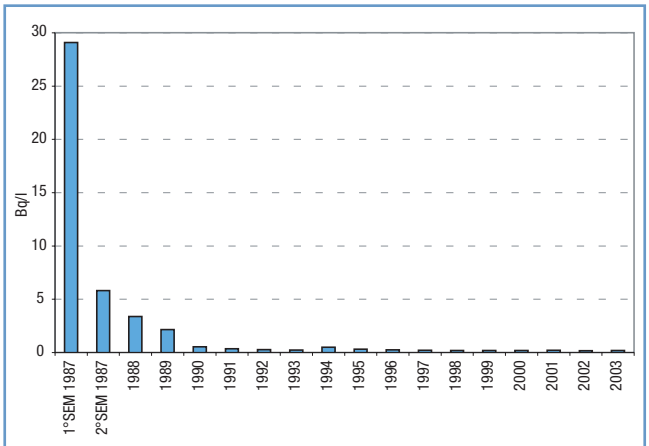
Figure 15.4: Monthly trend of activity concentrations in Italia of Cs-137 in atmospheric particulate matter

The assessment of the activity concentrations of artificial radionuclides in the environment and foodstuffs (in atmospheric particulate matter, airborne fallout materials and milk) makes it possible to control environmental contamination by radionuclides from diffuse sources of radioactive materials such as, for example, from nuclear fallout tests or accidents to nuclear facilities. The principal reference parameters are: the presence of artificial radionuclides in samples of atmospheric particulate matter corresponding to known volumes of air, wet and dry airborne fallout material and (fresh and pasteurized) cow's milk. Article 104 of D.Lgs. 230/95 as amended and supplemented, provides for the monitoring of environmental radioactivity by the national monitoring networks, among others. The European Recommendation 2000/473/Euratom of 8 June 2000 provides guidelines to the member States on the monitoring of environmental radioactivity. Most of the relevant data is collected by the ARPA/APPA facilities. At the end of 2002 a process was put into place with a view to reorganizing the



Source: ARPA/APRA data processed by CTN-AGF, collected by APAT in connection with the coordination of the National Monitoring Network. OECD-ENEA, 1987, The radiological impact of the Chernobyl accident in OECD countries, Parigi; APAT

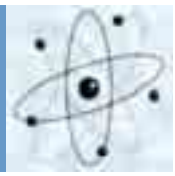
Figure 15.5: Annual trend of total fallout of Cs-137 in Italia



Source: ARPA/APRA data processed by CTN-AGF, collected by APAT in connection with the coordination of the National Monitoring Network

Figure 15.6: Trend of average national concentration of Cs-137 in cow's milk

entire radioactivity monitoring network, also due to its defective coverage of the country. Three time series are given by way of example. The first (figure 15.4) shows the trend in time (on a monthly basis) of the concentrations of Cs-137 in atmospheric particulate matter: the value for the first days of May 1986 refer to the arrival of the Chernobyl cloud in Italia, while the peak value for June 1998, higher in the North than elsewhere, is due to an accident that occurred in a Spanish foundry near Algeciras. The second (figura 15.5) gives the trend of the total fallout of Cs-137 in Italia from 1961: the peaks correspond to the nuclear tests carried out in the 60s and to the Chernobyl incident. The third (figure 15.6) shows the trend of the mean national concentration of Cs-137 in cow's milk from 1987.



IMPLEMENTATION OF THE ENVIRONMENTAL RADIOACTIVITY MONITORING NETWORKS

Table 15.1: State of the regional networks, examples of contributions to the national network (2004)

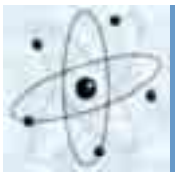
Region/Autonomous province	Regional network	Approved by Region/Autonomous province	Selection of data supplied to the national network		
			atmosferic particulate matter	wet and dry fallout	cow's milk
Piemonte	Yes	No	Yes	Yes	Yes
Valle d'Aosta	Yes	No	Yes	Yes	Yes
Lombardia	Yes	Yes (Dept. of Health)	Yes	Yes	Yes
Bolzano-Bozen	*Yes*	*No*	*No*	*Yes*	*Yes*
Trento	*No*	*No*	*Yes*	*Yes*	*Yes*
Veneto	Yes	Yes (Dept. of Health)	Yes	Yes	Yes
Friuli Venezia Giulia	Yes	Yes (Dept. of Health)	Yes	Yes	Yes
Liguria	Yes	Yes (Dept. of Health)	Yes	Yes	Yes
Emilia Romagna	Yes	Yes (Dept. of Health)	Yes	Yes	Yes
Toscana	Yes	Yes	No	Yes	Yes
Umbria	No	No	Yes	Yes	Yes
Marche	Yes (only food)	Yes (Dept. of Health)	No	No	Yes
Lazio	Yes	Yes (Dept. of Env.)	Yes	No	Yes
Abruzzo	Yes [a]	Yes	Yes	Yes	No
Molise	Yes	Yes (Dept. of Health)	No	No	No
Campania	Yes	No	No	No	Yes
Puglia	No	No	No	Yes	Yes
Basilicata	No	No	No	No	No
Calabria	No	No	No	No	Yes
Sicilia	Yes	Yes (Dept. of Health)	No	No	Yes
Sardegna	Yes	Yes (Dept. of Health)	Yes	Yes	Yes

Source: APAT/ARPA/APPA
[a] - The activity is managed by the Pescara ARPA and the Istituto Zooprofilattico of Teramo

This is a response indicator providing an overview of the monitoring by the national/regional/local networks. In ordinary operating conditions, the present organization, in fact, features a three-tier environmental monitoring/control system, in accordance with statutory requirements, based on:

- local networks, responsible for monitoring the immediate surroundings of the nuclear power plants and other significant facilities (potential) (*source related*);
- regional networks, responsible for monitoring and controlling general radioactivity levels at regional level (*source related/person related*);
- national networks, responsible for providing the general framework of the situation in Italia, for the purpose of assessing the population dose, regardless of the local situations (*person related*).

The indicator provides an assessment of the monitoring efficacy, *vis-à-vis* compliance with quality standards defined in relation to: monitored matrixes; sampling frequency; spatial density; monitoring sensitivity; participation inter-comparison exercises.



15. IONISING RADIATIONS

Table 15.2: State of implementation of environmental radioactivity monitoring

Facility	State of facility	Local network set up by facility operator	Local network set up by local authorities/ARPA
Garigliano Power Plant	undergoing deactivation and decommissioning, no fuel, conditioned waste	Yes	No
Latina Power Plant	undergoing deactivation and decommissioning, no fuel, partially conditioned waste	Yes	No
Trino Power Plant	undergoing deactivation and decommissioning, fuel present in piscina, partially conditioned waste	Yes	Yes
Caorso Power Plant	undergoing deactivation and decommissioning, fuel present in pool, partially conditioned waste	Yes	Yes
AGN 201 Reactor "Costanza" - University of Palermo	active, no waste	No	No
ITREC - C.R. Trisaia ENEA plant	loading under way, partially conditioned waste	Yes	No
ENEA Casaccia Plant:		Yes	No
TRIGA RC-1 reactor	active, waste deposited in NUCLECO		
RSV TAPIRO reactor	active, waste deposited in NUCLECO		
Plutonium Plant	no longer active, waste on the plant premises and deposited in NUCLECO		
RTS 1 – CISAM reactor	undergoing deactivation and decommissioning, no fuel, non-conditioned waste	-	No
Bosco Marengo NF plant	no longer active, fuel present, partially conditioned waste	Yes	Yes
EUREX - C.R.Saluggia ENEA plant	no longer active, fuel present, partially conditioned waste and non-conditioned liquid waste	Yes	Yes
TRIGA MARK II - LENA reactor University of Pavia	active, non-conditioned waste	Yes	No
ESSOR – CCR Ispra reactor	long-term cold shutdown, fuel present, partially conditioned waste	Yes	No
Avogadro – FIAT AVIO deposit	active, non-conditioned waste	Yes	Yes

Source: Plant operator and ARPA/APPA system data processed by APAT/CTN_AGF

Table 15.2 provides an overview of the state of implementation of environmental radioactivity monitoring (national and regional networks) in 2003. In particular, monitoring by the national networks is taken into account exclusively through the contributions of the various regions to the radiometric determinations of the set of indicators relating to atmospheric particulate matter, airborne fallout materials and milk. Table 15.1 shows the implementation of environmental radioactivity monitoring by the local networks, indicating whether a network has been set up by the facility operator and by the local authorities/ARPA/APPA.

16. NON-IONISING RADIATIONS

INTRODUCTION

Electromagnetic waves consist of a chain of electric and magnetic fields that are mutually generated and which propagate in space in the form of oscillations, regardless of the charges and currents generating them.
Non-ionizing Radiations (NIR) comprise ultraviolet radiations (UV), visible light, infrared radiations (IR or heat), radiofrequency waves (RF) and microwaves, *Extremely Low Frequency* fields (ELF), and static electric and magnetic fields.
In particular, this chapter further investigates the aspects related to telecommunications and broadcasting installations, primarily with respect to mobile telephones (Radio Base Stations - RBS) and radio and television (RTV) broadcasting, and the production, distribution and use of electrical energy.
The development of telecommunications systems, in particular mobile telephones, on the one hand, and the production, transport and use of electrical energy, on the other hand, constitute two of the distinctive traits of contemporary society. These technical innovations certainly entail significant improvements in the quality of life, but they are also often associated with environmental impact issues and health problems. Signal transmission and electricity distribution infrastructures, in fact, tend to modify the natural and urban landscape, and the biological effects of the long-term exposure to electromagnetic fields are still largely unknown.
Three indicators have been chosen here to provide an overview and representative picture of the specific environmental problems posed by "electromagnetic fields": the "*length in kilometres of electric power lines, broken down by voltage and number of transformer stations and primary power cabins, and by geographical area*" and the "*density of broadcasting and telecommunications facilities and sites and overall power throughout the country"*, which measure the main sources of pressure, and "*broadcasting and telecommunications sites found to exceed the statutory limits, and relevant remedial actions*", which measure non-compliance with statutory provisions and the response measures put into place by the competent authorities.
In the last year no significant changes were observed, with respect to the promulgation of regional and provincial measures implementing framework law 36/01 and control activities.

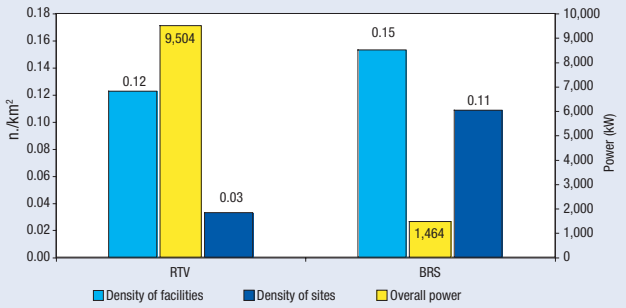
DENSITY OF BROADCASTING AND TELECOMMUNICATIONS FACILITIES AND SITES AND OVERALL POWER THROUGHOUT THE COUNTRY

INDICATOR - A07.001

LENGTH IN KILOMETRES OF POWER LINES, BROKEN DOWN BY VOLTAGE AND NUMBER OF TRANSFORMER STATIONS AND PRIMARY POWER CABINS, BY GEOGRAPHICAL AREA

INDICATOR - A07.002

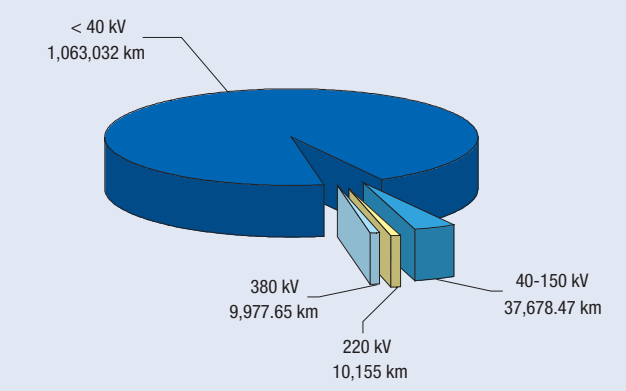
These two indicators measure the principle sources of non-ionizing radiations in the country. Figure 16.1 shows the density (number of facilities and sites per square km) and overall power (in kW) of radio and television (RTV) broadcasting facilities and of mobile phone radio base stations (RBS).



