APAT
Agency for Environmental
Prtotection and Technical Services

2005 - 2006
SUMMARY

ENVIRONMENTAL DATA YEARBOOK

SISTAN
Sistema Statistico Nazionale

ARPA APPA
Agenzie Regionali e delle Province Autonome per la Protezione dell'Ambiente

APAT
Agency for Environmental Protection
and Technical Services

ENVIRONMENTAL DATA YEARBOOK

SUMMARY

2005-2006

IN COLLABORATION WITH
THE NETWORK OF ENVIRONMENTAL PROTECTION AGENCIES
OF THE REGIONS AND AUTONOMOUS PROVINCES

SISTAN NATIONAL STATISTIC NETWORK

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Hunc igitur terrorem animi tenebrasque necessest
non radii solis neque lucida tela diei
discutiant, sed naturae species ratioque. [1]

Titi Lucreti Cari - De rerum natura
(Liber I, 146-148)

1 - This terror, then, this darkness of the mind, not sunrise with its flaring spokes of light, nor glittering arrows of morning can disperse, but only Nature's aspect and her law.


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FOREWORD

The future of our planet and the sustainable use of natural resources are key issues in the current national and international agendas of policy makers the media and the general public. Therefore, the availability of continuously updated, objective, scientifically sound and reliable information is of utmost importance.
Without a high quality information base we can hardly develop effective planning policies and avoid decisions built on scarce facts and figures.
Environmental information is a prerequisite for moving away from a purely “emergency response” approach to a “preventive” one enabling public decision-makers to develop rational and effective environmental policies, avoiding needless improvisation. Too many public debates are based on incorrect information and, even worse, some important decisions take the wrong direction for lack of appropriate scientific support.
The priorities needed to address these serious shortcomings are clear: improving knowledge, investing in scientific research and upgrading the political debate on environmental issues, taking stock of the technological and organizational innovations currently available.

Shared knowledge is a prerequisite for any rational decision. This is why I consider the Environmental Data Yearbook a precious and authoritative communication tool, capable of providing a fundamental contribution to policy-making, as mentioned above, as well as to the public through appropriate information on the environment.

APAT, with the important support of the Environment Agencies of the Italian regions and autonomous provinces, has produced a very valuable publication. The accuracy and reliability of the data and information it contains is the result of the joint work of the professional resources within the entire Italian Environmental Agencies Network actively operating throughout the country and which I intend to further develop and strengthen, to ensure its capability to respond in a timely and effective manner to the nation's environmental information needs.

I am certain that the information and data provided in the Yearbook will be read and perused with great interest by those who work in the field of the environment and related issues as well as by all those who are only occasionally attracted by them but wish to further improve their knowledge with tools based on solid technical and scientific grounds.

Hon. Alfonso Pecoraro Scanio
Minister for the Environment, Land and Sea


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INTRODUCTION

Now at its fifth edition, the APAT Yearbook has become the largest and most integrated collection of environmental data currently published in Italy.
Responding to one of its more important institutional tasks, that of coordinating the collection and dissemination of environmental information, the Agency is engaged in continuously building up its large and qualified database and translating it into a publication that can be effectively used by a broad range of users.
Decisive for achieving this objective is the consolidated and synergic relationship between APAT and the Environment Agencies of the Italian regions and autonomous provinces.
Of equal importance is the partnership between APAT and numerous technical and scientific organisations, the so-called "Principal Reference Institutions", which have provided a precious contribution throughout the Yearbook production cycle; in particular, for data validation and processing.
Correct environmental information is a prerequisite for building policies and targets and maximising their effectiveness. The timely identification of the current conditions and trends offered by the indicators in the Yearbook makes it possible to adequately assess existing critical issues and build related policies and implementation programmes as well as monitor and measure their effectiveness. This, in turn, can also produce positive effects in terms of the rationalisation and reduction of public expenditure. This is the case, for example, of the increasingly necessary monitoring and control activities where the level of detail and the reliability of available data allows the prompt identification of critical areas on which to concentrate targeted actions and resources. This implies also a more efficient allocation of public spending, at national and local level, for necessary (and costly) environmental rehabilitation projects

The innovations featured in this edition concern a number of chapters.
Section A, besides setting out the guidelines for interpreting the Yearbook, also contains a new chapter on environmental expenditure.
Section B is dedicated to the different industry sectors, the chapter on "Agriculture" having been altered consistently with the changes introduced by the OECD, the European Environment Agency (EEA) and Eurostat related to the integration between productive activities and environmental protection.
The chapter on "Transport" has been considerably broadened, taking into account the developments within the European Environment Agency (in terms of number and definition of the indicators) relating to the *Transport* and *Environment Reporting Mechanism* - TERM.
Section C, relating to environmental conditions, features the introduction, in the "Atmosphere" chapter, of a useful response indicator related to the drafting and implementation of regional air quality rehabilitation plans.
The chapter on the "Hydrosphere" has been also broadened, with the addition of the new Sinanet theme relating to the Venice Lagoon, which includes the indicators: *Astronomical tide height in the Venice Lagoon, High tide delays in the Venice Lagoon, Average sea level rise (ICLMM).*
The chapter on "Noise" features two new indicators, one relating to the percentage of km of the national rail network featuring excess noise level values and one relating to the implementation status of the noise containment and abatement plans for the rail network.
In Section D, the chapter on the "Environment and Health" is built around two themes: "Sustainable land management planning", which features a new indicator relating to the implementation of regional plans and programmes, and "Environment

and health", which includes, inter alia, the new indicator on the *Exposure of children to outdoor airborne atmospheric pollutants (PM_{10})*.
The consistency of the response indicators has also been improved, although a lot of work still remains to be done. There is a special focus on the indicators capable of recording planning progress in a number of environmental legislation sectors: from air quality to noise emissions. For example, the chapters on the "Atmosphere", "Noise" and "Environment and Health" include precisely this information.
Several chapters also feature in-depth information boxes, which are particularly useful for certain specific aspects related to the main theme, for instance, in the chapters on the "Hydrosphere" and "Noise".

This edition sets out about 250 indicators, 20 more than the previous edition, totalling about 150,000 data, organised in 400 tables and 390 figures.
This year too, the Yearbook will be published in a number of versions. An unabridged version in Italian, two summaries (in Italian and English), a hypertext version (available either on CD-ROM, or on the APAT website at www.apat.gov.it) and a multimedia version.
The multimedia version has been designed with a view to communicating with greater immediacy the environmental information of interest to the broader public (from climate change to air quality, from eco-compatible farming to waste generation and disposal). The use of an easier language, videos and interactive areas is aimed at helping a non-expert audience to understand some very complex phenomena and, hopefully, arousing the interest of a broader spectrum of users.
Lastly, we have improved further some database functionalities of the Yearbook Indicators, which can be accessed via the homepage of the www.apat.gov.it website, or directly at http://annuario.apat.it. After a simple registration procedure, users may directly access the database and make targeted searches by year of interest and keyword(s), for retrieving the most suitable set of indicators.

After having illustrated the contents of the publication, I'd also like to express, in my capacity as recently appointed Head of APAT, my personal interest and great satisfaction for this important tool for disseminating environmental information, especially in consideration of the fundamental service it provides to the public. Even before being appointed to this position, I was convinced that building and spreading environmental knowledge is the cornerstone not only for effective policy-making, but also and mostly for keeping the general public constantly informed in order to increase environmental awareness and encourage behaviours that are more useful for sustainable development.
Acting on this conviction, the planning and investment of human and financial resources in this sector will always be a guiding principle in my work at the head of this Agency.

It is obvious that this function can only be guaranteed if the Agency is granted a broad-ranging autonomy. Therefore, I wholeheartedly welcome the recent reform of the Agency included in the Decree Law 262/2006, attached to the 2007 Financial Law, approved by Parliament on 23 November 2006, and currently being published, which I very much supported and which gives the Agency autonomous status, separating the policy setting activities pertaining to the Chairman and Board of Directors, from the management activities assigned to the General Director.
I am convinced that this reorganisation, for which I wish to thank the Environment Minister, the Government and Parliament, will boost the Agency's activities, one of the main tasks of which is to produce and disseminate environmental data.

Avv. Giancarlo VIGLIONE
Extraordinary Commissioner, APAT

CONTRIBUTIONS AND ACKNOWLEDGEMENTS

5th Yearbook.

Almost five years have passed since the first prototype edition of the Yearbook called "Towards an Environmental Data Yearbook". At the time there were no more than 100 populated indicators and a lot of work had still to be done, in terms of strengthening the stakeholders involved (in particular, the Italian Environment Agencies network) and consolidating the data analysis and information reporting methods.

The first cornerstone of the project to provide the Country with an authoritative and regularly published environmental data communication tool was laid down in the White Paper on the "*Monitoring the State of the Environment in Italy",* published in 2000, as part of a programme defining the criteria and methods for the regular dissemination of environmental data.
The programme provided also for the implementation of several projects, the most important of which was, unquestionably, the one relating to the creation of National Thematic Centres (CTN).

The challenge represented by the initial attempts to populate the indicators was that of producing, within a short timeframe, a publication capable of authoritatively disseminating environmental data, on the one hand, and feeding environmental data into the National Statistical System, on the other hand.

The first milestone was the publication of the 2002 edition of the "Environmental Data Yearbook", but the process of stakeholder consolidation and fine-tuning of the techniques is continuously evolving, allowing us to obtain increasingly solid editions of the Yearbook, with regards to the reliability and broadness of the proposed information base.
Each successive edition, in fact, features the introduction of new indicators and the improvement, with regard to the space and time characteristics, of the previous indicators, which are continuously updated, with a view to ensuring that the information provided is always capable of faithfully recording the further of processes and factors determining the environmental conditions.
Furthermore, there is a special focus on the instruments used to communicate the processed information and data. The adoption of state-of-the-art reporting techniques, the creation of a Yearbook indicators database that can be accessed online and the production of a multimedia and interactive version of the Yearbook, are all examples of this focus on the continuous search for increasingly effective communication tools for circulating environmental information.

Within a framework of continuous improvement of the contents and information techniques employed, we do not consider this edition a point of arrival but a further step forward.

Like for the previous editions, this publication is the result of a complex examination by a large number of the Agency's Technical Units directly involved in the environmental reporting activities (Departments: State of the Environment and Environmental Metrology, Protection of Inland Waterways and the Sea; Soil Protection; Nature Protection; Nuclear Technological and Industrial Risks; Library, Documentation and Information Activities; Interdepartmental Services: Environmental Emergencies; Environmental Information; Direction, Coordination and Monitoring of Inspection Activities; Environmental Certification), and the important contribution by the Environment Agencies of the Italian Regions and Autonomous Provinces (ARPA/APPA) and by numerous technical and scientific organisations.

The coordination of the design, implementation and statistical analysis phases of the Yearbook has been carried out by the

APAT's Office for Institutional Relations with Eurostat, the Statistical Office of the European Communities.

There have also been numerous contributions by single experts, by central and local government departments and agencies and by other technical and scientific organisations.

In particular, with regard to government, we would like to mention all the Departments of the Ministry for the Environment and Land and Sea, the Ministry of Culture, the Ministry for Infrastructure, the Ministry for Agriculture and Forestry, the Ministry of Health, the Ministry for Economic Development, the Ministry of Transport, the various law enforcement agencies (the Carabinieri Department for Environmental Protection, the State Forest Corp, the National Coastguard environmental and marine services), the National Grid operator, the National Fire Fighter Corp, the regional and provincial governments and local authorities and PMPs. Among the technical and scientific organisations, we would like to mention ICRAM, ISTAT, Istituto Superiore di Sanità, the Water Management Authorities (Autorità di Bacino) and Magistrati alle Acque, CNR (IIA, IRSA, ICT, IMAA, III), ACI, ENEA, Comitato Glaciologico Italiano, ENEL, the *European Soil Bureau of the EU Joint Research Centre at* Ispra, EUROSTAT, Agecontrol S.p.A., Biobank, Database ITHACA, Registro nazionale delle organizzazioni EMAS, Rete Ferroviaria Italiana (RFI).

A detailed list of all specific contributors is featured in the unabridged version of the 2005-2006 Yearbook "Environmental Data Yearbook - 2005-2006".

We would also like to thank all those, individual experts, organisations and institutions that have made this publication possible.

Lastly, we would like to invite our readers to send in observations, remarks and any suggestions for change, in order to improve our information products over time with the help of everybody.

Roberto CARACCIOLO

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STRUCTURE OF THE *YEARBOOK* SUMMARY

Like the unabridged version of the Yearbook, the Summary too sets out the complex set of environmental data in nineteen chapters and an appendix. Each chapter contains one or more SINAnet themes.

In particular, the first five chapters *(Agriculture and Forestry, Transport, Tourism and Manufacturing)* represent the core of the publication dedicated to the *industry sectors,* obviously examined in terms of their interrelation with the environment and, primarily, in accordance with the DPSIR assessment framework, whereby driving forces (**D**) exert pressures (**P**) on the environment and determine a response (**R**).

Chapters 6 to 15 feature the indicators relating to *environmental conditions,* which are described primarily in terms of the current state (**S**) and future trends of the environmental resources, both qualitatively and quantitatively, the pressures (**P**) that tend to change this state and the resulting impact (**I**) on human beings and the ecosystem as a whole. These chapters include the *Atmosphere, Biosphere, Hydrosphere, Geosphere, Waste, Ionizing and Non-Ionizing Radiations, Noise, Natural Risk and Anthropogenic Risk.*

Each chapter features an overview of the principal relevant environmental issues, broken down into specific themes. For each theme have seen selected a small number of significant indicators, from among the overall set described in greater detail in the Yearbook. In the case of the *Biosphere*, for example, we focus on 4 main themes: biodiversity, monitoring the level of threat for animal and plant species; the effects of climate change, based on the variations to glacier fronts; protected areas, measuring their extension; wetlands, in terms of the pressures interfering with their conservation; forests, representing the current state and trends of forests and the extent of forest fires; and landscapes, in terms of protection measures.

Chapters from 16 to 19 primarily concern the indicators relating to the key (institutional and other) activities and projects aimed at preventing, monitoring and rehabilitating situations of environmental deterioration, and, therefore, primarily falling with the response (**R**) category.

Chapter 16 describes the *Environmental quality of organisations, enterprises and products.*

Chapter 17, which has been further broadened compared to the previous edition, contains information on *Monitoring and control* measures, with respect to activites of progress verification and worsening reporting in the environmental field.

Chapter 18 is dedicated to *Promoting and spreading an environmental culture* and has been further consolidated compared to the previous edition.

Chapter 19 is an innovation. After a first part dedicated to *Sustainable land management planning* (which includes the new indicator on the implementation status of regional plans and programmes) there is a section dedicated to the delicate relationship between the *Environment and health* (which includes the new indicator on the exposure of children to outdoor airborne atmospheric matter - PM_{10}).

The choice of indicators for this *Summary* has been based on the following criteria:

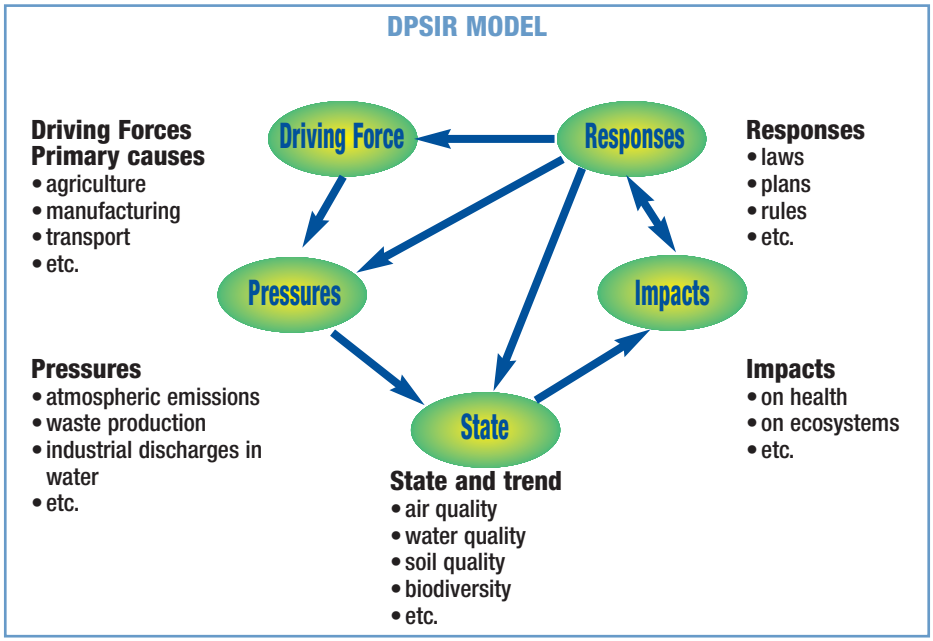
- a large amount of available information for indicator population purposes;
- the availability of well-defined and objective benchmark data, for a more effective interpretation of trends; for example, in the case of the atmosphere, we have selected climate-changing gas emissions, for which certain limit values must be achieved between 2008-2012;
- a high communication impact, in the sense of the preferential representation of indicators relating to phenomena (global climate) or problems (water treatment) for which information expectations by the public are highest.

To represent the indicators, with the aim of providing a clear and effective information, we have preferred graphs and theme maps, adding tables only in a limited number of cases.

LA STRUTTURA DELLA *SINTESI* DELL'ANNUARIO

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 details such as the name, position in the DPSIR diagram, aim, quality of information, space and time coverage, and Chernoff icon for "State and Trend". The indicators selected for the Summary are bold-faced.

The DPSIR framework, developed by the European Environment Agency and based on an earlier model (PSR) developed 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 organises the environmental data and information according to 5 categories linked by specific causality 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 releases, etc.), most of which are caused by human activities (called *driving forces*), such as industry, agriculture, transport, etc., 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, and so on. The impacts may be addressed and contrasted by means of *responses*, which are measures (such as laws and regulations, action plans, guidelines, etc.) 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 over time: completeness of the time series, consistency of the methodology in time.
- comparability across space: number of regions represented, use or the same or similar methodologies, reliability within the region itself.

Each component (relevance, accuracy, comparability over time and across 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 over time and across space, defines the quality of information, according to the ranking table below:

Definition of information quality

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

With regard to the determination of the 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, based on the indicator trend
😐	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.

1. AGRICULTURE AND FORESTRY

INTRODUCTION

In Italy, agriculture and forestry, besides representing an important source of food, fibres and timber, and allowing the economic diversification of rural communities - which provide a much higher contribution than portrayed by the national accounts - also constitute a key component of land use and natural resources management. Farmland (13,206,662 ha) and forests (6,857,069 ha) cover about two-thirds of the country's surface area (30,110,831 ha) and provide important habitats for thousands of species and a variety of environmental and cultural services and goods; in many cases they also offer opportunities for depollution and environmental rehabilitation, as well as options for mitigating the greenhouse effect (through the production of renewable energy capable of replacing fossil fuels, and by sequestering 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 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 well-being. 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: in short, an eco-efficient agriculture, in which resources' use is increasingly “decoupled” from the generation of environmental pressures.

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

Table 1.1: Distribution of fertilizers by agricultural use, type and region (2005)

Region	Mineral fertilizers							
	Nitrogen	Phosphate	Potassium	Binary	Ternary	Based on middle elements	Based on micro-elements	Total
	t* 1,000							
Piemonte	124.401	2.860	23.963	46.950	96.293	0.083	0.208	294.758
Valle d'Aosta	0.004	0.000		0.000	0.055	0.001	0.001	0.061
Lombardia	253.924	13.515	45.295	54.745	115.603	0.180	1.060	484.321
Trentino Alto Adige	9.743	0.539	2.229	1.126	24.282	0.664	0.297	38.880
Veneto	226.947	21.416	33.346	42.166	168.404	0.783	2.162	495.224
Friuli Venezia Giulia	63.101	2.369	14.984	22.113	36.929	0.090	0.463	140.049
Liguria	1.702	0.103	0.900	1.146	4.631	0.144	0.281	8.906
Emilia Romagna	233.722	47.066	9.533	54.392	73.538	0.283	2.142	420.675
Toscana	65.149	3.734	2.505	19.945	32.688	0.111	0.119	124.251
Umbria	50.835	5.356	1.317	24.214	18.156	0.231	0.051	100.159
Marche	72.086	16.975	0.228	25.059	15.870	0.015	0.180	130.412
Lazio	60.055	2.439	1.824	25.529	40.011	0.522	0.433	130.813
Abruzzo	24.795	6.234	1.550	15.780	20.810	0.065	0.944	70.179
Molise	14.954	3.455	0.093	7.606	2.611	0.020	0.042	28.781
Campania	101.630	13.004	0.836	29.498	49.338	0.637	0.220	195.162
Puglia	170.636	26.483	2.263	58.633	61.431	4.127	1.953	325.525
Basilicata	21.196	2.553	0.339	7.079	5.344	0.273	0.078	36.862
Calabria	32.575	6.347	0.653	9.311	30.725	2.754	0.068	82.433
Sicilia	45.306	16.775	3.196	25.737	45.981	0.897	1.615	139,507
Sardegna	33.721	2.340	1.444	30.866	20.848	0.118	0.026	89,363
ITALY	**1,606.480**	**193.561**	**146.500**	**501.894**	**863.545**	**11.997**	**12**	**3,336.320**

Region			Organic fertilizers	Organo-mineral fertilizers	Total fertilizers [a]	Soil conditioners	Soil improvers	Total fertilizers
			t * 1,000					
Piemonte			29.202	32..322	356.282	52.711	13.335	422,329
Valle d'Aosta			0.054	0.127	0.243	1.542	0.000	1,785
Lombardia			44.487	20.767	549.576	288.298	20.478	858,351
Trentino Alto Adige			6.163	1.212	46.254	13.192	1.189	60,636
Veneto			47.802	26.436	569.462	292.179	11.084	872,725
Friuli Venezia Giulia			9.365	13.239	162.653	14.877	1.567	179,097
Liguria			4.272	3.942	17.121	52.136	0.050	69,306
Emilia Romagna			32.623	44.239	497.538	71.192	2.626	571,356
Toscana			25.622	37.014	186.886	52.194	1.214	240,294
Umbria			4.984	12.596	117.738	8.821	0.128	126,687
Marche			5.461	17.392	153.265	26.047	0.477	179,788
Lazio			18.500	21.315	170.629	62.537	1.725	234,891
Abruzzo			3.126	13.045	86.350	9.590	0.121	96,061
Molise			0.714	2.536	32.030	1.561	0.016	33,607
Campania			7.582	24.643	227.387	24.063	0.219	251,669
Puglia			19.108	34.585	379.218	22.128	1.285	402,631
Basilicata			1.318	4.158	42.337	2.342	0.104	44,783
Calabria			5.963	11.000	99.396	12.135	0.557	112,088
Sicilia			24.614	29.293	193.414	48.574	1.481	243,469
Sardegna			2.315	3.506	95.183	7.307	0.127	102,617
ITALY			**293.274**	**353.366**	**3,982.959**	**1,063.427**	**57.782**	**5,104.167**

Source: ISTAT

LEGEND:

[a] - Includes mineral, organic and organo-mineral fertilizers

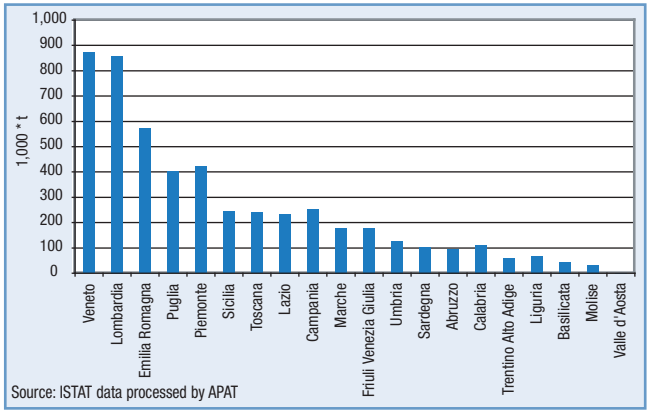


Figure 1.1: Percentage distribution of fertilizers distributed for agricultural use at regional level (2005)

The largest distribution of fertilizers in the country is in the Northern regions (59.5%), with 17.2% in the Centre and the remaining 23.3% in the South (table 1.1). In particular, Northern regions consume 52.2% of fertilizers, 73.9% of soil conditioners and 87.1% of soil improvers (on the rise compared to the previous year). Figure 1.1 shows that Veneto (872,725 tonnes) and Lombardy (858,351 tonnes) are the regions with the largest fertilizer distribution, accounting for 17.1% and 16.8% of the national figure, respectively. In 2005, an average of 235.9 kilos of nutrients (158.5 if we consider only chemical fertilizers) were distributed per hectare of fertilized area, down 5.2% compared to 2004 and up 11.1% compared to 2001.

FARMS IMPLEMENTING ECOLOGICALLY ORIENTED AND ORGANIC FARMING TECHNIQUES

INDICATOR - D02.007

Between 1990 and 2001, organic farming in Italy grew at breakneck speed, especially in the Southern regions, in terms of both overall area and number of farms.

From 2001 to 2004, however, this trend has turned around and there has been a drop in both indicators. In 2005, there was a new recovery in the sector: the number of farms rose to 49,859, while the conversion of UAA for organic farming purposes reached 1,067,103 hectares.

This trend, which has no equal in the other EU countries, highlights that now in Italy organic farming is consolidated and mature.

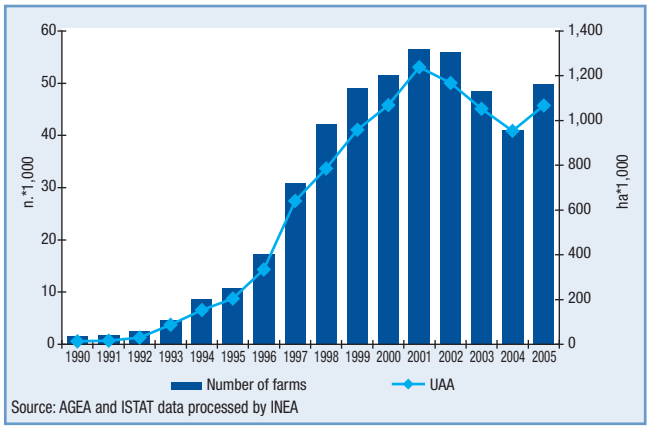


Figure 1.2: Development of the number of controlled farms (n.*1,000) and Utilized Agricultural Area (ha*1,000) according to the organic farming method (Council Regulation EEC/2092/91)

ECO-EFFICIENCY IN AGRICULTURE

INDICATOR - D02.009

Figure 1.3 shows a good eco-efficiency trend in the 1990-1999 period, when the gradual increase of economic values corresponded to a slower increase and, indeed in some cases, to a decrease of the pressure and environmental impact factors. Since 1999, however, the economic variable first slowed down and then dropped, while both energy consumption and the use of technical farming equipment started rising again, highlighting a turnaround trend of this indicator. GHG emissions in agriculture (methane and nitrogen oxides) currently account for less than 2%. Between 1991 and 2000 the level of these gases was higher than the reference year value (1990); between 2001 and 2003 a slight drop was observed: in particular, in 2003 the value dropped by 6% compared to 2002. Among the substances contributing to acidification (which include ammonia, nitrogen oxides, carbon monoxide, non-methane volatile organic compounds and sulphur oxides) the only significant one for the agricultural sector is the production of ammonia, accounting for 94.7% of national emissions of this substance and 5.1% of total national acid emissions. In this case too, the amount of acid substances produced by agriculture remained practically unchanged between 1990 and 2003 (when a 2% drop compared to the previous year was recorded). Non-methane volatile organic compounds (NMVOC) and nitrogen oxides are classed among the precursors of tropospheric ozone. Agriculture contributes very little (accounting for 0.1%) to their total production and there seems to have been a gradual downward trend until 2001, with a slight increase in 2002 and a new drop in 2003. Energy consumption, after a

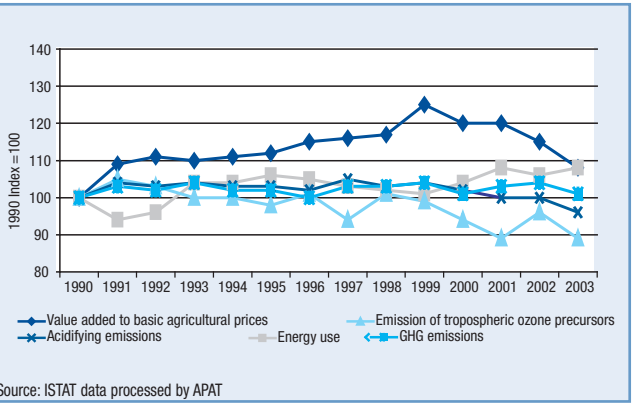


Figure 1.3: Eco-efficiency in agriculture shown as the integrated index of value added to basic agricultural prices, energy consumption and pollutant emissions

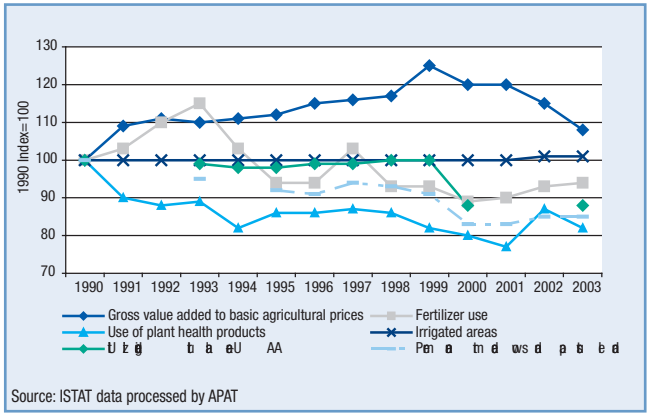
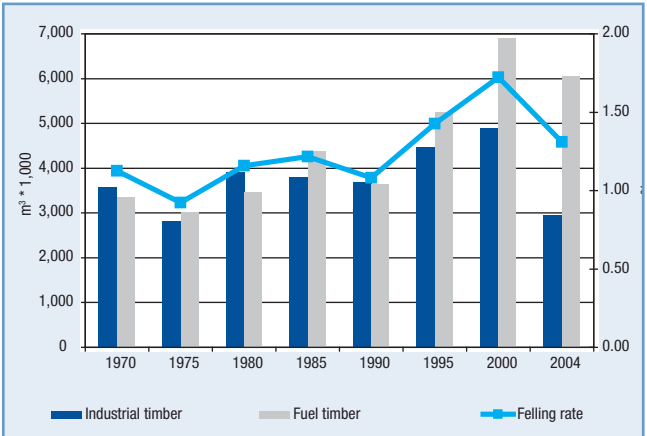


Figure 1.4: Eco-efficiency in agriculture, expressed as the integrated index of value added to basic agricultural prices, use of natural resources and consumption of chemical substances

considerable rise at the beginning of the 1990s, subsequently stabilized, with a slight downward trend until 1999 and an increase since 2000, which in 2003 stood at 7% compared to 1999.
Figure 1.4 also shows that the use of phytosanitary products dropped until 1994 and then remained stably below the reference values of 1990, continuing to plummet until 2001 when the trough value of the entire series was recorded; this was followed, from 2002, by a marked increase and a new drop in 2003 (albeit remaining below the reference value), all this despite a drop of UAA in 2000, compared to 1990, which stabilized at about 13,207,000 in 2003.
It is interesting to note, with respect to the UAA, that the irrigated component remained constant until 2001, compared to 1990, with a slight increase in more recent years corresponding to a more extensive use of water for farming purposes. The permanent meadows and pasture land component toughed in 2001, entailing a pressure on the biodiversity that characterizes these ecosystems.

WOOD AND NON-WOOD FOREST PRODUCTION

INDICATOR - D02.011



Source: ISTAT data processed by APAT/CTN_NEB

Figure 1.5: Trend in wood removals (in-and-outside forests), broken down by wood for industrial use and energy use, and removal rate

With regard to timber production, after a drop in felling since the mid-1970s, the use of forest resources has resumed, picking up speed after 1990 (figure 1.5). Between 1990 and 2000 the removals of wood, primarily for energy purposes, has increased considerably and now accounts for 50% of total wood production. In 2004, there was a considerable drop in the timber felling rate, especially with regard to timber for industry (-40% compared to 2000). As regards non-wood forest products, the urbanization and the disappearance of many local traditions have contributed to a drop in consumption. In 2004, ISTAT recorded a slight drop in the harvesting of cork, pine nuts, truffles, wild strawberries and raspberries and acorns and a rise in the harvesting of chestnuts, mushrooms and blueberries, compared to 2000.

2. ENERGY

INTRODUCTION

The set of proposed indicators has been drawn from the *"Energy and Environment in the European Union"* report by the European Environment Agency (EEA), which aims to provide policy-makers the necessary information for assessing how environmental and energy policies may be integrated, in order to further the process started at the Cardiff European Council in 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 Italy, the recently surveyed set of indicators highlights, (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, since 2001, a rise in solid fuel consumption. The increasing role played by natural gas in power production may be explained by the drop in average specific fuel consumption for producing electricity from fossil fuels (about -5% between 2004 and 2005), as a result of the enhanced efficiency of natural gas fired combined cycles compared with traditional steam cycles. This performance has been affected by both the international fuel market trends and regulatory developments, with the liberalization of the energy markets and the introduction of new incentives for the production of electricity using renewable energy sources, each electricity producer being required to produce a minimum amount of power from these sources. With regards to final energy consumption, between 2002 and 2005 there was a considerable increase in the services sector and by households, due to essentially climatic factors. This trend, coupled with the limited growth of the GDP, is the cause of the increased total power intensity recorded in recent years.
Even though some of the abovementioned trends entail a reduction in national emissions of greenhouse gases, it is likely they will not be sufficient to allow Italy to comply with its reduction targets under both the Kyoto Protocol and the European Burden Sharing Agreement, without resorting to carbon absorption by forests and land use and to the international cooperation mechanisms introduced under the Protocol. The drop in the emission trends of sulphur dioxide (-72.5% in 2004 compared to 1990) and nitrogen oxide (-39.8% in 2004 compared to 1990) means that compliance with the emission reduction commitments under the international Protocols on cross-border pollution will be a less problematic issue.

TOTAL EMISSIONS OF GREENHOUSE AND ENERGY-RELATED GASES
INDICATOR - D03.009

This indicator concerns GHG emissions into the atmosphere affecting climate balances. The Kyoto Protocol takes into account 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 primarily produced by burning fossil fuels (energy production plants, means of 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. Nitrous oxide is produced by agricultural and industrial processes. The so-called F-gases (HFCs, PFCs, SF_6), control of which was 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 been constantly increasing since 1995 (+13.6% in 2004, compared to 1990); based on this trend, Italy 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

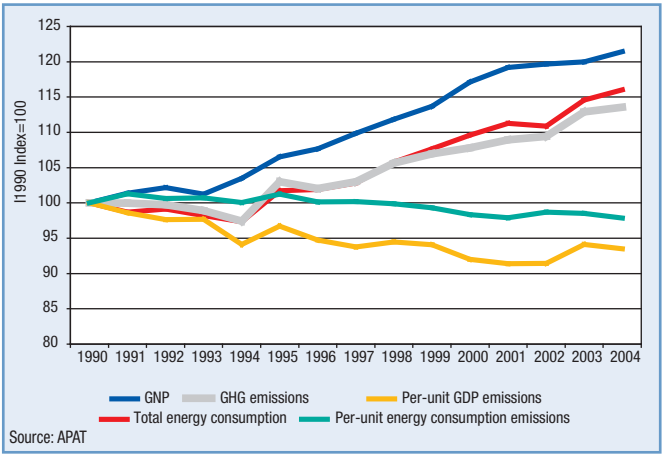


Figure 2.1: Economic and energy indicators, GHG emissions

mechanisms set out in the Protocol. In 2004, energy-related processes produced 94.2% of carbon dioxide emissions, 17.9% of methane emissions and 25.2% of nitrous oxide emissions, while they did not contribute to F-gas emissions; however, 82.4% of overall GHG emissions were energy related.

AVERAGE SPECIFIC FUEL CONSUMPTION FOR PRODUCING ELECTRICITY FROM FOSSIL FUELS

INDICATOR - D03.016

This indicator measures the primary energy (in kilocalories) needed to produce one kilowatt-hour of electricity, to assess the efficiency of converting the primary energy of fossil fuels into electricity for final consumption. The available data highlight a drop in specific consumption for producing electricity by 8.2% (gross production) and 9.1% (net production) in the examined period (1996-2005). This drop in consumption was particularly heavy between 2004 and 2005 (-4.9% of gross and 5.1% of net production, respectively). The reasons for this downward trend in specific consumption for electricity production lie in the gradual commissioning into service of natural gas (or derivative gas) fired combined-cycle power plants - which are more efficient that conventional plants - especially since

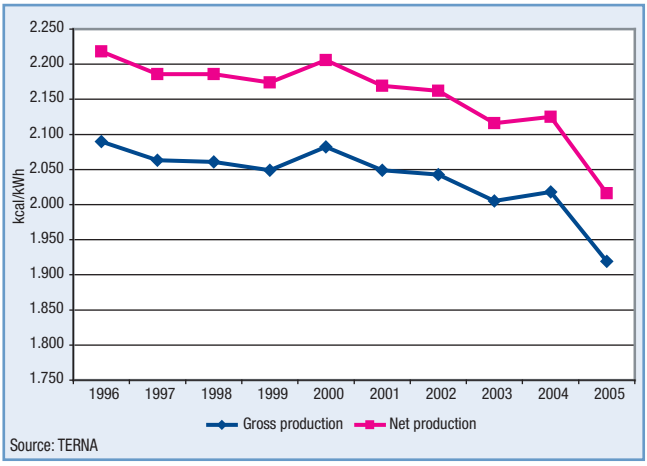


Figure 2.2: Average specific consumption of fossil fuels for the (gross and net) production of electricity

1999. Countering this trend, there has been a increase of the specific consumption of solid fuels for producing electricity due to the commissioning, between 1999 and 2000, of a large number of emission-reducing plants, which, however, require extra energy.

