CHAPTER 12
TOOLS FOR ENVIRONMENTAL KNOWLEDGE AND AWARENESS AND MARKET INTERFACE

Introduction

Why spread knowledge and promote environmental awareness?

Environmental science, knowledge and innovation play increasingly crucial roles in the future of our society. To effectively safeguard and upgrade the environmental heritage, promote knowledge and engage in projects of sustainability, the general public must perceive and understand how strategically important environmental and scientific knowledge and skills are to social and economic development. Instead, the environment is all too often scattered and removed from mainstream awareness, being viewed as a complex set of problems and limitations rather than a source of opportunities for growth and development for the whole Country. Major surveys in the sector point a large gap between available environmental knowledge, methods and tools and the public’s awareness of their importance to society and to mechanisms of development. An example is the 2007 Eurobarometer, in which the percentage of the Italian public environmentally informed had fallen from 48% in 2004 to 42% in 2007.

At the same time, 98% of those who consider themselves well informed hold environmental considerations to be as important as economic and social factors and feel that the general public should participate and be directly involved in environmental protection. The 2010 Eurobarometer found that 30% of Italians did not know the meaning of the concept of "loss of biodiversity", as compared to an average figure of 19% for Europe as a whole, while 81% of the respondents declared themselves to be scarcely or poorly informed on environmental issues, the worst result for any EU country (Germany, for example, recorded 41%) and a further 1% below the outcome from the 2007 survey. The results for the younger generations are similar, as demonstrated by a major international survey of the OECD: the Programme of International Students Assessment (PISA), held every three years on a sample group of fifteen year-olds from approximately 50 countries, compares levels of awareness of students, especially with regard to the environmental and geo-sciences. In the 2010 edition of the survey, only 14% of the sample population reached the maximum performance level, whereas the OECD average was 19%. In contrast, roughly 45% of Italian students scored at the minimum level, or even lower than the minimum, as compared to an average of approximately 24% throughout the OECD.

An analysis of the data indicated above show that, to reduce the gap between scientific knowledge and society’s perception and awareness of that knowledge, the dissemination of environmental information and the promotion of the related culture need to be further reinforced. To arrive at an effective dissemination of environmental knowledge, procedures must be identified, refined and constantly updated and adequate tools must be found to encourage both the general public
and political decision-makers to achieve a full understanding and awareness not only of environmental problems but also of the social opportunities (in terms of growth, safety, quality of life etc.) that can result from sustainable behaviours, decisions and lifestyles. An example is the question of energy consumption, which has a noteworthy impact on family budgets and - though with less public awareness of the fact - on the environment. Significant benefits could be obtained from appropriate spreading of new knowledge and existing technology that heighten the production of energy from renewable sources, as well as good practices for improving energy efficiency of homes, plus pro-environmental attitudes and behaviour that lead to consumer and production decisions which prove advantageous both for the environment and in terms of savings etc.

In evaluating the general public’s interest in environmental topics, it is important to stress that the natural heritage, in the broadest sense of the term, is also an indicator of the wellbeing of society. As stated in Chapter 10 of the recent BES Report on equitable sustainable wellbeing put out by ISTAT and the CNEL - *The Natural Heritage, our Future*: “The availability and use of natural goods and services by Mankind depends on recognition of the key role of the natural heritage. For that matter, optimisation of the approach to natural resources provides everyone with the possibility of benefiting from the tangible and intangible goods that Nature offers while also contributing to a reduction in the instances of inequality in today’s society”. Seeing that trends in lifestyles and production/consumption do not point to a full understanding of the crucial role of Nature in our individual existences, there is no question that increasing the general public’s awareness of the central importance of the environment would be worthwhile, given that it constitutes a proven source of psycho-physical wellbeing, prevention of illness and treatment of health (as witnessed by the current popularity, especially in the United States, of “Place Based Education”, whose focus on bringing children back into contact with natural sites and spontaneous movements is designed to prevent and treat conditions that are widespread among young people, such as obesity and “type 2” diabetes). In terms of regulatory measures, the need to increase the awareness of the public with regard to environmental issues, informing and involving citizens in decision-making procedures designed to protect and defend the environment, was addressed as early as the 1998 Aarhus Convention, which was transposed into Italian legislation as Law 108/2001. This act was followed by Directive 2003/4/EC, which became Italian Legislative Decree no. 195 of 19 August 2005 on public access to environmental information, plus Legislative Decree no. 152 of 2006 “Environmental Regulations” (referred to as the “Environmental Code”). These measures gave practical form to the commitment on the part of public authorities to provide citizens with **credible and reliable** sources of environmental information, in this way contributing to the broader process, on both the international and national levels, that finds the European Union at the forefront of efforts to coordinate and spread environmental knowledge and increase the environmental awareness of individual citizens. As part of this process, government authorities will be able to provide suitable responses to the main environmental issues.
of this process, each EU member state is expected to equip itself with necessary and suitable tools to spread and communicate data and information.