Source: Data supplied by APAT, ARPA/APPA (Osservatorio NIR), Vodafone S.p.A., TIM S.p.A., WIND Telecomunicazioni S.p.A., H3G S.p.A., ISTAT, and processed by APAT/CTN_AGF

Figure 16.1: Density of telecommunications and broadcasting facilities and sites and overall power throughout the country (2003)

Figure 16.2 gives the length of electrical power lines by voltage.

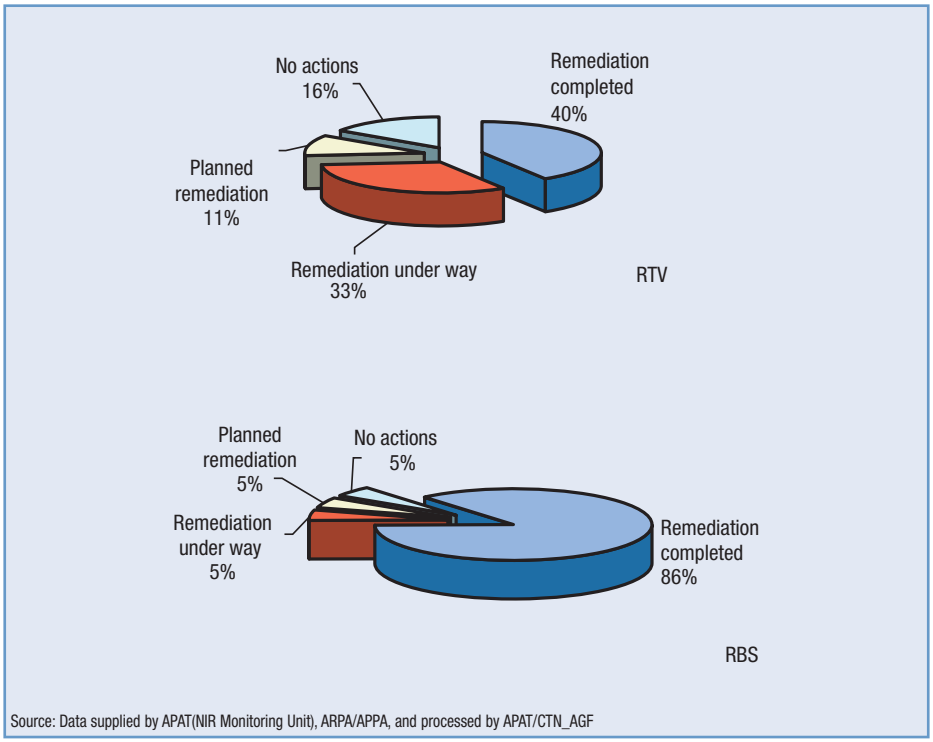


Source: Data supplied by ENEL Terna, ENEL Distribuzione, DEVAL S.p.A., and processed by APAT/CTN_AGF

Figure 16.2: Length of ENEL electric power lines, broken down by voltage (2003)

BROADCASTING AND TELECOMMUNICATIONS SITES FOUND TO EXCEED THE STATUTORY LIMITS, AND RELEVANT REMEDIAL ACTIONS

INDICATOR - A07.003



Source: Data supplied by APAT(NIR Monitoring Unit), ARPA/APPA, and processed by APAT/CTN_AGF

Figure 16.3: Progress of remedial actions in RTV and RBS sites found to exceed statutory limits at least once (2003)

The indicator relating to radiofrequency (RF) sources measures the remediation progress made, with respect to the on-site and field monitoring activities conducted by the ARPA/APPA system. It is interesting to note, in figure 16.3, that the remediation actions completed and under way differ for the two types of sources (RTV and RBS); this is due to the fact that, in the case of RTV facilities, the remediation process is technically more complex, because it concerns a larger number of facilities and often does not allow compliance with the service quality set out in the relevant licenses.

17. NOISE

INTRODUCTION

Noise pollution is defined by framework Law 447/95 as "*the introduction of unwanted sound both in the home and outdoors, such as to cause a nuisance or to disturb rest and human activities in general, representing a hazard to human health, and causing the deterioration of ecosystems, material goods, monuments, indoor and outdoor environments, or such as to interfere with the legitimate use and enjoyment of the environments themselves"*. It is one of the principal causes of impairment of the quality of life of the population, especially in urban areas, where the noise levels are often high due to the simultaneous presence of numerous sources, such as means of transport and business activities (in particular, bars and clubs), and noisy temporary activities, such as building sites, concerts, events, etc.

The framework law on noise pollution sets out the key principles for protecting indoor and outdoor environments from noise, defining the action lines with regard to prevention and remediation measures.

The following two indicators summarize the present state of noise pollution and the measures to be undertaken by the competent authorities.

The state indicator is *"monitored sources and percentage of those found to exceed the statutory limits at least once"*, which provides a quantitative and qualitative assessment of noise pollution, while the response indicator *"state of implementation of municipal noise zoning plans"* highlights the progress made in the application of statutory requirements, with respect to the local authorities' noise prevention and protection duties.

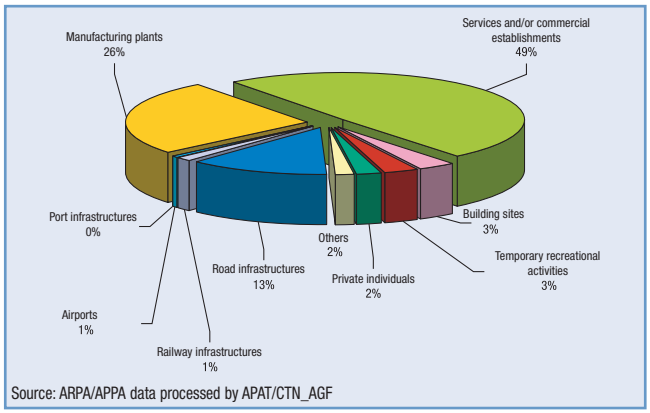
The local authorities are generally scarcely compliant with the provisions of the framework law, in particular with regard to noise zoning and the implementation of relevant remediation measures.

The currently available data on exposure to noise is still limited and hardly comparable, due to the different survey techniques and analysis methods employed, however, it is obvious that significant amounts of the population are exposed to high levels of noise pollution, in excess of the statutory limits - 65 dBA Leq during the daytime, 55 dBA Leq at night - and especially with regard to the latter limit.

MONITORED NOISE SOURCES AND PERCENTAGE OF THOSE FOUND TO EXCEED THE STATUTORY LIMITS AT LEAST ONCE

INDICATOR - A08.007

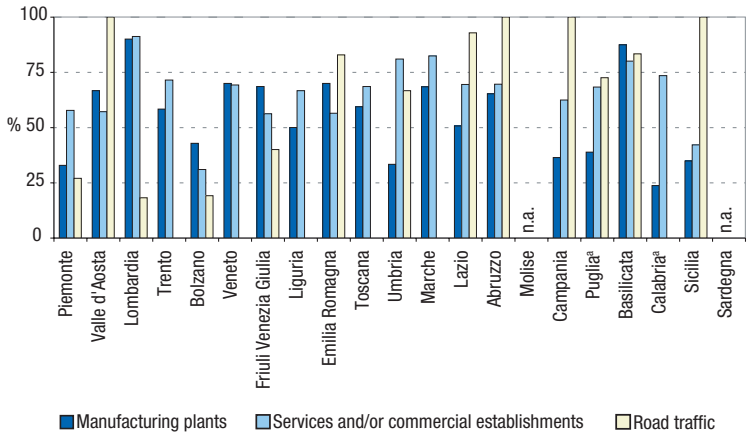
This indicator describes the indoor and outdoor monitoring activities, relating to compliance with the statutory limits (Law 447/95), normally conducted by the ARPA/APPA system agencies, by type of sources (manufacturing plants, services and/or commercial establishments, building sites, temporary recreational activities, road/rail infrastructures, etc.), and, in particular, it highlights any non-conformities with the percentage of monitored



Source: ARPA/APPA data processed by APAT/CTN_AGF

Figure 17.1: Distribution of monitored noise sources according to different activities/infrastructures - total number of monitored sources: 6,195 (2003)

sources found to be in excess of the statutory limits at least once. Figure 17.1 shows the percentage breakdown of the sources monitored in 2003 by type of activity/infrastructure: at the top of the ranking are manufacturing plants and services and/or commercial establishments, accounting together for 75% of the total (among the commercial establishments, bars and clubs prevail); road traffic accounts for 13% of monitored sources. It must be highlighted that, at 31.12.2002, the specific regulations referred to in Law 447/95 relating to road traffic noise (DPR 142/04) had not yet been issued. Further more, the monitoring activities are generally carried out following reports by members of the public: although vehicle traffic is the principal and most widespread source of noise in built-up areas, it is not the number one complaint in the reports made by the public to their local authorities.



Note:
[a] - data relating to only a part of the region
Road traffic noise: no monitoring was conducted in Molise, Marche, Liguria, Calabria and PA Trento; no information is available on excess values for Toscana and Veneto;
Manufacturing plants: no excess values were found in Molise;
Services and/or commercial establishments: no excess values were found in Molise;
Source: ARPA/APPA data processed by APAT/CTN_AGF

Figure 17.2: Percentage of monitored sources found to be in excess of the statutory limits at least once (2003)

Figure 17.2 shows the percentage of sources found to be in excess of the statutory limits at least once, by type of source (2003). In 2003, the controls, mostly carried out following reports by members of the public, highlighted a general problem of noise pollution for 61% of the monitored sources (found to be in excess of statutory limits at least once), thus confirming the results of the previous years' surveys.

17. NOISE

STATE OF IMPLEMENTATION OF THE MUNICIPAL NOISE ZONING PLANS

INDICATOR - A08.008

This indicator measures the number of local authorities that have approved noise zoning guidelines, compared to the total number of local authorities in each region/autonomous province. Law 447/95 requires local authorities to provide for the noise zoning of their municipalities (an obligation that had already been introduced by DPCM 01/03/91), consisting in the classification of each zone into which the municipal area has been uniformly divided, for the purposes of the abovementioned regulations, according to six noise classes, based on the predominant and actual land use of the zone concerned. The same regulations also require the regional governments to define the criteria for noise zoning purposes.

Figure 17.3 shows the percentage of local authorities that have complied with the noise zoning requirements, for each region/autonomous province.

Based on the collected information at national level, at 31/12/2003, the noise zoning requirements had been complied with by only about 17% of all local authorities for which the figures were available (for 19 of the 20 regions, 7,692 local authorities). This percentage, however, had risen from about 8% in 2000 and 12.5% in 2002.