OVERALL 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 35.8% in 2005, that of oil products dropped from 56.6% to 43.3%, while primary electricity (imports + production from renewable sources) rose from 9.8% to 10.6%. 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 10.8% in 2004 and 10.4% in 2005. For many years, Italy's energy supply structure was characterized by the prevailing role of oil products, besides one of the 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).

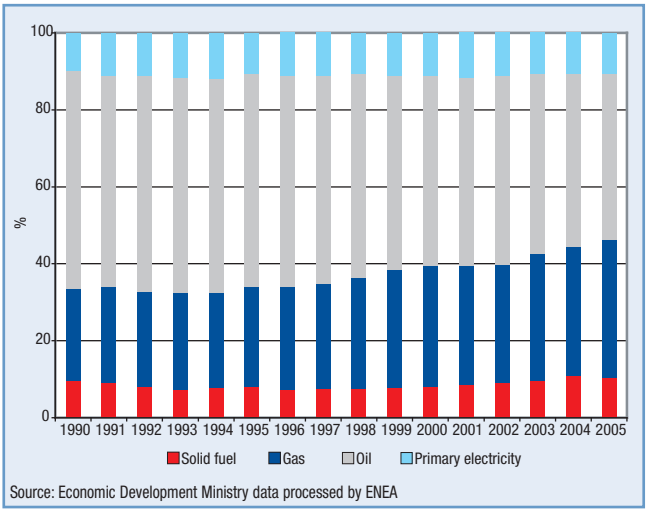


Figure 2.3: Overall energy consumption by primary sources

GROSS ELECTRICITY PRODUCTION FROM RENEWABLE ENERGY SOURCES

INDICATOR - D03.022

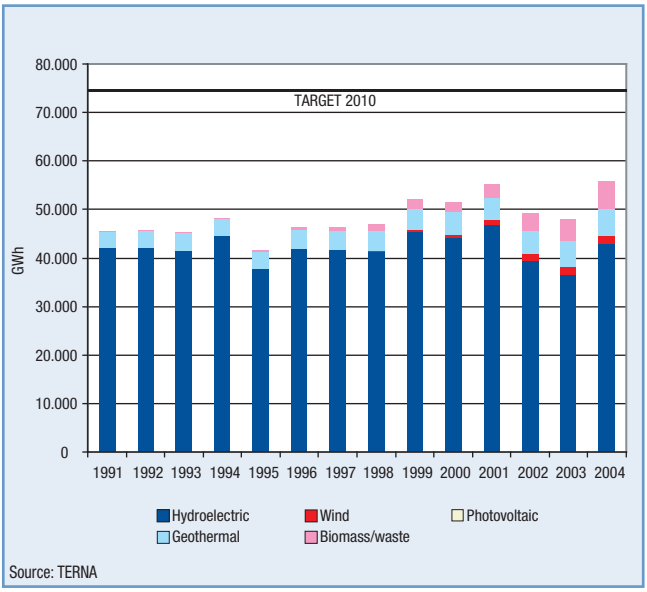


Figure 2.4: Gross electricity production from renewable energy sources

In the last few years (1997-2005), there has been a considerable increase of power production from wind (from 117.8 to 2,343.4 GWh) and biomass/waste (from 820.3 to 6,154.8 GWh) and also, albeit to a lesser extent, from geothermal energy (from 3,905.2 to 5,324.5 GWh). The contribution of photovoltaic (PV) cells remains neglectable (4 GWh in 2004, rising to 31.0 GWh if PV roofs are taken into account, which are not included in the electricity sector surveys). The trend, however, is not sufficient to allow the achievement, by 2010, of the target set for Italy by the 2001/77/EC Directive. Overall production trends feature the annual fluctuations of hydroelectric energy production, due to weather conditions, and the growth of production from non-traditional sources (wind, geothermal, biomass and waste).

3. TRANSPORT

INTRODUCTION

In Italy transport demand is continually increasing and continues to be met primarily by road transport, which is the least efficient transport mode, economically and environmentally; the number of vehicles running on our motorways, towns and cities has now exceeded their carrying capacity. This situation can not be tackled only through vehicle technology improvements and/or infrastructural facilities; on the contrary, there is a need to start reducing the use of road transport means by implementing consistent and integrated transport policies.
The European Commission has set the aim of a gradual decoupling of transport growth from economic growth, to be pursued through a set of measures (charging, modal rebalancing and targeted investments in the Trans-European network). This goal was partially addressed in the 2001 General Transport and Logistics Plan, but its achievement still seems far away.

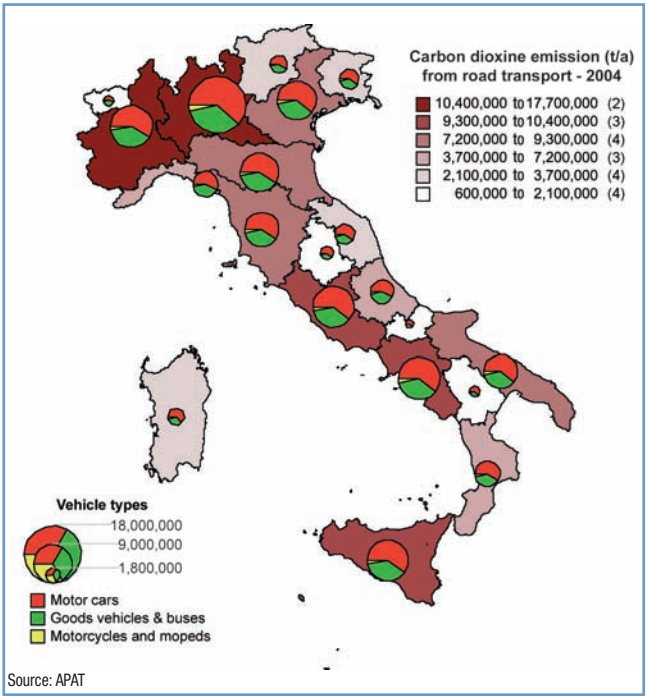
The unsustainability of our transport system becomes apparent through the three dimensions of sustainable development, namely the economic, the environmental and the social dimension.
Economically, the transport sector produces serious diseconomies, due to the non-internalization of external costs. These, in fact, significantly raise the price tag for the community at large and are not paid for by the transport users or operators for damage prevention, mitigation or indemnification purposes (costs relating to the use of the infrastructure and to congestion, accidents and environmental impacts). These costs considerably distort the competitiveness of the various transport modes, fostering an irrational modal split, which determines a drop in productivity and a reduction of the overall efficiency of the economic system and a correspondent increase of the sector's environmental impact.
New urban development patterns, changes in lifestyle and deterioration of public transport services contribute to inaccessibility and car dependence, which, in turn, determine a further decline in the supply of public transport; moreover, high traffic levels can cause social isolation and restrict interpersonal relations. The present mobility pattern also has serious effects on population health, especially for the more vulnerable groups. Lastly, road accidents are the major cause of death for young people aged between 15 and 35.
Then there is a series of direct and indirect impacts of the transport sector on the environment, such as energy consumption from non-renewable sources, air pollution, noise, water and soil pollution, climate change, land consumption, habitat loss, damage to the historical and artistic heritage, as well as hydrogeological stability and the landscape.
However, in the last few years the environmental impact of vehicles and transport infrastructures has slowed down, as a consequence of the improvements concerning certain harmful emissions and recycling; but in Italy this progress has been offset by the enormous growth in transport demand, especially road transport.

GREENHOUSE GAS EMISSIONS FROM THE TRANSPORT SECTOR

INDICATORE - D03.002

The increasing concentrations of greenhouse gases (GHGs) are producing dangerous effects on global temperatures and on the Earth's climate, besides potentially negative consequences for the planet's ecosystems, human settlements, agriculture and other socio-economic activities. This indicator takes into account the presence in the atmosphere of the three principal greenhouse gases, namely carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

The transport sector depends almost entirely on the consumption of oil products and accounts for 1/4 of total national GHG emissions. National emissions of GHGs from transport increased by 27.5% between 1990 and 2004; carbon dioxide accounts for 96.5% of all GHG emissions produced by the sector. Carbon dioxide emissions are directly related to energy consumption. Nitrous oxide emission increase is related to the growth of vehicles fitted with catalytic converters. Passenger transport accounts for 65.8% of GHG emissions from transport, while road transport accounts for 95% of emissions.



Source: APAT

Figure 3.1: Carbon dioxide emissions by region and vehicle type (2004)

Table 3.1: GHG emissions by the transport sector in Italy

	1990	1995	2000	2001	2002	2003	2004
	$MtCO_2eq$						
Carbon dioxide	101.5	112.0	120.4	122.8	124.9	126.0	128.0
Methane	0.8	0.9	0.8	0.7	0.7	0.6	0.7
Nitrous oxide	1.7	2.2	3.2	3.3	3.7	3.8	4.0
TOTAL	**104.0**	**115.1**	**124.5**	**126.8**	**129.2**	**130.4**	**132.6**

Source: APAT

3. TRANSPORT

AIR POLLUTING EMISSIONS BY THE TRANSPORT SECTOR

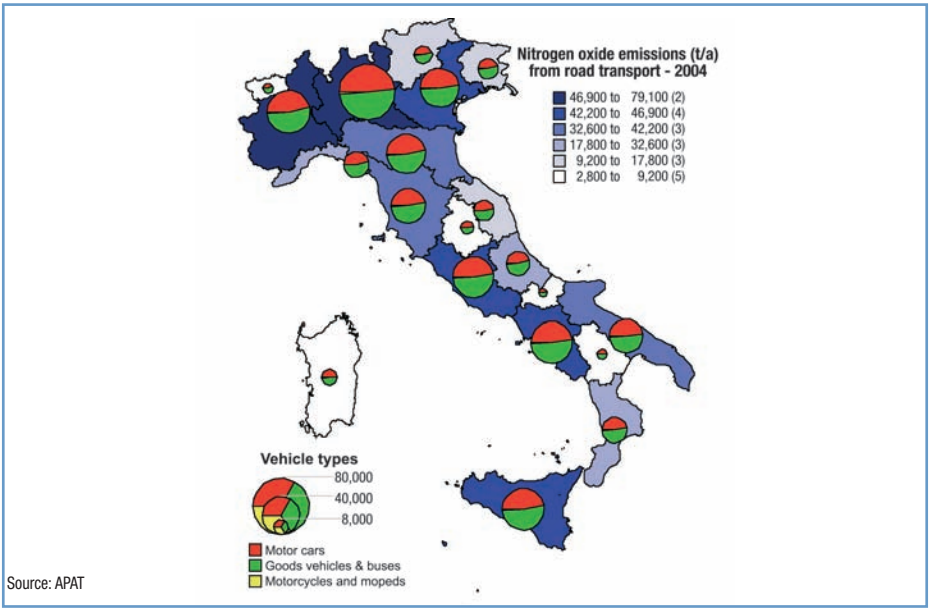
INDICATOR - D03.003

This indicator takes into account emissions of nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOCs), particulate matter (PM_{10}), lead (Pb) and benzene (C_6H_6). Nitrogen oxides play a key role in the formation of acid rain, eutrophication and the formation of tropospheric ozone and, indirectly, in global warming and in alterations to the ozone layer; they are primarily produced by high-temperature combustion, such as the one occurring in motor car engines. NMVOCs are precursors of photochemical smog and contribute to the formation of ozone. Nowadays particulate is the pollutant that most heavily affects human health in urban areas. Benzene is a carcinogenic substance present in traces in petrol and is primarily produced in the process of combustion in motor vehicles.

Two opposite factors affect the trend of NO_x and NMVOC emissions over the last years: on the one hand, the increase of the vehicle fleet and kilometres travelled increase emissions; on the other hand, the renewal of the fleet reduces them. In particular, nitrogen oxide, NMVOCs 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 methods of combustion of the energy sources and they may be considerably reduced through appropriate technology. Two-stroke engines play a key role in the emission of NMVOCs. With regard to the other harmful compounds, particulate emissions, primarily from heavy trucks, are slightly dropping, while benzene emissions have dropped considerably, due to the percentage reduction of this substance in petrol. The downward emission trend of lead, is due to the phasing out of leaded petrol.

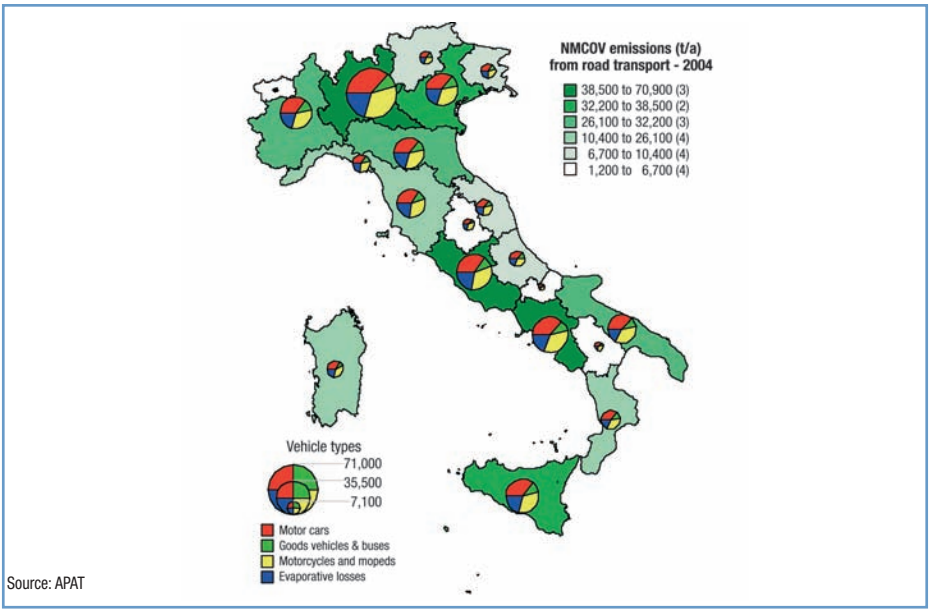
Table 3.2: Principal pollutant emissions by type of traffic

	1990	1995	2000	2001	2002	2003	2004
Nitrogen oxides				%			
Passengers	60.3	60.1	65.6	65.3	65.0	64.8	63.8
Freight	38.1	37.4	31.8	32.1	32.4	32.5	33.8
Others (P.A., ships)	1.6	2.6	2.5	2.6	2.6	2.7	2.4
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Non-methane volatile organic compounds				%			
Passengers	75.0	75.6	72.2	72.2	70.8	69.8	67.9
Freight	12.4	11.1	13.6	13.7	13.9	14.3	15.4
Others (P.A., ships)	12.6	13.4	14.2	14.2	15.3	16.0	16.7
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**
PM_{10}				%			
Passengers	41.7	31.7	31.3	31.2	33.2	35.1	35.8
Freight	57.3	65.4	67.9	67.6	65.6	64.0	63.4
Others (P.A., ships)	1.1	2.9	0.8	1.2	1.2	0.9	0.8
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Source: MIT data processed by APAT							



Source: APAT

Figure 3.2: Nitrogen oxide emissions by region and vehicle type (2004)



Source: APAT

Figure 3.3: NMVOC emissions by region and type of vehicle (2004)

PROPORTION OF VEHICLE FLEET MEETING CERTAIN EMISSION STANDARDS

INDICATOR - D03.014

This indicator measures the proportion of vehicle fleet meeting the more recent (and stringent) emission standards for new vehicles. The emissions of harmful substances in this sector are mostly related to the energy combustion methods; therefore, the use of appropriate technologies can considerably reduce the amount of emissions.
Upgrading the vehicle fleet to the environmental standards for new vehicles proceeds at a natural fleet replacement pace, although there are still large amounts of vehicles that do not meet these standards (about half the heavy commercial vehicles and over half the motorcycles). This trend, however, is not viewed negatively, because an acceleration in the upgrading of the fleet would inevitably produce an expansion of the fleet itself, the side effect of which would be to further increase the share of road transport.

Table 3.3: Vehicles meeting certain emissions standards in Italy by fuel type (2004)

	Pre-euro/ Euro 0	Euro 1, since 1.1.1993	Euro 2, since 1.1.1997	Euro 3, since 1.1.2001	Euro 4, since 1.1.2005	
Motor cars			%			
Petrol	30.8	20.1	28.0	18.5	2.4	
Diesel	12.8	5.3	29.1	48.4	4.4	
LPG	55.9	26.2	15.2	2.5	0.1	
Methane	37.6	23.4	24.4	13.3	1.2	
Motorcycles and delivery tricars	**Pre-euro / Euro 0**	**Euro 1, since 1.1.2003**	**Euro 2, since 1.7.2004**	**Euro 3, since 1.1.2008**		
All fuels	54.2	45.8	-	-		
Light commercial vehicles	**Pre-euro / Euro 0**	**Euro 1, since 1.1.1995**	**Euro 2, since 1.1.1999**	**Euro 3, since 1.1.2001**	**Euro 4, since 1.1.2006**	
All fuels	40	16	16.6	27.5	-	
Heavy commercial vehicles	**Pre-euro / Euro 0**	**Euro 1/stage I, since 1.1.1994**	**Euro 2/stage II, since 1.1.1997**	**Euro 3, since 1.1.2001**	**Euro 4, since 1.1.2006**	**Euro 5, since 1.1.2009**
Lorries	57.2	7.6	20.9	14.2	-	-
Buses	49.5	7.9	27.1	15.5	-	-

Source: ACI data processed by APAT

LEGEND:

The percentage figures are related to the vehicle fleet circulating at the end of the year.
Note: The dates refer to registration or, in the case of motorcycles, to sales. State-of-the-art vehicles are often marketed in advance of the deadlines shown.

4. TOURISM

INTRODUCTION

Since 2000, the number of international tourist arrivals has increased by over 10% (according to the preliminary data issued by the UNWTO); this fact proves that business or pleasure travels becoming are part of our social behaviour, an actual need. In Italy, in 2004, the number of tourist arrivals and overnight stays in hotels increased (5% and 2.1%, respectively), while overnight stays in complementary accommodation facilities dropped (-0.8%, 3.2%). On the contrary, in 2005 there was a slight recovery for both sectors (especially the complementary accommodation facilities, with 5.4% of arrivals and 2.8% of overnight stays).

The different scale of values, changed in correspondence of the consumer society, new social and economic conditions and increased well-being, has radically altered the concept of holidaymaking and, consequently, tourist demand.

Nowadays tourists look for top quality, privileging particularly attractive destinations, whether for natural or cultural reasons, enabling them to escape their everyday life and experience new emotions.

Cars are still the most widely used form of transport for travelling, because of the great freedom they provide, but the liberalization of the transport sector (and of airline industry in particular), the boom of *low cost/low fare* companies, the use of smaller airports have all further simplified travelling and increased the importance of air travel.

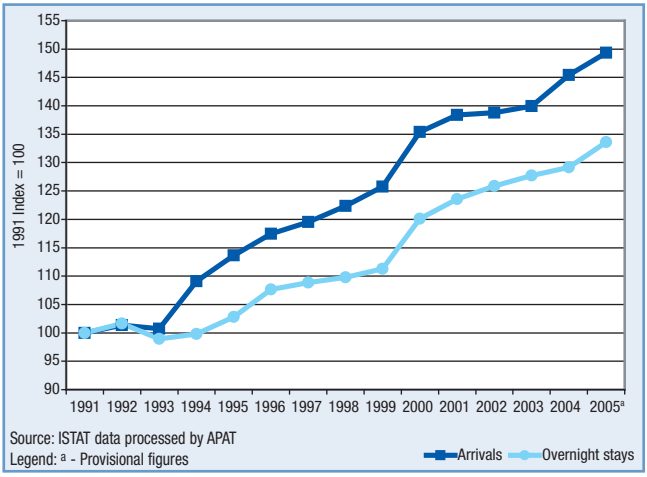
The demand for tourist values is primarily a demand for environmental and cultural values (climate, nature, traditions, historical and artistic resources), but the conservation of these assets could be seriously threatened by the excessive and uncontrolled development of the tourist activities.

The growing number of tourists visiting certain destinations, besides radically altering the population density and causing congestion, may also irreparably damage the quality of the environment, jeopardising the future attractiveness of the location concerned. The fluctuating number of people present in a certain location, due to the arrival of tourists, can alter the quality of the local air and water, put pressure on the traditional habitats, encourage deforestation, produce enormous amounts of waste and generally overload the local services; on the contrary, a careful assessment of the carrying capacity of a tourist location, taking account of all the components involved (physical, social and economic) may make it possible to determine the extent to which tourist development can develop without jeopardising the local resources, from which it depends, while at the same time satisfying the needs of the tourism industry, the tourists and the local population.

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

Over the years 2003 and 2004, tourist intensity increased - in terms of arrivals and overnight stays - and especially in 2004 arrivals increased by 3.9% and overnight stays by 1.1%. In 2005 (provisional figures), there was a further 2.7% and 3.5% increase of arrivals and overnight stays, respectively.



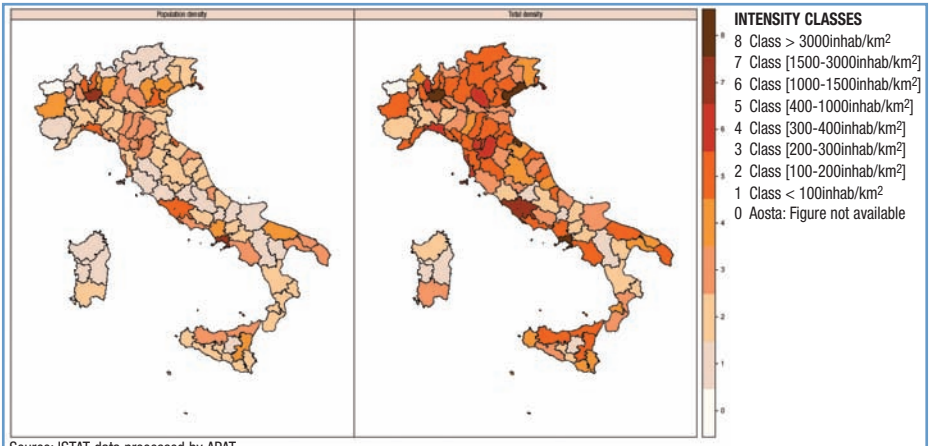
Source: ISTAT data processed by APAT
Legend: a - Provisional figures

Figure 4.1: Tourist intensity variations in terms of arrivals and overnight stays

The "carrying capacity" of a certain location is given by the maximum number of tourists it can accommodate without damaging its physical environment or peculiarities. An increasing number of people inevitably leads to the deterioration of the quality of life, negatively affecting living standards, safety, transport, water treatment, waste disposal, etc.

In 2005 (provisional figures), the regions of Trentino Alto Adige and Valle d'Aosta regions featured the highest ratio of both, (i) arrivals to residents (7.9 and 6.9, respectively), and (ii) overnight stays to residents (41.2 and 25.7, respectively), well above the national average.

It is interesting to note how the population density in the various Italian provinces changes on the basis of tourist flows. Provinces like Rome, Rimini, Venice and Florence, for both cultural and "recreational" reasons, accommodate such a large number of tourists that radically alter their population density (figure 4.2).

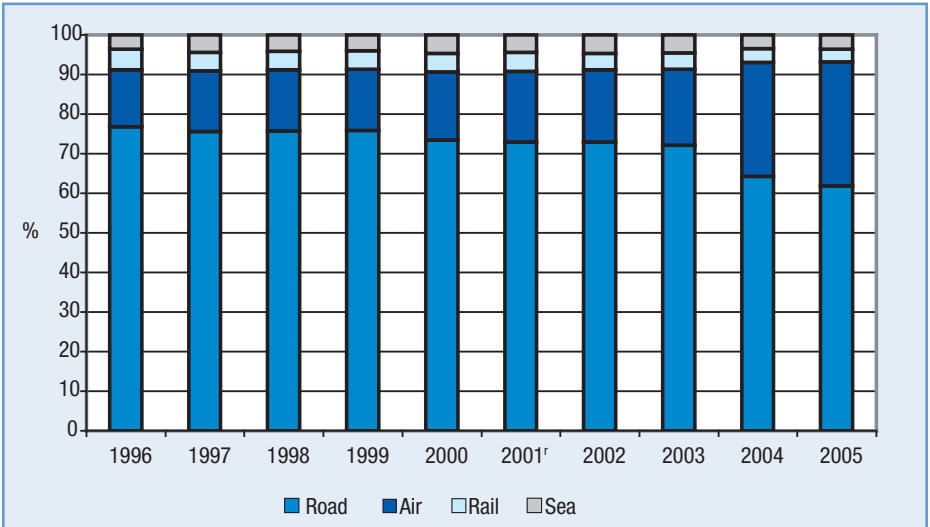


Source: ISTAT data processed by APAT
Note: The map on the left, showing the "Population density", groups the Italian provinces into eight population density classes; the map on the right, showing the "Total density" groups the provinces into the same eight density classes, but also taking into account the total density, i.e. Resident population + Arrivals / Surface area in km2. By comparing the two maps one can clearly see the density class changes of the various provinces.
a - Provisional figures

Figure 4.2: Variation of the population density of the Italian provinces taking into account tourist flows (2005a)

TOURIST FLOWS BY MODE OF TRANSPORT

INDICATOR - D01.002



Source: Ufficio Italiano Cambi 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 the country

The persisting usage of polluting means of transport, such as cars and airplanes, relevantly contributes to an increasing environmental pressure. In 2005, the number of foreign visitors to Italy rose slightly, primarily due to increased transport by air (31.3%).

As for Italian residents, by principal means of transport and type of journey, the number of trips increased by 3.6%, in 2004, especially those for holiday (3.8%) and work (2.9%). On the contrary, in 2005, the recorded increase (9.1%) was due only to trips for holidaymaking purposes (+10.8%).

However, the preferred means of transport for tourism purposes remains the car (64.4%), followed by air transport (13.6%) and rail (10.8%): the incidence of these two last means of transport is higher in relation to work business purposes (28.6% and 20%, respectively).

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 eco-friendly development” are becoming relevant for the definition of selection criteria of 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. This goal requires the integration of 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, whenever possible, re-utilizing the waste within the manufacturing process. The Council Directive 96/61/EC, also known as the IPPC Directive (converted into Italian Legislative Decree 59/2005), 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. Manufacturing is responsible for a wide range of environmental issues, 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 data and determining sufficiently concise and representative indicators, it has been possible to define eight indicators in the Yearbook. The following figures and tables provide a general overview of some of them.

INES REGISTER: NUMBER OF PLANTS AND IPPC ACTIVITIES

INDICATOR - D02.015

Source: APAT

Figure 5.1: INES Register - Number of reports by region (reference year 2004)

The number of INES reports (the INES Register is a national register on pollutant releases and transfers) corresponds to the number of IPPC facilities which, based on the criteria set out in the applicable regulations (Commission Decision 2000/479/EC, DM 23.11.2001), feature higher emissions into the air and water. In brief, the criteria consist in a list of air and water pollutants, with the respective specific threshold values and environmental sector. The regulations establish that the IPPC facilities releasing emissions into the air and/or water above the threshold values, even for a single pollutant, are required to file a report.

Therefore, the indicator represents the whole set of sources releasing the largest quantities of emissions into the air and water.

Information on the facilities was collected for drafting the INES 2005 Report and thus refers to 2004. On the basis of INES registered data, in 2004 reports were filed for 679 facilities.

Figure 5.1 illustrates the number of reports by region. It is apparent that the regions with the large-

st number of reports are: Lombardia (22%), Veneto (12%), Emilia Romagna and Piemonte (10%). Aggregating the data by geographical area, we have 64% of facilities in the North, 16% in the Centre and 20% in the South of the country.

R&D EXPENDITURE IN THE MANUFACTURING INDUSTRY

INDICATOR - D02.014

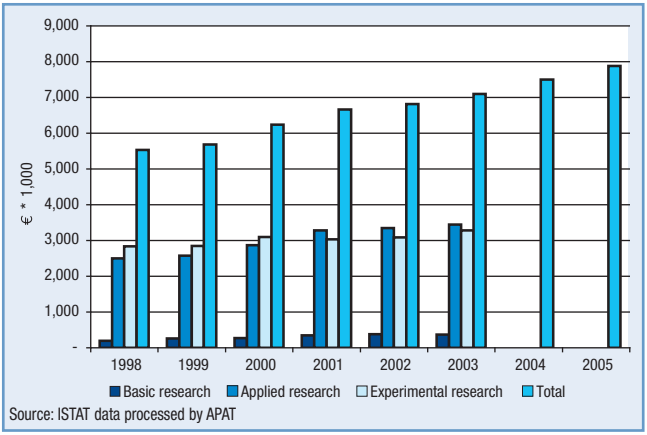


Figure 5.2: R&D expenditure in the manufacturing industry

This indicator gives the annual outlays by enterprises for R&D. R&D expenditure shows the manufacturing 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. For 2004 and 2005 only the total values are available, based on forecasted figures, supplied by the enterprises. These values feature a continuous upward trend; in particular, the manufacturing sector is investing primarily in applied and experimental research, with a slight prevalence of the former since 2001; expenditure for basic research is on average about 5% of the total.

SPECIFIC EMISSIONS IN THE CHEMICAL INDUSTRY

INDICATOR - D02.018

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 build the indicator have been estimated according to the CORINAIR method.

The annual updating of the emissions has entailed a revision of the entire historical series, based on the larger amount of information and on the most recent methodo-

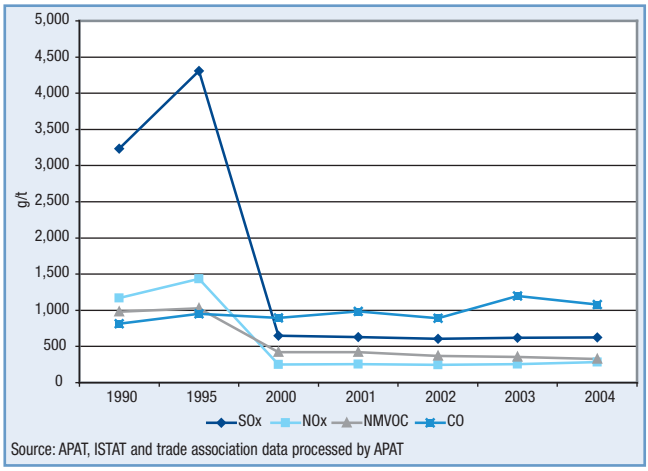


Figure 5.3: Specific emissions in the chemical industry

logical developments. This edition of the Yearbook presents the emissions from "black coal", previously not included because of lack of data. In consideration of the featured 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 reductions of emissions were observed throughout the 1995-2000 period, with respect to SOx, NOx and NMVOC, while the variations of CO were much smaller.

SPECIFIC EMISSIONS IN THE PAPER INDUSTRY

INDICATOR - D02.020

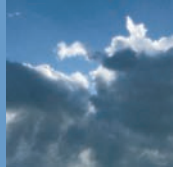
Table 5.1: Specific emissions in the paper industry and other industry data

Sector	Unit of measurement	2000	2001	2002	2003	2004	2005
Plants	n.	201	200	200	196	194	191
ISO 14001 certified plants	n.	12	19	24	37	39	39
Paper and cardboard production	$t*10^6$	9.13	8.96	9.36	9.49	9.67	9.99
Use of virgin fibres	$t*10^6$	3.38	3.48	3.67	3.84	3.76	3.99
Use of waste paper	$t*10^6$	5.08	5.14	5.27	5.28	5.47	5.48
Use of water per product unit	m^3/t	46.1	46.1	45.0	43.9	38.2	n.a.
COD emissions per product unit	kg/t	2.7	2.8	2.8	2.6	2.4	n.a.
Suspended solids per product unit	kg/t	0.9	0.8	0.8	0.7	0.6	n.a.
Waste production	kg/t	103	106	111	114	116	n.a.
Source: Assocarta data processed by APAT							

This 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. The aim is to assess the environmental performance of the papermaking industry as a whole.

Table 5.1 shows that, in the period of interest, the number of plants dropped by 10 units, while production actually increased. Of interest is the figure relating to the use of waste paper, which increases despite the drop in production (2001). The number of ISO 14001 certified plants more than tripled between 2000 and 2003, while no significant variations occurred in the following two years. Water consumption per product unit dropped considerably in 2004 with a consequent reduction of emissions (COD and Suspended Solids). The waste production is ever increasing, partially due to a greater use of waste paper and to a reduction of the pollutants released per product unit.

6. ATMOSPHERE



INTRODUCTION

Air pollution is any change in the composition of the atmosphere due to the presence of one or more substances, at a concentration and with characteristics that alter the normal environmental conditions and determine a direct or indirect harmful effect for human health, ecosystems and material goods. The pollutants released into the atmosphere have both anthropogenic (transport, power plants, industrial activities, household heating) and natural origin (volcanic emissions, decomposition of organic materials, etc.).

Air pollution concerns involve various space and time scales. Pollutants like carbon monoxide and benzene have local relevance and short response times, in the order of a couple of hours, as their concentration in the air is closely related to the sources of emissions - typically, traffic in built-up areas - wherefore the problem has local relevance and short response times, in the order of a couple of hours. Other pollutants, such as PM_{10}, ozone (O_3) and nitrogen dioxide (NO_2), feature a much more complex behaviour due to the presence, in the atmosphere, of an important (albeit not predominant) secondary component not originated directly from the sources of emissions, but formed in the atmosphere as a result of chemical reactions involving other pollutants. Consequently, the scales of space and time characterizing the pollution phenomena appear are much broader and sometimes take on a cross-border dimension.

The framework Council Directive 96/62/EC translated into the Legislative Decree 351/99, and following statutory instruments, define the procedures for implementing ambient air quality assessment and management, in terms of both the protection of the population and safeguarding the environment as a whole. This objective is pursued through the introduction of fact-finding tools, such as air quality monitoring, emission inventories and models describing the process of transport, dispersion and chemical transformation of pollutants in the atmosphere; such tools must be used in an increasingly uniform and integrated manner. Hence, the need to define a harmonised system for producing, gathering and circulating information.

The set of indicators relating to the Atmosphere is 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 are responsible for: climate change, stratospheric ozone depletion, acidification, photochemical smog, air quality deterioration. The emissions are evaluated through suitable processes of estimation, based on emission factors and activity indicators. With regard to GHGs, the benchmark methodology is the one provided by the *Intergovernmental Panel on Climate Change* (IPCC). For the other pollutants, the reference methodology is the one provided by the CORINAIR project (*COoRdination-INformation-AIR*) implemented by the European Environment Agency, according to the *Selected Nomenclature for Air Pollution* (SNAP97).

The analysis of national emissions, industry sector contributions, temporal evolution and spatial distribution is a key element for establishing environmental priorities and identifying the objectives and relevant policies, both nationwide and at the local level. The selected indicators meet the criteria of traceability, reliability and easy interpretation; in addition they are significant, with respect to the principal problems relating to the atmosphere.

GHG (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6) EMISSIONS: TRENDS AND SECTORAL BREAKDOWN

INDICATOR - A01.001

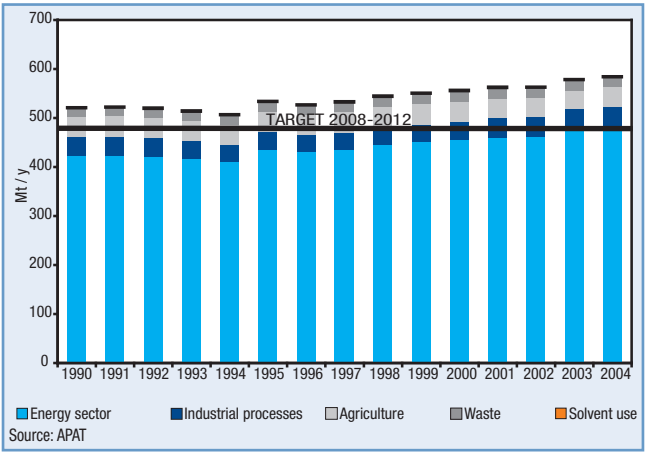


Figure 6.1: Overall national emissions of GHGs

In the context of the Convention on Climate Change and, in particular, of the Kyoto Protocol, which entered into force on 16 February 2005, Italy 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 is 1990 for carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (hydrofluorocarbons HFCs, perfluorocarbons PFCs, sulphur hexafluoride SF_6). Total GHG emissions considered by the Kyoto Protocol in 2004, in CO_2 equivalent terms, are 12% higher than the base year. Emission trends are closely related to energy consumption.