In the case of a research body and institutes such as the ISPRA, which is assigned to carry out this necessary task, the knowledge produced and the information obtained in various manners must be shared not only within the scientific community but also on the broader social and territorial levels, allowing it to become both a factor in development and a catalyst for participation and interest on the part of society as a whole. Of particular importance in a similar context is ISPRA’s assigned role of developing projects and initiatives to make available for general use all the geospatial data and information acquired in the course of activities financed with public funds (art. 23, paragraph 12-quaterdecies of Legislative Decree no. 95 of 6 July 2012, converted into Law no. 135 of 7 August 2012 – Spending review). This challenge calls for all possible approaches to be taken to gathering together skills, information and cultural and scientific contents (platforms of technological cooperation, sharing of national and international standards, access to environmental data, thematic and digital libraries, museum and science-centre organisations etc.). ISPRA’s specific functions of research, combined with its responsibilities of monitoring and control, give the institute a strategic role in the spread of information and awareness. This dual function, appropriately geared towards meeting the priorities set by the Ministry of the Environment, can be effectively applied to achieving a sustainable use of the environment only if a strategic synergy is in place with the rest of the social context (institutions, agencies, public and private operators, the citizenry, schools and universities, the world of business etc.). The opportunity is an important one for the environment, which should ideally be viewed not only as a system to be protected and safeguarded, but also as a resource and an opportunity for reviving economic prosperity and growth in Italy.

An overview of the knowledge to be spread
For some time now, a wide range of initiatives have been launched to resolve environmental problems and promote sustainable development of society. But though solutions and actions of undeniable importance, in terms of both technological advances and content, have been proposed, numerous issues but some of them controversial, remain unresolved, meaning that further reflection should be done. A critical vision of scientific culture, the available technology and ongoing innovation necessarily leads to the conclusion that the general public must be informed, stimulated and provided with an awareness of the environment and the risks posed by the current approach of development, which still has need of structural and social changes to become sufficiently geared towards sustainability. It cannot be denied that the current paradigm of environmental awareness and knowledge has yet to produce – within the institutional sphere and in terms of the perceptions and behaviour of the general public – a consolidated, long-term approach to the environment capable of resolving its problems, and this despite the fact that theoretical studies regarding economics, social affairs, politics and culture consistently point to an integrated

A major challenge for ISPRA: optimising the knowledge produced and promote scientific and environmental knowledge as a key factor in economic and social development.

A critical vision of scientific and environmental knowledge is needed to fully support the transformation of society in the direction of a model of sustainable development.
analysis of “economics, development and the environment” as being the three pillars of sustainability within a knowledge-driven society.

The critical attitude referred to above, whose ultimate goal is to give rise to a new attitude towards the environment, echoes the increasingly relevant words pronounced by the Nobel laureate in economics Elinor Ostrom on the occasion of an international conference on the science of sustainability held at the University of Rome’s “La Sapienza” campus in 2010: “Each individual, through his or her buying habits, can do a great deal. Purchasing with an eye towards the future, paying attention to the concept of savings and perceiving the value of common goods, are practices that can lead us to construct a future of sustainable development (...). Failures should not breed discouragement, but rather the realisation that true success is achieved by finding ways to correct the errors of the past, which means not only establishing a dialogue between the world’s different communities but also forging a long-term vision through joint initiatives and day-to-day efforts”.

Spreading correct, authoritative, transparent and independent scientific information would be an adequate response on the part of institutions to both individuals and various groups within society, all as part of a long-term strategy to promote social change that moves in the direction of sustainable social and environmental development. Here is the underlying reason for the monitoring and reporting on the state of the environment as a whole (air, water, soil, works with environmental impact, protected areas, all human activities affecting the environment etc.), as well as for the spreading of scientific data on environmental matrices, all of which constitute one of the main areas of activity of an organisation whose institutional responsibilities regard the environment, as in the case of ISPRA.

Possible goals for improvement?