Source: ARPA/APPA data processed by APAT/CTN_AGF

Figure 17.3: Percentage of local authorities that have approved noise zoning guidelines (at 31/12/2003), compared to the total number of local authorities in each region/autonomous province

18. NATURAL RISK

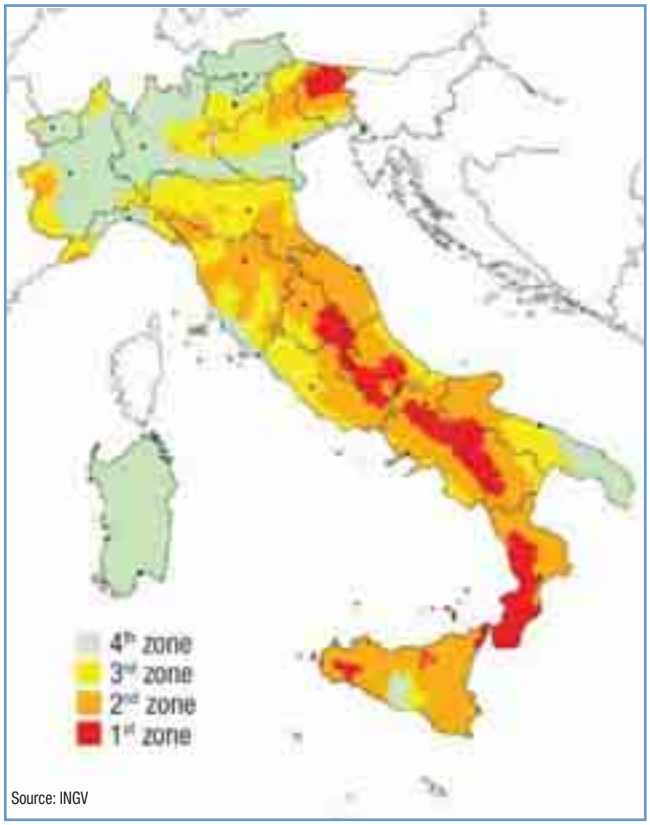
INTRODUCTION

The landscape is the result of the (often combined) action of endogenous and exogenous processes: the former are produced by the forces developing within the Earth, and comprise volcanic activity, earthquakes and tectonics, while the latter act on the Earth's surface and tend to level it out, modifying the landscape by means of erosion and sedimentation.
Most of these actions take place in the short term, causing natural catastrophic events that unleash enormous amounts of energy in the space of only a few seconds, days or weeks, such as earthquakes, vulcanic eruptions (which are the most spectacular of the endogenous processes) and other geological and hydrological events, such as floods, landslides and avalanches.
On the contrary, events like subsidence (which is generated by the natural or man-induced compaction of organic sediments), eustasy (a change in sea level caused by the climate), and the vertical movements of the Earth's crust (so-called isostatic movements), take place over much longer periods of time, which can hardly be described in terms of years.
All these geological, atmospheric, and hydrogeological activities can harm human beings and their activities, according to where they take place and to how serious and frequent they are, and together they make up the notion of "natural risk", meaning the likelihood of the occurrence of an event of given intensity, over a certain period of time (danger), and the degree of vulnerability to that event of the area concerned, which can be assessed in terms of the potential damage it can cause, such as the number of casualties, the destruction of infrastructure, damage to buildings, to the environment and to the cultural heritage.
Italia, because of its geodynamic position and high population density, is almost entirely concerned by natural risks. Specific indicators have been built to illustrate the salient characteristics of this situation; these indicators, however, although useful for descriptive purposes are not always able to accurately identify improvement or worsening trend, in environmental terms, because they are related to natural events and processes that are, generally speaking, beyond man's control (with the sole exception of man-induced subsidence).

18. NATURAL RISK

SEISMIC ZONING
INDICATOR - A11.003

This indicator is based on the classification of municipalities into 4 zones (1, 2, 3 and 4), characterized by a decreasing seismic hazard, with 4 corresponding classes of maximum acceleration of the ground with likelihood of occurrence of 10% in 50 years. In 2003, based on OPCM No. 3274 of 20 March 2003, new seismic zoning requirements were introduced, based on the integrations to the previous system of 1984 (Consiglio Superiore dei Lavori Pubblici, Servizio Sismico Nazionale, 1984), and the new proposals formulated in 1998 by the Working Group set up by the National Committee for Forecasting and Preventing Natural Disasters (National Earthquake Service, 1998). The new seismic map of the country, drawn by INGV and approved in April 2004, no longer features the "unclassified" class (provided for in the 1998 proposal) and the entire country has been considered subject to seismic hazard, albeit with considerable differences between the various zones.



Source: INGV

Figure 18.1: Seismic zoning map of Italia, based on the new zoning guidelines introduced in 2003, and approved in April 2004, as subsequently implemented by the regional authorities

FLOODS
INDICATOR - A11.005

Source: Data supplied by INPS and the regional governments of Friuli Venezia Giulia; Toscana; Puglia; Campania; Abruzzo; Calabria; Sicilia; and processed by APAT

Figure 18.2: Municipalities affected by flooding in 2003

This indicator measures the socio-economic effects of floods. It is based on processed data relating to the major floods that struck Italia between 1951 and 2003. The information was drawn from technical reports and/or stored data belonging to APAT, the ARPA agencies, central and local government bodies, various institutions and newspaper reports, and, for the period between 1951 and 2001, take account of the number of casualties and the amount of resources needed for environmental rehabilitation and/or risk mitigation purposes, while for the years between 2002 and 2003 - in which APAT began systematically monitoring events, includes data relating to rainfall, type of land degradation, number of persons involved and urgent measures introduced to face the event. The collection of historical data for assessing the indicator's trend concerned the period following World War II (1951-2003), due to the difficulty of finding sufficiently reliable data for earlier periods. In the period in question, about 50% of the floods examined caused more than 5 victims and about 10% more than 100; the considerable social impact of these events is, therefore, obvious. However, it must be highlighted that the effects of flooding are not related solely to the intensity of hydrometeorological events. The objective extent of the event, in fact, can be measured in terms of entirely natural factors (such as the length and intensity of rainfall, the discharge of rivers, etc.), although the effects of these events and the ensuing damage also depend on factors such as land use and management, and the existence and effectiveness of protection works. Of course, generally speaking, it can be said that the more infrastructures and buildings there are, the greater the damage produced by a natural event, regardless of its intensity. On the other hand, a greater focus on flood protection works, and on the implementation and improvement of monitoring and warning systems, means less casualties and reduced damage to infrastructure.

STATE OF IMPLEMENTATION OF THE LAND AND WATER IMPROVEMENT SCHEMES (PAI)

INDICATOR - A11.006

Table 18.1: Implementation of Land and Water Improvement Schemes (LWIS) (July 2004)

River basin authorities	No schemes yet under way	Draft schemes and/or planning under way	Adopted draft schemes	Adopted LWISs	Approved LWISs
	Number				
National		1	5		1
Inter-regional		3	5	2	3
Regional (and Autonomous provincial)		6	3		9

Source: Environment Ministry data processed by APAT

This indicator measures the state of implementation of the Land and Water Improvement Schemes (LWIS), under article 1 section 1 of DL 180/98, by the competent river basin authorities, in terms of the drafting, adoption and approval of draft schemes first, followed by the actual schemes.

The indicator refers to a highly significant environmental problem, in respect of which the demand for information has increased considerably in the last ten years. The data, published by the Ministry of the Environment, refers to information supplied by all the river basin authorities of national, inter-regional and regional importance, operating in a standard (spatial and temporal) benchmark framework.

The analysis of the data shown in table 18.1 highlights that a certain progress has been made in the adoption/approval of land and water improvement schemes, which testifies to a greater awareness of soil protection issues. Despite the trend obviously moving towards the achievement of the target, one cannot help pointing out the considerable delays in implementation compared to the provisions set out in the reference law.

PROGRESS OF THE HYDROGEOLOGICAL RISK MITIGATION PROJECTS FINANCED UNDER DL 180/98

INDICATOR - A11.007

Figure 18.3: National distribution of the urgent hydrogeological risk mitigation projects, implemented under DL 180/98 as amended and supplemented (March 2004)

This indicator is the result of the ongoing effort by APAT, since 2000, for monitoring the projects financed under DL 180/98, in all the regions of the country.

DL 180/98 introduced urgent soil protection measures (thus supplementing Law 183/89) aimed at mitigating hydrogeological risks. In particular, article 1 section 2 of the Decree provides for the definition of urgent programmes and projects for reducing the hydrogeological risk of particularly vulnerable areas, with a view to protecting persons and the environment in the face of dangerous events, with priority status assigned to areas concerned by the proclamation of a state of emergency. In this respect, APAT was appointed by the Environment Ministry to monitor the projects. The results of these monitoring activities have been presented in a special constantly updated database, which effectively processes the collected information.

The indicator meets the demand for information on soil protection issues and illustrates the measures put into place by the public authorities to contrast land and water deterioration. The aim is, (i) to report the progress of the urgent measures for mitigating hydrogeological risks, financed under DL 180/98 as amended and supplemented, and (ii) to show the use of the funds over the years, at national level. The indicator does not provide any information on the actual effectiveness of the funds earmarked for risk mitigation purposes, in the areas in which the projects are implemented.

Between January 1999 and March 2004, a total of 1,272 projects were financed, for a total outlay of 916 million euros, which are broken down as follows in the APAT database: 1998 projects; 1999-2000 projects; 1999-2000 project amendments and supplements; 1999-2000 supplementary projects; *programmi stralcio (I-VIII) ex art. 16 L 179/02*.

IFFI PROJECT: THE ITALIAN LANDSLIDES INVENTORY

INDICATOR - A11.009

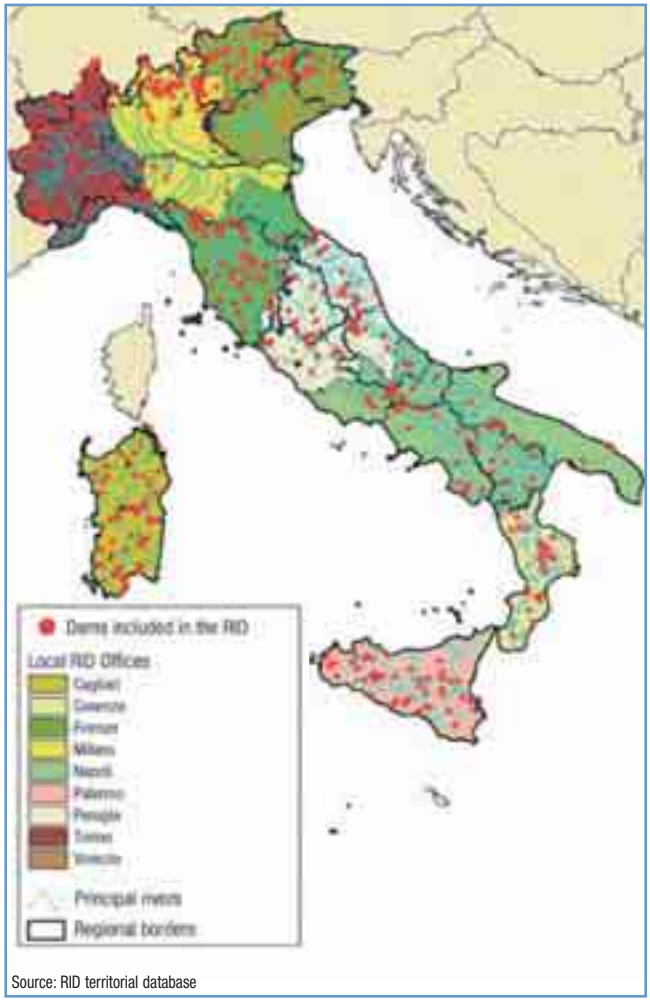
This indicator provides information on the number, type, density and knowledge of landslides in Italia. The Landslide Project provides for the identification and mapping of landslides, based on the data already available to the regional authorities, which may be supplemented and integrated for any areas featuring no or insufficient data. The database comprises both alphanumerical elements (landslide data sheets) and maps. The landslide data sheets feature a three-tier system of investigation, taking account of the differing degree of knowledge about each landslide. The first tier contains basic information and is mandatory for every landslide; the second tier goes into greater detail and is mandatory for landslides investigated in pursuance of DL 180/98; the third tier is optional and contains detailed information on the damage caused and the subsequent measures undertaken. Each landslide, georeferenced and mapped on a scale of 1:25.000, is represented by means of three fundamental levels of information: the "IFFI" (Landslide Project) level, comprising the Landslide Identification Point (PIFF), which represents the location of the highest point of the crown; the "FRANE" (Landslide) level, comprising the polygons of landslides with an area in excess of 10,000 m^2; and the "DIREZIONE" (Direction) level, which indicates the direction of the movement.