PRODUCTION OF STRATOSPHERIC OZONE DEPLETING SUBSTANCES (CFCs, CCl_4, HCFCs)

INDICATOR - A01.002

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 Italy, 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.

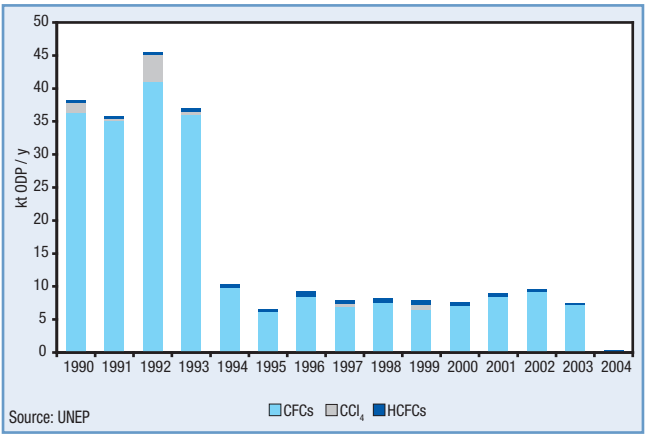


Figure 6.2: Nationwide production of stratospheric ozone depleting substances (CFCs, CCl_4, HCFCs)

ACIDIFYING SUBSTANCES (SO_X, NO_X, NH_3) EMISSIONS: TRENDS 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, Italy is obliged to reduce its national emissions of sulphur dioxide to 0.475 Mt by 2010, which means a 4% reduction compared to 2004. In Italy sulphur dioxide emissions dropped by 47.8% between 1980 and 1990, and by 72.3% between 1990 and 2004.

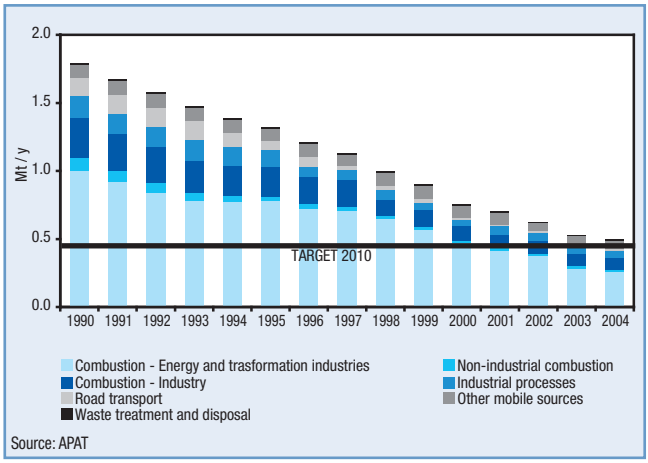


Figure 6.3: National emissions of sulphur dioxide (SO_2)

Under the Council Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants, Italy is obliged to reduce its national emission of nitrogen oxides to 0.990 Mt by 2010, which means a 16% reduction compared to 2004. In Italy nitrogen oxides emissions rose by 25.8% between 1980 and 1992 (the peak year), and then dropped by 41.9% between 1992 and 2004.

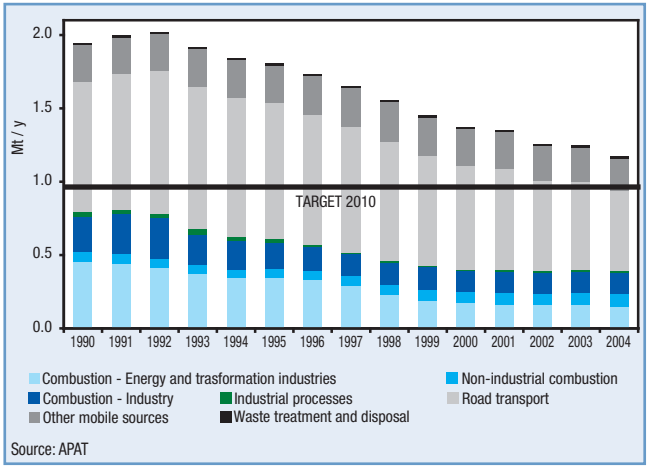


Figure 6.4: National emissions of nitrogen oxides (NO_x)

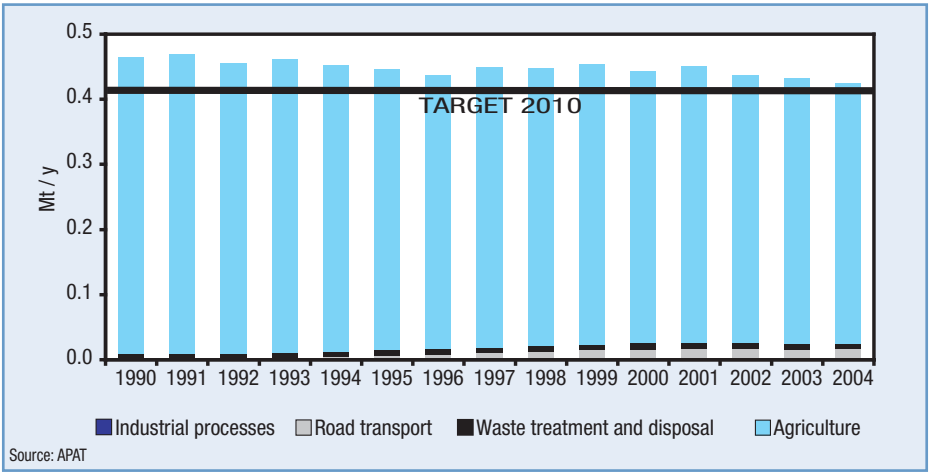


Figure 6.5: National emissions of ammonia (NH_3)

Under the Council Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants, Italy is obliged to reduce its national emission of ammonia to 0.419 Mt by 2010, which means a further 2% reduction compared to 2004.

TROPOSPHERIC OZONE PRECURSORS (NO_X AND NMVOCS) EMISSIONS: TRENDS AND SECTORAL BREAKDOWN

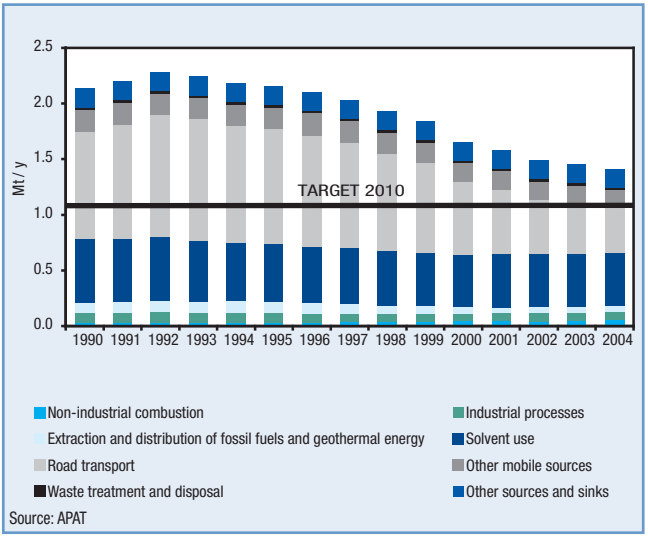


Figure 6.6: National emissions of non-methane volatile organic compounds (NMVOCs)

INDICATOR - A01.004

According the Council Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants, Italy is obliged to reduce its national emission of NMVOCs to 1,159 Mt by 2010, which means a further 18.8% reduction compared to 2004. In Italy NMVOCs emissions rose by 7% between 1980 and 1992 (the peak year), and then dropped by 37.8% between 1992 and 2004.

BENZENE (C_6H_6) EMISSIONS: TRENDS AND SECTORAL BREAKDOWN

INDICATOR - A01.007

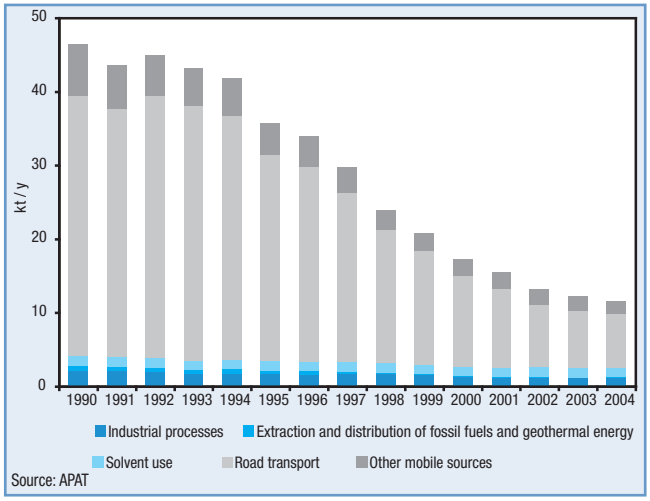


Figure 6.7: National emissions of benzene (C_6H_6) according to the SNAP97 sectoral breakdown

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 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 road vehicle use in city centres and its ascertained carcinogenicity render benzene one of the most important pollutants in urban areas.

PARTICULATE MATTER (PM_{10}) EMISSIONS: TRENDS AND SECTORAL BREAKDOWN

INDICATOR - A01.005

Particulate matter of 10 microns or less in diameter has both natural and human sources. Man-made particles are mainly due to traffic and combustion processes (manufacturing plants and household heating systems). Natural particles generally originate from soil erosion, sea spray, biogenic aerosol production (plant fragments, pollen, spores), volcanic emissions and the long-distance transport of sand (Sahara dust). A large part of the particles present in the

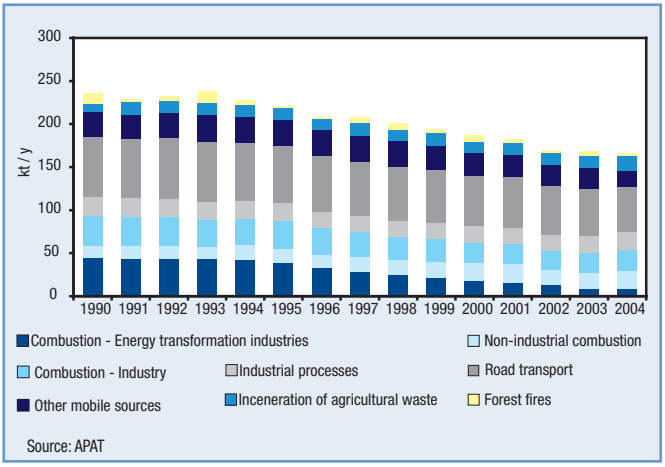
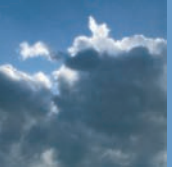


Figure 6.8: National emissions of PM_{10} particulate matter, according to the SNAP97 sectoral breakdown



atmosphere is of 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 set of indicators developed for this edition of the environmental data Yearbook are based on the information collected by the Agency on an annual basis according with the Council Decisions 97/101/EC and 2001/752/EC (EoI Decisions) that establish a reciprocal exchange of information and data provided by air pollution monitoring networks and stations within the Member States.
In parallel with the information flow under the EoI decision, the legislation regulating the assessment and management of air quality (Legislative Decree 351/99, Ministerial Decree 60/2002 and Legislative Decree 183/2004) provides for another information flow from the local level to the national and European levels.
Based on the recent statutory criteria for selecting the monitoring stations and in view of the imminent entry into force of the new provisions providing for a single information flow, the air quality monitoring networks set up in Italy are currently being upgraded and streamlined. This process has already been (totally or partially) completed in several regions, but must still be implemented in others.
While awaiting the definition of a set of monitoring networks and stations meeting the statutory criteria and constituting a uniform and more complete information base representing air quality in our country, , the data collected under the EoI decision have been used to verify several of the most significant limit values, under the regulations for assessing air quality for the protection of human health.
This overview presents some indicators relating to PM_{10} particulate matter, tropospheric ozone and nitrogen dioxide.

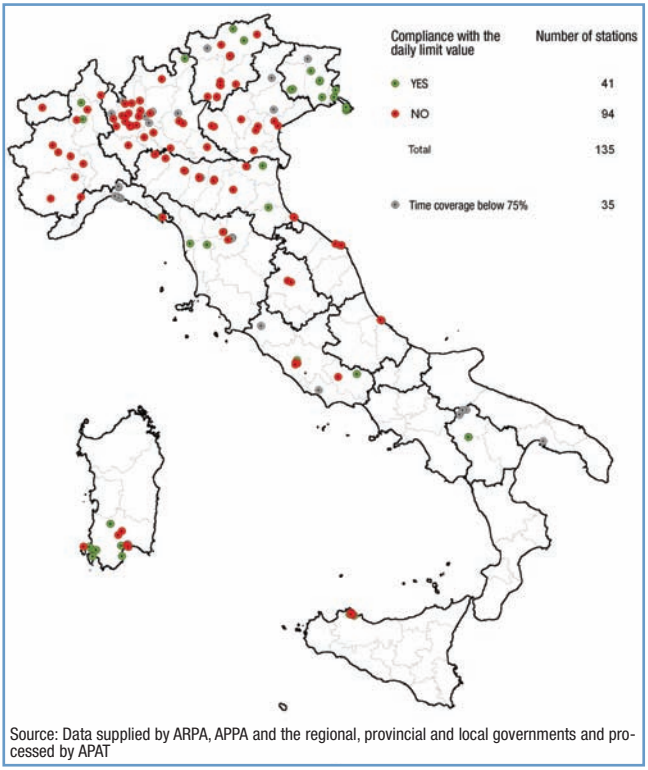
AMBIENT AIR QUALITY: PM_{10} PARTICULATE MATTER

INDICATOR - A01.011

Particulate Matter (PM) consists of airborne particles in solid or liquid form with an aerodynamic equivalent diameter of between 0.1 and about 100µm. The acronym PM_{10} identifies the airborne particles having an aerodynamic equivalent diameter of up to 10 µm. They tend to remain in the air for long periods of time and, therefore, can be transported very far from the point of emission; these particles have a very complex and variable chemical composition, and are capable of penetrating into the human respiratory system beings with negative effects on health.

PM_{10} particulate matter is a pollutant with an important secondary fraction.

The sources of airborne particles may be either natural (wind erosion, volcanic eruptions, forest fires) or anthropogenic (road vehicle traffic and combustion of various kinds). Road vehicles, in particular, contribute to airborne particle pollution through exhaust emissions, road surface wear and tire wear. Anthropogenic sources of PM_{10} also generate the many gases causing secondary pollution and which determine the formation of very fine particles, such as, for example, sulphur and nitrogen oxides, VOCs (Volatile Organic Compounds) and ammonia.



Source: Data supplied by ARPA, APPA and the regional, provincial and local governments and processed by APAT

Figure 6.9: PM_{10} particulate matter: overview of monitoring stations based on compliance with the daily limit value (50 µg/m³ that is not to be exceeded more than 35 days per calendar year) 2004

In 2004, 135 monitoring stations (out of a total of 170) supplied a set of valid data with a time coverage of at least 75%.

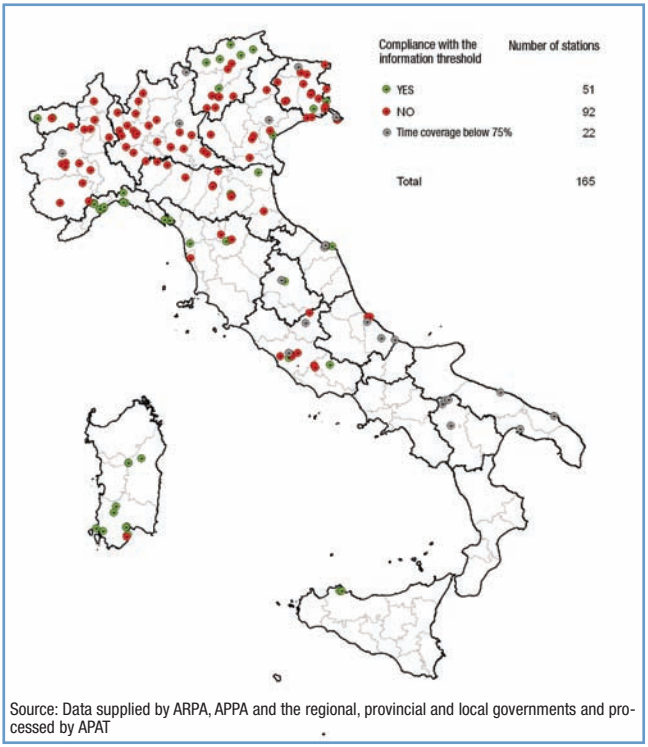
The daily limit value for PM_{10} is 50 µg/m³; this limit value is not to be exceeded more than 35 days per calendar year. This limit was introduced in 2005.

Figure 6.9 shows, with respect to 2004, the monitoring stations nationwide that exceeded or did not exceed the daily limit value. It can be observed that 94 stations (69.6% of the total) record exceedances of the daily limit value for between 36 and 188 days in the year, while the remaining 41 stations (30.4%) respect it.

AMBIENT AIR QUALITY: TROPOSPHERIC OZONE (O_3)

INDICATORE - A01.012

Tropospheric ozone is a secondary pollutant formed by photochemical reactions in the presence of primary pollutants such as nitrogen oxides (NO_x) and volatile organic compounds (VOCs). Tropospheric ozone can seriously harm both human health and the ecosystems, as well as agriculture and materials. Photochemical pollution is a cross-border phenomenon that can concern huge geographical areas (the Po River basin, for example). Consequently, the excess values recorded in a certain area are not always the result of emissions from sources located in that area; it is often the case, for example, that the largest contribution comes from adjacent areas. The highest concentrations of ozone are recorded in the hottest months of the year at the hottest time of the day. In urban areas ozone tends to form and to transform itself very rapidly, according to a behaviour that differs greatly from other pollutants. The principal emission sources of ozone precursors are road vehicles, household heating systems and power plants.



Source: Data supplied by ARPA, APPA and the regional, provincial and local governments and processed by APAT

Figure 6.10: Ozone: overview of monitoring stations based on compliance with the information threshold, hourly-average concentration value of 180 µg/m^3 (2004)

One of the principal threshold values according to the current legislation (Commission Directive 2002/3/EC, translated into Italian law by Legislative Decree 183/2004) for the protection of human health is the information threshold of 180 µg/m^3 as the hourly-average concentration value, which is the limit value beyond which there is a hazard for human health in the case of short-term exposure of several sensitive population groups.

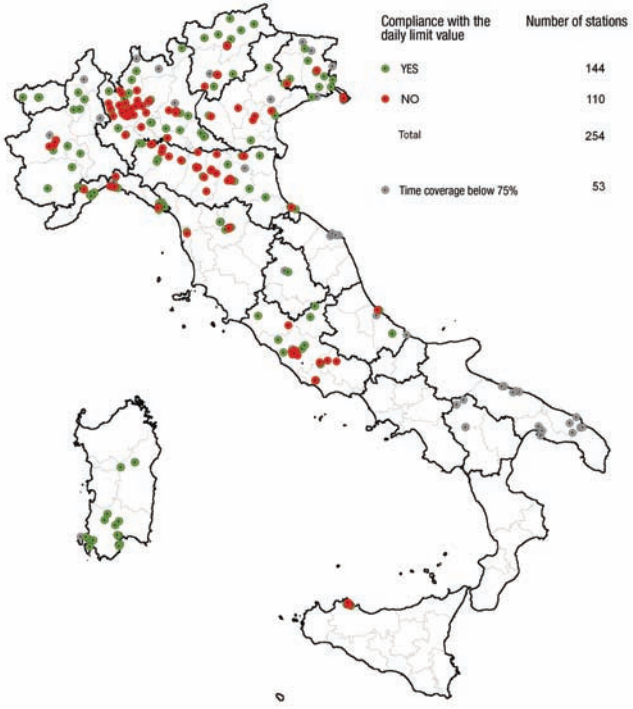
Figure 6.10 shows, with respect to 2004, the nationwide distribution of monitoring stations with the indication of the station that exceeds or does not exceed the information threshold. It can be observed how the figure confirms that the monitoring stations are still non-uniformly distributed: many provinces still lack stations and the highest densities can be found in the North. 40% of the stations (67 out of the total of 165) did not record exceedances of the information threshold; most of this stations are located in the North; there is a twofold reason for this: first of all, the broader network coverage and, secondly, the well-known weather peculiarity of the Po River basin.

AMBIENT AIR QUALITY: NITROGEN DIOXIDE (NO_2)

INDICATOR - A01.013

Nitrogen dioxide (NO_2) is a pollutant with a significant secondary component that is a result of the oxidation, in the atmosphere, of nitrogen monoxide; only a very small part of NO_2 is released directly into the atmosphere. The principal sources of emission of nitrogen oxides (NO_x=NO+NO_2) are road vehicles; other sources being household and industrial heating systems, power plants and a broad array of industrial processes. Nitrogen dioxide, therefore, is a very diffuse pollutant without localised high-concentration values. Nitrogen dioxide has negative effects on human health and, together with nitrogen monoxide, causes eutrophisation, photochemical smog (it is a precursor for the formation of secondary pollutants, such as tropospheric ozone and secondary fine airborne particulate matter) and acid rain.

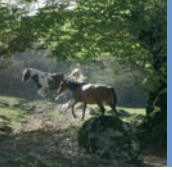
In 2004, 254 monitoring stations (out of a total of 307) supplied a set of valid data with a time coverage of at least 75%.



Source: Data supplied by ARPA, APPA and the regional, provincial and local governments and processed by APAT

Figure 6.11: Nitrogen dioxide: overview of monitoring stations based on compliance with the annual limit value (from 2010) of 40 µg/m³ (2004)

Figure 6.11 shows, with respect to 2004, the nationwide distribution of the monitoring stations with the indication of the station that exceeds or does not exceed the annual limit value of 40 µg/m³, which will enter into effect in 2010, according to Legislative Decree 351/99 and Ministerial Decree 60/02. It can be observed that the annual limit value has been respected in 144 stations (56,6% of the total) while it has been exceeded in 110 stations, with maximum value of 85 µg/m³.



7. BIOSPHERE

INTRODUCTION

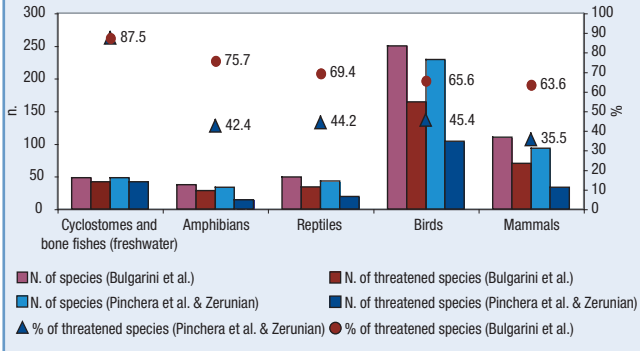
The biosphere is the product of interactions between soil, rocks, water, air and the living organisms they contain. It constitutes a complex system - the terrestrial ecosystem - in dynamic balance with the Earth's other components. A reductive approach (i.e. which investigates only a part of the system, while keeping the surrounding conditions unchanged) is not the best way of tackling its problem; a holistic survey method, aimed at understanding the complexity of the system, is much more advisable.
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, the selection of these indicators required an effort in order to represent the major problems related to the preservation of biodiversity, the effects of climate change, the establishment of parks and nature reserves, the protection of forests and the landscape.

The set of indicators shows 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, at national and international level, aimed at combating the loss of biodiversity. Direct measures are concerned with protecting species and ecosystems, while indirect measures are aimed at reducing the sources of pressure. The gradual, albeit constant, increase of forest areas in Italy 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

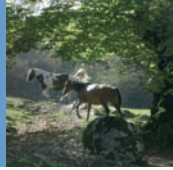
INDICATOR - A02.001

Figure 11.1 highlights the particularly high level of threat affecting Vertebrates living in Italy; the percentage of threatened species, compared to the total, varies depending on the data source, between 68.4% and 47.5%. The level of risk is concentrated, in particular, on certain classes: the situation of Fish, for example, is particularly worrying, because of a large number of species in critical danger. Their extinction risk in the foreseeable future is very high. As for the Invertebrates (which are not represented in the figure below) the situation looks equally serious.



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;
Bulgarini F.,Calvario E., Fraticelli F., Petretti F., Sarrocco S., (Eds.), 1998, Libro rosso degli Animali d'Italia;
Pinchera F., L. Boitani & F. Corsi, 1997. Application to the terrestrial vertebrates of Italy of a system proposed by IUCN for a new classification of national Red List categories. Biodiversity and Conservation 6, 959-978.

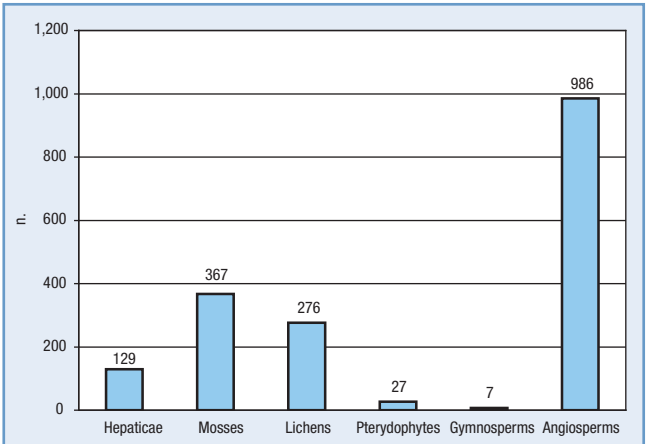
Figure 7.1: Vertebrate species living in Italy and included in the "Red Lists"



LEVEL OF THREAT FOR PLANT SPECIES

INDICATOR - A02.002

Figure 7.2 shows the high threat affecting Italian plant species, highlighting that 772 species of Hepaticae, Mosses and Lichens are at risk, and 1,020 species of vascular plants (Pterydophytes, Gymnosperms and Angiosperms). In addition, a large number of Bryophytes (Hepaticae and Mosses) are extinct (205 species), endangered (237) or rare (54), with a total amount of some 40% of all known species; furthermore, about 10% of Lichens are included in the IUCN Red List of threatened species (276).

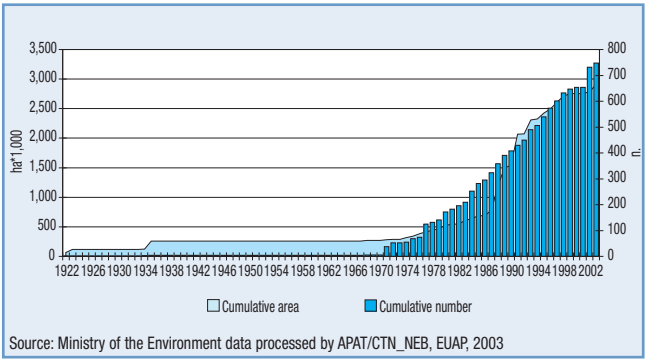


Source: Data processed by APAT and drawn from:
Conti, Manzi, Pedrotti, 1992, Libro Rosso delle Piante d'Italia. Ministero dell'Ambiente, WWF Italia;
Conti, Manzi, Pedrotti, 1997, Liste Rosse Regionali delle Piante d'Italia. WWF Italia, Soc.Bot.Ital., Univ. di Camerino;
Scoppola, Spampinato, 2005, Atlante delle specie a rischio di estinzione (CD-ROM). Min. Amb. D.P.N., Soc.Bot.Ital., Università della Tuscia, Università di Roma La Sapienza.

Figure 7.2: Threatened plant species in Italy

PROTECTED TERRESTRIAL AREAS

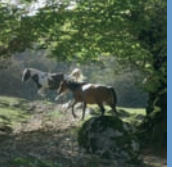
INDICATOR - A2.009



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

Figure 7.3: Annual variation of the cumulative area and cumulative number of protected terrestrial areas

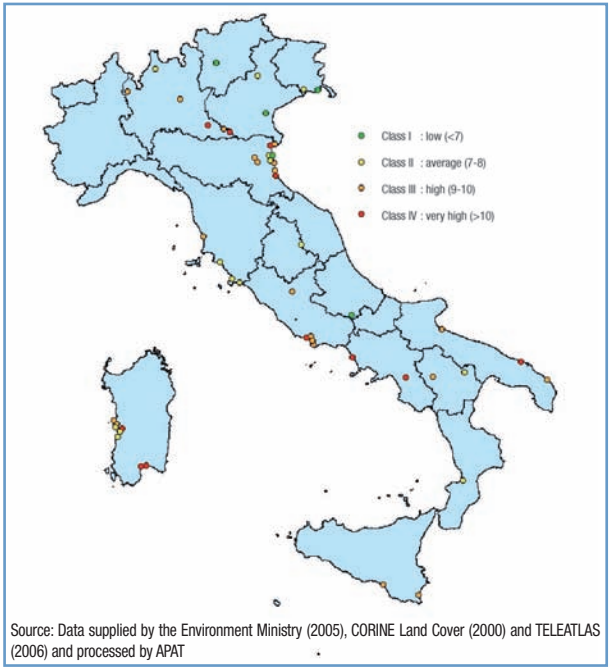
In Italy, protected areas cover 9.7% of the country. Figure 7.3 shows a significant increase of the total surface of protected terrestrial areas and of their number since the mid-1970s, mainly promoted by the regional governments. The various measures - before and after the 1991 National Framework Law on protected terrestrial areas - have constantly encouraged the implementation of protection activities. Since the second half of the 1990s also the central government has been involved in setting up many new protected areas, acting alongside the regional governments.



HUMAN PRESSURE ON WETLANDS OF INTERNATIONAL IMPORTANCE

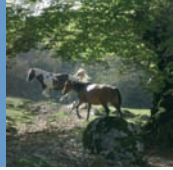
INDICATOR - A02.015

The index shown in figure 7.4 summarizes the main pressure factors on wetlands protected under the 1971 Ramsar Convention (namely: urbanization, farming and infrastructures). The index of human pressure mainly features medium to high values. Class III (high pressure), is the most represented with 20 areas. Classes III and IV, together, concern 62% of all wetlands. This percentage shows the precarious balance of these highly sensitive environments, threatened from the surrounding human activities.



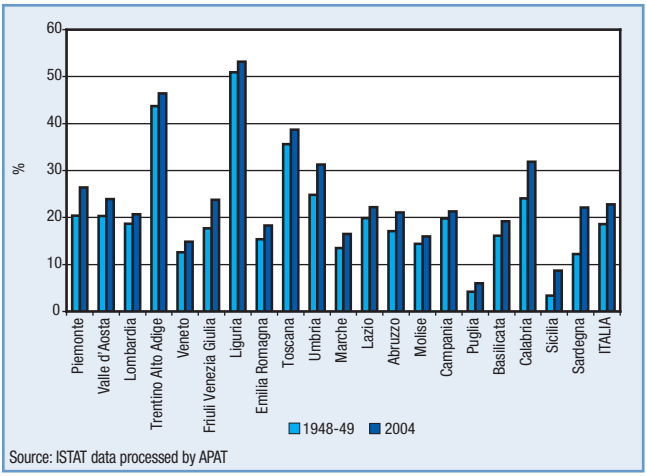
Source: Data supplied by the Environment Ministry (2005), CORINE Land Cover (2000) and TELEATLAS (2006) and processed by APAT

Figure 7.4: Human pressure on the Ramsar areas



FOREST AEREA: CURRENT SITUATION AND TRENDS

INDICATOR - A02.016



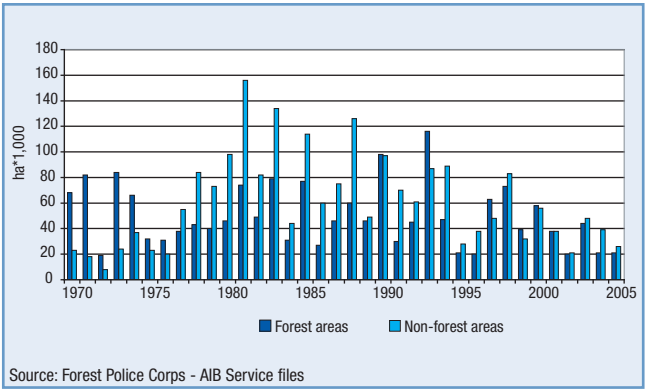
Source: ISTAT data processed by APAT

Figure 7.5: 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 2004, proof of a gradual - yet continuous - increase of total forested areas in Italy.

EXTENT OF FOREST FIRES

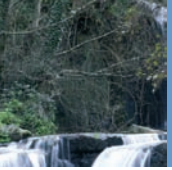
INDICATOR - A02.017



Source: Forest Police Corps - AIB Service files

Figure 7.6: Forest and non-forest areas hit by fires

The overall data series over the 1970 - 2005 period (figure 7.6) features an up and down trend of forest fires, with peaks and troughs. Data shows a highly critical period in the 1980s, followed by some irregular peaks and by a gradual mitigation from 2000 to 2005.



8. 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 human beings, 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 withdrawal and consumption, and qualitative, descending from natural and human activities, which determine increasing and, often irreversible, forms of pollution.

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

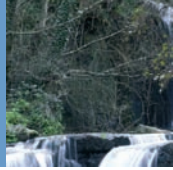
A more effective management of the quantitative aspects of water resources is expected following the full transposition into Italian law of the EU Water Framework Directive, which provides for the planning and management of this resource at the level of "River Basin Districts", and following the enactment of DM 185/03, a measure regulating the technical standards for the reutilization of wastewater, and DM of 28 July 2004, which lays down the criteria for defining the "minimum flow" of rivers, and calculating the "river basin water budget"; a key component for assessing this budget is precisely the measurement of river discharge at the mouth section.

Updated knowledge on the actual and potential availability and multiple use of water resources may be found in, (i) the 2005 Report to Parliament on the State of the Environment (CNA 1972 updated to 1989, IRSA 1999), (ii) the data released by the regional authorities, in connection with the Water Protection Plans produced in pursuance of Legislative Decree 152/99, (iii) the data published by the River Basin Authorities, and (iv) the data collected directly by the former Hydrographic Service Offices, which have been taken over by the Regional Governments.

The trophic conditions of coastal waters do not show any significant changes compared to last year: 58% of the sampled stations, in fact, featured a high trophic "quality status", in 34% of the stations it was good, moderate in 7% and poor in only 0.4% of stations. Therefore, most of the Italian coastal waters are averagely in good ecological condition. The most critical conditions were observed in the Upper Adriatic and Tyrrhenian seas, at river mouths where wastes from large urban and industrial agglomerations pour into the sea. Emilia Romagna is the most critical region, where most of the stations feature moderate-ranking readings, with the sole exception of the area of Cattolica. The most critical trophic status on the Tyrrhenian coastal waters can be found in Campania and Lazio, the former region ranking poor along the coast at the mouth of the Sarno river moderate at mouth of the Volturno river and at Portici, while in the latter region the locations featuring moderater-ranking readings are Fiumicino, for the province of Rome, and Minturno for the province of Latina. On the Ionic coastal. On the Ionic coastal waters and the coast of Sardinia and Sicily all the sites featured low trophic levels, with a high or good ecological condition.

Transition waters, which comprise the final sections of rivers and coastal ponds, lagoons and lakes, whose waters are influenced by the coastal waters, are highly variable ecosystems with a large degree of biodiversity. In particular, the Venice Lagoon, which has an extension of 50,000 hectares and is, therefore, the largest and most important lagoon in the country. Its dynamic is the result of a multiplicity of natural and human factors: natural and induced ground subsidence, long and medium-term sea-level fluctuations, the accumulation of river sediments, the seawater dynamics along the coast.