Drawing inspiration from Ostrom’s assertion that, “True success is obtained by finding ways to correct the errors of the past”, it is important that government authorities “forge a long-term vision through joint initiatives and day-to-day efforts”, increasingly focussing their activities on the spread of environmental knowledge and awareness. New areas of operation could be explored by ISPRA: by analysing the data gathered during research on the subject (by the OECD – PISA, the Eurobarometer, the BES, the reports of the CNEL and other environmental reports), an overview could be established that makes possible comparison of the different results, with effective monitoring of the amount of knowledge spread to date, and the ways in which this has been accomplished, plus study of the extent to which the knowledge, awareness and skills needed to arrive at a sustainable approach to development have been increased, together with the ways in which this has been done (or not done!) accomplished. It would also be worthwhile for ISPRA, in collaboration with the system of regional and provincial environmental protection agencies and in accordance with the instructions of the Ministry of the Environment, to review past experiences and research involving initiatives of information, education, heightening of public awareness and training, so as to establish indicators of quality capable of assessing the effectiveness of the process of initiatives, projects and programs undertaken by the

ISPRA can meet the challenge of establishing an overview of reports on environmental awareness and information, so as to monitor the effectiveness of efforts to distribute and make available environmental data.
government authorities and public agencies in this field. Another key effort meant to harmonise indicators of sustainability and “network” activities is the joint effort of the Global Green Growth Institute, the OECD (Organisation for Economic Co-operation and Development), the UNEP (United Nations Environment Programme) and the World Bank, which have established an international network of development specialists (the Green Growth Knowledge Platform, or GGKP). Together they engaged in global research meant to produce tools that could contribute to encouraging green economics and moving towards sustainable development, with specific efforts including the formulation of a set of internationally accepted indicators of sustainability. The activities of the GGKP network were recently documented (April of 2013) in the “Scoping Paper Moving towards a Common Approach on Green Growth Indicators”. This report touched on the complexity of the process and its multidimensional nature, the inevitable involvement of the local/global spheres and the social ramifications of development decisions, plus the need for ongoing monitoring of the process and the benefits of identifying potential indicators of green growth, in part to provide a groundwork for an analysis of the green economy as a whole while, at the same time, reaching out to inform a broader public.

To reach similar objectives in terms of organisation, monitoring and control, emphasis must again be placed on the importance - indeed, the unavoidable need – of a joint in support of cooperative and network activities, with a mutual exchange of information between internal structures and outside institutes, and between the world of business and the market in general, so as to facilitate the proper procedures for a sustainable use of natural resources and, in the final analysis, to aid business enterprises in finding their way through the “green labyrinth”. All in accordance with the 7th Framework Program for Technological Research and Development, along with the initiatives tied to the European Research Space. As European Commissioner for the Environment Janez Potocnik recently put it: "If we intend to favour sustainable growth, then we must see to it that products which make a more efficient use of resources and prove more ecological are known and recognisable on the market". An exhortation to follow approaches that provide reliable environmental which lends itself to comparison, so as to gain the confidence of consumers, business partners, investors and interested enterprises.

There is the need to understand the demands arising from the public, and from the territory as a whole, with respect to environmental issues (calls for education, training and information for both businesses and the public, as well as the need for sharing of data among different institutes, information on patterns of behaviour and consumption to be followed in times of environmental crisis and emergency etc.). To reach this objective, tools of information feedback can be drawn on, allowing the users, possibly with the initial involvement of those already registered on the sites and the social network outlets of the institutes engaged in spreading environmental information, to make know their information/training needs, so as to establish through a direct reading of the demand, the most appropriate offerings in terms

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The Green Growth Knowledge Platform, an international network of development specialists.

The demand for environmental information, training and education must be understood, in order to develop and refine offerings that spread knowledge and awareness through networks of cooperation.
of tools, products, events and services. The participatory technological platforms, including those on a number of different institutional sites, together with other initiatives of collective participation, offer a possible solution. A similar commitment calls for resource and skills that can be retrieved only by creating a cooperative network system that brings together a number of body and institutes in an effort to revive the practice of shared projects that make it possible to accelerate the process of safeguarding and upgrading our environmental heritage through actions that succeed in overcoming the limits on the investment of public resources which inevitably accompany a spending review.