Source: APAT

Figure 18.4: Progress of the IFFI Project (July 2004)

The Landslide Project, which is nearing completion, has produced a database of landslides in Italia which is a true example of excellence among national environmental databases, because of its size (383,831 landslides), quality, data uniformity and geographical coverage. The data for the regions of Abruzzo, Basilicata and Sardegna have not yet been presented because the surveying operations are still under way.

RESERVOIRS
INDICATOR – A11.012



Source: RID territorial database

Figure 18.5: Dams included in the Italian Register of Dams (RID)

This indicator gives the number and location of the reservoirs in each region of Italia, with respect to the potential reservoir volume. The information also comprises, besides the survey of the large dams included in the Italian Register of Dams (RID), the hill and mountain reservoirs in respect of which the regional authorities are required to provide supplemental information. The aim is to build an updated database of reservoirs and their current operating condition, besides their geographical distribution, in relation to seismic zoning (under OPCM No. 3274 of 20 March 2003) and major flood hazards. At present, the indicator does not highlight the monitoring procedures applicable to reservoirs in the event of earthquakes or major floods; nor does it contemplate the assessment of the interactions between the facility and its surroundings in these conditions.

With regard to reservoirs included in the RID - such as dams higher than 15 metres and reservoirs with a (potential) volume in excess of 1,000,000 m^3 (Law 584/94), the data supplied are complete for the entire country. The survey is currently lacking with respect to regional dams. Assessments on their operating conditions and geographical distribution, in respect of seismic zoning and major flood hazards are forthcoming.

19. ANTHROPOGENIC RISK

INTRODUCTION

The Council Directive 82/501/EEC on the major-accident hazards of certain industrial activities ("Seveso" Directive) was issued in the 80s to reduce the occurrence of major industrial hazards, to protect the population and the environment as a whole.
The Seveso Directive was transposed into Italian law six years later (DPR 175/88). Fourteen years later, based on the observations formulated by the EU member States, it evolved into Directive 96/82/EC on the control of major-accident hazards involving dangerous substances (a.k.a. Seveso II Directive), transposed into Italian law as D.Lgs. 334/99.
In the light of several other serious accidents in Europe in recent years (e.g. Toulouse), and of the experience gained from the application of the abovementioned two directives, the subject matter covered by the Seveso Directive was further integrated by Directive 2003/105/EC, which must be implemented into national law by the end of July 2005.
The principal element that characterizes and classifies "an establishment liable to be affected by a major accident", within the meaning of the Directive, is the storage of potentially hazardous substances or classes of substances, in quantities above certain thresholds.
The storage and use of large quantities of substances that may be classified as toxic, inflammable, explosive, oxidising and dangerous for the environment may, in fact, lead to the possible uncontrolled development of an accident, posing a serious (immediate or delayed) hazard to human beings inside or outside the establishment and the environment, in consequence of:

- the emission and/or diffusion of toxic substances for human beings and/or the environment;
- fire;
- an explosion.

INDUSTRIAL RISK

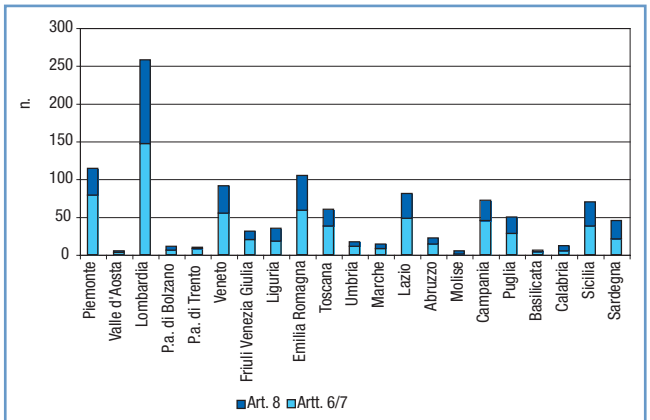
An effective system for controlling all "activities entailing major accident hazards" must necessarily be based on a suitable information system enabling the collection and management of data relating to the activities carried out, the hazardous substances stocked, the safety measures adopted, the likely accident scenarios, and the areas subject to the potential hazards. This information, related to the characteristics of vulnerability of the surrounding areas, allows the mapping of the hazards to be used for regional planning purposes, informing the public and tackling any emergencies.
For this reason APAT, in partnership with the Environment Ministry, has developed and updates the National Database of activities entailing a major accident hazards, provided for under D.Lgs. 334/99 (the so-called Seveso Law), and has undertaken a project for developing, in partnership with the regional Agencies, a national georeferenced information system for a more effective management of the information collected in connection with the monitoring activities, such as technical reports, safety management system investigation reports, etc.
Awaiting the completion of the project and, therefore, the drawing of a complete map of hazards, the National Database makes available a set of information (data relating to the establishment, activities carried out, geographical location, substances stored, with relevant quantities and other information), for a preliminary assessment of the hazards for the population and the environment in the proximity of an establishment liable to be affected by a major accident (articles 6/7 and 8 of D.Lgs. 334/99).
The National Database of establishments liable to be affected by a major accident is based on the information, drawn from the notifications and information sheets made available to the population (ANNEX V of D.Lgs. 334/99), supplied by the management of the establishments and received by the Environment Ministry in October 2000, after the abovementioned decree had entered into effect. The database is constantly updated with the information received by the Ministry from the management, fire protection authorities, prefectures, etc., and is validated thanks to the fruitful collaboration of the Regional Environment Agencies.
Based on the information set out in the database (at 31/12/2003), this overview presents 2 indicators representative of the

geographical distribution and concentration of the establishments liable to be affected by a major accident in the country, namely: *number of establishments liable to be affected by a major accident; municipalities hosting 4 or more establishments liable to be affected by a major accident.*
Following is the representation of the two indicators at national level.

NUMBER OF ESTABLISHMENTS LIABLE TO BE AFFECTED BY A MAJOR ACCIDENT HAZARD

INDICATOR - A10.001

The data for this indicator, drawn from the National Database of establishments liable to be affected by a major accident, comprises the number of establishments at regional, provincial and municipal level, broken down by category, in accordance with the formalities the managers of the establishments are required to comply with under the law. Article 8 provides for the obligation to notify the competent authorities, including the Ministry of the Environment, to draw a safety report and to adopt a specific safety management system; articles 6/7 provide for the same obligations as article 8, but without the safety report. Article 5 section 3 provides for the obligation to submit a simple report to the competent regional authorities. The statistical processing of the data, carried out in this overview, takes into account the number of establishments liable to be affected by a major accident, with the obligation to notify this hazard (under articles 8 and 6/7 of D.Lgs. 334/99), at regional and provincial level, and includes several observations on the map of industrial hazards in Italia.



Source: Environment Ministry data processed by APAT

Figure 19.1: Number of establishments obliged provide information, in respect of major accident hazards (articles 8 and 6/7 D.Lgs. 334/99)

At 31/12/2002, the number of establishments thus determined was 1,114 (458 under article 8 and 656 under articles 6/7), down by 9 compared to December 2002 (1,123). However, it must be observed that there have been a far greater number of changes, if one considers the overall number of new entries, deletions and passages from one category to another (from 6/7 to 8, and vice versa). To the abovementioned 1,114 establishments we must add about another 200 (approximated by defect, based on a preliminary estimate by APAT), which are subject to article 5 section 3 of D.Lgs. 334/99 and which, therefore, are also establishments liable to be affected by a major accident.

19. ANTHROPOGENIC RISK

Figure 19.2: Distribution of establishments subject to articles 6/7 and 8 of D.Lgs. 334/99 by province – Centre-North – (2003)

Having regard to the geographical distribution of the establishments subject to articles 6/7 and 8 of D.Lgs. 334/99, about 23% of these are located in Lombardia alone (in particular, in the provinces of Milano, Bergamo, Brescia and Varese). Other regions with a large number of such establishments are Piemonte (about 10%), Emilia Romagna (about 9.4%) and Veneto (about 8%), with several areas featuring a particularly high concentration, such as Trecate (in the province of Novara), Porto Marghera, Ferrara and Ravenna, mainly oil refineries and/or petrochemical plants, and others in the provinces of Torino, Alessandria and Bologna.

Source: Environment Ministry data processed by APAT

Source: Environment Ministry data processed by APAT

Figure 19.3: Distribution of establishments subject to articles 6/7 and 8 of D.Lgs. 334/99 by province – Centre-South – (2003)

In this half of the country, the regions featuring the highest number of establishments are Lazio (about 7%), Sicilia (about 6%), Campania (about 6%), Puglia (about 4%) and Sardegna (about 4%), primarily comprising the oil refineries and petrochemical plants at Gela, Priolo, Brindisi, Porto Torres and Sarroch, with high concentrations in the provinces of Roma, Napoli and Bari. There are no establishments subject to articles 6/7 or 8 in the provinces of Prato, Macerata, Crotone and Enna.

MUNICIPALITIES WITH 4 OR MORE ESTABLISHMENTS LIABLE TO BE AFFECTED BY A MAJOR ACCIDENT HAZARD

INDICATOR - A10.002

Figure 19.4: Municipalities hosting 4 or more establishments subject to articles 6/7 and 8 of D.Lgs. 334/99 (2003)

Source: Environment Ministry data processed by APAT

This indicator features the list of municipalities hosting establishments subject to articles 6/7 and 8 of D.Lgs. 334/99) and the number of such establishments.
The choice of a threshold of 4 has been made for practical reasons and is not based on any statutory requirements.
Based on an analysis of the indicator, the following observations may be made on the industrial hazards map of Italia. The indicator, in fact, makes it possible to highlight the areas with a particularly high concentration of hazardous establishments. These areas are potentially subject to the specific regulations on areas with a high concentration of establishments referred to in article 13 of D.Lgs. 334/99, if it is found that the identification criteria being defined by the Ministry of the Environment, in partnership with the Ministries of the Interior, Health, and Production Activities, and the State - Regions Conference, applies to them.
Figure 19.4 shows the location of the municipalities, with the graphical indication of the number of hazardous establishments based in them. The municipalities featuring a large number of such establishments are Ravenna, Venezia and Roma (over 20), followed by Genova and Napoli (over 10); then there are significant concentrations in Trecate, Brindisi, Porto Torres, Taranto, Catania, Augusta-Priolo and Livorno. Furthermore, there are 476 municipalities hosting one establishment liable to be affected by a major accident, subject to notification (they are not shown in the map); 114 municipalities with 2 establishments, and 25 with 3. Calculating the 51 municipalities with four or more establishments, the total number of municipalities concerned by the Seveso Directive (hosting at least one establishment with the obligation of notification) is 666.