The criticalities of the Venice Lagoon are many and complex, ranging from the morphological deterioration caused by the increased volumes exchanged with the sea and the increased erosion strength of the sea currents, to the flattening of the seabed, where the tides now feature the same characteristics of the open sea; from the bad quality of the lagoon water and sediments, to the releasing of pollutants by the contaminated sites in the industrial area of Porto Marghera; from the wave movements caused by water traffic, which is threatening the city's immense architectural heritage, to illegal clam fishing;



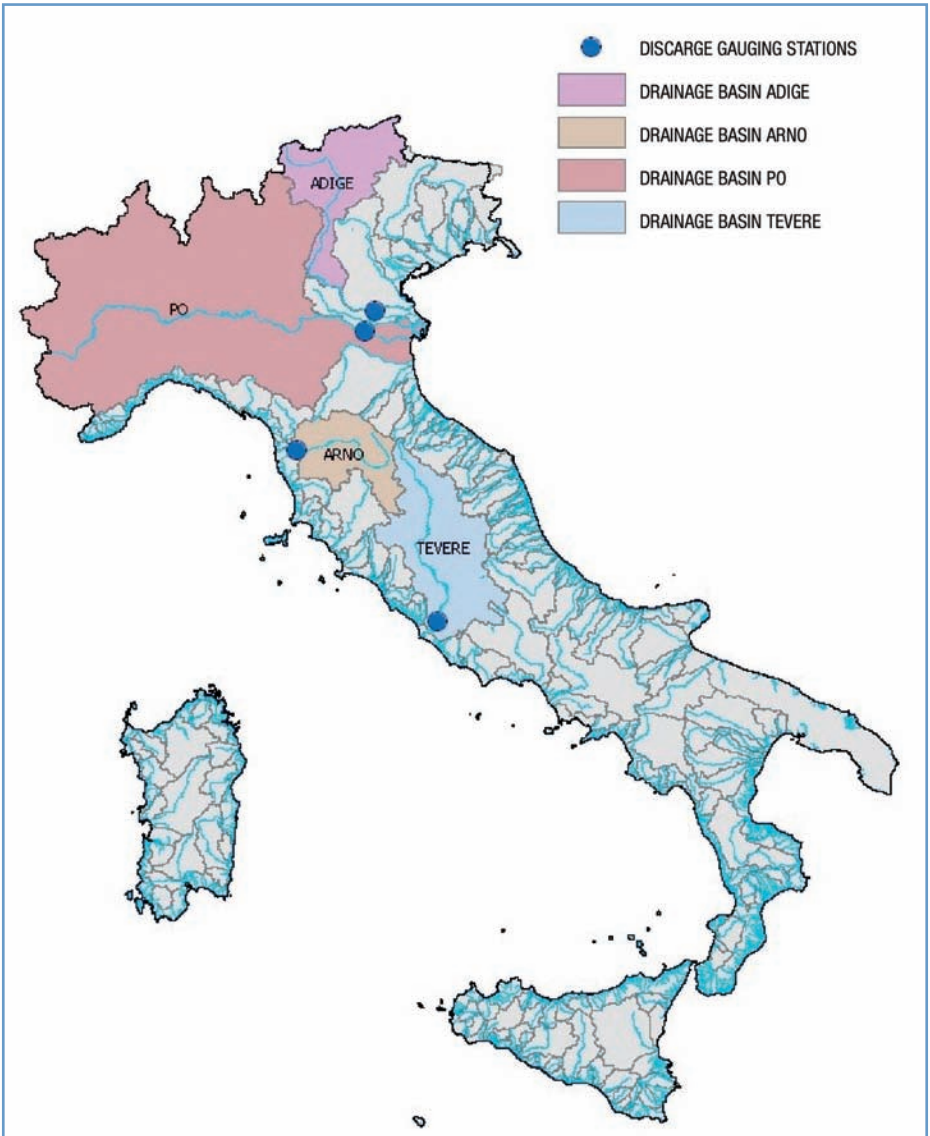
last but not least, the increased frequency of the "high waters", as a result of the interplay of the ground subsidence typical of Venice and the eustatism affecting the entire planet.
With regard to the Ecological State of Rivers (ESR), 39% of these were found to be in good or very good condition, corresponding to the environmental targets set out in Legislative Decree 152/99 (by 2016), plus another 40% found to be in a sufficient condition, corresponding to the minimum target to be achieved by 2008). The overall situation, therefore, can be considered to be satisfactory.
The Ecological State of Lakes (ESL) has been monitored in 11 regions and 2 autonomous provinces, totalling 107 lakes and 120 monitoring sites. Among the monitored lakes, 44 ranked in class 3 (sufficient quality), 37 in class 2 (good quality) and 3 in class 1 (very good quality).
This overview shows the chemical quality conditions of underground waters, expressed by the CSUW factor, for 9 Italian regions and 1 autonomous province. 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, as a result of 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 USE

The local availability of this precious resource depends on the natural water cycle, from rainfall through rivers flow in drainage basins, evaporation and the distribution of water into the different typologies of surface water and groundwater bodies, according to the climate conditions and the nature of soils.
Only a part of available water is actually renewable. The sustainable use of water requires that, on the long term, water withdrawals must not exceed the renewable fraction.
River discharges, besides representing a key element for estimating the availability of water, are also a fundamental information for assessing pollution load rivers carry into final water recipients, 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 stage-discharge relationship) will not undergo any significant changes, the operation is not carried out and river water level measurements are used instead. Geographical coverage is lower compared to 2001, because the transfer of the SIMN offices to the control of the ARPA/Regional Governments has required the reorganization of the data surveying and validation activities.

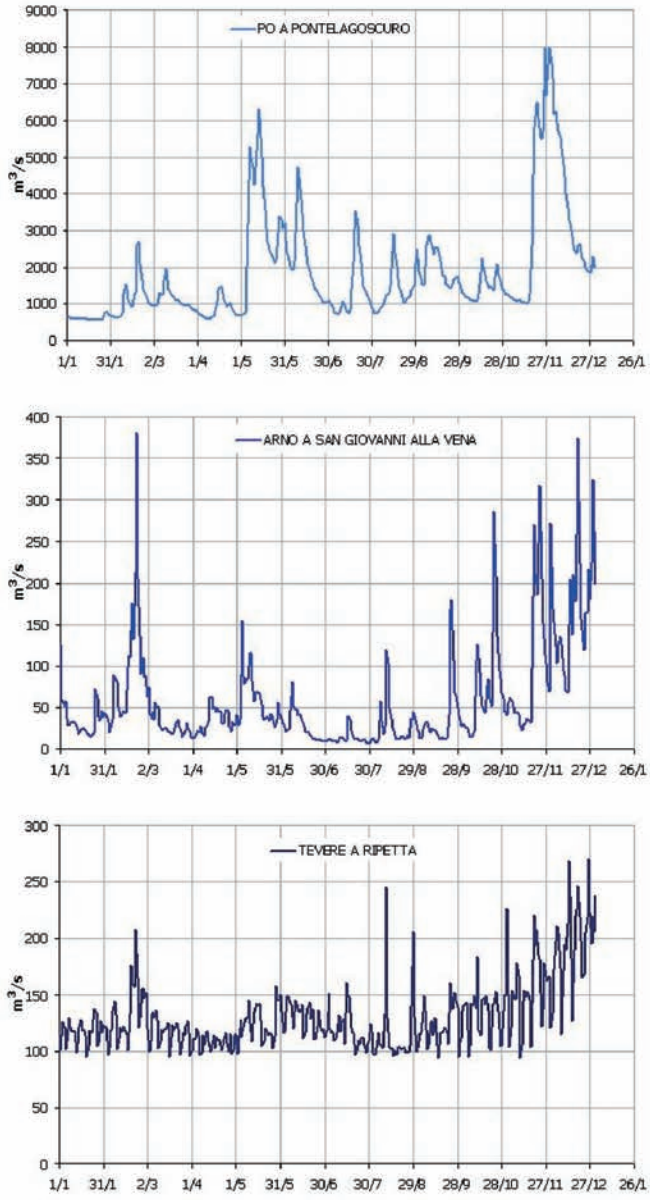
DISCHARGES

INDICATOR - A03.013



Source: Regional/ARPA data processed by APAT

Figure 8.1: Gauging stations located at sites near the mouths of several important Italian rivers (2002)

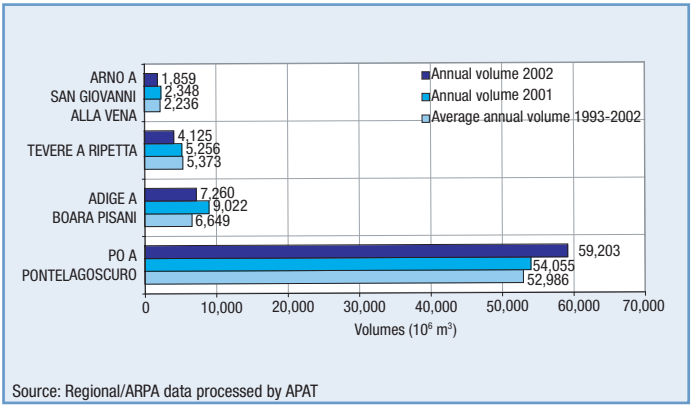


Source: Regional/ARPA data processed by APAT

Figure 8.2: Daily discharges (m^3/sec) of several Italian rivers (2002)

This indicator measures the volume of water flowing through a cross-section of a river per unit time (a second). The regular measurement 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 flood 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.



Source: Regional/ARPA data processed by APAT

Figure 8.3: Annual flow volumes (m^3) at the mouths of several Italian rivers (2002)

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

Figure 8.1 shows the location of the gauging stations, near the mouths of the most important Italian rivers, for which data is available for 2002. Figure 8.2 shows the daily discharge graphs for 2002 for several Italian rivers. Figure 8.3 compares the annual flow volumes for 2001 and 2002 with the reference period (1993-2002).

For a more significant comparison with the benchmark period, it would be convenient to take account of the human activities affecting the water regime, such as water withdrawals, diversions, dams, which have considerably changed in recent years. Only by subtracting these effects from the total dicharge can it be possible to assess the influence of climate changes on discharge variations.

WATER QUALITY

Quality of coastal and transitional waters

The importance of coastal waters for Italy 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 waters, and the transitional waters, represent 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, upwelling, 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 waters: the *Marine Trophic Index* (TRIX), *Bathing Quality Standards* and the *Index of Bacteriological Quality* (IBQ), and, with regard to transitional waters, an analysis of the state of the Venice Lagoon. This year's edition of the Yearbook, however, does not feature updated figures for two indicators: *Bathing Quality Standards* and the *Index of Bacteriological Quality* (IBQ).

Moreover, the indicator for Waters capable of sustaining shellfish life concerns both types of water habitats.

Consistently with the Directive 2000/60/EC on water policies, and in particular with respect to transitional waters, as regards the Venice Lagoon we have integrated the conventional indexes employed to described water quality with several indexes related to the morphological condition of the Lagoon. In particular, this overview contains on indicator on the average sea level rise at Venice.

MARINE TROPHIC INDEX (TRIX)

INDICATOR - A03.001

Source: Si.Di.Mar. (Environment Ministry) data processed by APAT

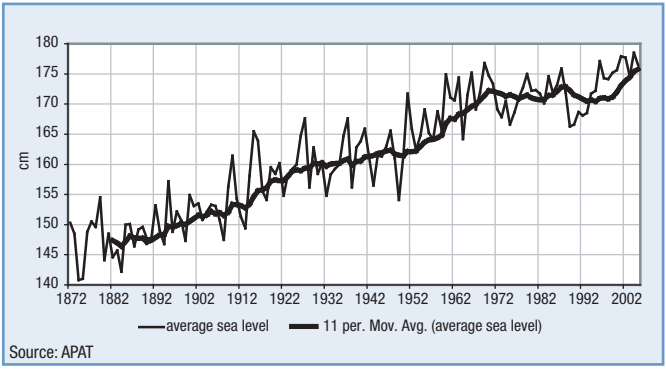
Figure 8.4: TRIX, average annual quality status of coastal waters (June 2004-June 2005), within a 500 m range from the shore

The trophic quality status of the coastal wates (i.e. the quantity of biomass, phytoplankton and nutrients) is represented by the TRIX index (figure 8.4). 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 Sardinia.

According to the trophic scale of coastal waters, blue is high, light blue means good, yellow means moderate and red means poor. Examining the figures relating to the period between June 2004 and June 2005, it can be seen that 58% of the sampled sites are classed high, 34% good, 7% moderate and only 0.4% poor (figure 8.4). 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 moderate ranking. 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 and moderate at the mouth of the Volturno river and in the area of Portici. In Lazio, the sites with a poor ranking are located at Fiumicino, in the province of Rome, and Minturno, in the province of Latina. In the case of the Ionian Sea and the Sardinian and Sicilian coastlines, all the sampling sites feature scarce trophic conditions and, therefore, an ecological quality status between high and good.

AVERAGE SEA LEVEL RISE (ICLMM)

INDICATOR - A03.026



Source: APAT

Figure 8.5: Average level of tides at Venice (Punta Salute)

This indicator groups the measurements of the sea level rise at Venice, as a result of the combined effects of eustatism (global sea level rise) and subsidence (soil compaction), due to the peculiar geological nature of the North Adriatic coast. It is of key importance for the conservation studies and projects for the Venice Lagoon and the coastal areas subject to flooding.

The historical series of the average seal level at Venice features a growing trend, summarised by the mobile average. In particular, we can observe a heightening of the phenomenon between the 1950s and 1970s, which has been related to the water harvesting by the industrial plants at Porto Marghera and consequent water-table depletion. Since the closing down of the wells in the mid-1990s, the situation seems to have stabilised, although there has been a new phase of growth in the last 10 years.

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 underground waters. 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* (LPM), due to man-made pollution, to the biological state with the *Extended Biotic Index* (EBI) of the bentonic macro-invertebrates and the *Ecological State of Rivers* (ESR), besides indexes relating to Macro-descriptors and loads. In the case of lakes, the *Ecological State of Lakes* (ESL) is taken into consideration, while the *Chemical State of Underground Waters* (CSUW) applies to underground waters.

Underground waters 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.

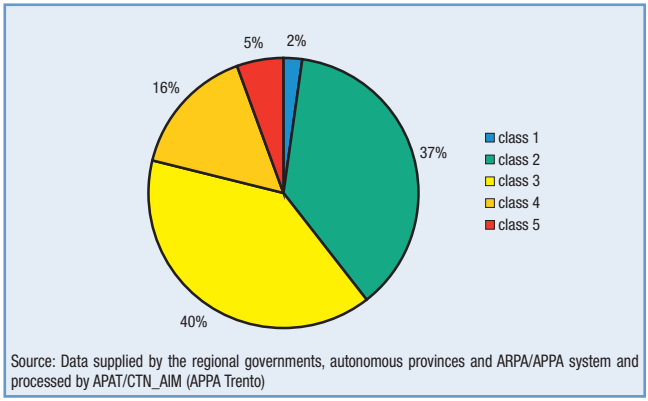
The overall environmental condition of underground waters is represented by the quantitative state, which measures the variance of this body of water from its replenishment balance, and the chemical state, which is defined by the *Chemical State of Underground Waters* (CSUW), which takes account of both 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 ESR, ESL and CSUW indicators.

ECOLOGICAL STATE OF RIVERS (ESR)

INDICATOR - A03.007

The Ecological State of Rivers (ESR) is determined by integrating the LPM (built on the parameters as follows: dissolved oxygen, BOD_5, COD, NH_4, NO_3, total phosphorus, inorganic phosphate, Escherichia coli), with the EBI. The ESR ratings comprise five decreasing quality classes: class 1 = very good, class 2 = good, class 3 = sufficient, class 4 = poor and class 5 = bad.



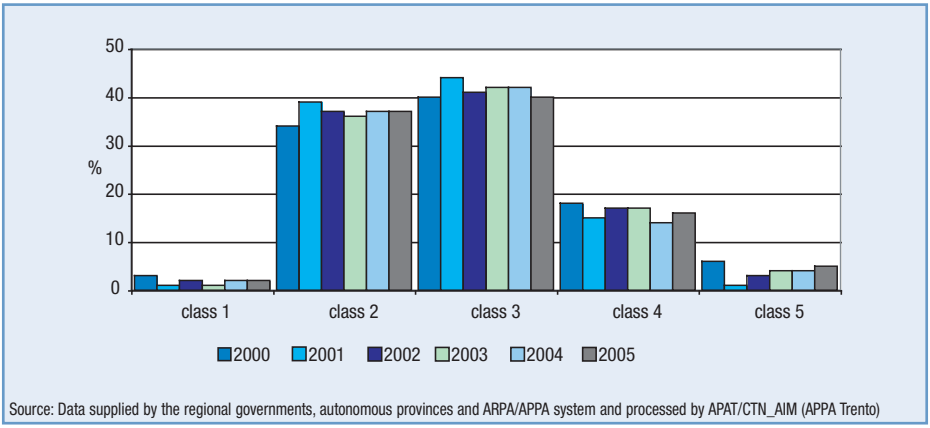
Source: Data supplied by the regional governments, autonomous provinces and ARPA/APPA system and processed by APAT/CTN_AIM (APPA Trento)

Figure 8.6: Percentage distribution of the quality classes of the ESR index (2005)

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.

The ESR values for 2005 are based on readings from 716 nationwide monitoring sites. The distribution by quality class indicates a general non-critical situation. The 2000-2005 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.

In 2005, 79% of the sites featured a condition between sufficient and very good. In particular, 2% of the monitored sites were very good, 37% good and 40% sufficient (figure 8.6).



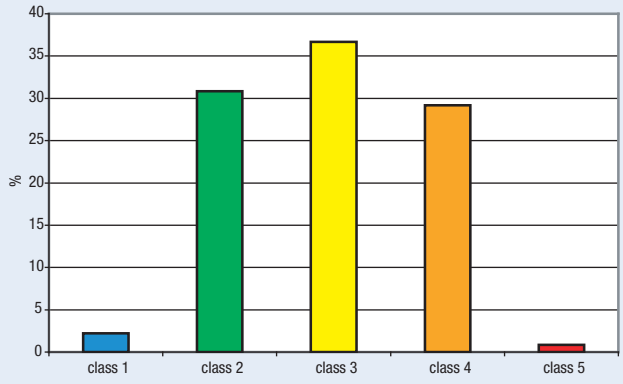
Source: Data supplied by the regional governments, autonomous provinces and ARPA/APPA system and processed by APAT/CTN_AIM (APPA Trento)

Figure 8.7: Percentage distribution of the quality classes of the ESR index

ECOLOGICAL STATE OF LAKES (ESL)

INDICATOR - A03.008

The ESL defines the ecological state of the lakes, based on the different trophic states. The ESL data, confirmed by those relating to the presence of special chemical pollutants, allow the assignment of the Environmental State of Lakes (EnSL). Considering a total of 120 stations (figure 8.8), representing 107 lakes: 44 (36%) are ranked in class 3 (sufficient), 37 (31%) in class 2 (good), and 3 (2.5%) in class 1 (very good). With regard to the EnSL, the value of the supplementary parameters, available for 9 regions and 2 autonomous provinces, 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 very good account for 70% of all sites.

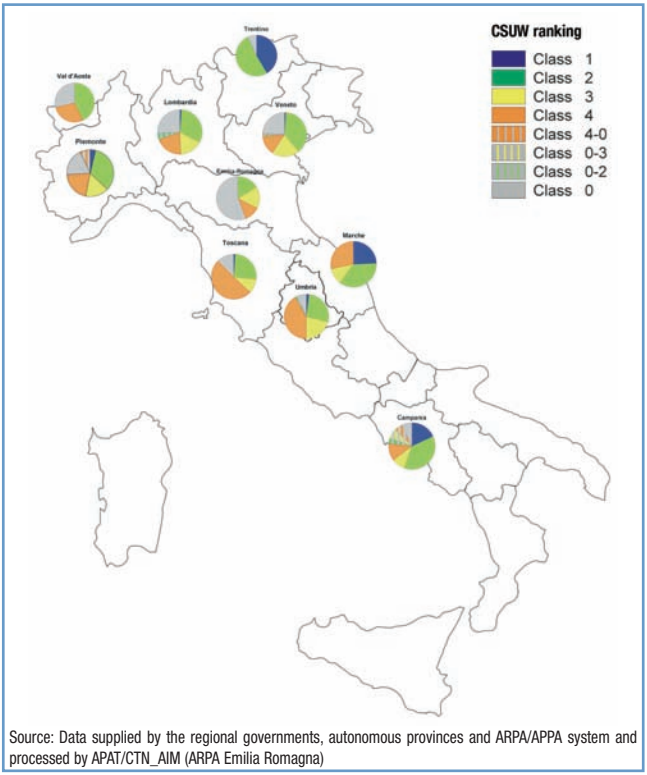


Source: Data supplied by the regional governments, autonomous provinces and ARPA/APPA system and processed by APAT/CTN_AIM (ARPA Lombardia)

Figure 8.8: Percentage distribution of the stations according to the 5 quality classes of the ESL index (2005)

CHEMICAL STATE OF UNDERGROUND WATERS (CSUW)

INDICATOR - A03.011



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

Figure 8.9: Quality of underground bodies of water, percentage of total monitored sites (2005)

The CSUW 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 CSUW index is based on the average concentrations of the basic parameters (electrical conductivity, chlorides, manganese, iron, nitrates, sulphates, ammonium ion), 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 8.9 shows the nationwide extension in 2005, covering 9 regions and 1 autonomous province. Major criticalities in the chemical quality of underground waters occur when nitrates exceed 50 mg/l (threshold of water potability), 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 - 25% of the total - featuring low chemical quality for natural reasons.

9. GEOSPHERE

INTRODUCTION

The geosphere is the solid surface of the Earth and consists of, (a) the soil, i.e. the uppermost layer of the Earth's crust formed by pedogenic processes, which makes life on Earth possible, (b) the subsoil, i.e. the bed of 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 (c) the land, meaning the areas on which all human activities take place. The national evolutionary processes of this system, combined with those of the other environmental systems, give rise to phenomena that can generate risks of varying intensity, if they interact with human activities (natural risk).
Knowledge of the factors that regulate the set of processes and phenomena operating within the Geosphere, therefore, plays a strategic role in developing policies aimed at combining the needs and requirements of communities, including safety, and a careful and respectful management of the natural environment and its resources.
Notwithstanding the available information on land use can be improved, it is possible to draw a reliable picture of the Italian situation, that with respect to soil is still rather limited and rather patchy, with a few exceptions.
Yet soil is one of the key factors for environmental balance, playing a priority role in protecting underground waters from pollution, controlling the quantity of CO_2 in the atmosphere, regulating surface water flows, with direct consequences on flooding and landslides, preserving biodiversity, with respect to nutrition cycles, etc. The state of health of the soil affects the plant biomass, with obvious repercussions on the food chain. Soil can undergo serious degenerative processes, as a result of bad farming practices, the concentration of people and economic activities in certain areas, the increased potential sources of contamination, climate change and changes in soil use, which limit or even inhibit its functionality.
Soil, therefore, has an enormous environmental importance, which is acknowledged in the directive proposal on the management, assessment and preservation of this resource (COM (2006) 232 - *Soil Thematic Strategy*). In Italy, soil has historically been considered only in relation to its production potential and, within the Agency system, activities are generally limited to aspects related to contaminated sites. Soil information, therefore, is generally collected and filed by national or regional bodies depending on the Ministry of the Environment. Unfortunately, the bodies performing regional pedological services possess a large amount of environmentally significant information on soil, but this latter is often inhomogeneous, . Without a proper process of harmonization the available information can hardly be used to build national indicators, and provide an overall picture of the environmental condition of soil. Hence, collaboration initiatives have been entered into with these soil-investigating bodies at national, regional and even European level.
A first result of this cooperation is the publication of the “White Paper on the State of Soil in Italy”, which is the first step in the implementation of a series of joint projects.
We are also undertaking projects aimed at defining the common and shared criteria for building environmental soil indicators based on the harmonization of the available regional information, in line with the INSPIRE directive proposal (SIAS project).

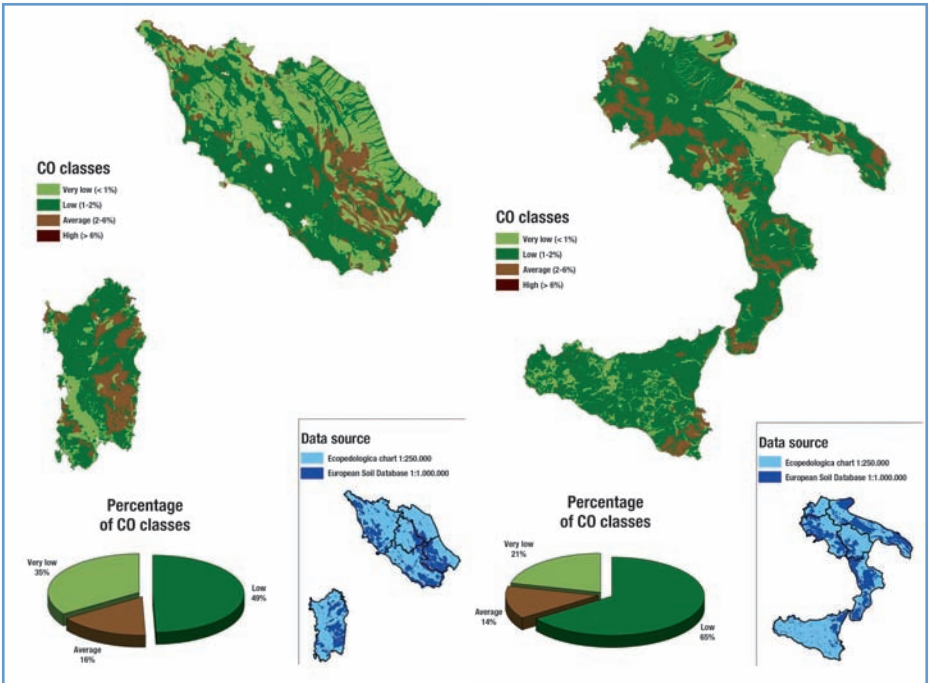
SOIL QUALITY

The soil quality indicators are primarily state indicators representing the chemical, physical and pedological characteristics of the soil (pH, organic substances, texture, etc.); they are necessary to understand what takes place 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 according to a set of common benchmarks, it has been possible to provide a national overview only of the indicator relating to organic carbon.
Another set of indicators describes the levels of certain chemical elements, which can contaminate the soil and, consequen-

tly, 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. The *Content of heavy metals in farmland* indicator highlights larger quantities of certain metals (zinc, copper, lead and cadmium) in the surface layers, compared to deeper down, probably as a result of pollution from widespread sources (farming, road traffic, etc.). Although such an indicator is very interesting, especially because of its underlying methodology, it suffers from the lack of a nationwide soil monitoring network; therefore it currently provides information relating to 11 regions alone, with samplings conducted on the basis of a 36x36 km grid.

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

INDICATORE - A04.01



Source: MATT and JRC data processed by APAT

Figure 9.1: Percentage of CO in the topsoil layers, in central and southern Italy (1988-2003)

Awaiting the use of available data at local level, following the conclusion of a data harmonization process, a new indicator has been developed relating to the organic carbon content of Italian topsoils which, although still rather approximate, nevertheless provides a sufficiently significant picture of the situation in Italy.

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 (2006) 232, and 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%. On the basis of the adopted classification (very low: < 1%,

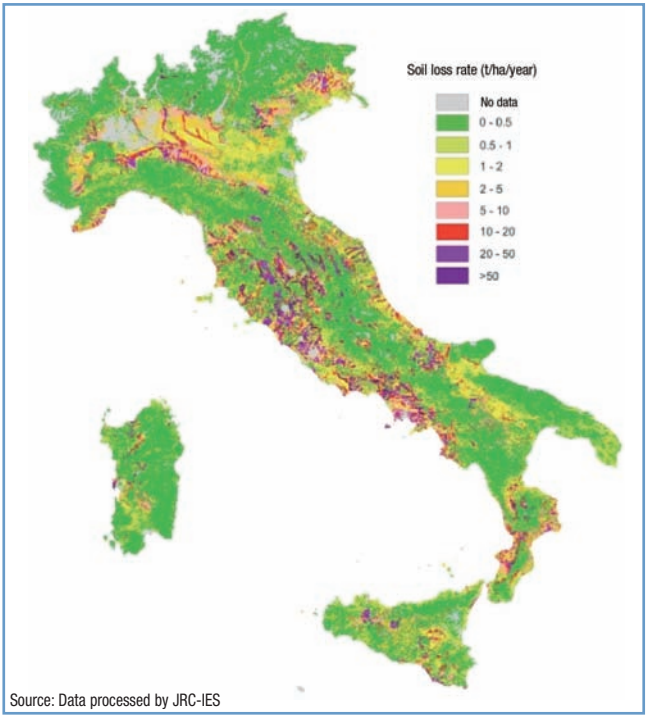
low: 1-2%, average: 2-6%, high: >6%) the situation appears worrying: about 80% of Italian soils features a CO content below 2%, while the "high" ranking class is practically absent in the country.

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, (a) 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 (b) town and country planning which, as a rule, is scarcely interested in taking these problems into account. The building of the relevant indicators is largely hindered 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). In the case of soil erosion, a representative picture of the country can be provided, which can unquestionably be improved by using more detailed harmonized data. An overview of the extent of the level of deterioration is offered by the deliverables produced as part of projects relating to desertification.

WATER EROSION
INDICATOR - A04.005

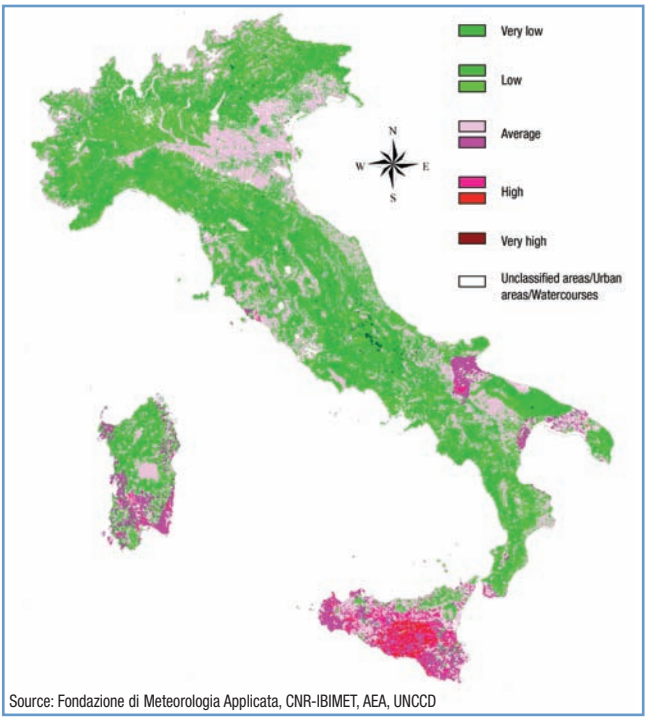
The map showing an assessment of the soil loss risk due to water erosion (figure 9.2) has been obtained by combining the climatological, pedological, vegetation and land use data, according to the principles and parameters set out in the *Pan European Soil Risk Assessment* (PESERA) system. Despite the approximations due to the limited level of detail of the data used (the map is only a excerpt from the broader European project), the indicator highlights the widespread risk of fertile soil loss in cultivated and highly mechanized areas. This aspect, which may have significant economic and environmental effects, especially in areas where quality crops are farmed, requires the introduction of farming techniques capable of mitigating the phenomenon.



Source: Data processed by JRC-IES

Figure 9.2: Soil loss risk assessment as a result of water erosion in Italy (2004)

DESERTIFICATION
INDICATOR - A04.003



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

Figure 9.3: National map of desertification sensitive areas

The methodology for this indicator is based on an analyses of thetrends of several environmental and socio-economic indices, which can be combined to identify sensitive areas, or the ecosystems' degree of reactivity to the stresses produced by external agents (biological, geodynamic, climatic, human pressure, etc.). 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 permit comparisons. Among the tested methodologies, MEDALUS (*Mediterranean Desertification and Land Use*) is the most common; this 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).

The map shown in figure 9.3, drawn as part of the international cooperation project called DISMed (*Desertification Information System for the Mediterranean*), is the first attempt ever 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 Italy, 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.

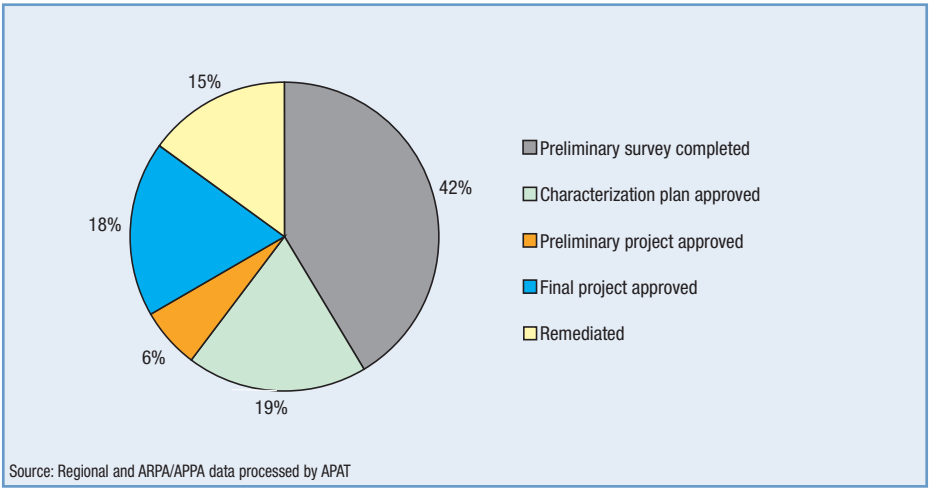
CONTAMINATED SITES

Soil pollution from local 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 affected by the alteration of the quality characteristics of the environmental

matrixes (topsoil, subsoil, groundwater and surface water), as a result of past or present human activities. The statutory provisions relating to contaminated sites are currently being reviewed: the Ministerial Decree 471/99, in fact, setting out the criteria and procedures for the safety measures, remedation and environmental rehabilitation of contaminated sites, has been replaced by Title V "Remedation of Contaminated Sites" of Part Four of Legislative Decree 152/06, which is currently in the process of being reformulated. Among the innovations introduced there is the definition of contaminated site, the focus being shifted from threshold values based upon land use to site-specific risk analyses. The regulations currently in force provide for a system for collecting and updating the data on contaminated sites, through the creation of "Regional registers of contaminated sites", whose implementation, however, is behind schedule for a number of reasons. The currently available information, supplied by the regional authorities and/or the ARPA/APPA, allows the building 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: Regional and ARPA/APPA data processed by APAT

Figure 9.4: Sites included in the regional registers - Breakdown by progress of remedation activity (June 2006)

The regional registers, although still in the commissioning phase, are already providing data on the number and characteristics of contaminated and remediated sites. Important information on the matter also comes from the data on contaminated sites of national interest.

Figure 9.4 shows about 4,900 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 remedation activity; the data, relating to mid-2006, covers 16 regions. For almost half the sites listed in the registers only preliminary information is available. The characterization plan has been approved for a fifth of the sites, while another fifth is now being remediated (which means that both the preliminary and final projects have been approved). In 740 sites (15% of the total) the remedation process has been completed. To date, 54 contaminated sites of national interest have been identified (figure 9.5).

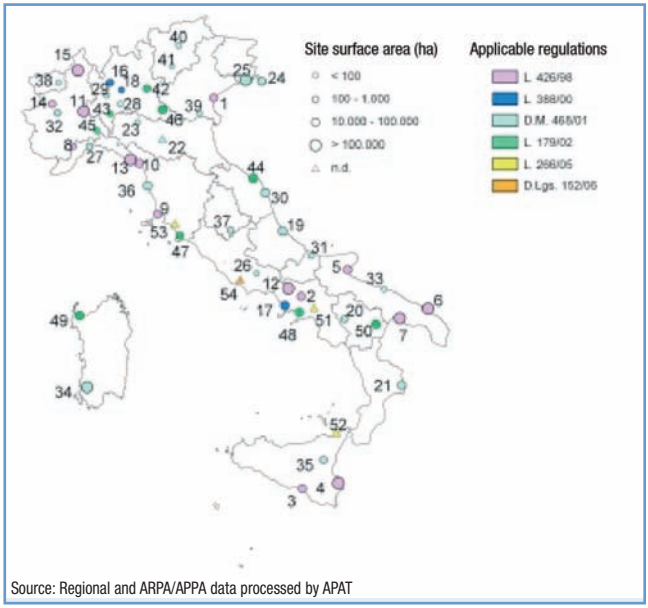
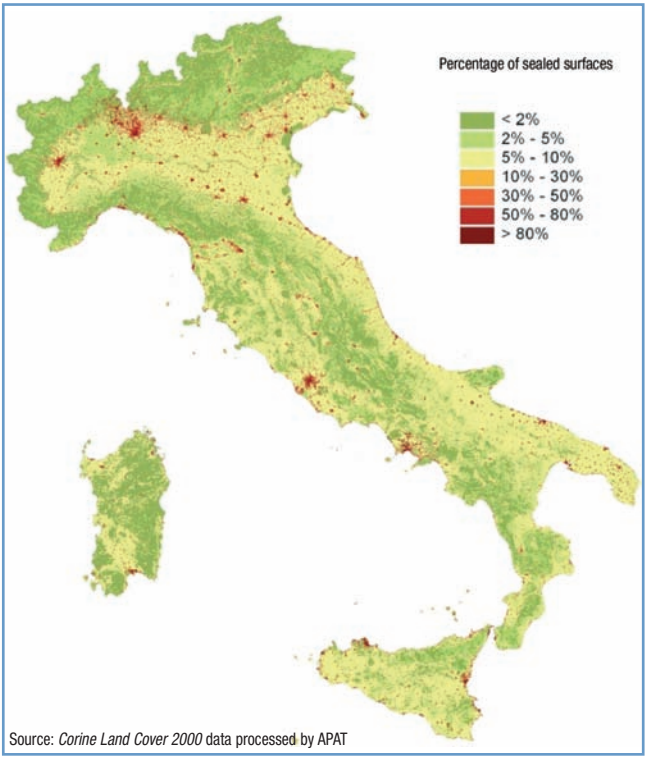


Figure 9.5: Location, size and applicable regulations, in respect of contaminated sites of national interest (2006)

LAND USE

Land use takes account of, analyzes and represents the data relating to land cover, land use and its trends over the years. It attempts to integrate the basic local information with the information on production or services sectors. A set of indicators has been identified and the assessment of their actual application is still under way. Closely related to this issue are the indicators in the chapters *Anthropogenic Risk, Industrial Risk, Biosphere* and *Production Sectors*. The indicators, relating to the land use and urbanized areas and infrastructures, describe land use in general, with a special focus on land take forms characterized by irreversible, or hardly reversible, soil sealing. A second set of indicators, relating to both topsoil and subsoil, concerns the progress achieved by official geological mapping; this is a prerequisite for land management planning operations (CARG project) and several activities with an obvious environmental and land management impact, such as primary and secondary mineral extraction sites (mines and quarries), sites used for extracting energy resources and water harvesting sites.