The tools used by ISPRA and by the regional and provincial environmental agencies to spread knowledge and awareness

In the interest of providing contributions and data that can aid in the formulation of a critical reflection “in response” to the questions raised, this chapter reviews the various tools and services for the dissemination of information which ISPRA, in carrying out its assigned tasks, develops and implements, at times in concert with the provincial and regional environmental agencies, as well as with other professional contributions. These include:

- environmental reporting, to inform technical experts, political decision-makers and the general public of the results of environmental analyses and research, as well as of policies currently underway, in this way giving an overview of the overall performance of government agencies, together with specific information on individual environmental topics (the Year-book of Environmental Data, individual technical reports and technical-scientific documentation);

- the spreading of environmental knowledge over websites (in the form of database, environmental information etc.) to provide technical experts and political decision-makers with input to supply responses that are scientifically reliable, adequate and balanced to the needs and requests of citizens, of public opinion and of the media in times of crisis, emergency and risks to health;

- library services both for the public administration’s own personnel and for interested outside users;

- activities of environmental education on sustainability, so as to turn out products based on innovative approaches to learning that can contribute to the development of citizenship skills and be used in activities of “Long Life Learning” (LLL);

- environmental training activities to qualify human resources in environmental sectors through focussed, continuous and interdisciplinary training;

- tools of voluntary compliance with environmental standards (EMAS, Ecolabel UE, ISO), in order to achieve the goal of reconciling environmental improvement with the competitive demands of the marketplace.
DISSEMINATION OF ENVIRONMENTAL INFORMATION

Communication and information are the key methods of distributing environmental knowledge. These activities are of fundamental importance in providing policy-makers with the input they need to arrive at decisions and in heightening public awareness of topics tied to the environment and to environmental defence.

The involvement and participation of individuals and social groups is not only useful but should be considered of priority importance for the promotion of policies of sustainable development, given its dual effect on the communication process, in that it established a direct link between citizens/recipients and political decision-makers (bottom-up) while also facilitating the monitoring and control of the solutions enacted.

Reporting, mass media, web and library services are the main tools for spreading environmental knowledge to the public/target.

The reporting products generated by the activities of ISPRA and of the regional and provincial environmental agencies, all increasingly carried out according to shared approaches and processes of standardisation, make it possible to analyse and compare different territorial realities, with the dissemination of data and scientific information on environmental conditions and the various initiatives of defence undertaken. These data are also collected through the use of information monitoring systems. The most widely used types of reports include inter-thematic documents, such as the Environmental Data Yearbook and the Report on the State of the Environment, as well as the thematic reports. The products differ in terms of their final recipient and their purpose.

The Environmental Data Yearbook is a statistical compendium whose information base, made up of indicators and indexes, provides an objective, scientific overview of the state of environmental resources. Its primary target audience consists of experts and political decision-makers. It can thus provide valid support for additional reporting tools or for policies, plans and programs of environmental protection. Thanks to the wide range of versions offered, including the full edition and the Key Topics, as well as the abbreviated and multimedia versions, the ISPRA Environmental Data Yearbook can extend its reach to a generic, non-specialised readership.

The Report on the State of the Environment analyses the causes of environmental developments, evaluating the effectiveness of the policies implemented in response, making it an assessment of use to operators and politicians active in the sector.

The thematic reports examine in depth specific environmental matrixes, such as the water, air, climate, waste etc.. They are meant for political and technical roundtables and committees, as well as for local government officials and managers in the sector.

Over time, the ties between the different published products have matured, becoming increasingly close.
The mass media are tools used to transmit information to any number of indistinct recipients/users. Mass communications flows in a single direction: the message goes from a source or centre of emission to many recipients (a one-to-many communication) that, being unable to respond or interact directly with the source, undergo the communication passively. This form of communication can take place either over the air or by cable, on television or the radio, or in the print media (daily papers and periodicals). The network of ISPRA and the provincial and regional environmental agencies (the institutional source of environmental information) addresses the media through articles, letters, e-mails, press releases, interviews and press conferences, in the interests of distributing useful information and promoting activities, services and products to an increasingly large audience that includes the general public, technical experts and political decision-makers.

More extensive monitoring of the environmental information carried by the mass media, as compared to what is currently in place, covering on-line consumption of contents and of the media using the new technology (web TV, web radio, smartphone, tablets), would make possible more thorough identification of the topics given top priority by public opinion, as well as those that draw especially high levels of attention or requests for news and updates, in this way favouring feedback and interaction with the target.

In fact, the communications promoted by government institutes, and especially those of the environmental agency system, are increasingly web communications.