APPENDIX

APPENDIX

1. AGRICULTURE AND FORESTRY

Q1: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Agriculture and forestry	Number of farms and Utilized Agricultural Area[a]	D/P	To provide a description of farmed land area and to indicate trend in the capacity of agricultural land to meet the demand for food and fibres and to contribute to the national income	★★★	R	1990, 2000	☹
	Distribution of fertilizers for agricultural purposes (fertilizers, soil improvers and conditioners)	**P**	**To provide information on the quantity of fertilizers distributed for agricultural use**	★★★	**I, R**	**1971,1981, 1985, 1990-2003**	😐
	Distribution of pesticides for agricultural purposes (herbicides, fungicides, pesticides, acaricides)	P	To provide information on trend in the distribution of plant health products employed in agriculture and on the active principles they contain	★★★	I, R	1990, 1996-2003	😐
	Use of pesticides by type of crop	I/R	To survey the intensity of use of plant health products on a significant group of crops	★★	I	2002-2003	😐
	Livestock breeding farms	P	To provide information on the size of the populations of major livestock species and their distribution by class and region	★★★	I	1960,1970, 1980,1990, 1995-2002	😐
	Farms adopting environment friendly and organic farming techniques	**R**	**To provide a measure of the adoption of farming techniques deemed most consistent with environmental quality and the healthiness of the foods and fibres produced**	★★★	**I**	**1990-2003**	☺
	Eco-efficiency in agriculture	**R**	**To provide indications on the eco-efficiency of the farming sector, that is on the capacity to separate the economic growth factors from the increase of impact and pressure factors**	★★★	**I**	**1990-2002**	☺
	Farmland concerned by the deliberate output, for experimental purposes, of genetically modified plants (GMPs)	P	To measure the number of deliberate outputs, for experimental purposes, of GMPs, by type and quantity, within natural and agricultural ecosystems	★★★	R, P	1999-2004	😐
	Wood and non-wood forest products	**D/P**	**To highlight the principal wood and non-wood products of Italian forests. The indicator is also useful to measure the impacts of forestry on the forest ecosystems, implementing the different types of forest removals**	★★★	**I**	**1970,1975, 1980,1985, 1990,1995, 2000**	☺
	Certification of sustainable forest management	R	To quantify SFM (Sustainable Forest Management) certification	★★★	I	1998-2004	☺

[a] - This indicator has not been updated, compared to the 2003 Yearbook, either because the relevant information is supplied according to intervals of more than one year, and because the information was not made available in useful time. Therefore, the relative indicator fact sheet is not contained in this edition of the Yearbook.

APPENDIX

2. ENERGY

Q2: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Energy	**Greenhouse gas (GHG) emissions, in total and from energy-related processes**	**P**	**To assess the role of energy processes in GHG emissions**	★★★	**I**	**1990-2002**	☹
	GHG emissions from energy-related processes, by economic sector	P	To assess the trend in GHG emissions from energy-related processes by economic sector	★★★	I	1990-2002	☹
	Sulphur dioxide emissions, in total and from energy-related processes	P	To assess the role of energy-related processes in sulphur dioxide emission	★★	I	1980-2002	☺
	Nitrogen oxide emissions, in total and from energy-related processes	P	To assess the role of energy-related processes in nitrogen oxide emission	★★	I	1980-2002	☺
	Final and total energy consumption by economic sector	D	To assess the trend in total energy consumption at national level and by economic sector	★★★	I, R	1990-2003	☹
	Final consumption of electrical power by economic sector	D	To assess the trend of electrical power at national level and by economic sector	★★★	I, R	1990-2003	☹
	Ratio of final to total energy consumption	**R**	**To assess the overall efficiency of the conversion of primary energy from the various sources of usable energy**	★★★	**I**	**1990-2002**	😐
	Average specific fuel consumption of the production of electrical power from fossil sources	R	To assess the efficiency of conversion of primary energy from fossil sources to electricity for end consumption	★★	I	1996-2003	☺
	Gross generation of electrical power by cogeneration plants	R	To assess the contribution of cogeneration plants to the total production of electrical power	★★★	I	1997-2003	☺
	Final energy intensity, by sector and in total	R/D	To assess the energy efficiency of economic systems	★★★	I	1990-2002	😐
	Total energy consumption by primary sources	**D/R**	**To assess the contribution by the various primary energy sources to the energy production**	★★★	**I**	**1990-2003**	😐
	Production of electrical power by source	D/R	To assess the contribution by the various energy sources to the electrical power production	★★★	I	1990-2003	😐
	Gross energy production from renewable sources in equivalent fossil fuel	R	To assess the contribution by clean and non-exhaustible energy sources to total energy production	★★	I	1991-2003	😐
	Gross production of electrical power of plants from renewable sources	R	To assess the contribution by clean and non-exhaustible energy sources to total electrical power production	★★★	I	1991-2003	😐
	Energy product prices	D/R	To assess the effects of international energy market trend and energy sector policies on energy product prices	★★	I	1990 - 2003	😐

Q2: SYNOPTIC TABLE OF INDICATORS							
SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Energy	Tax revenue from oil products	R	To assess the extent to which taxation takes account of external costs and can fosters the use of cleaner products	★★★	I	1995-2003	😐
	External energy production costs	I	To assess the environmental and social costs entailed by energy production	★	I	1998	-

3. TRANSPORT

Q3: SYNOPTIC TABLE OF INDICATORS							
SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Transport	Accidental and illegal oil spills into the sea, from ships	P	To quantify oil spills into the sea by ships, in order to eliminate oil pollution and prohibit illegal discharges	★	I	1993-2002	😐
	Energy consumption	D	To quantify fuel consumption by the transport sector, in order to reduce and/or diversify it	★★★	I, P, R	1985-2002	☹
	Emission of the main air pollutants (NOx, NMVOC, PM10, lead and benzene), by transport mode	**P**	**To assess the emission of principal air pollutants by the transport sector, to assess compliance with EU and international emission reduction targets by 2010**	★★★	**I**	**1985-2002**	☺
	GHGs emission from the transport sector, by transport mode	**P**	**To assess GHG emissions by the transport sector, to assess compliance with EU and international emission reduction targets by 2010**	★★★	**I, P, R**	**1985-2002**	☹
	Road vehicle waste	P	To prevent waste production and to re-use and recycle scrap as far as possible	★★★	I	1991-2002	☹
	Freight transport demand and intensity	**D**	**To assess freight transport demand and to compare the relevant trend with the economic growth trend; to compare the different transport modes and their internal development dynamics, with a view to achieving more efficient modal split**	★★	**I**	**1985-2002**	☹
	Passenger transport demand and intensity	**D**	**To assess passenger transport demand and to compare relevant trend with the economic growth trend; to compare the different transport modes and their internal development dynamics, with a view to achieving modal shift**	★★	**I**	**1985-2002**	😐
	Transport accident rates	P	To determine mortality and morbidity rates associated with the different transport modes in order to increase transport safety	★★★	I	1990-2002	😐

APPENDIX

Q3: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Transport	Transport infrastructure network capacity	D	To quantify the values for monitoring road and rail networks, with a view to optimizing the use of the existing infrastructure capacity and to revitalize rail and inland navigation	★★★	I, R	1990 - 2002	😐
	Energy efficiency in the transport sector	P	To compare the different transport modes, with regard to energy efficiency and GHGs, in order to reduce energy consumption per passenger-km and per tonne-km	★	I	2002	☺
	Share of vehicle fleet complying with certain air emission standards	D	To increase the share of vehicle fleet complying with the more recent (and stringent) emission standards for new vehicles	★★★	I, P, R	1990-2002	☺
	Average age of vehicles	D	To assess the time required to spread new less polluting technologies	★★	I, P, R	1990-2002	😐
	Size of vehicle fleet	D	To measure the private vehicle fleet (motor cars and two-wheel motor vehicles), which is an important driving factor for road transport demand and the ensuing environmental pressure	★★★	I, P, R	1985-2002	☹
	Specific emission of pollutants	D	To quantify and compare pollutant emissions by vehicle type and mode of transport mode	★★	I	2002	☺
	Diffusion of cleaner vehicle fuels and number of alternative fuel vehicles	D	To measure the diffusion of low environmental impact fuels (natural gas, LPG and biodiesel) and the number of alternative fuel vehicles, to foster the use of renewable and less polluting fuels	★★★	I, P, R	1985-2002	☺

4. TOURISM

Q4: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Tourism	Tourist infrastructures	D	To quantify the accommodation capacity of hotels, complementary facilities and B&Bs	★★★	I, R	1990-2003	😐
	Tourist flows by mode of transport	**D**	**To highlight the different forms of transport used for tourist purposes**	★★★	**I**	**1996-2003**	☹
	Tourism intensity	**D**	**To determine the tourist pressure in the country**	★★★	**I, R**	**1991-2003**	☹
	Household expenditure for tourism	D	To determine the trend in household expenditure for tourism purposes and its influence on the Gross Domestic Product (GDP)	★★★	I	1995-2003	-

5. INDUSTRY

Q5: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Industry	Industrial Production Index	D	To assess the level of industrial production compared to its environmental pressure	★★★	I	1995-2003	😐
	R&D expenditure in industry	**R**	**To assess R&D expenditure by enterprises**	★★★	**I**	**1998-2003**	☺
	Innovation in the industrial sector [a]	R	To assess expenditure incurred by the industrial sector for R&D, compared with the expected technological innovation	★★	I	1998-2000	-
	Number of manufacturing plants subject to integrated environmental authorization/number of authorizations issued[a]	R	To assess progress in the introduction of integrated environmental authorization, as a tool for pollution prevention and abatement	★★	I, R	2003	-
	INES register: number of IPPC reports and reported activities	**R**	**To identify the IPPC plants generating the highest air and water emissions; that is, those which, at national level, most contribute to industrial emissions**	★★	**I, P, R**	**2002**	**-**
	INES register: air emissions	P	To supply qualitative and quantitative information on air emissions generated by IPPC activities reported in the INES register	★★	I, R	2002	-
	INES register: water emissions	P	To supply qualitative and quantitative information on water emissions generated by IPPC activities reported in the INES register	★★	I, R	2002	-
	Specific emissions generated in the chemical industry	**P**	**To assess the specific emissions generated by a manufacturing unit in the chemical industry**	★★★	**I**	**1990-2002**	☺
	Specific emissions generated by the iron and steel industry	P	To assess the specific emissions generated by the iron and steel industry	★★★	I	1990-2002	☺
	Specific emissions generated in the paper industry	**D/P**	**To assess the environmental performance of the industry as a whole.**	★★★	**I**	**2000-2002**	😐

[a] - This indicator has not been updated, compared to the 2003 Yearbook, either because the relevant information is supplied according to intervals of more than one year, and/or because the information was not made available in useful time. Therefore, the relative indicator fact sheet is not contained in this edition of the Yearbook.