SOIL SEALING
INDICATORE - A04.021



Source: *Corine Land Cover 2000* data processed by APAT

Figure 9.6: National soil sealing map (2000)

Soil sealing, is the result of covering the soil with "impervious" materials, which partially or totally prevent it from performing its vital functions. The issue primarily concerns built-up areas, where the largest surfaces covered by buildings are located, and areas covered by industrial plants, commercial buildings and transport infrastructures. Similar effects may also be observed in intensive farmland areas, due to the formation of compacted soil. These impervious levels form a vertical barrier between the pedosphere, the atmosphere and the hydrosphere. The national soil sealing map (figure 9.6), which shows the sealed areas due to urbanization, has been obtained by applying a method based on *Corine Land Cover 2000* data and which can be exported to all CLC project member countries. This allows a uniform assessment of the problems, on a national and European scale. The highest values have been recorded in Lombardia, Puglia, Veneto and Campania, with higher concentrations in the urban areas and along the main roads. In particular, the problem is critical in the plainland areas, where urbanization is coupled with intensive farming. Although it is not yet possible to define a trend, the analysis of land use change, based on the CLC90-CLC2000 comparison, nevertheless highlights an increase of urbanized areas, which translates into an increase of sealed areas.

PRIMARY MINERAL EXTRACTION SITES (MINES)
INDICATOR - A04.015

SECONDARY MINERAL EXTRACTION SITES (QUARRIES)
INDICATOR - A04.014

Primary and secondary mineral extraction activities (mines and quarries, respectively) represent an important sector of the national economy, which, however, also features a high environmental and landscape impact.
Mining activities spread nationwide according to a growing trend until the middle of the last century, after which they

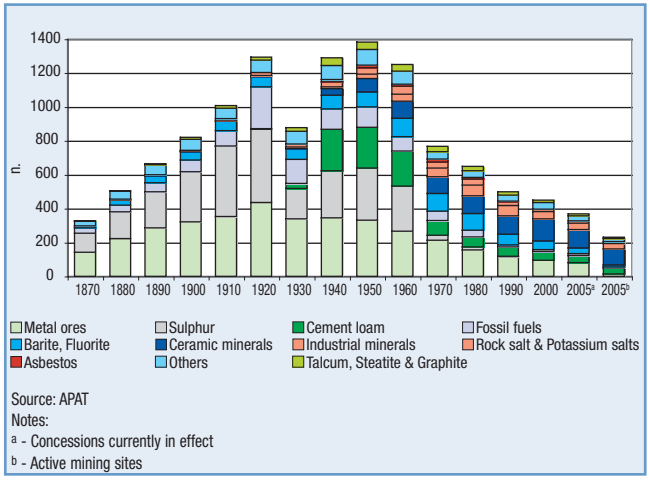


Figure 9.7: Mining sites by type of mineral

started decreasing up to the present situation, in which mining is a practically residual activity basically limited to loam for cement making, ceramic and industrial minerals (figure 9.7). The gradual reduction in extraction activities, especially with regard to metal ores, has unquestionably mitigated the pressure of mining on the environment. However, the serious ecological, health, static and structural problems relating to the hundreds of abandoned mines and quarries have not yet been solved.

As far as quarries are concerned, there are about 6,200 nationwide, 70% of which are concentrated in 8 regions, featuring more than 450 quarries (figure 9.8). The regional regulations implemented to date are aimed at mitigating the environmental impact of the extraction activities, at rationalizing these activities and undertaking projects for reclaiming unused mines and quarries and recycling the materials found there. The situation, however, differs considerably at national level and many regions have not yet approved the necessary planning instruments, which also affects the temporal inhomogeneity of the data shown in figure 9.8 which, in some cases, relates to 2001. To date, it has proved impossible to provide an overview of the situation of the thousands of unused or illegal quarries, which may cause serious environmental problems related to their use, especially problems of illegal nature.

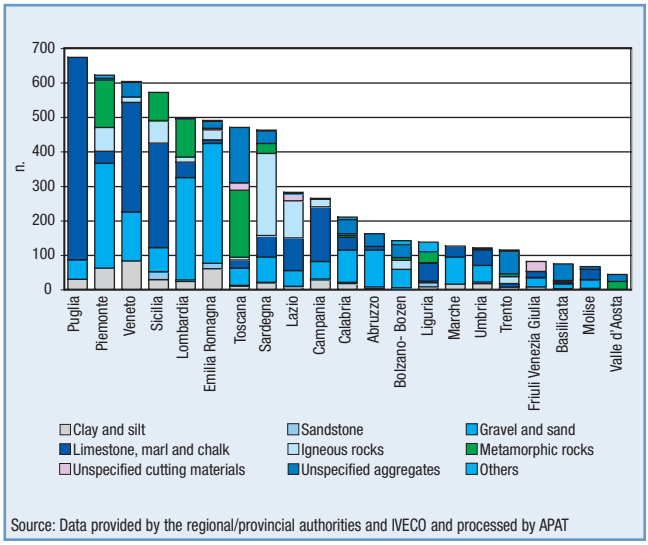


Figure 9.8: Number of active quarries by type of materials

10. 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 industry sector. At the same time, the principal environmental impacts related to waste production/management, such as water pollution, soil contamination, air emissions and the potential risk for human health related to the production of hazardous dust and gases, have increased.

Every year, Europe alone produces about 1.3 billion tonnes of waste, 40 million tonnes of which are hazardous waste. The production of waste has continued to grow since the 1990s, in parallel with the increase of wealth, of disposable incomes and of the higher and higher standards of living in First World countries. Between 1990 and 1995 the total waste production increased by about 10% and it has been forecasted that, by about 2020, the production of waste will increase by 45% compared to 1995. The main sources of waste are the building construction sector, agriculture, mining and manufacturing.

In 2003-2004, in Italy, there was a 3.7% rise in the overall municipal waste growth rates. This increase is decidedly higher than the average growth rate in the previous period (2000-2003), which was equal to 1.2%. An initial phase of stability, therefore, has been followed by a reverse trend in the production of municipal waste.

In 2004 the waste production figure of 533 kg/per inhabitant per year, is practically the same as the one for 2003 (524 kg/per inhabitant per year).

Between 2000 and 2004, separate waste collection systems increased by 2.9 million tonnes in Italy (from 4.2 to 7.1 million tonnes); in the same period the overall prodution of municipal waste rose by less than 2.2 million tonnes.

In 2004, separate waste collection accounted for 22.7% of all municipal 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, an examination of the data shows that, besides a reduction of the amount of municipal waste disposed of in landfills, in the five-year period from 2000 to 2004, dropping from 72.4% to 51.9%, there was a slight increase of incinerated waste, from 8.5% in 2000 to 9.7% in 2004 (even though this percentage is uncomparable with the European average). At the same time, the mechanical and biological treatment of unseparated waste remained substantially stable between 2003 and 2004 (from 21.3 to 20.5%), while the composting of selected fractions rose slightly from 5.1 to 5.4%.

Generally speaking, it may be observed that the higher the percentage of incineration, the lower the landfill tipping levels. In 2002, at European level, about 54% of all municipal waste was disposed of in landfills. Incineration with energy recovery concerned about 12% of waste; other forms of recovery, such as recycling and composting, concerned about 34% of all waste.

The situation, therefore, is extremely diversified in the different EU countries; in some landfill tipping is still the most widely used method of municipal waste disposal, accounting for 80% or more; in others, this figure drops to below 20%. The difference relating to the biodegradable fraction of municipal waste is even larger; many countries, in fact, prohibit the landfill tipping of biodegradable waste (France, Norway, Denmark, Netherlands, Germany, Sweden and Finland).

In some countries, the landfill disposal of municipal waste with heating power above a certain threshold is banned (Sweden); in Austria it is forbidden to tip waste with a net calorific value (NCV) > 6.000 kJ/kg, while in Germany, this prohibition will enter into force in 2005; in Italy 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 Europe, about 68 million tonnes of hazardous waste were produced in 2003. In recent years a great number of laws have been enacted, at European and national level, profoundly transforming waste management systems.

The principal strategic and regulatory measures introduced in Europe provide for a number of changes aimed at strengthening producer responsibility and implementing the hierarchy based first and foremost on preventing waste, followed by the recovery of materials and energy and, lastly, by the safe disposal of only the fraction of waste that cannot be treated otherwise.

Among the innovations introduced in Europe it is worthwhile to mention: the Communication (2005) 666 “Taking sustaina-

ble use of resources forward: A Thematic Strategy on the prevention and recycling of waste", and the European Parliament and Council Proposal for Revision of Waste Framework Directive [COM(2005)667], both of which were approved on 21 December 2005.

In particular, the prevention and recycling strategies has been developed after a lengthy consultation process and discussions between the Community institutions and the stakeholders involved in the waste management cycle, which has led to a detailed analysis of the current trends in waste production and management and the state of implementation of the EU legislation in the member countries.

The waste framework directive revision proposal contains a number of innovations which should significantly boost the new waste management policies, essentially based on prevention and recovery.

It represents one of the first measures for implementing the thematic strategy on prevention and recycling.

The European Commission has also undertaken a series of consultations with experts and representatives of the member States on the implementation, with respect to the waste sector, of the Directive 96/61/EC concerning integrated pollution prevention and control (the so-called IPPC Directive), with a view to assessing the possibility of extending the Directive's scope of application to all hazardous and non-hazardous waste recovery facilities and, above all, of ensuring the uniform application of the European provisions to all waste management facilities.

At national level, the entry into effect of Legislative Decree 152/2006 setting out environmental protection provisions has altered the entire legislative framework.

The fourth section of the decree, in fact, regulates the whole matter of waste management and the clearance of pollutes sites and replaces the framework law on waste (D.Lgs. 22/97).

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

The data refer to municipal waste, hazardous and non-hazardous waste.

TOTAL WASTE GENERATION AND BY GDP UNIT

INDICATOR - A05.001

The total amount of waste generated in 2003 equalled about 130 million tonnes, comprising 58 million tonnes of hazardous and non-hazardous waste, about 5.4 million tonnes of which was hazardous waste, 30 million tonnes of municipal waste and 42.5 million tonnes of construction and demolition (C&D) waste. The data, broken down by type of waste show that, between 2000 and 2003 there was a drop in the overall growth rate of municipal waste production (average annual rate of +1.2%, compared to +2.9% in 1997-2000), a 3.5% increase of the total production of hazardous and non-hazardous waste, a slight increase in non-hazardous waste of 0.9% and a considerable increase of hazardous waste (+39%). The municipal waste production trend, both at national and regional level, seems to be related (nationally and regionally) to the performance of the principal socio-economic indicators, according to which the growth or drop in consumption is reflected in a greater or lesser tendency to produce waste. Between 1997 and 2003, the production of hazardous waste was closely related to economic growth until 2001. In 2002, the entry into force of the new waste list 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.

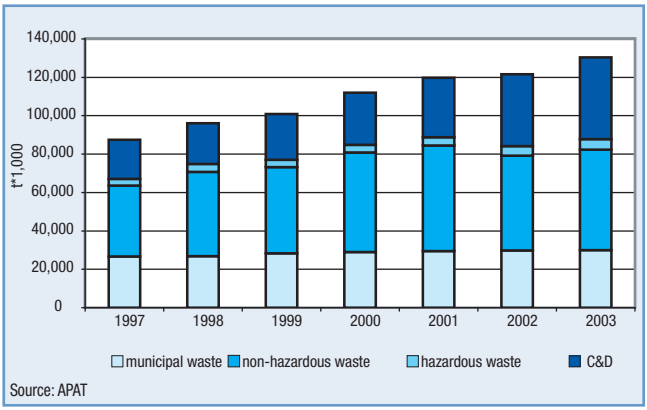


Figure 10.1 Breakdown of total waste generation

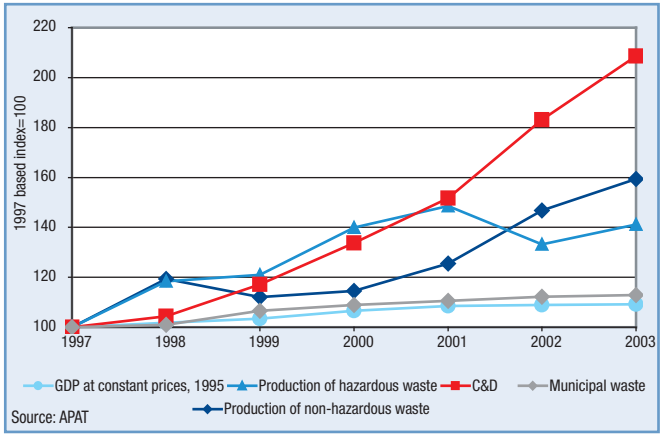


Figure 10.2: Waste production and GDP trends

Consequently, in 2003, there was an increased production of hazardous waste, up by 27% compared to 2001, compared to a GDP growth, in the same period, of just 0.6%.

Compared to 2002, there was an increase in the production of hazardous waste equal to 8.6% and a GDP growth of 0.3%. For the other types of hazardous and non-hazardous waste, including C&D, the growth rate was consistently higher than the GDP in 1997-2003; however, it can be related to the economic parameter represented by added value to the base prices, at 1995, in the building construction sector.

SEPARATE COLLECTION OF MUNICIPAL WASTE

INDICATOR - A05.005

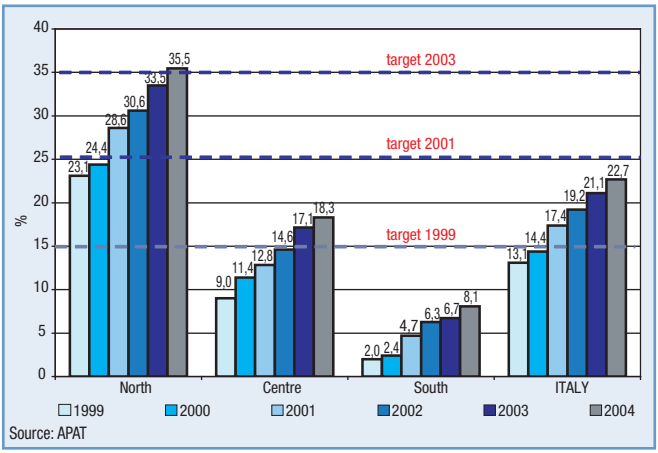


Figure 10.3: Percentage of separately collected municipal waste

Between 2000 and 2004, separately collected waste rose, at national level, by 2.9 million tonnes (from 4.2 to 7.1 million tonnes), corresponding to a percentage increase of 69%; in the same period there was an overall growth of municipal waste by almost 2.2 million tonnes (7.6%). In 2003, separately collected waste accounted for 21.1% of the total municipal waste produced and in 2004 it rose by 1.6% to 22.7%. The situation, however, can differ radically according to each geographical macro-area: the North, with a collection rate of 35.5% has attained and exceeded the target set by the regulations for 2003, with only one year's delay. The Centre is, instead, still far from the 2001 target, while the South does not attain the one for 1999.

In absolute terms, separate waste collection in 2004 totalled about 5 million tonnes in the North, 1.3 million tonnes in the Centre, and 823,000 tonnes in the South.

LANDFILL DISPOSAL, IN TOTAL AND BY TYPE OF WASTE

INDICATOR - A05.007

Figure 10.4 highlights that, in the period between 1997 and 2003, the amount of waste disposed of in landfill dropped by about 11%, from over 42.2 million tonnes to about 37.7 million tonnes, especially in the case of municipal waste (-15%). The percentage of municipal waste disposed of in landfill accounted for 60% of all municipal waste in 2003, 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 hazardous and

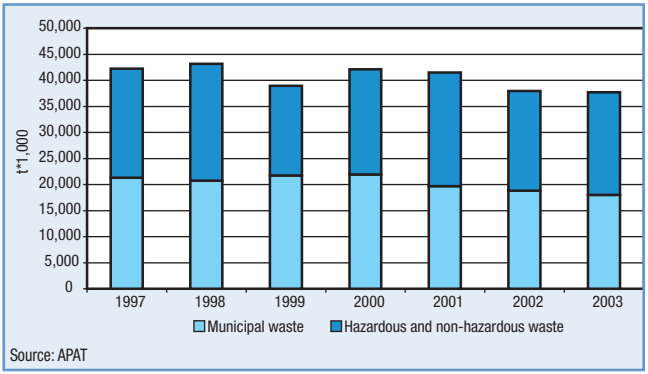


Figure 10.4: Landfill-disposed municipal waste by type

non-hazardous 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 hazardous and non-hazardous waste disposed of in landfill - compared to the total - not including storage, was 30%, dropping to 27 and 25% in 2002 and 2003, respectively.

INCINERATION, IN TOTAL AND BY TYPE OF WASTE

INDICATOR - A05.009

In 1997-2003, incineration of municipal waste increased by 77-1%. In the same period, there was a slight increase (about 15%) of non-hazardous waste, while hazardous waste dropped (-5%).

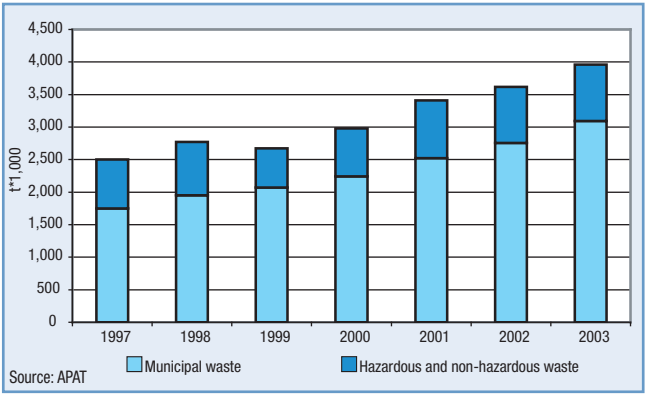


Figure 10.5: Incinerated waste, by type

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

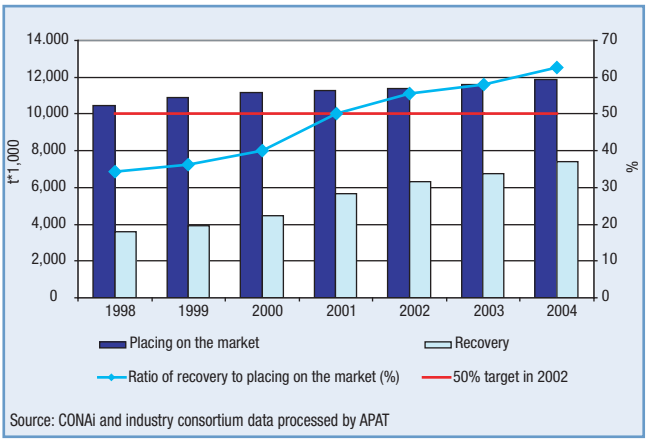
The amount given here relates only to waste incinerated in dedicated facilities for municipal and special waste. Therefore, they do not include waste treated in energy recovery or industrial plants, the main purpose of which is the production of energy or goods, where waste is used in the place of conventional fuels. Different quantities of incinerated waste depend on the number of facilities as well. The possible unavailability of just one of them can seriously affect the quantities of treated waste. Moreover, incineration plants for hazardous and non-hazardous waste also handle small quantities of municipal waste and CDR; these quantities, which totalled about 1.4% in 2003, has been included among the total incinerated municipal waste.

In 2003, a total of about 3.9 million tonnes of waste were incinerated, of which 3.1 million of municipal waste and 868,000 of hazardous and non-hazardous waste.

PLACING ON THE MARKET OF PACKAGING AND RECOVERY OF PACKAGING WASTE

INDICATOR A05.012 - A05.013

Article 6.1 of Directive 94/62/EC sets out the minimum targets for recovery and recycling of packaging waste to be attained within 30 June 2001; while paragraph 3.b provided that no later than six months before the end of the first five-year phase, the Council would have fixed targets for the second five-year phase. The aim is a further increase of recovery and recycling of packaging waste in order to reduce its impact on the environment.



Source: CONAi and industry consortium data processed by APAT

Figure 10.6:Amount of packaging placed on the market and recovered, and ratio of recovery to placing on the market (%)

For this purpose, Directive 2004/12/EC was introduced, which raises the minimum weight of recovered packaging from 50% to 60%, removing the maximum weight of 65% set out in the previous Directive 94/62/EC, being considered no longer necessary to ensure the functioning of the internal market.

On the contrary, with regard to the recycling of packaging waste, the overall percentages of recycled packaging shall be raised, from the previously established minimum value of 25% to 55%, and special minimum targets will be introduced based on the type of material (glass, paper and cardboard, metal, plastic, wood).

Reference to the two targets previously set out in the Directive 94/62/EC will also be made, namely, preventing and reducing the environmental impact of packaging and of packaging waste, and the harmonization of the national measures, in order to prevent the occurrence of any obstacles to trade and any distortions of competition.

In Italy, the total amount of packaging placed on the market in 2004, according to the data processed by CONAI, totals 11.87 million tonnes, a figure that appears substantially stable compared to the 2003 figure (11.62 million tonnes). The total quantity of recovered packaging waste, in 2004, totalled about 7.4 million tonnes, up by about 10% compared to 2003, thus confirming the positive trend recorded in the previous years; the highest proportion of the total recovery figures relates to recycling, which, with respect to certain fractions, such as steel and glass, is still the only form of recovery. Recycling accounts for about 86% of all recovery.

11. IONIZING RADIATIONS

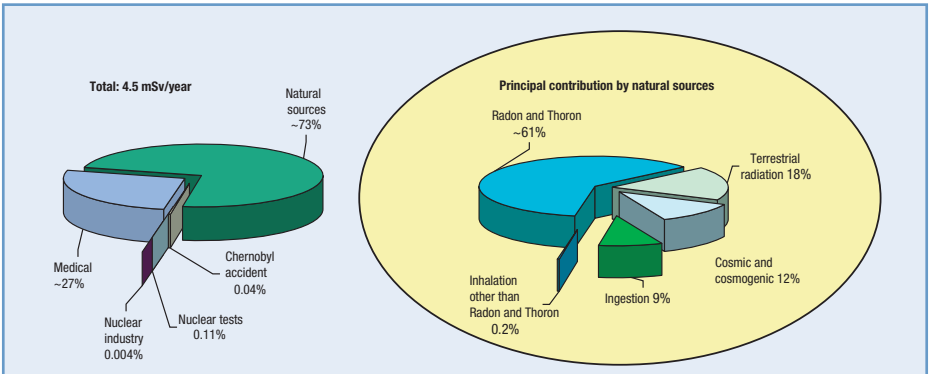
INTRODUCTION

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. Generally, 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 spcific magnitude, called "Effective dose", measured in Sieverts (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 frequent exposure, have a "stochastic" occurrence, i.e. for the same dose received, the damage varies on a wholly casual basis from one individual to another. The stochastic effects are defined as "somatic" or "genetic", according to their occurrence 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), as follows: *Indoor radon activity concentration,* 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 *Implementation status 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, NRC, UNSCEAR data processed by APAT

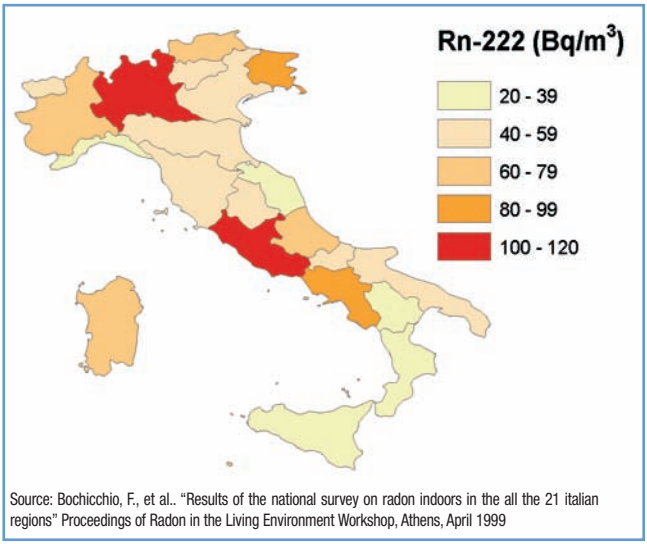
Figure 11.1: Distribution of contributions to the annual average effective dose per person

This indicator gives an approximate estimate of the impact of the principal sources of radiation on the Italian population. From figure 11.1, 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 11.2 shows the results of a survey, conducted on a statistically representative sample, for determining the mean concentration of radon inside homes (which are the environments where people spend most of their time) in all the Italian regions, while figure 11.3 highlights the regions where, until 2005, surveys were conducted and measures implemented, with a view to identifying high radon risk areas. European guidelines have fixed the indoor radon concentration thresholds - 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 Italy, 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 make a detailed assessment of the geographical distribution of radon nationwide, and to rationalize resources for implementing appropriate remedial mea-



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, Athens, April 1999

Figure 11.2: Theme map of the activity concentrations of Rn222 inside homes, by region and autonomous province (the choice of intervals is given only by way of example) (1989-1997)

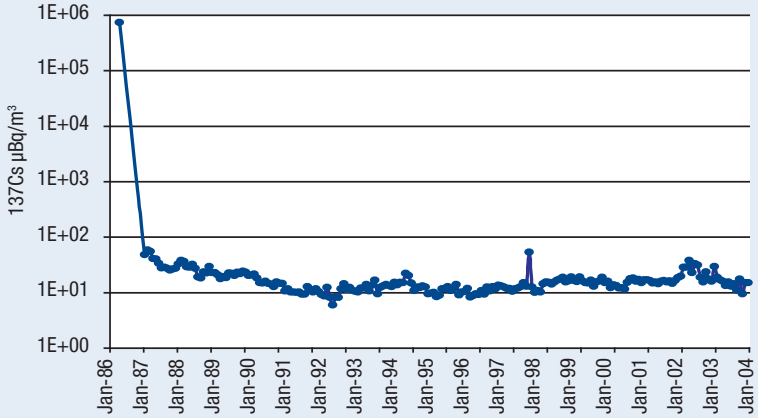
Source: APAT

Figure 11.3: Regions where surveys have been conducted and measures implemented to identify radon risk areas (highlighted in green)

sures, it is necessary to map the country, i.e. to identify the areas with the largest likelihood of the presence of high concentrations of radon. With regard to the techniques for collecting and processing the relevant data, the most widespread method, applied internationally and for the surveys already conducted in several Italian regions (Veneto, Friuli Venezia Giulia, Toscana, Piemonte and the Autonomous Province of Bolzano), are indoor measurements, i.e. measurements made in closed environments, especially homes and schools.

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

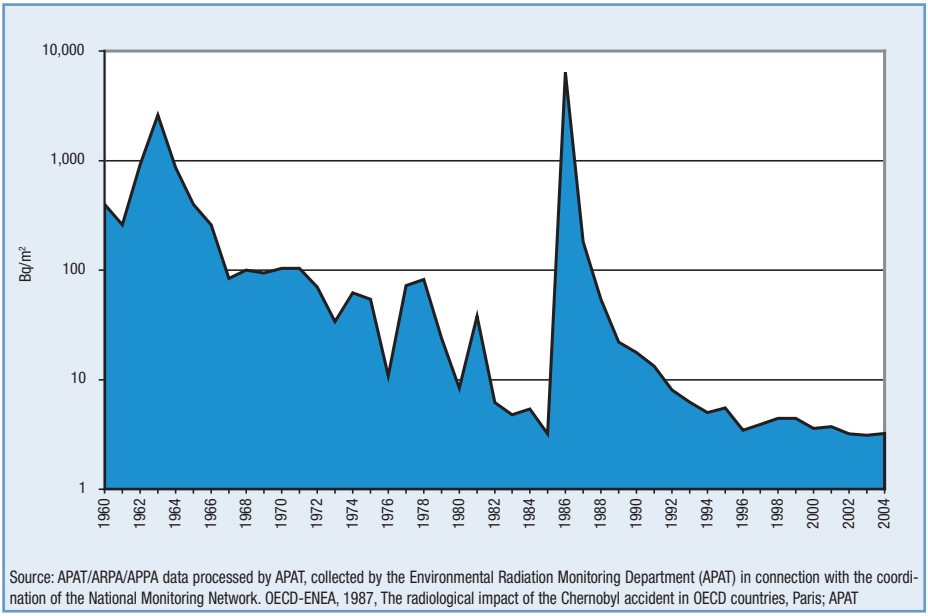
INDICATOR - A06.008



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, Reti nazionali di sorveglianza della radioattività ambientale in Italia, 2002; APAT.

Figure 11.4: Monthly trends of activity concentrations in Italy of ^{137}Cs in airborne particulate matter

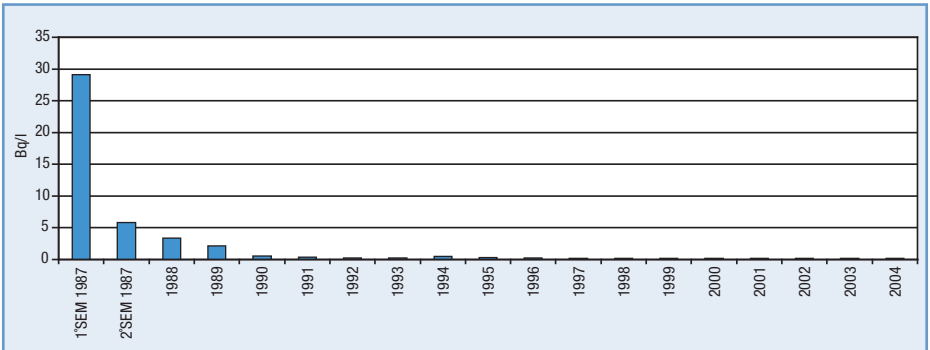
The assessment of the activity concentrations of artificial radionuclides in the environment and foodstuffs makes it possible to control environmental contamination by radionuclides from diffuse sources of radioactive materials such as, for example, nuclear fallout from tests or accidents to nuclear facilities. The principal benchmark 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. At the end of 2002 a process was put into place with a view to reorganizing the entire radioactivity monitoring network, also due to its defective coverage of the country. Three historical series are given by way of example. The first (figure 11.4) shows the trends in time (on a monthly basis) of the concentrations of ^{137}Cs in airborne particulate matter: the value for the first days of May 1986 refers to



Source: APAT/ARPA/APPA data processed by APAT, collected by the Environmental Radiation Monitoring Department (APAT) in connection with the coordination of the National Monitoring Network. OECD-ENEA, 1987, The radiological impact of the Chernobyl accident in OECD countries, Paris; APAT

Figure 11.5: Annual trends of total fallout of ^{137}Cs in Italy

the arrival of the Chernobyl cloud in Italy, 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 (figure 11.5) gives the trends of the total fallout of ^{137}Cs in Italy from 1961: the peaks correspond to the nuclear tests carried out in the 60s and to the Chernobyl incident. The third (figure 11.6) shows the trends of the mean national concentration of ^{137}Cs in cow's milk from 1987.



Source: APAT/ARPA/APPA data processed by APAT/CTN-AGF, collected by the Environmental Radiation Monitoring Department (APAT) in connection with the coordination of the National Monitoring Network.

Figure 11.6: Trends of mean national concentration of ^{137}Cs in cow's milk

IMPLEMENTATION STATUS OF THE ENVIRONMENTAL RADIOACTIVITY MONITORING NETWORKS

INDICATOR - A06.010

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 Italy, for the purpose of assessing the population dose, regardless of the local situations (*person related*).

The indicator provides an assessment of the monitoring efficacy, with respect to quality standards defined in relation to:

- monitored matrixes;
- sampling frequency;
- spatial density;
- monitoring sensitivity;
- participation in intercomparison exercises.

Table 11.1: Implementation status of the regional networks, main contributions to the national network at 31/12/2005

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

Source: APAT/ARPA/APPA
LEGEND: [a] - The activities are managed by ARPA Pescara and Istituto Zooprofilattico di Teramo

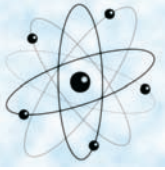


Table 11.1 provides an overview of the implementation status of environmental radioactivity monitoring (national and regional networks) in 2005. In particular, monitoring by the national networks is taken into account exclusively through the contributions of the various regions to the radiometric determinations of the set of indicators relating to airborne particulate matter, airborne fallout materials and milk. Table 11.2 shows the implementation status 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.

Table 11.2: Implementation status 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 decommissioning and decommissioning, no fuel, conditioned waste	Yes	No
Latina Power Plant	undergoing decommissioning and decommissioning, no fuel, partially conditioned waste	Yes	No
Trino Power Plant	undergoing decommissioning and decommissioning, fuel present in pool, partially conditioned waste	Yes	Yes
Caorso Power Plant	undergoing decommissioning 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 Research center:		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 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 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

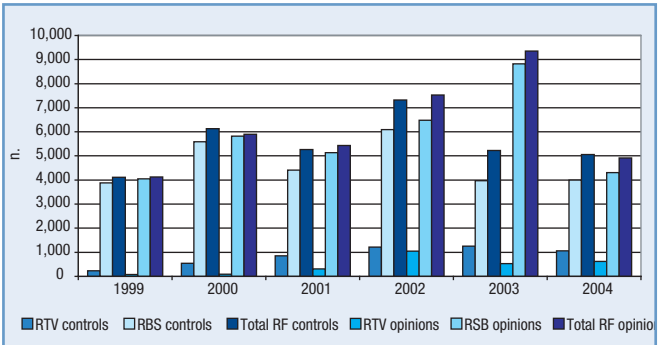
12. NON-IONIZING RADIATIONS

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 and to 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 on human health of the long-term exposure to electromagnetic fields are still largely unknown.
Two indicators have been chosen in this overview, to provide a representative picture of the specific environmental problems posed by "electromagnetic fields", with respect to both sources (ELF and RF), limitedly to the information on control activities, Number of early opinions and monitoring actions in relation to RF field sources and Number of early opinions and monitoring actions in relation to ELF field sources.

NUMBER OF EARLY OPINIONS AND CONTROLS ON RF FIELD SOURCES
INDICATOR - A07.005

This indicator describes the activities carried out by the ARPA/APPA agencies, in terms of early opinions and controls, using both numerical models and measuring instruments, on high radio frequencies (RF), broken down into radio broadcasting facilities (RTV) and mobile radio base stations (RBS). The data collected by the NIR Observation Unit are incomplete (non-availability of data, partial coverage of the region, etc.); national coverage is estimated equal to 70%. The RBS control data point out that the percentage of controls carried out on request ranges from a minimum of 10% to a maximum of 100% of total experimental controls; with regard to RTV controls, this percentage ranges from a minimum of 13% to a maximum of 83%. Figure 12.1, which represents the trend of the total number of opinions and controls (both model-based and experimental), carried out on RF facilities, broken down by type of source, refers only to the regions that have



Source: APAT, ARPA/APPA data processed by the NIR Observation Unit
Note: The data are relating to the single regions/autonomous provinces for which we have a complete series

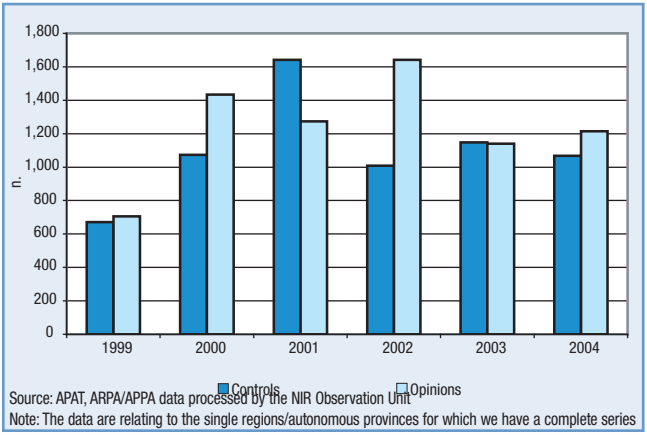
Figure 12.1: Opinions and controls carried out on RF installations in Italy, by type of source

supplied the data for all the provinces in the 1999-2004 period (Piemonte, Valle d'Aosta, Provincia Autonoma di Bolzano, Provincia Autonoma di Trento, Veneto, Emilia Romagna, Umbria, Marche). Based on an analysis of the data, it can be observed how, in 2002, there has been a drop in total number of early opinions on the installation of new facilities, probably as a result of the less opinions for RBS, which dropped by 51%, while those for RTV increased by 17%. At the same time, the total number of RF controls, both experimental and model-based, dropped slightly (-3%), due to a reduction of those for RTV (-15%).