Environmental information is distributed on the web using on-line reviews, newsletter, databanks, Rss feeds (Rss: Rich Site Summary or Really Simple Syndication), documents offered for downloading and specific thematic areas of institutional internet sites that have become virtual contact points with citizens.

The proper operation of these information systems, from their architecture to the graphic treatment, as well as the way in which the contents are organised, determines the quality of the interaction with the public while guaranteeing democratic access to rights and services. With the arrival of web 2.0, born in the early 2000’s, the web underwent an evolutionary change that witnessed the development of new on-line services and applications featuring high levels of interaction.

Starting with the use of e-mails and search engines, the static nature of web 1.0 (the web of the early 90’s) gradually became obsolete, with the role of the user of information and contents moving in the direction of author/co-producer of the same. Blogs, forums, chats and the vast store of social media currently used on a regular basis by web navigators are now a part of institutional sites. Public environmental communication over the web amplifies its own capacity to successfully spread information, establishing a dialogue with a pool of users that increasingly takes the form of an active public ready to participate, as opposed to a highly p[liable mass of indistinct individuals.
Libraries and documentation centres, traditionally given the dual role of “guardians of knowledge” and mediators of information, provide users, both local and remote, with information sources pertinent to environmental topics and the earth sciences. In this way they not only safeguard, augment and optimise book and document resources, but they also spread knowledge within the sector, contributing to increase its reach and positive fallout on the general public.

Multiple services are offered from reading facilities to external and interlibrary loan, online catalogues (OPAC) where publications of interest can be localised, plus database and specialised electronic resources (online periodicals and e-books), as well as the organisation of expositions and events dedicated to the presentation and promotion of publications of particular importance and worth, together with initiatives oriented to support scientific research and environmental communication in the broader sense of the term.

Among the environmental agencies, though distinct differences remain in terms of organisational procedures and the way in which services are supplied to users, a gradual computerisation of library systems is evident in all the different phases of book processing: from the acquisition of the catalogue entry to the supply of information and documents to the public.

To make documents more easily to an increasing number of readers, libraries have promoted the develop of networks of cooperation at various levels, favouring and simplifying the knowledge access and sharing of resources.

As far as library institutions are concerned, “networking” is both an intelligent approach to overcoming “local difficulties” (economic, regulatory, organisational, involving relations with suppliers) and a strategy that makes it possible to reach a wider user, both real and potential, specialised and generalist, in ways held to be more effective and advantageous when it meets an highly diversified need for information.

Thanks to the resources made available by technological advances, libraries and documentation centres, whose mission is the selection, sharing and spreading of scientific information on environmental topics, can represent as additional tools for the construction of a collective identity and for the revival of an active role, on the part of citizens, in decision-making processes regarding environmental protection and health, based on a cultural process characterised by transparency and democracy.
Environmental information through reporting and mass media

Over the last decade, environmental reporting activities in Italy have registered not only an increase in the number of products for distributing information, but also noteworthy developments in reporting methods.

With the establishment of the network of regional and provincial environmental agencies, whose responsibilities include territorial monitoring and control, the noteworthy flow of environmental data and information has been gradually harmonised and organised, establishing a national system of environmental knowledge.

With its “Three-Year Program for 2010-2012”, the regional and provincial environmental agencies network began, among other things, a coordinated effort with ISPRA to draw up guidelines for reporting and to create a core set of indicators.

The goal is to develop a process under which shared rules can be arrived at for the formulation of both environmental reports meant to fulfil precise obligations involving the communication of data and information and reports on specific topics, or sets of topics, pertinent to the state of the environment.

Since 2003, ISPRA’s Environmental Data Yearbook presents the results of the monitoring of the reporting products turned out by the provincial and regional environmental agencies, in particular as regards reports on the state of the environment/Environmental Data Yearbook, manuals/guidelines, reports on specific topics and minutes of technical-scientific events (conventions, seminars, study days etc.).

It should be remembered that neither European-Community nor international reporting activities have been the focus of a structured analysis based on shared indicators.

Reports, Environmental Data Yearbook and updates on specific topics are of particular importance, given their frequency of publication, when it comes to assessing the effectiveness of environmental policies and informing citizens of the qualitative conditions of the environment in which they live, so as to promote eco-compatible forms of conduct and informed participation in decision-making processes.

To reach these objectives, policies have been implemented for spreading the environmental information in the possession of institutional parties, promoting the development of internet tools, portals, databanks of environmental indicators accessible to the public, plus websites and catalogues.