APPENDIX

6. ENVIRONMENTAL QUALITY OF ORGANIZATIONS, FIRMS AND PRODUCT

Q6: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Environmental quality of organizations, firms and product	Number of EMAS registration	R	To describe the development of environmental awareness by organizations and firms	★★★	I	1997-2004	☺
	Number of UNI-EN-ISO 14001 certificates	R	To describe the development of environmental awareness by organizations and firms	★★	I	2000-2004	☺
	Number of Ecolabels awarded	R	To describe the development of environmental awareness by organizations and firms	★★★	I	1998-2004	☺

7. MONITORING AND CONTROL

Q7: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Monitoring	Number of ARPA/APPA system laboratories	R	To collect information on the actual monitoring and control potential of the Environment Agencies	★★★	I, R	2002, 2004	-
	Number of samples analysed by the ARPA/APPA laboratories for information requests	R	To assess the level of implementation of the regulations providing for different application phases according to the local characteristics	★★	R 19/20	2001	😐
	Number of accredited ARPA/APPA laboratories	R	To collect information on the number of laboratories conducting analytical tests accredited by the competent authorities. To measure the laboratories' capacity to operate on a quality basis.	★★★	I R	2002, 2004	😐
	Number of laboratories taking part in the data exchange programme organized by APAT	R	To assess the participation (in absolute and percentage terms) of the ARPA/APPA agencies in the specific projects aimed at improving the quality of national environmental measurements, compared to the total number of existing Environment Agency laboratories	★★	I, R	2002 - 2003	😐
	Number of actions implemented by APAT/ARPA/APPA for data quality purposes	R	To follow up on the actions implemented by the Environment Agency system to achieve the goal of ensuring the quality of the analytical information produced by its laboratories	★★	I	2002-2004	-
	Monitoring radioactivity in the environment	R	To quantify the the number of activity concentration measurements, relating to a number of different environmental and food matrixes, conducted by the RECORAD radioactivity monitoring network	★★	I	2003	😐

APPENDIX

Q7: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Control	**Control activities by environmental matrix**	**R**	**To prevent or, in any case, abate pollution and the ensuing levels of environmental contamination**	★★	**R 13/20**	**2001-2003**	😐
	Measurements and penalties for illegal actions	**R**	**To assess compliance with statutory environmental measures and regulations**	★★	**R 13/20**	**2000-2003**	😐
	Bathing water controls	**R**	**To highlight compliance by the government and other competent authorities with the relevant statutory provisions**	★★★	**P.c.[a]**	**2003**	☺

[a] - Provinces coastline

8. PROMOTING AND SPREADING AN ENVIRONMENTAL CULTURE

Q8: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Environmental information	**Number of environmental information publications**	**R**	**To survey the amount of publications dedicated to disseminating environmental information**	★	**I, R 15/20**	**2003**	-
	Library services and user resources	R	To assess accessibility by users to library services and environmental information resources	★	I, R 9/20	2003	-
	Environmental information and the mass media	R	To estimate the dissemination, by the mass media, of environmental data/information	★	I, R 15/20	2003	-
	Environmental information in the Internet	R	To assess the supply of environmental information on the Web, as a means of improving environmental knowledge and awareness implemented by the government and other competent authorities	★	I, R19/20	2003	-
Environmental communication	Environmental communication activities	R	To provide an overview of the environmental communication activities put into place at national level	★	I, R 15/20	2003	-
	Environmental communication on the web	**R**	**To assess the supply of web-based communication and interaction services by the government and other competent authorities in response to the environmental information needs expressed by users**	★	**I, R 19/20**	**2003**	-
Environmental capacity building	**Environmental capacity building supply**	**R**	**To provide an overview of the environmental capacity building projects put into place**	★	**I, R 15/20**	**2003**	-
	E-learning supply	R	To provide an overview of the environmental capacity building by e-learning projects	★	I, R15/20	2003	-
Environmental education	**Environmental education supply**	**R**	**To describe the state of the art of environmental education projects implemented to date**	★	**I, R 15/20**	**2003**	-
	Working capacity of the local environmental education network	R	To provide an overall picture of the working capacity of and degree of integration among the stakeholders	★	I, R 15/20	2003	-

APPENDIX

9. ENVIRONMENT AND HEALTH

Q9: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Environment and health	Overcrowding and space standards	S	To assess the degree of overcrowding in houses, indicating a condition that can affect the health and well-being of the occupants	★★	I, R	1991, 2001	😐
	Financial availability for purchasing a good-quality house	D	To assess financial availability for purchasing a good-quality house, made with quality construction materials and according to good building standards, which are decisive factors for indoor air quality and living conditions in general	★★	C 9/8101	2002-2003	☹
	Road accident rate	S	To meet the growing demand for information on road accidents, involving economic and socio-demo-cultural factors. Every year, road accidents cause high social and human costs for society. The estimated social cost alone of road accidents, at European level, is 2% of the GDP of the EU. Monitoring road accident rates, therefore, can help policy makers and planners, with regard to implementing integrated management measures in regional planning	★★★	I, R	1997-2002	😐
	Road accident casualties	**I**	**To monitor road safety and how it develops over the years, thus providing objective information on its direct impact on health, with a view to planning local projects integrating environmental, economic and social factors**	★★★	**I, R**	**1997-2002**	☹
	Road accident death rate	**I**	**To support the assessment relating to the effectiveness of the road safety policies undertaken in recent years, providing planners and researchers with useful information on the future decisions and projects to be implemented in the field of infrastructures, regional planning and land management, vehicle safety and healthcare facility effectiveness, road safety and traffic management regulations**	★★★	**I, R**	**1991-2002**	☺
	Potential years of life lost (PYLL) for road accidents	**I**	**To support policymakers, with respect to the choice of prevention and planning priorities. The potential years of life lost due to road accidents are an indicator of premature mortality. Compared to the death rate, it takes account of the age of the population involved. The resulting information, therefore, highlights the weight of the accident death rate on the younger age groups**	★★★	**I**	**1997-2001**	😐

10. ATMOSPHERE

Q10: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Emissions	**GHG emissions (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6): trend and sectoral breakdown**	P	**To estimate national emissions and assess the contribution of each sector, in order to monitor the achievement of the established targets**	★★★	I	1990-2002	☹
	Production of stratospheric ozone depleting substances (CFCs, CCL_4, HCFCs)	D	**To assess the production of stratospheric ozone depleting substances, in order to monitor the achievement of the targets set out in the Montreal and subsequent protocols**	★★★	I	1990-2003	☺
	Emission of acidifying substances (SO_x, NO_x, NH_3): trend and sectoral breakdown	P	**To estimate national emissions and assess the contribution of each sector, in order to monitor the achievement of the established objectives**	★★★	I, R	1980,1985, 1990-2002	☺
	Emission of tropospheric ozone precurors (NO_x e NMVOC): trend and sectoral breakdown	P	**To estimate national emissions and assess the contribution of each sector, in order to monitor the achievement of the established objectives**	★★★	I, R	1980,1985, 1990-2002	☺
	Emission of particolate matter (PM_{10}): trend and sectoral breakdown	P	**To estimate national emissions and assess the contribution of each sector, in order to monitor the achievement of the established objectives**	★★★	I, R	1990-2002	☺
	Emission of carbon monoxide (CO): trend and sectoral breakdown	P	To estimate national emissions and assess the contribution of each sector, in order to monitor the achievement of the established objectives	★★★	I, R	1980,1985, 1990-2002	☺
	Emission of benzene (C_6H_6): trend and sectoral breakdown	P	**To estimate national emissions and assess the contribution of each sector, in order to monitor the achievement of the established objectives**	★★★	I	1990-2002	☺
	Emission of persistent organic compounds (IPA, dioxins and furans): trend and sectoral breakdown	P	To estimate national emissions and assess the contribution of each sector, in order to monitor the achievement of the established objectives	★★★	I	1990, 1995-2002	☺
	Emission of heavy metals (Cd, Hg, Pb, As, Cr, Cu, Ni, Se, Zn): trend and sectoral breakdown	P	To estimate national emissions and assess the contribution of each sector, in order to monitor the achievement of the established objectives	★★★	I	1990, 1995-2002	☺
	Local (regional and/or provincial) recordings of air emissions (existence and distribution of the relative registers)[a]	R	To verify whether or not the local (regional and/or provincial) authorities have implemented local registers of air emissions (existing or undergoing implementation)	★★★	I	-	-

[a] - This indicator has not been updated, compared to the 2003 Yearbook, either because the relevant information is supplied according to intervals of more than one year, and because the information was not made available in useful time. Therefore, the relative indicator fact sheet is not contained in this edition of the Yearbook.

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Q10: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Air quality	**Air quality: monitoring stations**		**To provide an overview in the country, of air quality monitoring stations providing data and information in accordance with EU regulations and standards**	★★	**I, R 17/20**	**2003**	☺
	Air quality: PM_{10} particulate matter	S	To assess the annual distribution of the concentration of PM_{10} particulate matter in the atmosphere, by means of statistical parameters processed in accordance with the EU Council Decision on exchange of information	★★	I, R 16/20	2002, 2003	☹
	Air quality: tropospheric ozone (O_3)	**S**	**To assess the number of days of excedences by tropospheric ozone, based on the information threshold limits, for human health and plant protection purposes, in accordance with the EU and national regulations and standards**	★★★	**I, R 16/20**	**2002, 2003**	☹
	Air quality: nitrogen dioxide (NO_2)	S	To assess the annual distribution of the concentration of nitrogen dioxide in the atmosphere, by means of statistical parameters processed in accordance with the EU Council Decision on exchange of information	★★★	I, R 16/20	2002, 2003	☹
	Air quality: benzene (C_6H_6)	S	To assess the annual distribution of the concentration of benzene in the atmosphere, by means of statistical parameters processed in accordance with the EU Council Decision on exchange of information	★★★	I, R 13/20	2002, 2003	☺
	Air quality: sulphur dioxide (SO_2)	S	To assess the annual distribution of the concentration of sulphur dioxide in the atmosphere, by means of statistical parameters processed in accordance with the EU Council Decision on exchange of information	★★★	I, R 16/20	2002, 2003	☺

11. BIOSPHERE

Q11: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Biodiversity: trend and changes	**Level of threat for animal species**	**S/I**	**To provide an overview of the level of threat for animal species (Vertebrates and Invertebrates) and of the taxa subject to the highest risk of losing their biodiversity, and to assess the level of threat for the various systematic groups**	★★★	I	**1997, 2002-2003**	☹
	Level of threat for plant species	**S/I**	**To provide an overview of the state of conservation of plant species, identifying the areas subject to the highest risk of losing their biodiversity**	★★★	**R**	**1982, 1992, 1994, 1997, 2000, 2001, 2004**	☹
	Hunting pressure	P	To assess the regions of the country subject to the highest hunting pressure	★★	I, R	1992-1999, 2003	☺

APPENDIX

Q11: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Biodiversity: trend and changes	Fishing pressure	D/P	To provide an overview of overall fishing trend, by analysing how the fishing fleets have changed over the years, as an indicator that can be related to the pressure on fish resources	★★★	I	1993-2003	☺
	Principal habitat types present in the larger protected areas	S/R	To estimate the distribution of habitat types in the country, within the larger protected areas, to assess the effectiveness of the conservation policies put into place, compared to the conservation targets set out in the European and national regulations and standards	★★★	I	1996, 2002-2003	-
	Principal habitat types present in the (approved and proposed) Sites of Community Importance (SCI/pSCI)	S/R	To assess the distribution of the various habitat types set out in Appendix I of the Habitat Directive present in the (approved and proposed) Sites of Community Importance	★★★	I, R	2004	☺
	State of conservation of the SCI/pSCI	S	To assess the conservation of the natural and semi-natural habitats under the Habitat Directive existing in the Italian SCI/pSCI	★★	I, R	2004	😐
	Number of cetaceans present in the Marine Mammal Sanctuary	S	To make an estimate of the size and trend of the cetacean communities in the Marine Mammal Sanctuary	★★	I	1990-2000	-
Effects of climate change	**Changes to glacier fronts**	**S**	**To assess trend in glacier front changes and any other anomalies due to global change**	★★	**I**	**1958, 1978-2002**	☹
	Glacier mass balance	S	To assess trend in glacier mass balance and any anomalies due to global change	★★	I	1967-2003	☹
Protected areas	**Protected land areas**	**R**	**To assess the proportion of the country's land occupied by protected land areas**	★★★	**I, R**	**1922-2003**	😐
	Protected marine areas	R	To assess the proportion of Italian coastal waters concerned by protected marine areas	★★★	R.c. [a] 9/15	2000, 2002-2003	😐
	Special Protected Areas (SPA)	R	To assess the proportion of the country's land occupied by SPA areas and protection trend over the years	★★★	I, R	1981-2004	☺
	Approved and proposed Sites of Community Importance (SCI/pSCI)	R	To assess the proportion of the country's land concerned by (approved or proposed) Sites of Community Importance (SCI/pSCI)	★★★	I, R	2000-2004	☺
	Pressure by communication infrastructures in protected areas	P	To assess the development of the principal communication networks in protected areas, as a measure of human pressure	★★★	I, R	1997, 1999, 2003	-
Wetlands	Wetlands of international interest	S/R	To assess the area of wetlands of international interest, compared to the country's area, and to define the habitat types	★★★	I	1976-2003	😐
	Human pressure on wetlands of international interest	**P**	**To assess the pressures potentially interfering with the state of conservation of wetlands of international interest**	★★	**I**	**1996, 1999, 2003**	☹