NUMBER OF EARLY OPINIONS AND CONTROLS ON ELF FIELD SOURCES

INDICATOR - A07.006

This indicator describes the activities carried out by the ARPA/APPA agencies, in terms of early opinions and controls on low frequency radiation sources, using both numerical models and instruments. The figures processed by the NIR Observation Unit are incomplete, in terms of availability and geographical coverage; national coverage is estimated at about 65%, the information supplied by the contact covers the entire region, except for Lombardia, the data for which is not complete for all the provinces. An examination of the control data shows that the percentage of those conducted on request ranges from a minimum of 20% to a maximum of 100% of all controls. The data shown in figure 12.2 show the trend in time of the total number of opinions and controls carried out for ELF installations, from 1999 until 2004, nationwide; this trend takes into account only the regions/autonomous provinces for which the figures are available for the entire considered timeframe (Piemonte, Valle d'Aosta, Provincia Autonoma di Bolzano, Provincia Autonoma di Trento, Veneto, Emilia Romagna, Liguria, Umbria, Marche). The number of opinions, between 2003 and 2004, has increased slightly by 6%. At the same time, the number of controls carried out (with both measurements and calculation models) dropped slightly (-7%).



Source: APAT, ARPA/APPA data processed by the NIR Observation Unit
Note: The data are relating to the single regions/autonomous provinces for which we have a complete series

Figure 12.2: Trends in the number of opinions and controls by ELF field sources in Italy

13. NOISE

INTRODUCTION

The framework law 447/95 defines Noise Pollution as *"the introduction of unwanted sound both in the home and outdoors, such as to cause annoyance or 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"*. Noise pollution is one of the major causes of impairment of the quality of life of the population. Primarily due to road, rail and air traffic, industrial activities, and to the lifestyles of people as well, unwanted or harmful sounds are a trouble, bother and nuisance for an increasing amount of people. The principal objective of noise pollution regulations is to reduce the number of people exposed to noise, by preventing or reducing environmental noise, through the definition of intensity thresholds and the protection of areas that feature good noise quality. Legislative Decree 194/2005, which translates into Italian law the Community Directive 2002/49/EC relating to the assessment and management of environmental noise, is aimed at preventing or reducing the harmful effects of exposure to environmental noise, in accordance with the defined priorities.
The three indicators described in this chapter feature an overview of the present state of noise pollution and introduce several protection measures undertaken locally by the competent authorities.
The state indicator relating to the *Population exposed to noise* is a feature of environmental quality today and is given by the percentage of population exposed to noise, a requirement for implementing planning actions under the applicable statutory guidelines. The indicator, at this stage, offers incomplete and non-uniform, albeit essential ,data for introducing future measures. Of decisive importance, in relation to the representation of the state of noise pollution for one of the principal sources of noise, is the indicator *Percentage of km of the domestic rail network featuring excess noise levels,* based on the noise thresholds set out in the DPR 459/1998, with respect to this infrastructure. An example of response indicator, in relation to rail transport, is the indicator relating to the *Approval status of Noise Containment* and *Abatement Plans for the rail network,* which describes the activities and measures implemented by the national rail operator under the applicable guidelines.

POPULATION EXPOSED TO NOISE

INDICATOR - A08.006

This indicator is an assessment of population exposure to noise pollution, by estimating the percentage of population exposed to levels of noise in excess of the established thresholds.
The data currently available are insufficient and do not allow comparisons, because of the different methods of estimation employed; therefore, the data should be interpreted with a certain degree of caution, with respect to both the production of noise data and the related association with the proportion of exposed population. However, on the basis of the references set out in the documents for forecasting and reducing noise pollution, provided for under the applicable guidelines, and on the basis of the indication of common methods of estimation, this indicator is expected to be increasingly and effectively used in the future, despite the initial difficulties.
The results of surveys carried out in several locations, relating to the percentage of people residing in areas where the values of the Equivalent Level of Sound Pressure, which is a descriptor of environmental noise, exceed the established thresholds of 55 dBA at night (10 pm to 6 am) and 65 dBA during the day (6 am to 10 pm), compared with the total surveyed population, highlighting a significant proportion of people exposed to excess noise levels.

PERCENTAGE OF KM OF THE NATIONAL RAIL NETWORK FEATURING EXCESS NOISE LEVELS

INDICATOR - A08.012

This indicator highlights the rail network sections that do not conform to Law 447/95 and subsequent enforcement regulations, as a percentage figure of the kilometres of the domestic rail network featuring excess noise levels, above the threshold set out in the applicable guidelines.

The data in tables 13.1 and 13.2 relate to the measures undertaken by RFI, in recent years, to implement the rail noise pollution guidelines. The analysed data (table 13.1) show that, in 2004, the Italian rail network was 17,163 km long and featured 8,151 km of lines with noise levels in excess of the threshold value set out in group "A" (the group closest to the infrastructure with a width of 100 m, i.e. about 200 m extending across the infrastructure itself), corresponding to about 47.5% of the entire network. The surveys then focused on a determination of the section of the network featuring excess noise values and noise receptors, which section totals 2,874 km, corresponding to about 35.3% of the non-conforming section, with respect to the noise pollution guidelines, and where it will be necessary to provide for corrective measures.

Table 13.1: Italian rail network, as a whole and the proportion of network featuring at least one occurrence of excess noise values (2004)

Type of rail section	km
Total network	17,163
Length of network featuring excess noise values[a]	8,151
Length of network featuring excess noise values and noise receptors	2,874
Total length of rail network featuring sensitive noise receptors[b]	86

Source: RFI data processed by APAT
LEGEND:
[a] - The section taken into account belongs to group "A", within the meaning of DPR 459/98 (about 200 m across the infrastructure)
[b] - Sensitive receptors are schools, hospitals, care and elderly homes

Table 13.2: Percentage of the national rail network featuring at least one occurrence of excess noise values (2004)

Type of rail section	%
Percentage of the entire rail network featuring excess noise levels[a]	47.5
Percentage of the section of network featuring excess noise levels and noise receptors	35.3
Percentage of the entire rail network featuring sensitive noise receptors[b]	0.5

Source: RFI data processed by APAT
LEGEND:
[a] - The section taken into account belongs to group "A", within the meaning of DPR 459/98 (about 200 m across the infrastructure)
[b] - Sensitive receptors are schools, hospitals, care and elderly homes

APPROVAL STATUS OF NOISE CONTAINMENT AND ABATEMENT PLANS FOR THE RAIL NETWORK

INDICATOR - A08.013

This indicator describes the number of approved noise containment and abatement plans for the rail infrastructure, compared to the total plans provided for under DM 29/11/00.

Based on an analysis of the data set out in table 13.3, we may observe how the requalification plan provides for 8,843 measures concerning 2,874 km of the rail network, in 1,250 locations. The plan was approved on 01/07/2004 by the Unified Conference, which, pursuant to DM 29/11/00, agreed to the draft Noise Containment and Abatement Plan proposed by RFI, approving the 432 passive noise mitigation measures to be implemented in the first 4-year period, and which total 4.89% of the measures provided for.

Table 13.3: Proposed and approved measures, pursuant to DM 29/11/00, and relevant locations (2004)

	n.
Proposed measures	8,843
Approved measures[a]	432
Locations concerned	1,250
	%
Percentage of approved measures	4.89

Source: RFI data processed by APAT
LEGEND:
[a] - Passive mitigation measures relating to the first 4-year period

14. 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, comprising volcanic activity, earthquakes and tectonics, and capable of unleashing enormous amounts of energy, while the latter act on the Earth's surface and tend to level it out, modifying the landscape by means of erosion, transport and sedimentation.

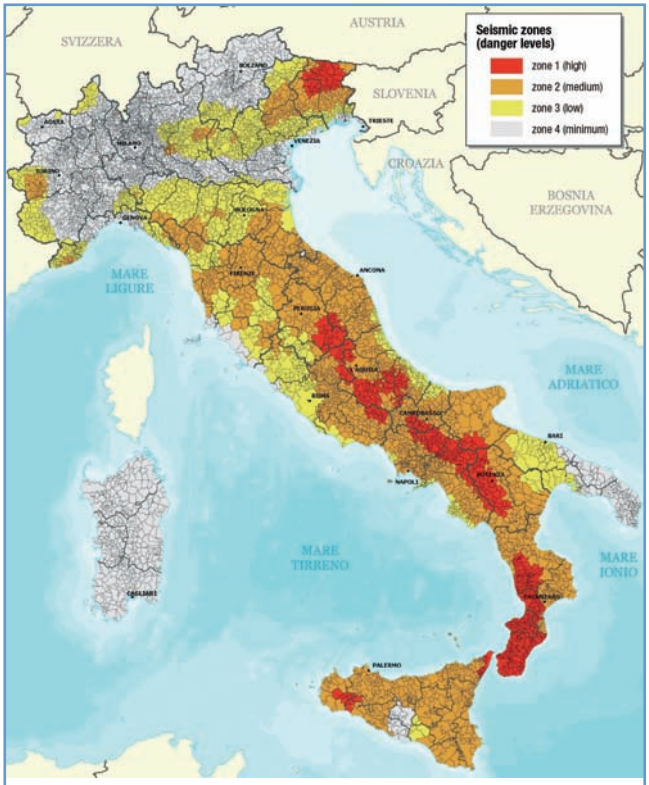
Sometimes the modelling processes occur at a speed not immediately appreciable by the human eye. Plate tectonics, the formation of mountains and valleys, subsidence (due to tectonics or generated by sediment diagenesis, whether natural or caused by human processes), eustatic movements (changes in sea level due to climate oscillations) and isostatic movements (such as uplift of land resulting from the melting of the polar caps) generally take place at rate of several millimetres or centimetres per year. In other instances, the landscape can change in the space of a few seconds, as a result of landslides, floods, earthquakes and volcanic eruptions, all catastrophic natural events that develop rapidly and violently. The Planet's surface, therefore, is subject to an uninterrupted cycle of reshaping of its appearance. This natural evolution interplays with man and his activities and can give rise to so-called “Natural risk”, which depend on the geographical distribution of the geological and hydrological, seismic and volcanic phenomena and their hazard level and frequency, and the presence of human structures and activities.

Almost the whole of Italy, due to its geodynamic position and high population density, is affected by natural risk. Specific indicators have been developed to illustrate the salient characteristics of this situation, broken down into two large thematic areas: “Tectonic and volcanic risks” and “Geological and hydrological risks”.

SEISMIC ZONING

INDICATOR - A11.003

The aim of this indicator is to provide an up-to date picture of the different seismic danger zones into which the country has been divided and for each of which appropriate building construction guidelines and regulations have been issued. All local administrative units have been classified according to a 4-zone system (from 1 to 4), characterised by a decreasing sismic hazard, and to 4 corresponding classes of maximum soil acceleration, with a 10% likelihood of occurrence in 50 years. According to the 2004 seismic zoning, based on the OPCM of 20 March 2003, no. 3274, currently in force, and with respect to the guidelines provided for under the Law 64/74, the first three zones correspond to a high, moderate and low sismic hazard, respectively, while zone 4 has only recently been introduced and its application allows the regional authorities to impose more or less stringent obligations with regard to earthquake resistant building construction.



Source: National Seismic Services Office of the Civil Protection Department

Figure 14.1: Seismic zoning map (2004), updated and implemented by the regional authorities at 30 March 2004

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

INDICATOR - A11.006

Table 14.1: Implementation of Land and Water Improvement Schemes (LWIS) (July 2006)

River Basin Authorities	Draft schemes and/or planning under way	Adopted draft schemes	Adopted LWISs	Approved LWISs
	n.			
National		2	2	3
Inter-regional	1	2	5	5
Regional (and Autonomous provincial)	1	7		10

Source: Environment Ministry data processed by APAT; River Basin Authority websites

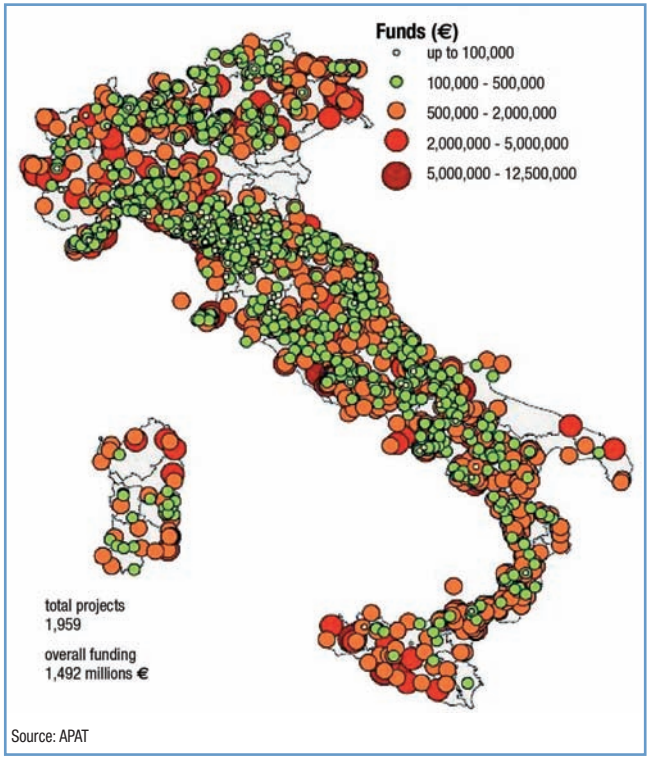
This indicator measures the implementation status of the Land and Water Improvement Schemes (LWIS) [see article 1(1) of DL 180/98], by the competent River Basin Authorities, in terms of the drafting, adoption and approval of draft schemes, followed by the actual schemes.

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 and posted on the websites of the different River Basin Authorities, refers to information supplied by all the River Basin Authorities of national, inter-regional and regional relevance, operating in a standard (spatial and temporal) benchmark framework.

The analysis of the data shown in table 14.1 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 approaching target achievement one cannot help highlighting 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 (AS SUBSEQUENTLY AMENDED AND SUPPLEMENTED)

INDICATOR - A11.007



Source: APAT

Figure 14.2: Nationwide distribution of the urgent hydrogeological risk mitigation projects, implemented under DL 180/98 (as subsequently amended and supplemented) (March 2006)

The data resulting from the monitoring activity of the urgent measures financed under the so-called "Sarno Decree" (DL 180/98), collected by APAT since 2000, have allowed the development of this indicator, as a response to the measures implemented to prevent and mitigate hydrogeological risks.

As stated in the previous editions of the Yearbook, DL 180/98 was promulgated primarily to accelerate the implementation of Law 183/89) in areas affected by high hydrogeological risks, introducing the definition of "urgent measures and projects for mitigating hydrogeological risks in those areas of the country where the special vulnerability of the natural environment may determine an enhanced level of danger for the people living there and the natural assets, with priority status assigned to the areas in which a state of emergency has been proclaimed". In this respect, APAT was appointed by the Environment Ministry to monitor the implementation of the measures and projects. The results of these monitoring activities have been presented in a special continuously updated database, which effectively processes the collected information.

The indicator meets the demand for information on soil protection issues and illustrates the measures implemented 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, 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 measures are implemented.

Between January 1999 and March 2006, a total of 1,959 measures and projects were financed, for a total outlay of 1,500 million euros.

IFFI PROJECT: ITALIAN LANDSLIDES INVENTORY

INDICATOR - A11.009

Table 14.2: Italian landslides inventory (IFFI) - main parameters (December 2005)

Region/Autonomous province	Number of landslides	Landslide density	Area affected by landslides	Landslide ratioa	Landslide ratio for mountainous-hilly terrain
	n.	n./100 km²	km²	%	%
Piemonte	33,965	122	2,666	9.6	15.7
Valle d'Aosta	2,992	92	520	16.0	16.0
Lombardia	118,248	496	2,312	9.7	20.9
Trentino Alto Adige					
Bolzano Bozen	*1,246*	*17*	*453*	*6.0*	*6.1*
Trento	*7,633*	*123*	*776*	*12.5*	*13.0*
Veneto	7,786	42	176	1.0	2.4
Friuli Venezia Giulia	4,323	55	514	6.5	14.9
Liguria	6,003	111	387	7.1	7.3
Emilia Romagna	32,395	146	2,165	9.8	20.0
Toscana	29,208	127	1,035	4.5	5.6
Umbria	34,631	410	615	7.2	9.0
Marche	42,832	442	1,873	19.3	21.1
Lazio	6,426	37	245	1.4	2.1
Abruzzo	8,493	78	1,241	11.4	12.5
Molise	22,527	508	494	11.1	12.5
Campania	21,737	159	912	6.7	8.3
Puglia	346	2	56	0.3	0.6
Basilicata	n,d,	n.d.	n,d,	n.d.	n.d.
Calabria	9,416	62	822	5.5	6.0
Sicilia	3,657	14	500	1.9	2.2
Sardegna	1,523	6	191	0.8	1.1
ITALY	**395,387**	**135**	**17,953**	**6.1**	

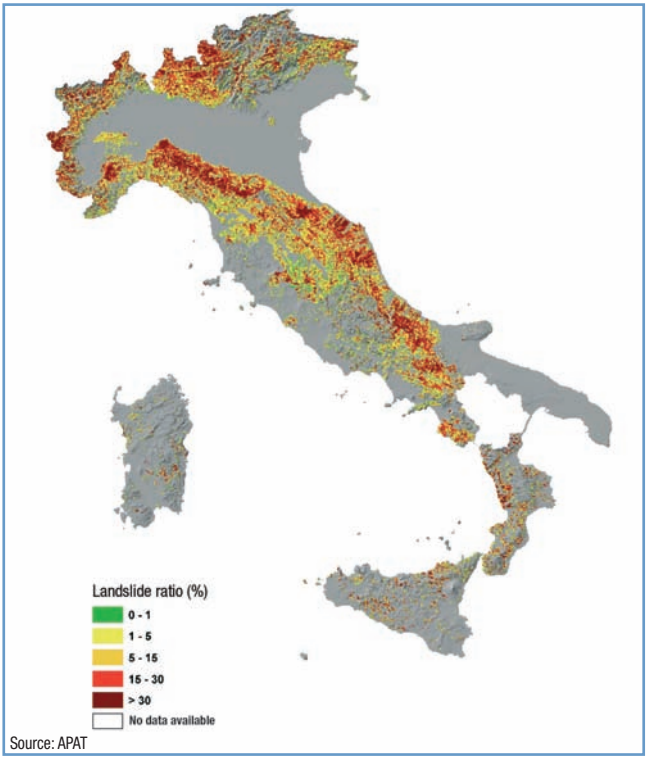
Source: APAT
LEGEND:
[a] -The 'landslide ratio' is the ratio of landslide area to total area

The Italian landslide Inventory project provides information on the number and distribution of landslides in Italy by creating a database featuring maps and alphanumerical elements. The Project, financed by the Interdepartmental Committee for Soil Protection (established under Law 183/89), provides for the identification and mapping of landslides nationwide, based on standard and shared procedures. In this framework, APAT's role is to set guidelines and coordinate activities, assess the consistency of the mapping and alphanumerical data (landslide data sheets) and provide for statistical processing at national level.

The indicator provides information on the identification and mapping of landslides, based on the data already known to the regional authorities, or the supplementing of this data for areas for which it is lacking or insufficient.

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" (Italian Landslide Inventory Project) level, comprising the Landslide Identification Point (PIFF in Italian), 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 m2; and the "DIREZIONE" (DIRECTION) level, which indicates the direction of the movement.



Source: APAT

Figure 14.3: Landslide ratio (%), corresponding to the percentage ratio of landslide area to total area (December 2005)

15. ANTHROPOGENIC RISK

INTRODUCTION

The Council Directive 82/501/EEC ("Seveso" Directive) on the major-accident hazards of certain industrial activities 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 (Seveso II Directive) on the control of major-accident hazards involving dangerous substances, transposed into Italian law as D.Lgs. 334/99.
In December 2003, 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, translated into national law on 21 September 2005 (D.Lgs. 238).
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.

The improvements to the Seveso Directive, introduced under the latest Community directive, entail important changes to the obligations held by certain establishments affected by major accident hazards (MAHs); in particular, those establishments stocking:

- petroleum products (petrol, diesel and kerosene);
- explosives;
- environmentally toxic substances (substances classified as R 51/53 and R50).

However, since the complete data relating to the situation of the establishments affected by MAHs are not yet available, based on the notifications received in March 2006 from the operators, in this edition of the Yearbook we will continue to refer to the previous guidelines (data referred to January 2006).

INDUSTRIAL RISK

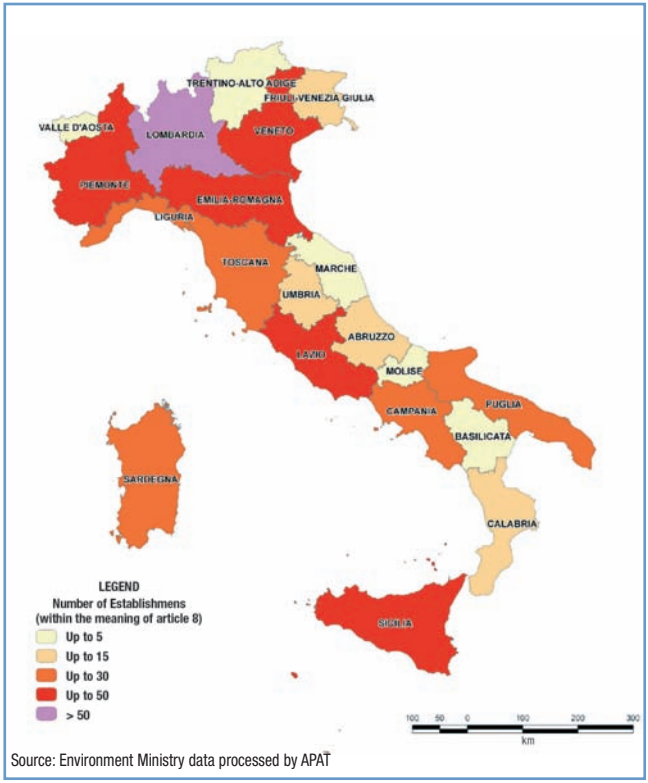
An effective system for controlling all "activities entailing major accident hazards" must necessarily be based on a suitable information system enabling the collection and management of data relating to the activities carried out, the hazardous substances stocked, the security measures adopted, the 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.
This is the reason why APAT, in partnership with the Environment Ministry, has developed and currently updates the National Database of activities entailing major accident hazards, provided for under D.Lgs. 334/99 ('Seveso Law');in addition, APAT has undertaken a project for developing, in partnership with the regional Agencies, a national georeferenced information system for a more effective management of the data collected through 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 and up-to-date map of the hazards entailed by the presence of an establishment affected by MAHs, the National Register makes available a first set of information (data relating to the establishment, the activities carried out there, its geographical location, the substances stocked by it, with rele-

vant quantities and other information), for a preliminary assessment of the potential 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 Register of establishments liable to be affected by a major accident is based on the information, drawn from the notices and information sheets made available to the population (Schedule 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/Provincial Environment Agencies. Based on the information set out in the database (at January 2006), this overview presents two indicators illustrating 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; Local administrative units hosting four or more establishments liable to be affected by a major accident.*

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

INDICATOR - A10.001

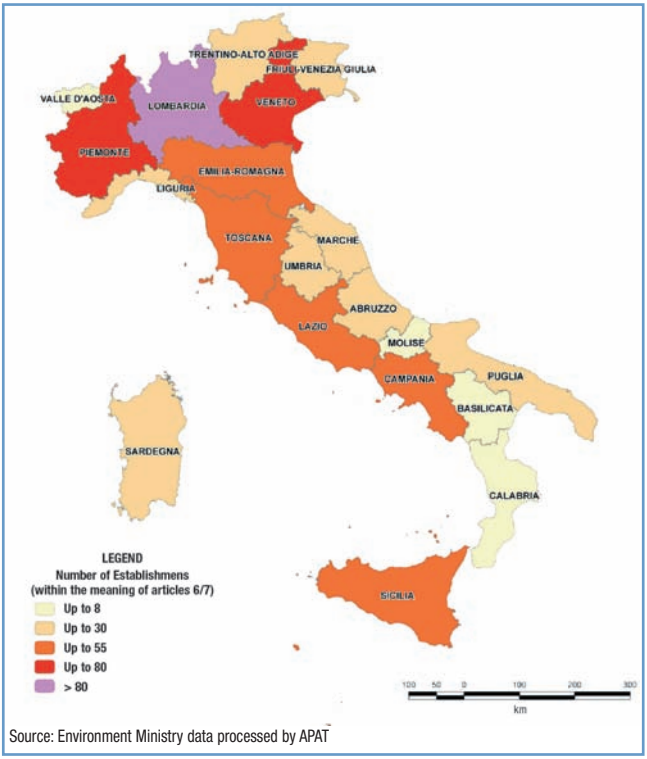
The data for this indicator include the number of establishments at regional, provincial and local level, broken down by category, in accordance with the formalities the managers of the establishments are required to comply with under the law. The establishments referred to in article 8 are obliged to notify the competent authorities, including the Ministry of the Environment, to draw a safety report and to adopt a specific safety management system.



Source: Environment Ministry data processed by APAT

Figure 15.1: Number of establishments subject to article 8 of D.Lgs. 334/99 (2005)

The establishments referred to in articles 6 and 7 have the same obligations as those mentioned above, but are exempted from drafting a safety plan.



Source: Environment Ministry data processed by APAT

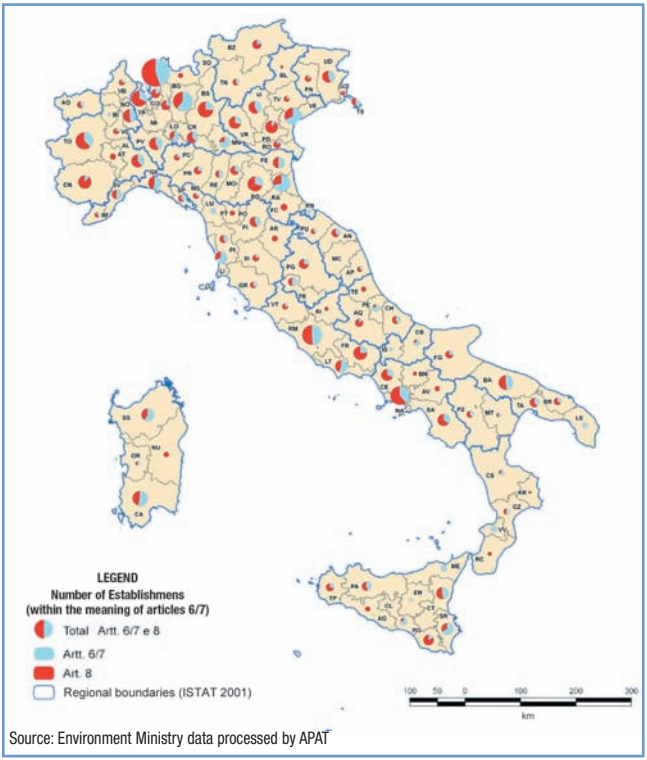
Figure 15.2: Number of establishments subject to articles 6/7 of D.Lgs. 334/99 (2005)

The statistical processing of the data for the purposes of this overview is based on the number of establishments liable to major accidents subject to the obligation of notifying the regional and provincial authorities (articles 8 and 6/7), and allows us to make some observations on the map of the industrial risk in this Country.

First of all, the number of establishments at risk in Italy, and subject to the obligations referred to in articles 6/7 and 8 of D.Lgs. 334/99, has not featured any significant changes in recent years, in absolute terms, although there have been a large number of new entries, dropouts and category changes (from 6/7 to 8 and vice versa). Generally speaking, the dropouts and category changes are the result of changes to the amount of hazardous substances stocked at the establishments and, in some cases, to the closing down of the establishments themselves, for business or safety reasons identified in connection with the preliminary investigations carried out under the "Seveso" directives. On the contrary, the new entries are due to new businesses being set up (very few) or to the extension of existing businesses.

Another observation concerns the establishments subject to article 5.3 of D.Lgs. 334/99. Due to the fact that this paragraph has been abrogated by the new guidelines (D.Lgs. 238/05), the establishments concerned are no longer subject to the obligations under the regulations on major accident hazards.

Having regard to the geographical distribution of the establishments subject to notification obligations (under articles 6/7 and 8 of D.Lgs 334/99), about a quarter 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 and Emilia Romagna (about 9%) 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. In the Centre and South of the country, the regions featuring the highest number of establishments are Lazio (about 8%), Campania (about 7%), Sicilia (about 6%), Puglia (about 4%) and Sarde-



Source: Environment Ministry data processed by APAT

Figure 15.3: Provincial distribution of establishments subject to articles 6/7 and 8 of D.Lgs 334/99 (2005)

gna (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.

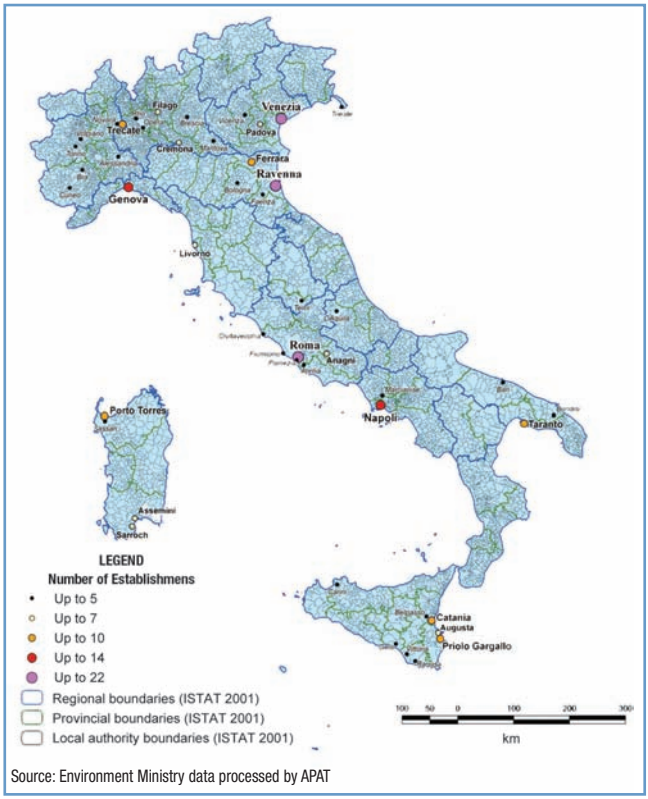
LOCAL ADMINISTRATIVE UNITS WITH 4 OR MORE ESTABLISHMENTS LIABLE TO BE AFFECTED BY A MAJOR ACCIDENT HAZARD

INDICATOR - A10.002

This indicator features the list of local administrative units (LAUs) hosting establishments subject to notification obligations (under 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 Italy. 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 districts 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 15.4 shows the location of the LAUs, with the graphical indication of the number of hazardous establishments based in them.

Among the LAUs 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 478 LAUs hosting one establishment liable to be affected by a major accident, subject to notification; 114 LAUs with 2 establishments, and 27 with 3. Including the 48 LAUs with four or more establishments, the total number of LAUs concerned by the Seveso Directive (hosting at least one establishment with the obligation of notification) is 667.



Source: Environment Ministry data processed by APAT

Figure 15.4: LAUs hosting four or more establishments subject to articles 6/7 and 8 del D. Lgs. 334/99 (2005)

16. ENVIRONMENTAL QUALITY OF ORGANISATIONS, FIRMS AND PRODUCTS

INTRODUCTION

Five years on from their implementation, the EMAS and Ecolabel regulations have demonstrated to be effective for environmental prevention and improvement, and the key objective of the Sixth Action Programme (2000-2006), 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 (when the EMAS and Ecolabel schemes were effectively implemented in Italy), the two schemes have become increasingly widespread, with a significant annual increase The chapter illustrates the main characteristic of these tools and their implementation in Italy.

16.1 ENVIRONMENTAL QUALITY OF ORGANISATIONS AND FIRMS

The EMAS Regulation (2001/781/EC) was introduced to increase the environmental protection. The implementation, by organizations, of the environmental management system required by EMAS leads to increase performance efficiency and the reduction of costs deriving from the incorrect management of production practices.

Any type of organizations, whatever its products and services, is eligible to register to EMAS, 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 first step to obtain EMAS registration, is the *initial environmental analysis,* which aims 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. At the end 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 Italy, 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 wishing to reduce the environmental impacts of its activities, by adopting an environmental management system; hence its incorporation into the new EMAS Regulation.

In Italy, to date, there are 520 EMAS-registered organisations (31 July 2006). Among these, many are non-manufacturing firms belonging to the services sector or government organisations. At EU level, there are 4,000 EMAS-registered organisations.

NUMBER OF EMAS-REGISTERED ORGANIZATIONS

INDICATOR - R02.001

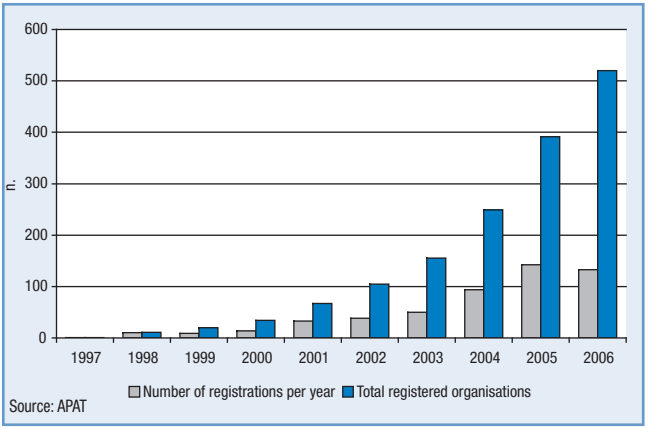


Figure 16.1: EMAS registration trend in Italy (updated to 31/07/2006)

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 decrease 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 the EMAS registration trend in Italy (1997-2006) shows that the environmental awareness of organizations is increasing by the year.

NUMBER OF UNI-EN-ISO 14001 CERTIFICATIONS

INDICATOR - R02.002

The number of UNI-EN-ISO 14001 certifications may be considered a further indicator of the environmental awareness of firms and organizations. The widespread presence of environmental management systems indicates an increase of awareness towards sustainable development, to the full advantage of the quality of the environment The number of certificates indicates, instead, 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 generated by manufacturing-related pollution. The standard envisages no targets, because compliance is entirely voluntary. The information is updated periodically by SINCERT, based on the number of certificates awarded .

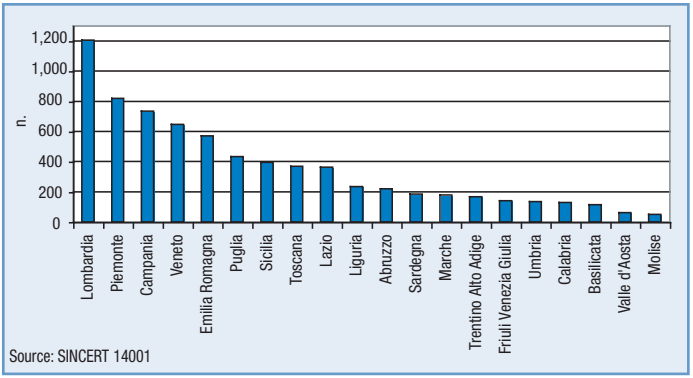


Figure 16.2: Geographical distribution of the UNI-EN-ISO 14001 certifications (updated to 31/05/2006)

16.2 ENVIRONMENTAL QUALITY OF PRODUCTS

The Ecolabel (Regulation 1980/2000/EC) is the European label of ecological quality, voluntary and selective, it rewards the most eco-friendly products and services. The Ecolabel, in fact, certifies that the product or service has a low environmental impact throughout its life-cycle, albeit maintaining high performance standards, distinguishing them from their market competitors.
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 cycle of product/service. The Ecolabel criteria for each product groups are aimed precisely at mitigating these impacts. Ecolabels can be assigned to products of widespread use (except foodstuffs, beverages and drugs) and services. To date, 23 products groups 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, televisions, vacuum cleaners), tissue-paper , copy paper, paints, soil improvers , PCs, laptops, textiles, light bulbs, hard floor coverings, lubricants, mattresses, tourism accommodation service and campsite service.
Many advantages accrue to both producers and consumers, because the Ecolabel 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 LICENCES AWARDED
INDICATOR - R02.003

The aim of the Ecolabel Regulation is to guide consumers and, consequently, the market, towards “cleaner” - that is, more eco-friendly - products. The number of Ecolabels licences may be viewed as a response indicator: it represents the degree of eco-friendliness of manufacturers and, consequently, of consumers too, thus highlighting the environmental “awareness” of the manufacturing industry. 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 Italy, between 1998 and 2006 (figure 16.3), 96 Ecolabels licences were awarded to a total of 1,380 products belonging to 13 different products groups (paints, detergents, footwear, textiles, copy paper, tissue paper, soil improvers and hard floor coverings, tourist accommodation facilities and camping facilities).
The efficiency of this voluntary instrument is reflected in the approx. 92% increase of the Ecolabels licences between 2005 and 2006 in Italy, which has now become the EU Competent Body with the highest number of Ecolabels licences (96), followed by Denmark (53) and France (45).
The figures shows that tourist accommodation service (22 licences), textiles (11 licences), hand washing detergents, footwear and tissue paper (9 licences) are the product groups with f the highest number of Ecolabels licences. Some differences may be seen at European level: the product groups with the most Ecolabels is textiles (65), tourist accommodation service (46), paints (45) and multipurpose detergents (26).

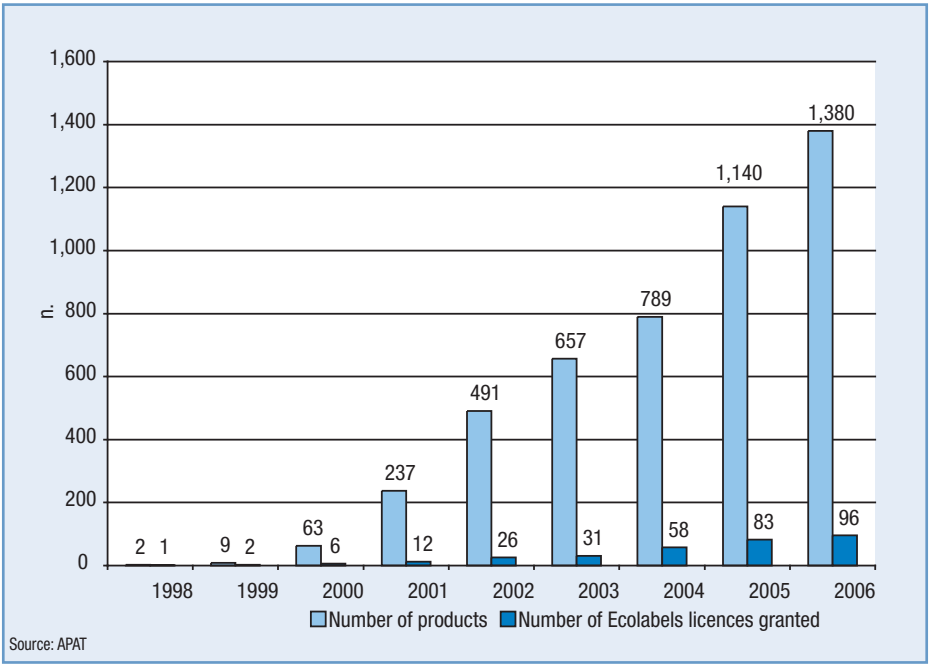


Figure 16.3: Ecolabel licences trends (updated to July 2006)

17. MONITORING AND CONTROL

INTRODUCTION

Environmental control is necessary to prevent or reduce pollution, with the aim to protect natural resources and improve the quality of ecosystems. Environmental control is performed by monitoring chemical, physical or biological parameters with an appropriate frequency.

In Italy monitoring and environmental control is guaranteed by a wide number of institutional bodies: the Ministry of the Environment and the regional, provincial and local authorities are responsible for authorisation procedures; control activities are assigned to the Supervisory Authorities, such as the Environmental Protection Agencies network (APAT, ARPA/APPA), the Hygiene Departments of the District Health Authorities (USL/ASL), law enforcement authorities (such as the Forest Police, the Carabinieri Environmental Protection Division-CCTA, the Harbour Master's Offices and the Municipal Police Corps), and Water Management Bodies (Autorità di Bacino, Magistrato delle Acque).

APAT is in charge of coordination with the task of:

- improving control planning;
- harmonizing the analytical methods adopted by the laboratories of the Environmental Protection Agencies network involved in the environmental monitoring and control activities;
- identifying and selecting the suitable tools and instruments for environmental monitoring and control purposes;
- improving the quality of the environmental analytical data, to ensure its comparability at national level.

Within this framework, in March 2006 the Environmental Protection Agencies network implemented the Recommendation 2001/331/EC by approving a draft Regulation laying down the criteria for planning and conducing environmental controls.

MONITORING

The Aarhus Convention (1998) defines the key elements of environmental democracy, based on: (a) access by all citizens to environmental information, (b) public participation in the decision-making process, and (c) access to justice. Access to environmental information must be guaranteed and the data for describing the quality of the environmental variables must be accurate, reliable and comparable in space and time. Monitoring is one of the main responsibilities of the Environmental Protection Agencies network. Intense and complex laboratory activities are commonly requested to the laboratories. Monitoring includes all the following analytical steps: sampling, sample transportation and preservation, sample preparation and pre-treatment, instrumental analysis, data evaluation. Such analytical effort must be accompanied by the continuous improvement of analytical techniques. At national and international level, comparability of environmental test results is one of the prerequisites for establish a common framework of the state of the environment, and a goal to be actively pursued by the scientific community and the operators involved.

Therefore, APAT was assigned the task of harmonizing at national level the quality of the monitoring and control data coming from the different laboratories. To this end, APAT organized interlaboratory comparison programme, by circulating among all the laboratories of the Environmental Protection Agencies network reference materials internally produced. A Permanent Advisory Group (GTP) has also been set up under APAT coordination. The GTP collects the priorities and needs of the local laboratories, supervises the implementation of interlaboratory exercises, involving the highest possible number of environmental laboratories.

A network of reference laboratories has been set-up. The reference laboratories are experienced in critical analytical issues, such as the determination of pesticides, polycyclic aromatics hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dioxins/furans and asbestos. A project aimed at defining the traceability chain for ozone measurements and air quality (PM_{10} and $PM_{2,5}$) started and the themes for the new core reference laboratories (waste characterisation, eco-toxicological tests and no ionizing radiation/noise field measurements) were also identified.

NUMBER OF ACCREDITED ARPA/APPA LABORATORIES

INDICATOR - R06.006

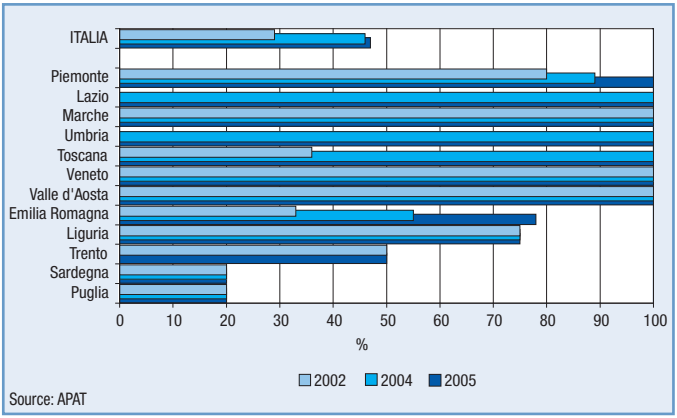


Figure 17.1: Comparison of the percentage of ARPA/APPA laboratories accredited are recognised by ORL in 2002, 2004, 2005

This indicator verifies the effectiveness, over the years, of the environmental measures implemented by the ARPA/APPA network, in relation to the improvement of environmental information and the results of the efforts to strengthen the Agency network laboratories. The quality of our environment also depends on the capability 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 require the member States to produce comparable environmental data; one of the methods for ensuring good quality of analitical data is precisely the accreditation of the laboratory tests according to the UNI CEI EN ISO/IEC 17025 standard. In the case of food products, the national legislation requires laboratory recognition by an organization belonging to the Istituto Superiore di Sanità (ORL).

NUMBER OF LABORATORIES TAKING PART IN THE INTERLABORATORY COMPARISON PROGRAMME ORGANIZED BY APAT

INDICATOR - R06.007

The indicator gives the number of laboratories of the Environment Agency network taking part, since 2002, in the interlaboratory comparison programme organized by APAT. Interlaboratory comparison are analytical exercises which allow the verification and improvement of the quality of the measurements over the years. The usual format for interlaboratory comparison is based on the distribution of samples of a test material (reference material) to the participants. Participating laboratories analyze the material without knowledge of the correct results and return the results of the measurement to APAT.
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 to the interlaboratory comparisons organized by APAT. The figures depend on a number of factors, including the reference materials produced by the APAT laboratories, the number of ARPA laboratories involved in specific projects for which the interlaboratory comparison is organized (see the first interlaboratory comparison organized in 2005), the analytical difficulties in the determination of specific analyses. The indicator highlights an active participation of the laboratories in the interlaboratory programme organised by APAT.

Table 17.1: Participation of ARPA/APPA laboratories in the APAT interlaboratory comparison programme

Region/Autonomous province	2003				2004								2005					
	1st comparion		2nd comparion		1st comparion		2nd comparion		3rd comparion		4th comparion		1st comparion		2nd comparion		3rd comparion	
	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%
Piemonte	1	10	3	30	4	44	1	11	0	0	0	0	0	0	4	44	1	11
Valle d'Aosta	1	100	1	100	1	100	0	0	1	100	1	100	0	0	1	100	0	0
Lombardia	2	17	5	42	8	67	1	8	7	58	7	58	0	0	4	33	2	17
Trentino Alto Adige	2	50	1	25	1	25	1	25	1	25	1	25	0	0	1	25	1	25
Bolzano Bozen	*1*	*50*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*50*	*0*	*0*
Trento	*1*	*50*	*1*	*50*	*1*	*50*	*1*	*50*	*1*	*50*	*1*	*50*	*0*	*0*	*0*	*0*	*1*	*50*
Veneto	6	75	7	88	5	63	1	13	5	63	6	75	0	0	6	75	1	13
Friuli Venezia Giulia	1	25	3	75	3	60	1	20	3	60	3	60	0	0	2	40	0	0
Liguria	0	0	3	75	2	50	1	25	2	50	1	25	0	0	1	25	1	25
Emilia Romagna	3	33	4	44	5	50	1	10	8	80	8	80	0	0	6	60	1	10
Toscana	7	64	8	73	5	45	1	9	9	82	9	82	1	9	7	64	1	9
Umbria	1	50	1	50	1	50	1	50	2	100	1	50	2	100	1	50	1	50
Marche	1	25	2	50	3	75	1	25	4	100	3	75	0	0	1	25	1	25
Lazio	0	0	3	60	1	20	1	20	2	40	2	40	0	0	1	20	2	40
Abruzzo	2	50	0	0	1	25	0	0	3	75	1	25	3	75	4	100	0	0
Molise	1	33	0	0	2	67	1	33	2	67	2	67	3	100	2	67	0	0
Campania	0	0	2	40	1	20	1	20	4	80	3	60	4	80	2	40	2	40
Puglia	0	0	2	20	1	20	0	0	3	60	2	40	1	20	3	60	1	20
Basilicata	0	0	0	0	0	0	0	0	1	50	0	0	2	100	1	50	0	0
Calabria	0	0	1	17	0	0	1	17	2	33	1	17	2	33	0	0	0	0
Sicilia	1	11	7	78	6	67	0	0	8	89	7	78	8	89	3	33	3	33
Sardegna	0	0	2	40	1	20	0	0	1	20	1	20	1	20	2	40	0	0
ITALY	**29**	**26**	**55**	**49**	**51**	**45**	**14**	**12**	**68**	**60**	**59**	**52**	**27**	**24**	**52**	**46**	**18**	**16**

Source: APAT

ENVIRONMENTAL RADIOACTIVITY MONITORING

INDICATOR - R06.009

This indicator consists of the number of activity concentration measurements carried out on environmental and food matrixes by the Environment Agency system laboratories belonging to the national Network for supervising the environmental radioactivity of equipped agencies, institutions and bodies (under article 104 of D.Lgs. 230/95 as subsequently amended and supplemented), identified with the acronym RESORAD (REte di SOrveglianza della RADioattività - Radioactivity Supervision Network). The data are arranged according to sampling location, based on the Commission Recommendation 08/06/2000 relating to 2000/473/Euratom, which recommends a nationwide network model suited to monitoring requirements and featuring an architecture consisting of high-sensitivity locations of excellence within a 'sparse monitoring network' (at least one for each macro-area into which Italy is divided) and monitoring locations belonging to a 'dense monitoring network', featuring ordinary sensitivity.

CONTROL

Environmental controls meet the twofold aim of, (1) promoting and strengthening conformity by establishments of the applicable environmental regulations and, (2) verifying compliance therewith, plus, in the case of default, promoting the necessary actions for achieving compliance. Controls, therefore, represent a response by the institutions aimed at preventing and mitigating pollution and environmental impact.

In this framework, they cannot be viewed as a mere “comparison” of a measured parameter with a reference value (emission, exhaust, etc. limit values), but rather as a integrated and multidisciplinary set of controls (involving administrative, technical, management and analytical competencies).

Today, in fact, besides the control functions carried out - at all levels - by thematic areas (air, water, soil, etc.) by inspectors specialised in the different environmental matrixes, a new integrated approach model is being proposed, by means of which the inspector (or inspection team) may (more effectively) identify, the corrective measures to be implemented, with respect to any establishments and/or sectors, for the purpose of improving environmental quality.

The intrinsic complexity of environmental issues has consequently led to the co-existence of both these control strategies: on the one hand, the one providing for the aggregation of data according to environmental matrix, which, moreover, is the traditional method; and, on the other hand, the approach that tackles environmental control by type of establishment (broken down into 14 classes, based on the ISTAT classification for the “2001 General Census of Industry and Services Sectors”).

CONTROL ACTIVITIES BY ENVIRONMENTAL MATRIX

INDICATOR - R06.001

This indicator quantifies the formal and technical operations performed by the control authorities by environmental matrix, such as: air, water, soil, waste management, physical agents (noise, vibrations, ionizing and non-ionizing radiations), anthropogenic risk, etc.

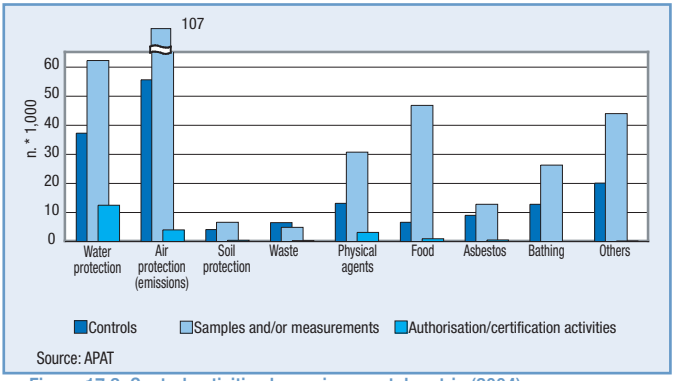
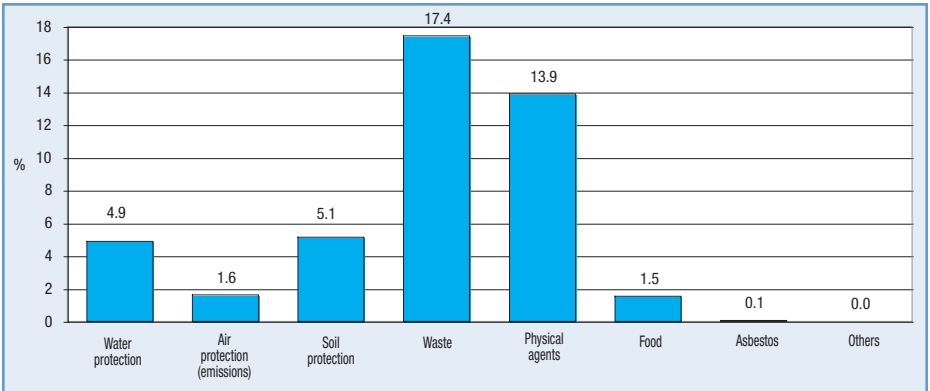


Figure 17.2: Control activities by environmental matrix (2004)

MEASUREMENTS AND PENALTIES FOR ILLEGAL ACTIONS

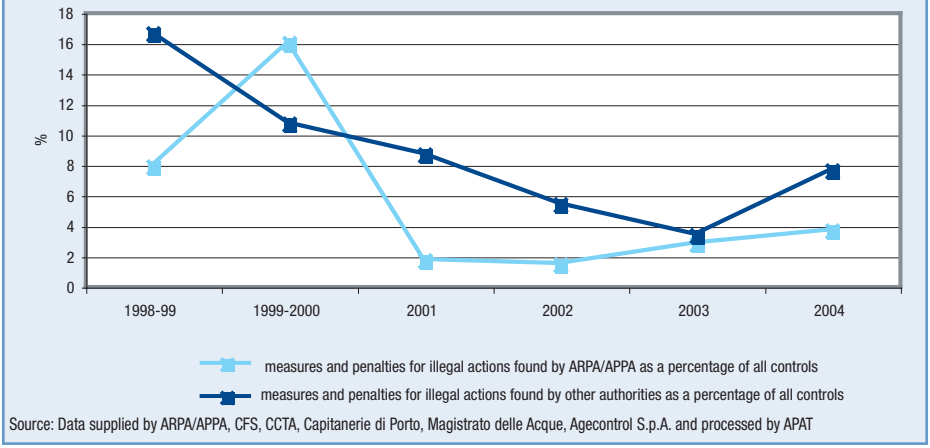
INDICATOR - R06.002



Source: ARPA/APPA data processed by APAT
LEGEND:
The data concerns 16 ARPA/APPA out of 21

Figure 17.3: Judicial measures and penalties for illegal activities found by ARPA/APPA control activities (2004)

This indicator measures the number of administrative (penalties) and criminal (reports to the judicial authorities and attachments) proceedings undertaken by the competent bodies, in the event of non-conformities with the applicable environmental guidelines and regulations, at all levels.
Figure 17.3 shows - for each environmental matrix - the percentage of non-conformities compared to the total number of controls: it is obvious that the highest number of illegal activities concerns waste management and physical agents (noise, ionizing/non-ionizing radiations).



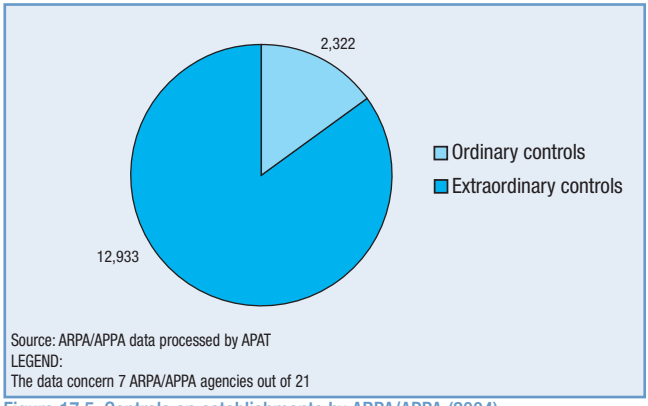
Source: Data supplied by ARPA/APPA, CFS, CCTA, Capitanerie di Porto, Magistrato delle Acque, Agecontrol S.p.A. and processed by APAT

Figure 17.4: Percentage of illegal activities found by the inspection and control authorities as a percentage of the total controls made

CONTROLS BY TYPE OF ESTABLISHMENT

INDICATOR - R06.010

This indicator is presented here for the first time: it shows, for each type of establishment and economic activity, the number of controls made by the inspection and control authorities, disaggregating them into 'ordinary controls' (i.e. routinely scheduled by the competent authorities) and 'extraordinary controls'. The objective is to quantify the environmental control activities performed by the competent bodies and assess the effectiveness of their planning and scheduling activities, with a view to identifying the classes of establishments or sectors of production activities that need greater attention in the planning phase. The data presented here, in relation to the ARPA/APPA activities in 2004, show how the extraordinary controls account for the largest proportion (85%) of control activities by the Agency network. When assessing the reported data, the limited geographical extension of the survey should be taken into account, because the data refers to only 7 ARPA/APPA agencies out of 21.



Source: ARPA/APPA data processed by APAT
LEGEND:
The data concern 7 ARPA/APPA agencies out of 21

Figure 17.5: Controls on establishments by ARPA/APPA (2004)

18. PROMOTING AND SPREADING ENVIRONMENTAL CULTURE

INTRODUCTION

Promoting and spreading environmental culture refers to the whole range of institutional activities, aimed at circulating scientific and technical knowledge among the general public, with a view to protecting the environment by adopting suitable lifestyles and/or behaviours.

A number of important EU and international environmental organisations operate in this field, although the effectiveness of them activities is not among the basic topics generally examined by them; this is why there is no availability of acknowledged methodological references. However, APAT believes that this subject constitutes a significant proportion of the package of responses that the national community should focus on, for an effective management of the environment, and, therefore, it pursues the object of formulating indicator proposals allowing the representation and monitoring of its more important aspects.

Based on this conviction, APAT feels the need to acquire facts and information in this respect, within a broader framework, which must always be open and liable to enlargement.

This chapter is divided into four themes (SINAnet themes) - environmental information, communication, capacity-building and education - which cover all the main aspects of this matter.

For each topic, the data concerning the APAT-ARPA/APPA Network are presented, collected, by and large, by the network of Agency System contacts for Environmental Communication, Information, Capacity-building and Education - CIFE, with the sole exception of the data relating to the library services, which have been collected through the System Library network (which features 9 members out of 21), and, with respect to the data relating to environmental information circulated by means of reports and publications, obtained through a specific survey of the Agency websited and confirmed by telephone conversations with the authorised contacts.

The data have been arranged according to ten indicators, as follows: four for *Environmental information* and two each for *Environmental communication, Environmental capacity-building* and *Environmental 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 media, 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 environmental management. In 2004-2005, the number of Environment Agencies publishing a Report on the state of the environment increased, although, it is still rather small. The services provided by the network of Environment Agencies Libraries were judged to be generally satisfactory. 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 Agency network, 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, maintaining relations 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 network, 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 targeting both the staff of the Agencies and outside stakeholders. 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 (DESS - 2005 - 2014), with a series of coordinated projects, at national level, by the Italian UNESCO Committee, which is the leading organisation for the implementation of the international Strategy. 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-RELATED PUBLICATIONS

INDICATOR - R03.001

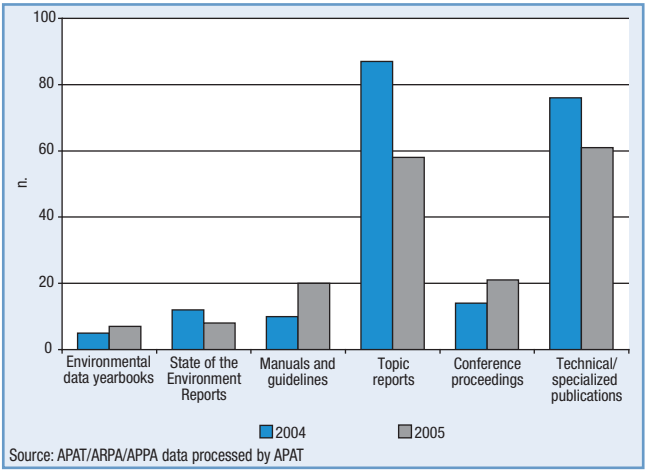


Figure 18.1: Environmental information by the APAT/ARPA/APPA network, comprising reports and publications

The number of environmental-related publications represents an estimate of the editorial products through which the competent public authorities - in this specific case, the local Environment Agencies - spread environmental data/information.

Figure 18.1 shows that, in the reference years, the APAT/ARPA/APPA network mostly produced topic reports and specialized publications. There was a drop in the amount of both these types of publications in 2005.

ENVIRONMENTAL COMMUNICATION ON THE WEB

INDICATOR - R03.006

This indicator allows an estimate of the willingness of the Institutions to communicate with users, by means of services encouraging interaction at various levels. In particular, this indicator takes account of the services provided through websites, such as direct contact between users and competent offices via e-mail, discussion forums and/or mailing lists, opinion polls, environmental news reviews, news and events.

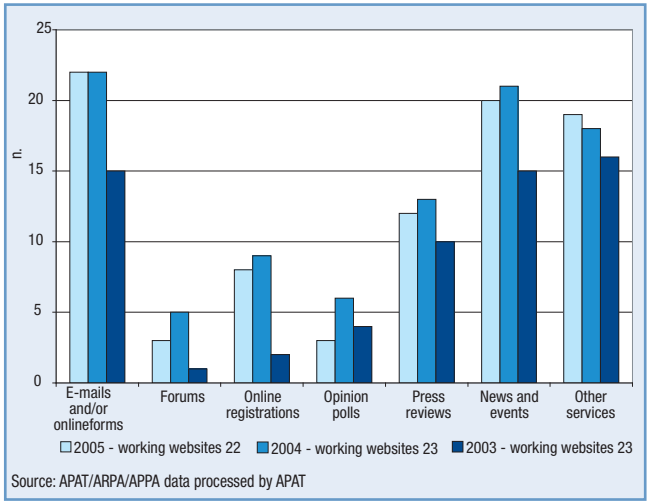


Figure 18.2: Trend of environmental communications on the Web

An examination of the data, collected directly by APAT through an online survey, highlights a reduced willingness of the Agency network to communicate with users interested in environmental topics through web-based communication and interaction channels. In particular, with regard to forums and surveys. The outcomes are considerations primarily relating to the management and maintenance of interactivity support technologies, with respect to users, which have turned out to be scarcely effective, over the years, because they require continuous outlays of financial and human resources.

ENVIRONMENTAL CAPACITY-BUILDING SUPPLY

INDICATOR - R03.007

This indicator provides a benchmark for the environmental capacity-building activities implemented by the environmental Agencies and targeting both System operators and outside stakeholders; the indicator is based on the number of training courses, the corresponding number of hours, and the number of participants per Agency, at national, regional and provincial level.

Comparing the overall number of hours to total environmental capacity-building course attendance figures, the result is an average attendance of 32 persons per course.

Furthermore, figure 18.3 shows, for each Agency, the average number of hours per course.

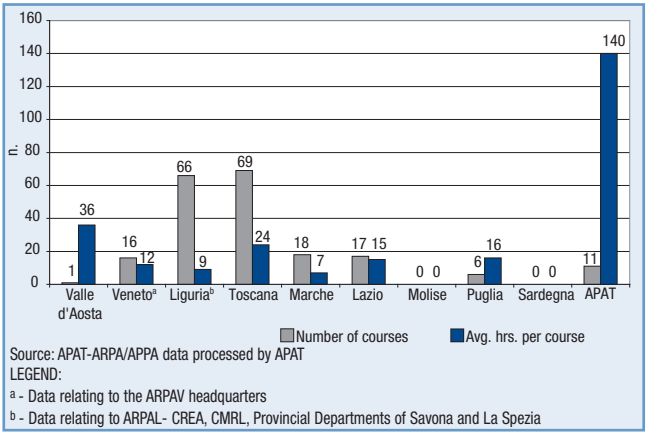


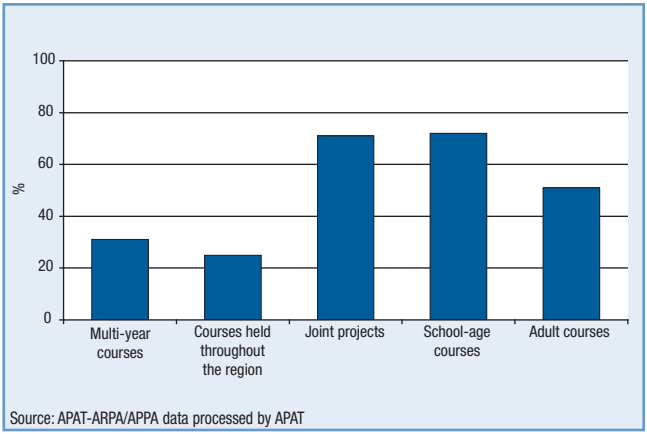
Figure 18.3: Environmental capacity building supply: average per course (2005)

ENVIRONMENTAL EDUCATION SUPPLY

INDICATOR - R03.009

This indicator provides a description of the state of the art of environmental education projects promoted by the Environment Agencies network. The projects concern both teaching activities and educational projects, totalling 125 and 89, respectively, in 2005.

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



Source: APAT-ARPA/APPA data processed by APAT

Figure 18.4: Environmental education projects by type (2005)

Figure 18.4 shows that out of the 89 educational projects implemented - of variable length and providing for a series of integrated theoretical and practical activities - about 72% targeted schoolchildren and 51% adults; furthermore, 31% were multi-year projects, 25% covered the entire region/province, and 71% were implemented as joint projects.

19. ENVIRONMENT AND HEALTH

INTRODUCTION

For several years now awareness relating to environmental issues has grown among Western people. Today, the safeguarding and sustainable use of natural resources are being increasingly associated with a new environmental dimension, that of personal well-being. This combination of environment and well-being is defined as a new frontier for economic and industrial growth, while at the same time representing a prerequisite for ensuring the development and health of human beings. Right from its onset, the EU's environmental policy has been inspired by health-related considerations. The Treaty of Amsterdam (1997) already contained provisions concerning Community action in the environment and health sectors, and the 6th Environmental Action Programme has confirmed the objective of contributing to "a high level of quality of life and social well being for citizens by providing an environment where the level of pollution does not give rise to harmful effects on human health and the environment".

The Community Programme on Public Health (2003-2008) also considers the environment as one of the main determinants of health, while the various research framework programmes include specific actions in this field.

The definition of "environment and health" by the World Health Organization (WHO) is much broader and includes "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".

In the European framework of sustainability, therefore, the importance of an integrated approach is becoming more and more important, also with regard to strategic planning decisions, based on a global, not sectoral, view of environmental impacts and their quality and quantity effects on land management and regional planning in general. Sustainable planning, respectful of the environment and of human health, taking into account the various aspects of the physical environment and the social and economic context and their interactions, is being implemented following the introduction into Community law of the of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment.

The development of environment and health indicators is a useful tool for measuring and monitoring the effectiveness of health promotion activities, within the framework of the environmental, land and regional planning policies.

For this purpose, the ECOEHIS (*Development of Environment and Health Indicators for the EU Countries*) project was launched in 2002 and completed in 2004, its aim being to identify environment and health indicators consistent with European legislation, and assessing their availability, quality, comparability and political relevance. Based on the results of the study, an initial core set of 46 indicators, classified according to the DPSEEA model, has been identified, grouped into three categories, according to their implementability, as follows: (a) ready indicators, the immediate implementation of which is recommended, (b) ready indicators that cannot be immediately implemented, and (c) desirable indicators requiring further development. The study has also highlighted how many of the proposed indicators cannot be populated, because of the lack of data, shortage of flow systems, or simply because they need to be specifically reorganised.

In this chapter some of the indicators set out in the ECOEHIS project and which can be populated using the available data are illustrated.

The aim of these indicators is to monitor health and impact related aspects in the field of transport policies. In particular, we have taken account of road accident rates, due to their significant impact in terms of both mortality and the temporary or permanent impairment of the quality of life (accident rate) and their social costs (potential years of life lost - PYLL).

Furthermore, in order to monitor the implementation, at local level, of the sustainable development guidelines set out in the Community and domestic regulations, an assessment has been made of the regional plans and programmes with potential effects on the environment, pursuant to Directive 2001/42/CE.

ROAD ACCIDENT RATE

INDICATOR - A09.004

This indicator provides information on road accident rates, with respect to the vehicle fleet (vehicles registered with the vehicle registration authorities) and the kilometres travelled by the circulating vehicles (these distances are expressed as vehicles per km). For the purposes of this indicator, road accidents are defined as all collisions involving at least one moving vehicle, on a road open to traffic, also including pedestrians and with at least one casualty.

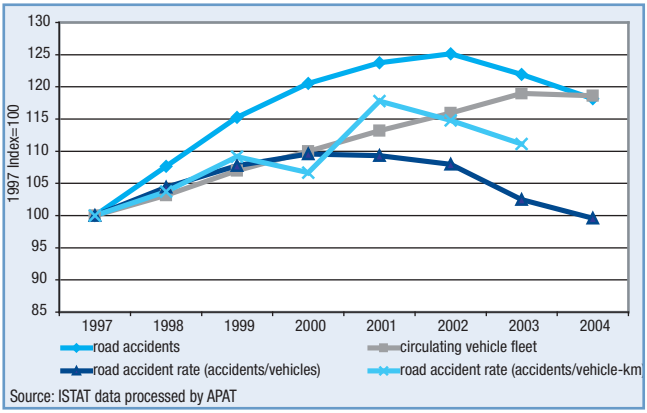


Figure 19.1: Trends of vehicle fleet, number of accidents and road accident rates

The general objective of the indicator is to meet the growing demand for information on road accidents, a phenomenon with economic and social, demographic and cultural implications. Road accidents, in fact, have serious social costs for the community, estimated at 33,706 million euros a year, equal to 2.5% of the national GDP in 2004. Therefore, monitoring road accident rates may assist decision-makers, with respect to managing mobility demand and supply, in connection with sustainable planning.

Between 1997 and 2002, road accidents increased faster than the vehicle fleet, affecting the road accident rate trend, which rose by about 8% (figure 19.1). In 2003 this trend was reversed, but in 2004 the rate increased once again back to the value recorded seven years earlier. This was due, (a) in part to the new road safety regulations (including the new road safety code that entered into effect in 2003), which determined a reduction in the number of road accidents, despite the constant rise of the vehicle fleet, and (b) partly to the improvements in the field of active and passive vehicle safety. The accident rate to distance travelled featured an increase of about 11% in the 1997-2003 period, with values of 38% on city roads (in 2001) and slight reductions (-2%) on motorways in 2003. Comparing road accident rates with the vehicle fleet, and the distance travelled, it may be observed how the former increases at a slower rate than the latter, probably as a result of the different growth recorded by the two parameters in the examined period: plus 19% for the vehicle fleet and plus 10% for the distances travelled.

IMPLEMENTATION OF REGIONAL PLANS AND PROGRAMMES

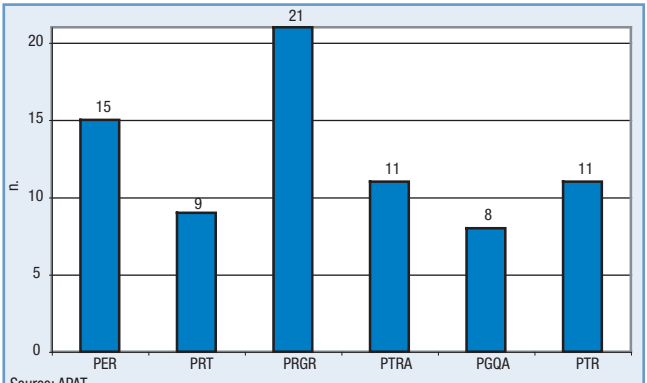
INDICATOR - A09.008

This indicator provides information about the existence of plans and programmes approved and adopted by the regional governments, under domestic legislation. The selection of the type of plans and programmes to be monitored is based on whether or not their implementation may “significantly” affect the environment, according to the Directive 2001/42/CE on the assessment of the effects of certain plans and programmes on the environment (the so-called SEA Directive). In this first draft, we have selected strategic plans and programmes, in relation to the implementation of environmental and regional development policies.

The principal aim of the indicator is to provide exhaustive information on the implementation status of the plans, at the various geographical levels, with a view to assisting public and private sector stakeholders in defining the relevant local policies and mea-

sures, with a view to enhancing the efficiency, effectiveness and consistency of sustainability objectives.

With regard to the examined plans and programmes, a good level of response was observed, in relation to energy and waste management plans, which have been approved/adopted by 15 and 21 regional governments, respectively (figure 19.2). Furthermore, a spatial analysis has revealed a larger number of plans/programmes in the Central and Northern regions. Sardegna being the region of Southern Italy/Islands with the largest number of examined plans.



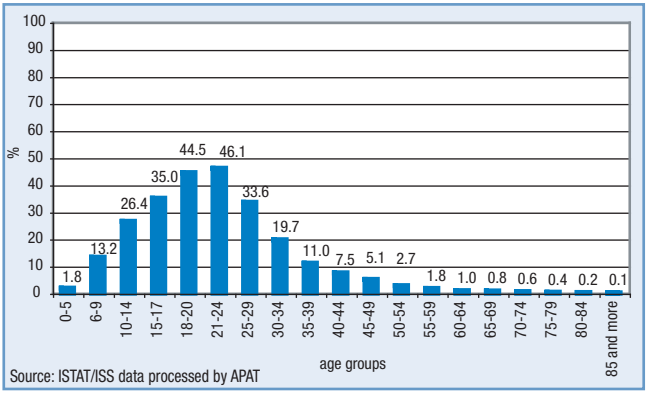
Source: APAT
LEGEND:
PER: Regional Energy Plan; PRT: Regional Transport Plan; PRGR: Regional Waste Management Plan; PTRA: Water Rehabilitation and Protection Plan; PGQA: Air Quality Management Plan; PTR: Regional Land Management Plan

Figure 19.2: Approved/adopted regional plans

POTENTIAL YEARS OF LIFE LOST FOR ROAD ACCIDENTS

INDICATOR - A09.007

The PYLL indicator *(Potential Years of Life Lost)* focuses on the potential number of years lost for different causes of death. This indicator is calculated as the number of deaths occurring at a certain age multiplied by the life expectancy figure at the same age. The PYLL is an indicator of premature mortality because, not only does it give a measure of the impact of mortality, but also of the personal characteristics of the persons involved, because different life expectancy weights are associated with the age of death (the more premature the death the greater the attached weight).



Source: ISTAT/ISS data processed by APAT

Figure 19.3: Percentage (%) weight of PYLL for road accidents, compared to the PYLL for all other causes of death, by age group (2002)

The information provided by this indicator highlights the greater weight of youth mortality due to road accidents, in terms of the potential years of life lost. In this sense, it constitutes a valid support in deciding the priorities for prevention and programming policies, with a view to reducing the social costs of road accidents.

Figure 19.3 shows how the contribution of road accident mortality to general mortality, in terms of PYLL, peaks (nearly 50%) in connection with the 18 to 24 years age group.