APPENDIX

Q11: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Forests	**Forest area: current situation and trend**	S	**To build a picture of forest area over the years, according to forest type, regional distribution and type of management**	★★★	R	**1948-2002**	☺
	Extent of forest fires	I	**To build a picture of forest fires, highlighting the characteristics and trend in time**	★★★	R	**1970-2003**	☹
	Critical loads of total acidity and relevant excedences	S	To measure the impact of atmospheric deposition of acidifying substances on plant ecosystems at national level	★★★	I, R	2003-2004	☺
	Critical loads of nitrogen nutrients and relevant excedences	S	To measure the impact of atmospheric deposition of eutrophying nutrient on plant ecosystems at national level	★★★	I, R	2003-2004	😐
	Critical loads of cadmium and lead and relevant excedences	S	To measure the impact of atmospheric deposition of cadmium and lead on plant ecosystems at national level	★★★	I, R	2003-2004	😐
	Defoliation of the tree canopies of forest species	I	To highlight the level of resilience or susceptibility of forest species to the impact of atmospheric fallouts and gas pollutants affecting the forest ecosystems	★★★	I	1997-2003	☹
	Carbon fixed by forests in Italia	S	To provide an estimate of the carbon dioxide fixing capacity of forests in Italia and their role in climate change mitigation	★★★	I	1985-2003	☺
Landscape	Protected landscapes	R	To assess the extent of measures imposing restrictions to protect the environment and landscapes, specifying the areas in each region subject to restrictions under D.Lgs. 42/04	★★★	R, P	2000, 2003	😐
	Regional governments that have approved and introduced landscape plans	R	To assess the implementation, by the regional governments, of superordinate and planning coordination schemes, in particular with regard to landscape plans	★★	R	2003	☺

[a] - Coastline regions

12. HYDROSPHERE

Q12: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Water quality	**Marine trophic index (TRIX)**	**S**	**To determine the trophic index of coastal seawater**	★★★	**R.c.[1] 14/15**	**2002-2003**	☺
	Index of bacteriological quality (IQB)	**S**	**To measure the level of human (civil and agricultural) contamination of bathing waters**	★★★	**C.c [2]**	**1999 -2002**	😐
	Bathing water quality	I	To determine the quality of bathing waters, from a hygienic and health protection viewpoint, based on the applicable statutory regulations	★★★	C.c.[2] R.c.[1]	2000-2002	☺
	Quality required for shellfish waters	S	To assess compliance with specific functional targets	★★	R.c.[1] 8/15	2001-2002	😐
	Number of days of anoxia in transition waters	**S**	**To assess and classify the ecological quality of lagoons and coastal lakes**	-	-	-	-
	Macrodescriptors (75° percentile)	S	To characterize the chemical and microbiological quality of rivers	★★★	R 18/20	2003	😐
	Levels of pollution by macrodescriptors (LIM)	S	To assess and classify the level of chemical and microbiological pollution of rivers	★★★	R 19/20	2000- 2003	😐
	Extended biotic index (IBE)	S	To assess and classify the biological quality of rivers	★★★	R 18/20	2000-2003	😐
	Ecological state of rivers (SECA)	**S**	**To assess and classify the ecological quality of rivers**	★★★	**R 17/20**	**2000-2003**	😐
	Ecological state of lakes (SEL)	**S**	**To assess and classify the ecological quality of lakes**	★★	**R 11/20**	**2003**	-
	Quality of waters needing protection to support fish life	S	To assess compliance with specific functional targets	★★	R 11/20	1997-2002	☹
	Chemical state of underground waters (SCAS)	**P**	**To determine the chemical quality due to natural or human causes**	★★	**R 12/20**	**2000-2003**	-
Water resources and sustainable uses	Water abstraction for potable usesa	P	To measure the quantitative impact of water harvesting	★★★	R 10/20	1993-1998 1999-2001	😐
	Discharges	**S**	**To determine river flows**	★★★	**B.n.[3] 5/11**	**1921-1970, 2001**	-
	Air temperature	S	To assess climate trend	★★★	CR[7] 16/20	1960-2001	-
	Rainfall	S	To determine rainfall	★★★	R	1960-2000	-
Water pollution	Average nutrients towards the river mouths	P	To characterize rivers and their content of pollutants	★★★	B[4]	2000 -2003	😐
	Potential organic matter contenta	P	To determine the pressure exercised on water quality by potential pollutants	★★★	R	1990,1996, 1999	😐

APPENDIX

Q12: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Water pollution	Water treatment plants: conformity of urban wastewater sewerage[a]	R	To determine the conformity of sewerage systems to the requirements under articles 3 and 4 of the Directive 91/271/EEC, transposed into national law by D.Lgs. 152/99 as amended and supplemented	★★	R	2001	😐
	Water treatment plants: conformity of urban wastewater treatment systems	R	To determine the conformity of the wastewater treatment systems to the requirements under articles 3 and 4 of the Directive 91/271/EEC, transposed into national law by D.Lgs. 152/99 as amended and supplemented	★★	R 19/20	2003	😐
	Programmes of measures for drinking water[a]	R	To determine the effectiveness of the programmes for improving surface waters for potable uses	★★★	R 17/20	1996-1998 1999-2001	😐
	Programmes of measures for bathing waters	R	To determine the effectiveness of the programmes for improving bathing water quality	★★★	R[5] 11/17	1999- 2003	☹
Physical state of the sea	Seawater temperature	S	To assess climate changes	★★★	M[6] 6/7	1989-2003	-
	Waviness	S	To assess the exchanges between the sea and the atmosphere	★★★	M[6] 6/7	1989-2003	-

[a] This indicator has not been updated, compared to the 2003 Yearbook, either because the relevant information is supplied according to intervals of more than one year, and/or because the information was not made available in useful time. Therefore, the relative indicator fact sheet is not contained in this edition of the Yearbook.

[1] Coastline regions, even though the data is collected at special sampling points;
[2] Coastline municipalities;
[3] National drainage basins;
[4] Drainage basins (12 basins and 5 lakes);
[5] Regions required to present improvement schemes;
[6] Seas
[7] Regional Capital town

13. GEOSPHERE

Q13: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Soil quality	**Percentage of organic carbon (CO) in topsoil layers (30 cm)**	**S**	**To describe the quantity of organic carbon (CO), expressed as a percentage of the weight, found in topsoil layers in Italia (30 cm)**	★★	**R**	**1988-2003**	**–**
	Total content of heavy metals in farmland	S	To describe the content of heavy metals present in farmland, due to natural or human causes	★★	P 40/103	1980-2000 2001-2004	–
	Balance of nutrients in the soil (Input/Output of nutrients)	S	To determine whether there is a deficit or surplus of nutrient substances in the soil, per unit of cropland	★★★	R	1994, 1998, 2000, 2002	😐
Physical and biological development of soils	**Desertification[a]**	**P**	**To identify any desertification sensitive areas, in accordance with the definition of the UN Convention on combating Drought and Desertification**	★★	**I, R 4/20**	**2004**	**–**
	Soil compaction risk, with respect to the number and power of farm machinery[a]	P	To estimate the risk of soil compaction, based on the repeated passing of farm machinery	★★★	I, R	1967, 1992, 1995, 2000	-
	Water erosion[a]	I	To estimate the risk of soil erosion due to running water in complex agricultural systems (basins)	★★	I, R	2003	-

Q13: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Soil contamination	Livestock breeding effluents	P	To measure the production of nitrogen (N) from livestock breeding and related effluents, based on the size of the livestock population	★★★	R	1994,1998, 2000, 2002	😐
	Areas used for intensive farming[a]	P	To measure the intensive UAAs, which generally represent a major risk of pollution, soil deterioration and loss of biodiversity	★★★	R	1995-2000	-
	Use of water treatment sludge in farming areas[a]	P	To determine the contribution of nutrients and heavy metals from the use of water treatment sludge in agriculture	★★★	R	1995-2000	😐
Contaminated sites	**Contaminated sites**	**P**	**To provide the number of areas requiring clean up measures for the soil and /or surface and underground waters**	★★	**R**	**2003**	**-**
	Contaminated sites of national interest	**P**	**To provide information on the progress made in cleaning up the soil and/or surface and underground waters of national interest**	★★	**R**	**2004**	**-**
	Depolluted sites	R	To highlight the number of depolluted sites by region	★★	R	2004	-
Land use	Updating official geological maps	S	To provide updated knowledge of the geology of the country through geological maps	★★★	R	2004	😐
	Primary mineral-extraction sites (mines)	P	To measure human "primary mineral extraction" activities featuring a high impact on the environment and the landscape	★★★	R, P 86/103	1870-2004	☹
	Secondary mineral-extraction sites (quarries) [a]	P	To illustrate the spreading of quarries, and related facilities, and to collect information on the quantity of soil subtracted from agriculture	★★	P 46/103	1995-1998	-
	Extraction sites of energy resources	P	To measure human activities relating to the "extraction of energy resources" featuring a high environmental and landscape impact, closely related to the local geological and geomorphological contexts	★★★	R	1982-2003	😐
	Potential use of underground waters	P/S	To monitor and control the use of underground waters over increasingly larger areas of the country, and to collect data in ever greater detail	★★★	I, R, P 102/103, C 4098/8101	1985-2003	-
	Land use	**S**	**To describe the type and extent of the principal human activities locally, allowing the survey of changes in soil use in agriculture and urban areas, and the development in land coverage of semi-natural systems**	★★★	**R**	**1990-2002**	😐
	Urbanization and infrastructures	P	To represent the extent of urbanization and infrastructure construction, which are the principal forms of irrecoverable loss of land	★★★	R	1990-2001	☹
	Urbanization in coastal areas	S	To measure the changes in the areas of soil use generated by human impacts in coastal areas, which are historically focal points of urban planning and biological abundance as ecotone areas	★★★	R	1975-1992, 2000	☹

a - This indicator has not been updated, compared to the 2003 Yearbook, either because the relevant information is supplied according to intervals of more than one year, and because the information was not made available in useful time. Therefore, the relative indicator fact sheet is not contained in this edition of the Yearbook.