EMAS
Ecolabel

APPENDIX


EMAS
Ecolabel

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	D/P	To provide an estimate of the land area actually used for productive farming. The UAA comprises cropland, permanent meadows and pasture land, timber crops, family vegetable gardens and chestnut orchards.	★★★	I, R	1990, 2000,2003	☹
	Distribution of fertilizers in farming (including soil improvers and conditioners)	**P**	**To analyse and compare over time the quantities of different types of fertilizers (fertilizers, soil improvers and conditioners) placed on the market and the nutrients they contain, distributed by hectare of fertilized area.**	★★★	**I, R**	**1971,1981, 1985,1990, 1991-2005**	☹
	Distribution of pesticides for agricultural purposes (herbicides, fungicides, pesticides, acaricides)	P	To analyse and compare over time the quantities of the different types of plant health products, and the active ingredients they contain, used to protect crops from parasites (especially insets and mites) and pathogens (bacteria, viruses, fungi), with a view to controlling the development of weeds and ensuring high quality standards for farm produce.	★★★	I, R	1997-2004	😐
	Use of pesticides by type of crop	I/R	To provide a picture of the average dosage of the plant health products employed and, consequently, of the active ingredients they contain and the average number of applications to the principal crop types by hectare of treated area.	★★	I	2003-2004	😐
	Farm soil management	D/P	To define the extent of the use of crop succession and soil cover practices.	★★★	I, R	1998, 2003	😐
	Water management	D/P	To provide information on farmland irrigation.	★★★	I, R	1998-2003	☹
	Farms implementing ecologically oriented and organic farming techniques	**R**	**To provide a measure of the adoption, by Italian farms, of farming techniques deemed most consistent with environmental quality and the healthiness of the foods and fibres produced**	★★★	**I**	**1990-2004**	☺
	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, 1995-2005	😐
	Eco-efficiency in agriculture	**R**	**To analyse the capacity of domestic agriculture to boost economic growth, while at the same time mitigating its pressure and impact on the environment.**	★★★	I	**1990-2003**	☹
	Farmland concerned by the deliberate output, for experimental purposes, of genetically modified plants (GMPs)	P	To quantify the number of experimental tests involving Genetically Modified Plants (GMPs) carried out, and the area of land concerned, between 1999 and December 2005, in Italy.	★★★	R, P	1999-2005	😐

Q1: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Agriculture and Forestry	**Wood and non-wood forest production**	**D/P**	**To provide a picture of the Italian forestry sector, with respect to production-related and socio-economic, and not just environmental, aspects.**	★★★	I	**1970, 1975, 1980, 1985, 1990, 1995, 2000, 2004**	☺
	Certification of sustainable forest management	R	To describe the certification activities of the examined forms of forest management (on a voluntary basis).	★★★	I	1998-2005	☺

2. ENERGY

Q2: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Energy	**Total emissions of greenhouse and energy-related gases**	**P**	**To assess the role of energy processes in GHG emissions**	★★★	I	**1990-2004**	☹
	GHG emissions from energy-related processes, by economic sector	P	To assess the trends in GHG emissions from energy-related processes by economic sector	★★★	I	1990-2004	☹
	Sulphur dioxide emissions, in total and from energy-related processes	P	To assess the role of energy-related processes in sulphur dioxide emission	★★★	I	1980-2004	☺
	Nitrogen oxide emissions, in total and from energy-related processes	P	To assess the role of energy-related processes in nitrogen oxide emission	★★★	I	1980-2004	☺
	Final and total energy consumption by economic sector	D	To assess the trends in total energy consumption at national level and by economic sector	★★★	I, R	1990-2004, 2005[a]	☹
	Final consumption of electrical power by economic sector	D	To assess the trends of electrical power at national level and by economic sector	★★★	I, R	1990-2004, 2005[a]	☹
	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	1990-2004	☺
	Average specific fuel consumption for producing electricity from fossil fuels	**R**	**To assess the efficiency of conversion of primary energy from fossil sources to electricity for end consumption**	★★	**I**	**1996-2005**	☺
	Gross generation of electrical power by cogeneration plants	R	To assess the contribution of cogeneration plants to the total production of electrical power	★★★	I	1997-2005	☺
	Final energy intensity, by sector and in total	R/D	To assess the energy efficiency of economic systems	★★★	I	1990-2004, 2005[a]	☹

Q2: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Energy	**Overall energy consumption by primary sources**	D/R	**To assess the contribution by the various primary energy sources to the production of energy**	★★★	I	**1990-2005**	😐
	Production of electrical power by source	D/R	To assess the contribution by the various energy sources to the production of electrical power	★★★	I	1990-2005	😐
	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	1991-2004	😐
	Gross electricity production from renewable sources	R	**To assess the contribution by clean and non-exhaustible energy sources to total electrical power production**	★★★	I	**1991-2005**	😐
	Energy product prices	D/R	To assess the effects of international energy market trends and energy sector policies on energy product prices	★★	I	1990 - 2005	😐
	Tax revenue from oil products	R	To assess the extent to which taxation affects external costs and can foster the use of cleaner products	★★★	I	1990, 1995-2005, 2006	😐
	External energy production costs	I	To assess the environmental and social costs entailed by energy production	★	I	1997,1998	-

[a] - Provisional data

3. TRANSPORT

Q3: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Transport	Energy consumption by the transport sector	D	To quantify fuel consumption by the transport sector, in order to reduce and/or diversify it.	★★★	I	1990,1995, 2000-2004	☹
	Greenhouse gas emissions from the transport sector	P	**To assess GHG emissions by the transport sector, to assess compliance with national and international emission reduction targets by 2010.**	★★★	I, R	**1990,1995, 2000-2004**	☹
	Air polluting emissions by the transport sector	P	**To assess atmospheric pollutants emissions by the transport sector, to assess compliance with the EU and international emission reduction targets by 2010.**	★★★	I, R	**1990,1995, 2000-2004**	☺
	Traffic noise: exposure and disturbance	I	To monitor the number of persons exposed to high road traffic noise levels, such as to threaten health and the quality of life.	★	I	1997	😐
	Transport accident rates	P	To determine mortality and morbidity rates associated with the various transport modes to increase transport safety.	★★★	I	1990,1995, 2000-2004	😐

APPENDIX

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	P	To quantify oil spills into the sea by tankers, in order to eliminate oil pollution and prohibit illegal discharges.	★	I	1993,2002	😐
	Road vehicle waste	P	To monitor the production of road vehicle waste, with a view to improving prevention, through re-use and recycling .	★★★	I	1995, 2000-2005	😐
	Passenger transport demand and intensity	D	To assess passenger transport demand and to compare the relevant trends with economic growth trends; to compare the different modes of transport and their internal development dynamics, with a view to achieving modal rebalance.	★★	I	1990,1995, 2000-2004	☹
	Freight transport demand and intensity	D	To assess freight transport demand and to compare the relevant trends with economic growth trends; to compare the different modes of transport and their internal development dynamics, with a view to achieving a more efficient modal split..	★	I	1990,1995, 2000-2005	☹
	Access to services	R	To assess access to transport means and services, with a view to increasing access levels, especially with regard to collective transport modes.	★★	I	2000, 2004-2005	😐
	Transport infrastructure network capacity	D	To quantify certain values for monitoring transport networks, in order to optimise use of the existing transport network and improve certain transport modes, such as rail transport.	★★★	I	1990,1995, 2000-2004	😐
	Transport prices	D	To describe the dynamics of passenger and freight transport prices, highlighting the trends over time of this important transport demand driving and its modal split.	★★★	I	1997, 2000-2005	😐
	Taxes and fees in the transport sector	R	To monitor the trends of prices and fees in the transport sector, in order to determine prices in a fair and efficient manner among the transport modes.	★★★	I	1990,1995 2000-2006	😐
	Expenditure for personal mobility	D	To assess how people spend for transport and if they spend a fixed proportion of their budget for this sector.	★★★	I	1990,1995 2000-2005	😐
	External costs of transport	P	To estimate and cut external transport costs.	★	I	1997-2004	☹
	Energy efficiency and specific CO_2emissions a	P	To compare the different modes of transport, with regard to energy efficiency and GHG emissions, in order to reduce energy consumption per passenger-km and per tonne-km	★	I	2002	☺
	Specific pollutant emissions a	P	To quantify and compare pollutant emissions by vehicle type and mode of transport.	★★	I	2002	☺
	Diffusion of greener and alternative vehicle fuels	D	To measure the diffusion of less polluting vehicle fuels, with a view to fostering their use.	★★★	I	1990,1995 2000-2002	😐

Q3: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Transport	Vehicle fleet size	D	To monitor an important "driving factor" for road transport demand and the relative environmental pressure.	★★★	I	1990,1995 2000-2004	☹
	Average age of vehicle fleet	D	To accurately monitor the average age of vehicles, in order to assess the time required to spread new and less polluting technologies.	★★	I	1990,1995 2000,2004	😐
	Proportion of vehicle fleet meeting certain emission standards	**D**	**To monitor the proportion of the vehicle fleet meeting the more recent emission standards for new vehicles.**	★★	**I**	**2004**	😐

[a] - This indicator has not been updated, compared to the 2004 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.

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	1991-2005	😐
	Tourist flows by mode of transport	**D**	**To highlight the different forms of transport used for tourist purposes**	★★★	**I**	**1996-2005**	☹
	Tourist intensity	**D**	**To determine the carrying capacity of tourism on the country**	★★★	**I, R**	**1991-2005**	☹
	Household expenditure for tourism	D	To determine the trends in household expenditure for tourism purposes and its influence on the Gross Domestic Product (GDP)	★★★	I	2000-2005	-

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	1995-2005	😐
	R&D expenditure in the manifacturing industry	**R**	**To assess R&D expenditure by enterprises**	★★★	**I**	**1998-2005**	☺
	INES register: number of plants and IPPC activities	**P/R**	**To identify the IPPC plants generating the highest air and water emissions, i.e. those which, at national level, most contribute to industrial emissions**	★★	**I, R, P**	**2003, 2004**	-
	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	2003, 2004	-

Q5: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Industry	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	2003, 2004	-
	Number of establishments subject to integrated environmental authorisation/ authorisations issueda	R	To assess progress in the introduction of the integrated environmental authorisation process, as a tool for pollution prevention and mitigation	★★	I, R	2003	-
	Specific emissions in the chemical industry	**P**	**To assess the specific emissions generated by a manufacturing unit in the chemical industry**	★★★	**I**	**1990, 1995, 2000-2004**	😐
	Specific emissions in the iron and steel industry	P	To assess the specific emissions generated by the iron and steel industry	★★★	I	1990, 1995, 2000-2004	😐
	Specific emissions in the paper industry	**D/P**	**To assess the environmental performance of the industry as a whole.**	★★★	**I**	**2000-2005**	😐

[a] - This indicator has not been updated, compared to the 2004 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.

6. ATMOSPHERE

Q6: 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): trends 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**	**1990-2004**	☹
	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**	**1990-2004**	☺
	Acidifying substance (SO_x, NO_x, NH_3) emissions: trends 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 1990-2004**	☺
	Tropospheric ozone precurors (NO_x and NMVOC) emissions: trends 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 1990-2004**	☺
	Particulate matter (PM_{10}) emissions: trends 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**	**1990-2004**	☺

Q6: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Emissions	Carbon monoxide (CO) emissions: trends and sectoral breakdown	P	To estimate national emissions and assess trends, in connection with the measures implemented to mitigate emissions, especially by road traffic and heating systems	★★★	I, R	1980,1985 1990-2004	☺
Emissions	**Benzene (C_6H_6) emissions: trends 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**	**1990-2004**	☺
Emissions	Emission of persistent organic compounds (IPA, dioxins and furans): trends and sectoral breakdown	P	To estimate national emissions and assess the contribution of each sector, in order to monitor the effectiveness of the emission mitigating measures and policies	★★★	I	1990, 1995-2004	☺
Emissions	Emission of heavy metals (Cd, Hg, Pb, As, Cr, Cu, Ni, Se, Zn): trends and sectoral breakdown	P	To estimate national emissions and assess the contribution of each sector, in order to monitor the effectiveness of the emission mitigating measures and policies	★★★	I	1990, 1995-2004	☺
Emissions	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	2003	😐
Air quality	Ambient air quality: air quality monitoring stations		To provide a fact-based picture of monitoring stations in the country, in relation to the transmission of air quality data in accordance with the European regulations.	★★★	I, R18/20	2004	☺
Air quality	**Ambient air quality: PM_{10} particulate matter**	**S**	**To provide information on the state of air quality, using the statistical parameters referred to in the EoI directive and by controlling compliance with the daily and annual limit values set out in DM 60/02.**	★★	**I, R17/20**	**2004**	☹
Air quality	**Ambient air quality: tropospheric ozone (O_3)**	**S**	**To provide information on the state of air quality, using the statistical parameters referred to in the EoI directive and by controlling compliance with the limit values set out in D.Lgs. 183/2004**	★★★	**I, R17/20**	**2004**	☹
Air quality	**Ambient air quality: nitrogen dioxide (NO_2)**	**S**	**To provide information on the state of air quality, using the statistical parameters referred to in the EoI directive and by controlling compliance with the hourly and annual limit values set out in DM 60/02.**	★★★	**I, R17/20**	**2004**	☹
Air quality	Ambient air quality: benzene (C_6H_6)	S	To provide information on the state of air quality, using the statistical parameters referred to in the EoI directive and by controlling compliance with the annual limit values set out in DM 60/02.	★★★	I, R15/20	2004	☺
Air quality	Ambient air quality: sulphur dioxide (SO_2)	S	To provide information on the state of air quality, using the statistical parameters referred to in the EoI directive and by controlling compliance with the hourly and daily limit values set out in DM 60/02.	★★★	I, R16/20	2004	☺
Air quality	Regional air quality improvement plans	R	To provide an analysis of the measures implemented by the regional and autonomous provincial authorities to ensure compliance with the limits referred to in the guidelines and regulations on air pollution.	★★	I, R	2001, 2002,2003	😐

[a] - This indicator has not been updated, compared to the 2004 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.

7. BIOSPHERE

Q7: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Biodiversity trends and changes	**Level of threat for animal species**	**I/S**	**To provide an overview of the level of threat for animal vertebrate species and 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, 1998, 2002-2005	☹
	Level of threat for plant species	**I/S**	**To provide an overview of the threat for Italian plant species, focusing especially on vascular pants; to identify the areas most at risk of losing their biodiversity, through an analysis of the regional contingent of endemic, exclusive and naturalized exotic plants and of regional protected flora.**	★★★	I, R	2005	☹
	Hunting pressure	P	To assess the regions of the country subject to the highest hunting pressure	★★	I, R	2000-2003	☺
	Fishing pressure	D/P	To provide an overview of overall fishing trends, 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	1993-2005	☺
	Principal habitat types present in the protected areas	S/R	To estimate the distribution of the main types of habitat in the protected areas and indirectly assess the effectiveness of the biodiversity conservation measures undertaken for each habitat.	★★★	I	2003	-
	Principal habitat types present in the (approved and proposed) Sites of Community Importance (SCI/pSCI)	S/R	To highlight, for each region, the different types of habitats in that region, with respect to SCI/pSCIs, to assess their representativeness for conservation purposes	★★★	I, R	2006	☺
	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	2006	😐
	Number of cetaceans present in the Marine Mammal Sanctuary	S	To make an estimate of the size and trends of the cetacean communities in the Marine Mammal Sanctuary	★★	I	1990-2000	-
Effects of climate change	Changes to glacier fronts	S	To assess trends in glacier front changes and any other anomalies due to global change	★★	I	1958, 1978-2003	☹
	Glacier mass balance	S	To assess trends in glacier mass balance and any anomalies due to global change	★★	I	1967-2005	☹

Q7: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Protected areas	**Protected terrestrial areas**	**R**	**To assess the proportion of the country's land occupied by protected terrestrial areas**	★★★	**I, R**	**2003**	😐
	Protected marine areas	R	To assess the proportion of Italian coastal waters concerned by protected marine areas	★★★	R	2000-2003	😐
	Special Protected Areas (ZPS)	R	To assess the percentage of land (at national and regional level) concerned by Special Protected Areas (ZPS), also in relation to a breakdown by bio-geographical zones.	★★★	I, R	2006	☺
	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), also in relation to a breakdown by bio-geographical zones.	★★★	I, R	2006	☺
	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	2005	-
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, R	1976-2005	😐
	Human pressure on wetlands of international importance	**P**	**To assess the pressures potentially interfering with the state of conservation of wetlands of international interest**	★★★	**I, R**	**2006**	☹
Forests	**Forest area: current situation and trends**	**S**	**To build a picture of forestation over the years, according to forest type, regional distribution and type of management**	★★★	**I, R**	**1948-2004**	☺
	Extent of forest fires	**I**	**To build a picture of forest fires, highlighting the characteristics and trends in time**	★★★	**I, R**	**1970-2005**	☹
	Critical loads of total acidity and relevant exceedances	S	To measure the impact of atmospheric fallout of acidifying substances on the plant ecosystems at national level	★★★	I, R	2005	😐
	Critical loads of nitrogen nutrients and relevant exceedances	S	To measure the impact of atmospheric fallout of eutrophying nutrient on the plant ecosystems at national level	★★★	I, R	2005	😐
	Critical loads of cadmium and lead and relevant exceedances	S	To measure the impact of atmospheric fallout of cadmium and lead on the plant ecosystems at national level	★★★	I, R	2005	😐
	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	1997-2005	☺

Q7: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Forests	Carbon fixed by forests in Italy	S	To provide an estimate of the carbon dioxide fixing capacity of forests in Italy and their role in climate change mitigation	★★★	I	1990-2005	☺
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 DLgs 42/04	★★★	I, R, P	2005	😐
	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	2005	☺

a - This indicator has not been updated, compared to the 2004 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.

8. HYDROSPHERE

Q8: 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]**	**2004-2005**	☺
	Index of bacteriological quality (IBQ) a	S	To measure the level of human (civil and agricultural) contamination of bathing waters	★★★	C.c. [2]	1999 -2002	😐
	Bathing water quality a	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.	2000-2002	☺
	Quality required for shellfish waters	S	To assess compliance with specific functional targets	★	R.c.[1], 9/15	2002-2003	-
	Number of days of anoxia in transition waters a	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 17/20	2000-2005	😐
	Levels of pollution by macrodescriptors (LPM)	S	To assess and classify the level of chemical and microbiological pollution of rivers	★★★	R 18/20	2000-2005	😐
	Extended biotic index (EBI)	S	To assess and classify the biological quality of rivers	★★★	R 17/20	2000-2005	😐
	Ecological state of rivers (ESR)	**S**	**To assess and classify the ecological quality of rivers**	★★★	**R 17/20**	**2000-2005**	😐
	Ecological state of lakes (ESL)	**S**	**To assess and classify the ecological quality of lakes**	★★	**R 12/20**	**2005**	😐
	Quality of waters needing protection to support the fish life	S	To assess compliance with specific functional targets	★★	R 15/20	1997-2003	-
	Chemical state of underground waters (CSUW)	**S**	**To determine the chemical quality due to natural or human causes**	★★	**R 10/20**	**2000-2005**	-

Q8: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Water resources and sustainable uses	Water abstraction for potable uses[a]	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] 4/11**	**1921-1970, 2002**	-
	Air temperature [a]	S	To assess climate trends	★★★	R	1960-2001	-
	Rainfall [a]	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 -2005	😐
	Potential organic matter content[a]	P	To determine the pressure exercised on water quality by potential pollutants	★	R	1990, 1996, 1999	-
	Waste water treatment plants: compliance of collecting systems	R	To determine the compliance of collecting systems with the Directive 91/271/EEC, requirements transposed into national law by DLgs 152/99 as amended and supplemented	★★★	R 18/20	2005	☺
	Waste water treatment plants: compliance of urban wastewater treatment systems	R	To determine the compliance of the wastewater treatment plans with the Directive 91/271/EEC requirements, transposed into national law by DLgs 152/99 as amended and supplemented	★★★	R	2005	☺
	Programmes of measures for drinking water	R	To determine the effectiveness of the programmes for improving surface waters for potable uses	★★★	R 16/20	2000-2004	☹
	Programmes of measures for bathing waters	R	To determine the effectiveness of the programmes for improving bathing water quality	★★★	R[6] 11/17	2004	☹
	First intense rainfalls	P	To monitor short and intense rainfalls, characterised by a rain height of 2.5-5 mm falling in the spece of 15' and preceded by 48 hours of dry weather	-	-	-	-
Physical state of the sea	Seawater temperature	S	To assess climate change	★★★	M[5] 6/7	1989-2004	☺
	Swell and tide	S	To assess sea-atmosphere exchanges	★★★	M[5] 6/7	1989-2004	😐
Venice Lagoon	Astronomical tide height in the Venice Lagoon	I/S	To monitor the long-term variations in the high tide characteristics inside the Venice Lagoon, as indicators of the morphological evolution of the lagoon.	★★★	-	1912-1940 2002-2004	☹
	High tide delays in the Venice Lagoon	I/S	To monitor the long-term variations in the high tide characteristics inside the Venice Lagoon, as indicators of the morphological evolution of the lagoon.	★★★	-	1912-1940 2002-2004	☹
	Average sea level rise (ICLMM)	I	**To measure the medium-to-long term variations of the average annual sea level.**	★★★	-	**1872-2005**	☹

[a] This indicator has not been updated, compared to the 2004 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] R. c. = Coastal regions, even though the data is collected at certain sampling points
[2] C. c. = Coastal local administrative units
[3] B. n. = National basins
[4] B. = Hydrological basins basins (12 rivers and 5 lakes)
[5] Seas
[6] Regions required to submit improvement programmes

9. GEOSPHERE

Q9: 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 Italy (30 cm)**	★★	**I**	**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	★★	R 11/20	2005	😐
	Balance of nutrients in the soil (Input/Output of nutrients)	S	To determine whethere 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**	**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 machinerya	P	To estimate the risk of soil compaction, based on the repeated passing of farm machinery	★★★	I R	1967, 1992, 1995, 2000	☹
	Water erosion	**I**	**To estimate the risk of soil erosion due to running water**	★★	**I**	**2004**	☹
Soil contamination	Livestock breeding effluents a	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 farminga	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 areasa	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 water and groundwater**	★★	**R**	**2005**	😐
	Contaminated sites of national interest	**P**	**To provide information on the progress made in cleaning up the soil and/or surface water and groundwater in national interest sites**	★★	**I, R**	**2005**	😐
	Remediated sites a	R	To highlight the number of remediated sites by region	★★	R	2003	-
Land use	Updating official geological maps	S	To provide updated knowledge of the geology of the country through geological maps	★★★	R	2005	😐
	Primary mineral-extraction sites (mines)	**P**	**To measure human "primary mineral extraction" activities featuring a high impact on the environment and the landscape**	★★★	**R**	**1870-2005**	☹
	Secondary mineral-extraction sites (quarries)	**P**	**To quantify the number of quarries nationwide**	★★	**I, R**	**2001-2006**	-
	Extraction sites of energy resources	P	To measure human "energy resource extraction" activities featuring a high impact on the environment and the landscape	★★★	I R 14/20	1982-2005	😐

Q9: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Land use	Potential use of groundwaters	P/S	To monitor and control the use of groundwaters over increasingly larger areas of the country, and to collect data in ever greater detail	★★★	I, R	1985-2005	-
	Land use	S	To describe the type and extent of the principal human activities locally, allowing the survey of changes in land use in agriculture and urban areas, and the development in land coverage of semi-natural systems	★★★	I, R	1990-2000	😐
	Urbanization and infrastructures	P	To represent the extent of urbanization and infrastructure construction, which are the principal forms of irrecoverable loss of land	★★★	I, R	1990-2000	☹
	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	★★★	I, R	1975-1992, 2000	☹
	Soil sealing	**P**	**To define the degree of soil sealing, caused by urbanisation, nationwide**	★★★	**I, R**	**2000**	☹

[a] - This indicator has not been updated, compared to the 2004 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.

10. WASTE

Q10: 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**	**1997-2003**	☹
	Municipal waste generation	P	To measure the total waste generated	★★★	I, R	2003-2004	😐
	Hazardous and non-hazardous waste generation	P	To measure the total waste generated	★★	I, R	2003	😐
	Quantity of equipment containing PCB	P	To measure the amount of equipment and machinery containing PCB	★★	I, R	2003-2004	😐
Waste management	**Separate collection of municipal waste**	**R**	**To determine the achievement of the separate waste collection targets set out in article 24 of DLgs 22/97**	★★★	**I, R**	**1999-2004**	😐
	Amount of waste sent to composting and biological-mechanical treatment	P/R	To assess the effectiveness of the policies aimed at encouraging the recovery of materials from waste	★★★	I	1999-2004	☺
	Amount of hazardous and non-hazardous 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	1997-2003	☺

APPENDIX

Q10: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Waste management	**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 DLgs 22/97, providing indications on the effectiveness of waste management policies**	★★★	**I, R**	**1997-2003**	😐
	Number of landfills	P	To collect information on the number of landfills throughout the country	★★★	I, R	1997-2003	☺
	Incineration, in total and by type of waste	**P/R**	**To determine the amount of waste disposed of by incineration**	★★★	**I, R**	**1997-2003**	☹
	Number of waste incineration plants	P	To determine the availability of waste combustion plants, at national and regional level	★★★	I, R	1997-2004	😐
Production and management of packaging	Packaging production, in total and by type of material a	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**	**1998-2004**	😐
	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**	**1998-2004**	☺

[a] - This indicator has not been updated, compared to the 2004 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.

11. IONIZING RADIATIONS

Q11: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Radiazioni ionizzanti	Work activities with Naturally Occurring Radioactive Materials (NORM) a	D	To survey the environmental pressure sources relating to NORM	★★★	I	2003	😐
	Facilities authorized to use 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 DLgs 230/95 as amended and supplemented), and their nationwide distribution	★★★	R 11/20	2005	😐
	Scrap metal treatment plants (collection, storage, melting) a	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	2005	😐
	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	2005	😐
	Indoor radon activity concentration	**S**	**To monitor one of the principal sources of exposure to radioactivity of the population**	★★★	**I R**	**1989 - 2005**	🙂
	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 - 2005	😐
	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 - 2004**	😐
	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**	**2005**	😐
	Implementation of the environmental radioactivity monitoring networks	**R**	**To assess progress in the implementation of environmental radioactivity monitoring networks in Italy, with respect to the existing networks, in conformity with the national and international quality assurance programmes**	★★★	**I, R**	**1997-2005**	😐

[a] - This indicator has not been updated, compared to the 2004 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.

12. NON-IONIZING RADIATIONS

Q12: 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 a	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 a	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 a	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 actionsa	S/R	To determine any non-conformities relating to the ELF sources, and the remedial actions undertaken	★	R	1996-2002	😐
	Number of early opinions and controls 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 14/20**	**2004**	-
	Number of early opinions and controls 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**	**2004**	-
	Monitoring unit for compliance with regional regulations a	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 skya	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 visiblea	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 2004 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.

13. NOISE

Q13: 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	2004-2005	-
	Airport traffic	P	To determine the size of airport traffic, as one of the principal sources of noise pollution	★★★	I R	2003-2004	😐
	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	1990-2004	☹
	Population exposed to noise	**S**	**To determine the proportion of the population exposed to noise above certain prescribed thresholds**	★	**C 48/8101**	**1996-2006**	☹
	Monitored noise sources and percentage of those found to exceed the statutory limits at least once a	S	To assess noise pollution, in terms of both quantity and quality	★★★	R 19/20	2000-2003	😐
	State of approval of the municipal noise zoning plans a	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 ambient noise pollution	★★	C 7692/ 8101 R 19/20	2003	😐
	State of implementation of the reports on the municipal acoustic state a	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	2003	😐
	State of approval of the municipal noise abatement plans a	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	★★	C 7628/ 8101 R 19/20	2003	😐
	Monitoring unit for compliance with regional regulations a	R	To assess the regulatory response relating to noise pollution, with regard to the Framework Law 447/95	★★★	R	2003	😐
	Percentage of km of the national rail network featuring excess noise levels	**S**	**To assess noise pollution, in terms of both quality and quantity, in locations near rail infrastructures**	★★★	**I**	**2004**	-
	Approval status of noise containment and abatement plans for the rail network	**R**	**To assess the implementation progress of the national noise guidelines and regulations by RFI, the national rail operator, by means of an analysis of the measures introduced**	★★★	**I**	**2004**	-

[a] - This indicator has not been updated, compared to the 2004 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.

14. NATURAL RISK

Q14: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Tectonic and volcanic hazards	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	2003-2005	–
	Seismic events	S	To define the seismicity of Italy, in terms of maximum expected magnitude, return times, local effects, useful information for correct regional planning and land management purposes	★★★	I	2004-2005	–
	Seismic zoning	**R**	**To provide an updated picture of the seismic zoning of Italy, according to the seismic hazard, with corresponding earthquake protection standards for building construction purposes**	★★★	**R**	**2005**	☺
	Volcanic eruptions	S	To determine the environmental risk, in Italy, of volcanic activities	★★★	R	2004-2005	–
Hydrogeological hazards	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	★★	I	1951-2005	–
	State of implementation of the Land and Water Improvement Schemes (PAI)	R	To determine the implementation of Land and Water Improvement Schemes (LWIS), aimed at identifying areas subject to major hydrogeological hazards, and bounding the areas that must undergo safeguarding measures	★★★	I Bacini	Luglio 2006	😐
	Progress of the hydrogeological risk mitigation projects financed under DL 180/98 (as amended and supplemented)	R	To highlight the progress of the urgent hydrogeological risk mitigation projects	★★★	R	Marzo 2006	😐
	Progress of urgent projects in areas affected by fires (pursuant to article 3 of OM 3073/00)	R	To highlight the progress of urgent projects in areas affected by fires	★★★	R 9/9[a] P 19/19[a]	2003-2005	😐
	IFFI Project: the Italian landslides inventory	**S**	**To provide an exhaustive and uniform picture of landslides in Italy**	★★★	**R 19/20 P 96/103**	**2005**	–
	Areas subject to sinkholes	S	To define a geological-structural and hydrogeological context subject to sinking	★★	I	2005	–
	Municipalities concerned by subsidence	S	To provide an overall picture of subsidence and its impact on the country	★★	C 643/8101	2005	–
	Reservoirs	S/R	To provide an updated database of the number of reservoirs and their operating conditions and national distribution	★★	R	Giugno 2006	–

[a] - The data refers to the regions/provinces included in the relevant action programmes.

15. ANTHROPOGENIC RISK

Q15: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Industrial hazards	Number of establishments liable to be affected by a major accident hazard	P	To determine the risk 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	2005	😐
	Local Administrative Units (LAUs) 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	2005	😐
	Typology of establishments liable to be affected by a major accident hazard	P	To determine the prevailing risks to which the atmosphere, soil, subsoil, aquifers and surface waters are subject due to the presence of certain types of establishments liable to be affected by a major accident hazard	★★★	I, R, P, C	2005	😐
	Quantities of hazardous substances and preparations stored by establishments liable to be affected by a major accident hazard	P	To determine the prevailing risks 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	2005	😐
	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	2005	😐

16. ENVIRONMENTAL QUALITY OF ORGANISATIONS, ENTERPRISES AND PRODUCTS

Q16: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and Trend
Environmental quality of organisations enterprises and products	Number of EMAS-registered organizations	R	To describe the development of environmental awareness by organizations and undertakings	★★★	I	1997-2006	☺
	Number of UNI-EN-ISO 14001 certifications	R	To describe the development of environmental awareness by organizations and undertakings	★★	I	1999-2006	☺
	Number of Ecolabels licences awarded	R	To describe the development, in recent years, of environmental awareness applied to products and services in Italy	★★★	I	1998-2006	☺

17. MONITORING AND CONTROL

Q17: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Monitoring	Number of ARPA/APPA network laboratories a	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 a	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 measure the laboratories' capacity to operate on a quality basis. To collect information on the number of laboratories conducting analytical tests accredited by the competent authorities.**	★★★	**I R**	**2004, 2005**	😐
	Number of laboratories taking part in the interlaboratory comparison 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**	**2003 - 2005**	😐
	Number of actions implemented by APAT/ARPA/APPA for data quality purposes a	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	😐
	Environmentalradioactivity monitoring	**R**	**To quantify the the number of activity concentration measurements, relating to a number of different environmental and food matrixes, conducted by the RESORAD radioactivity monitoring network**	★★★	**I**	**2004**	😐
Control	**Control activities by environmental matrix**	**R**	**To quantify the degree of knowledge of ecosystems as a whole and of the relevant resources**	★★	**I [c]**	**2002-2004**	😐
	Measurements and penalties for illegal actions	**R**	**To assess compliance with the applicable environmental guidelines and regulations**	★★★	**I [c]**	**2001-2004**	☹
	Bathing water controls	R	To assess the pollution of the coastline and the sea	★★★	P.c.[b]	2005	☺
	Controls by type of establishment	**R**	**To quantify the control activities relating to the different types of establishments, with a view to assessing the effectiveness of the implemented measures**	★★	**I [c]**	**2004**	-

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[b] - Coastal provinces
[c] - Spatial coverage

18. PROMOTING AND SPREADING AN ENVIRONMENTAL CULTURE

Q18: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Environmental information	**Number of environmental-related publications**	**R**	**To survey the amount of publications dedicated to disseminating environmental information**	★	**I R**	**2004-2005**	–
	Library services and user resources	R	To assess accessibility by users to library services and environmental information resources	★	I R 9/20	2004-2005	–
	Environmental information and the mass media	R	To estimate the dissemination, by the mass media, of environmental data/information	★	I R 11/20	2004-2005	–
	Environmental information on 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 R 9/20	2004-2005	–
Environmental communication	Environmental communication activities	R	To provide an overview of the environmental communication activities put into place at national level	★	I R 9/20	2004-2005	–
	Environmental communication on the web	**R**	**To assess the supply of web-based communication and interaction services by the institutional authorities in response to the environmental information needs of users**	★	**I R**	**2003-2005**	–
Environmental capacity	**Environmental capacity-building supply**	**R**	**To provide an overview of the environmental capacity-building implemented projects**	★	**I R 9/20**	**2004-2005**	–
	e-learning supply	R	To provide an overview of the environmental capacity-building by e-learning projects	★	I R 9/20	2004-2005	–
Environmental education	**Environmental education supply**	**R**	**To describe the state of the art of environmental education projects implemented to date**	★	**I R 8/20**	**2004-2005**	–
	Working capacity of the local environmental education network	R	To provide an overall representation of the networking capability of the Agencies and of their integration in the local environmental education systems	★	I R 8/20	2004-2005	–

19. ENVIRONMENT AND HEALTH

Q19: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Sustainable town and country planning	**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	1997-2004	😐
	Road accident injury rate	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. The featured data are disaggregated at the various geographical levels (regions), to meet the planning and programming needs in the different contexts	★★★	I R	1997-2004	😐
	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	1991-2004	☺
	Implementation of regional plans and programmes	**R**	**To provide exhaustive facts, in relation to the progress made in planning and programming, at the various geographical levels, so as to assist the public and private sector stakeholders with respect to the definition of the policies and measures, to be implemented at the local level concerned, to foster enhanced efficiency, effectiveness and consistency in the pursuit of sustainability objectives. Moreover, the nationwide assessment of regional planning tools that may potentially affect the environment also allows the monitoring of the extent and manner of implementation, at local level, of the sustainable development guidelines issued under EU and domestic legislation**	★★	R	2006	😐

Q19: SYNOPTIC TABLE OF INDICATORS

SINAnet theme	Indicator	DPSIR	Aim	QI	Coverage S	Coverage T	State and *Trend*
Environment and health	Overcrowding a	D	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	😐
	Potential years of life lost (PYLL) for road accidents	I	**To highlight the weight of road accident death rate on the younger age groups. 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. It therefore represents a valid support to policymakers, with respect to the choice of prevention and planning priorities, in relation to mobility and transport**	★★★	I	1997-2002	😐
	Exposure of children to outdoor airborne atmospheric pollutants - PM_{10}	I	To show exposure of the population (in this specific case, of children) to the concentrations of PM10 in city air, by comparing the situation in a number of different cities and/or general exposure over time. To provide information on the efficacy of the policies implemented to mitigate air pollution, with respect to the health of the general population.	-	-	-	-

[a] - This indicator has not been updated, compared to the 2004 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.

Legend:
The bold print shows the indicators featured in the Yearbook Summary.

Geographical coverage:
Indicates the level of geographical coverage of the data used to build the indicator.
"I": Nationwide: the data are aggregated and representative of only the country as a whole;
"R x/20": Regional: the data enable the information to be represented at regional level and are available for an x number of regions;
"P y/103": Provincial: the data enable the information to be represented at provincial level and are available for an y number of provinces;
"C z/8100": Local Administrative Units (LAUs): the data enable the information to be represented at local level and are available for a z number of LAUs.

Time coverage:
Indicates the period of the available historical series and/or the data shown in the table.

DPSIR model:
For the definition of each component of the model, see structure of the document at pag. XIV

Information quality:
For the definition of each component of the model, see structure of the document at pag. XIV

State and Trends
For the definition of each component of the model, see structure of the document at pag. XIV