APPENDIX

14. WASTE

Q14: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Waste generation	**Total waste generation and by GDP unit**	**P**	**To measure the total waste generated and the relationship between waste generation and economic development**	★★★	**I, R**	**1995-2002**	😐
	Municipal waste generation	P	To measure the total waste generated	★★★	I, R	2002-2003	☺
	Special waste generation	P	To measure the total waste generated	★★	I, R	2002	😐
	Quantity of equipment containing PCB	P	To measure the amount of equipment containing PCB	★★	I, R	2002-2003	😐
Sustainable waste management	**Municipal waste from separate collection**	**R**	**To determine the achievement of the separate waste collection targets set out in article 24 of D.Lgs. 22/97**	★★★	**I, R**	**1999-2003**	😐
	Amount of waste sent to composting and mechanical-biological treatment	P/R	To assess the effectiveness of the policies aimed at encouraging the recovery of materials from waste	★★★	I	1999-2003	☺
	Amount of special waste recovered	P/R	To assess the effectiveness of waste management policies, especially with regard to encouraging the recovery and re-use of waste, for producing materials or energy	★★	I, R	1997-2002	☺
	Landfill disposal, in total and by type of waste	**P/R**	**To determine the progress made in achieving the goal of reducing the use of landfills for disposing of waste, as provided by D.Lgs. 22/97, providing indications on the effectiveness of waste management policies**	★★★	**I, R**	**1997-2002**	😐
	Number of landfills	P	To collect information on the number of landfills throughout the country	★★★	I, R	2002	☺
	Incineration, in total and by type of waste	**P/R**	**To determine the amount of waste disposed of by incineration**	★★★	**I, R**	**1996-2002**	☹
	Number of waste incineration plants	P	To determine the availability of waste combustion plants, at national and regional level	★★★	I, R	1997-2003	😐
Production and management of packaging	**Packaging production, in total and by type of material**	**P**	**To measure the quantities of packaging produced nationwide (in total and by type of packaging material)**	★★★	**I**	**1993-2003**	😐
	Placing on the market of packaging, in total and by type of material	**P**	**To measure the quantity of packaging placed on the national market, to determine the proportions of recovery and recycling, in support of the monitoring activities conducted to assess achievement of the targets set out in the EU regulations and strategy documents**	★★★	**I**	**1998-2003**	😐
	Recovery of packaging waste by type of material	**R**	**To measure the total quantity of packaging waste recovered (recycling + energy recovery), to determine the recovery proportions in support of the monitoring activities conducted to assess achievement of the targets set out in the EU regulations and strategy documents**	★★★	**I**	**1998-2003**	☺

15. IONIZING RADIATIONS

Q15: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Ionizing radiations	Work activities with Naturally Occurring Radioactive Materials (NORM)	D	To survey the environmental pressure sources relating to NORM	★★★	I	2004	😐
	Facilities authorized to the use of radioisotopes	D	To document the number of facilities, by type, authorized to use radioactive sources, limited to the uses under category A (within the meaning of D.Lgs. 230/95 as amended and supplemented), and their nationwide distribution	★★★	R 16/20	2003	😐
	Scrap metal treatment plants (collection, storage, melting)	D	To monitor the number of scrap metal treatment plants and assess the amount of scrap metal treated there	★★	I, R	2003	😐
	Nuclear power plants: activities of radioisotopes released in the air and water	P	To monitor radioactive emissions, in the air and water, in normal operating conditions of nuclear power plants	★★★	I	2003	😐
	Quantity of radioactive waste stored	P	To document the type and quantity of radioactive waste, according to distribution in the storage sites	★★★	I, R 10/20	2003	😐
	Indoor radon activity concentration	**S**	**To monitor one of the principal sources of exposure to radioactivity of the population**	★★★	**I, R**	**1989-1997**	😐
	Gamma dose rates in air, from exposure to cosmic and terrestrial radiations	S	To document the size and distribution of the effective dose due to exposure to gamma radiations of cosmic and terrestrial origin (two of the sources of exposure to natural radioactivity), in order to assess its impact on the Italian population. To document any accidental events or situations that may entail increased exposure of the population to radiation	★★★	I, R	1970-1971 1986-2003	😐
	Artificial radionuclide activity concentrations in the environment and foodstuffs (atmospheric particulate matter, wet and dry airborne fallout, milk)	**S**	**To determine the average annual artificial radionuclide activity concentration in atmospheric particulate matter, wet and dry airborne fallout and milk, aimed at controlling environmental radiocontamination**	★★	**I**	**1986-2003**	😐
	Annual average effective dose per person	**I**	**To assess the contribution of the sources of exposure to radioactivity (of natural or man-made origin) of the population**	★★	**I**	**2003**	😐
	Implementation of the environmental radioactivity monitoring networks	**R**	**To assess progress in the implementation of environmental radioactivity monitoring networks in Italia, in conformity with the national and international quality assurance programmes**	★★★	**I, R**	**1997-2003, 2004**	😐

APPENDIX

16. NON-IONIZING RADIATIONS

Q16: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Electromagnetic fields	**Density of broadcasting and telecommunications facilities and sites and overall power throughout the country**	**D/P**	**To measure the principal sources of pressure on the environment by RF fields**	★★	**R 11/20 R**	**2003**	**–**
	Length in kilometres of power lines, broken down by voltage and number of transformer stations and primary power cabins, by geographical area	**D/P**	**To measure the principal sources of pressure on the environment by ELF fields**	★★★	**I, R**	**1991-2003**	😐
	Broadcasting and telecommunications sites found to exceed the statutory limits, and relevant remedial actions	**S/R**	**To determine any non-conformities relating to radiofrequency sources (RTV and RBS), found in connection with the monitoring activities carried out by the ARPA/APPA agencies, and the progress of the remedial actions undertaken**	★★★	**R 13/20 R 12/20**	**1998-2003**	**–**
	Power lines found to exceed the statutory electric and magnetic field limits, and relevant remedial actions[a]	S/R	To determine any non-conformities relating to the ELF sources, and the remedial actions undertaken	★	R	1996-2002	😐
	Number of preventive opinions and monitoring actions conducted on RF field sources	R	To measure compliance with the regulatory requirements, with regard to monitoring and supervisory activities of RF plants (radio and television broadcasting facilities, mobile telephone radio base stations)	★★	R 13/20	1999-2003	-
	Number of preventive opinions and monitoring actions conducted on ELF field sources	R	To measure compliance with the regulatory requirements, with regard to monitoring and supervision of ELF facilities (power lines, transformer rooms)	★★	R 13/20	1999-2003	-
	Monitoring unit for compliance with regional regulations	R	To assess the regulatory response relating to non-ionizing radiation sources, also with regard to the Framework Law 36/01	★★	R	1988-2004	☺
Light radiations	Relative brilliance of night sky[a]	S	To monitor the brilliance of the night sky, in order to assess the effects on the ecosystems of light pollution	★★★	I	1971, 1998	☹
	Proportion of the population living in areas where the Milky Way is no longer visible[a]	I	To assess the deterioration of the visibility of the night sky	★★★	I, P	1998	☹

[a] - This indicator has not been updated, compared to the 2003 Yearbook, either because the relevant information is supplied according to intervals of more than one year, and because the information was not made available in useful time. Therefore, the relative indicator fact sheet is not contained in this edition of the Yearbook.

17. NOISE

Q17: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Noise	Number and capacity of airport infrastructures	D	To determine the number and size of airport infrastructures	★★	I, R	2004	-
	Number and capacity of port infrastructures	D	To determine the number and size of port infrastructures	★★	I	2001	-
	Airport traffic	P	To determine the size of airport traffic, as one of the principal sources of noise pollution	★★★	I, R	2001-2002	😐
	Rail traffic	P	To determine the size of rail traffic, as one of the principal sources of noise pollution	★★★	I, R	1998-2002	😐
	Road traffic	P	To determine the size of road traffic, as one of the principal sources of noise pollution	★★★	I, R	1990-2003	☹
	Population exposed to noise	S	To determine the proportion of the population exposed to noise above certain prescribed thresholds	★	C 44/8101	1991-2003	☹
	Monitored noise sources and percentage of those found to exceed the statutory limits at least once	**S**	**To assess noise pollution, in terms of both quantity and quality**	★★★	**R 19/20**	**2000-2003**	😐
	State of implementation of the municipal noise zoning plans	**R**	**To assess the implementation progress of the national regulations on noise, with reference to the activities carried out by the local authorities, with regard to the prevention of and protection from noise pollution**	★★	**R 19/20 C 7692/8101**	**2003**	😐
	State of implementation of the reports on the municipal acoustic state	R	To assess the implementation progress of the national regulations on noise, with reference to the activities carried out by the local authorities, with regard to municipal acoustic state reporting	★★	R 19/20 C 133/138	2003	😐
	State of approval of the municipal noise abatement plans	R	To assess the implementation progress of the national regulations on noise, with reference to the activities carried out by the local authorities, with regard to noise abatement planning and programming measures	★★	R 19/20 C 7628/8101	2003	😐
	Monitoring unit for compliance with regional regulations	R	To assess the regulatory response relating to noise pollution, with regard to the Framework Law 447/95	★★★	R	2003	😐

APPENDIX

18. NATURAL RISK

Q18: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Tectonic and volcanic risk	Surface faulting (capable faults)	S	To identify the areas subject to major seismic hazards, providing key information and data for regional planning and land management purposes	★★	I	2003-2004	-
	Seismic events	S	To define the seismicity of Italia, in terms of maximum expected magnitude, return times, local effects, useful information for correct regional planning and land management purposes	★★★	I	2003	-
	Seismic zoning	**R**	**To provide an updated picture of the seismic zoning of Italia, according to the seismic hazard, with corresponding earthquake protection standards for building construction purposes**	★★★	**R**	**1984-2004**	☺
	Volcanic eruptions	S	To determine the environmental risk of volcanic activities, in Italia	★★★	R	2003	-
Hydrogeological risk	**Floods**	**I/P**	**With regard to hydrogeological degradation, to provide an updated national database of the number of floods, primarily those due to intense rainfall**	★★	**R**	**1951-2003**	**–**
	State of implementation of the Land and Water Improvement Schemes (PAI)	**R**	**To determine the implementation of Land and Water Improvement Schemes, aimed at identifying areas subject to major hydrogeological hazards, and bounding the areas that must undergo safeguarding measures**	★★★	**I Bacini**	**2004**	😐
	Progress of the hydrogeological risk mitigation projects financed under DL 180/98	**R**	**To highlight the progress of the urgent hydrogeological risk mitigation projects**	★★★	**R**	**2000-2004**	😐
	Progress of urgent projects in areas affected by fires (pursuant to article 3 of OPC 3073/00)	R	To highlight the progress of urgent projects in areas affected by fires	★★★	R 9/9 P 19/19	2003-2004	😐
	IFFI Project: The italian landslides inventory	**S**	**To provide an exhaustive and uniform picture of landslides in Italia**	★★★	**R 17/20**	**2004**	**–**
	Areas subject to sinkholes	S	To define a geological-structural and hydrogeological context subject to sinking	★★	I	2003	-
	Municipalities concerned by subsidence	S	To provide an overall picture of subsidence and its impact on the country	★★	C 632/632	2003	-
	Reservoirs	**S/R**	**To provide an updated database of the number of reservoirs and their operating conditions and national distribution**	★★	**R**	**2004**	**–**

19. ANTHROPOGENIC RISK

Q19: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Industrial risk	**Number of establishments liable to be affected by a major accident hazard**	**P**	**To determine the hazards to which the atmosphere, soil, subsoil, aquifers and surface waters are subject due to the presence of establishments liable to be affected by a major accident hazard**	★★★	**I, R, P**	**2003**	😐
	Municipalities with 4 or more establishments liable to be affected by a major accident hazard	**P**	**To provide initial elements for identifying areas with a high concentration of such establishments**	★★★	**I, R, P, C**	**2003**	😐
	Typology of establishments liable to be affected by a major accident hazard	P	To determine the prevailing hazards to which the atmosphere, soil, subsoil, aquifers and surface waters are subject due to the presence of certain typology of establishments liable to be affected by a major accident hazard	★★★	I, R, P, C	2003	😐
	Quantities of hazardous substances and preparations stored by establishments liable to be affected by a major accident hazard	P	To determine the prevailing hazards to which the atmosphere, soil, subsoil, aquifers and surface waters are subject due to the presence of certain hazardous substances in the establishments liable to be affected by a major accident hazard	★★★	I, R, P, C	2003	😐
	Quantities of hazardous substances and preparations present in each municipality (Risk phrases R 50 or R 51/53)	P	To provide initial elements for identifying areas potentially subject to pollution of the soil, subsoil, underground and surface waters due to the presence of environmentally hazardous substances stored by establishments liable to be affected by a major accident hazard	★★★	I, R, P, C	2002	😐