Table 12.1 summarises the environmental information distributed by the provincial and regional environmental agencies in 2011 and 2012 through reports and updates on specific topics.

Of the products referred to above, the most frequently used is the “single-subject” report, roughly a hundred of which were turned out in each of those years.

The topic of greatest interest is the air, accounting for approximately 47.6% of the single-subject reports published by the agency system in 2011 and 41.8% of those turned out in 2012 (Figure 12.1).
Table 12.1: Environmental information distributed through reports and publications

<table>
<thead>
<tr>
<th>Agency network</th>
<th>2011</th>
<th>2012</th>
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<tr>
<td>Environmental Data Yearbook / Reports on the state of the environment</td>
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<tr>
<td>ARPA Piedmont</td>
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<td>▲ 3</td>
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<td>0*</td>
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<td>ARPA Veneto</td>
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<tr>
<td>ARPA Friuli-Venezia Giulia</td>
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<td>ARPA Liguria</td>
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<td>ARPA Emilia-Romagna</td>
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<td>● 15</td>
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<td>● 32</td>
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<td>ARPA Sardinia</td>
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<td>ISPRA</td>
<td>● 41</td>
<td>● 29</td>
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Legend
* : Environmental Data Yearbook
▲: Reports on the state of the environment

Note
* : Estimate

Overview of the environmental information distributed by the agency system in 2011 and 2012 through the Environmental Data Yearbook and single-subject reports and updates.

It should be noted that, in many cases, the “reports on the state of the environment” are closer to “Environmental Data Yearbook” (listings of statistical data on environmental components and factors), as opposed to “reports” in the true sense of the term (documents that present not only statistics on environmental components and factors, but also information on the underlying assumptions of environmental policies).

The number of combined “Environmental Data Yearbook /reporting” publications registered for each year was less than ten. It should be noted, however, that some of the agencies which do not provide such products, such as the regional agencies of Veneto and Umbria, do maintain updated on-line databanks of environmental indicators.

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1 Source: ISPRA-ARPA/APPA data processed by ISPRA
The subject of greatest interest is the air, accounting for approximately 47.6% of the single-subject reports published by the agency system in 2011 and 41.8% of those for 2012.

Web-based environmental information and communication

Communication of environmental risk: the case of ISPRA website

The report “Statistical Analysis of Web Users of ISPRA Portal” was published in 2012, highlighting the role of web instruments of environmental communication and information, especially on the occasion of high-impact calamitous events. In fact, ISPRA website registered its peak number of Visits, Visitors and Pages Visited in March 2011, at the time of the earthquake in Japan that triggered a series of incidents at the Fukushima nuclear power plant. This event was monitored by ISPRA, which set up a nuclear emergency room in operation 24 hours a day to receive information issued by the International Atomic Energy Agency and publish updates on its site to keep citizens informed. In the month of March 2011 (34,438 visitors) and April 2011 (35,152 visitors), the number of visits to the site’s “News” section alone tripled, as compared to the monthly average data (12,600 visitors). The increase is explained by the fact that all the updates about Fukushima power plant were published in this section, starting from the day of the accident. The page dedicated to Fukushima alone registered 20,040 contacts in the month of March.

Figure 12.1: Breakdown of single-subject reports among subject areas (2011, 2012)

Source: ISPRA-ARPA/APPA data processed by ISPRA

The demand from citizens for information from ISPRA in 2011 was notably higher on the occasion of two high-impact calamitous events: the earthquake in Japan and the resulting incident at the Fukushima nuclear power plant, and the flooding in Spezzino and Lunigiana areas occurred in autumn 2011.

Source: ISPRA-ARPA/APPA data processed by ISPRA

and 22,061 in April. Further demonstration of the large-scale interest for topics involving environmental risk, particularly for the nuclear emergency, is the number of visits to the document “WENRA - Western European Nuclear Regulatory Association Declaration”, which was the most read document in 2011 with 792 visits only in the month of April. The figures on visitors to the most frequently consulted website areas dedicated to specific topics fully confirm the above observation: the topic “Radioactivity and radiation” was the most frequently consulted one in March of 2011.

The analysis of ISPRRA’s website access data also brought to light a second peak of Visits, Visitors and Pages Visited, occurred in the month of November 2011, at the time of the flooding in Spezzino and Lunigiana (October 25th) and in Genoa (November 4th). Once again, an increase in visitors was registered during the period in question to the pages dedicated to specific topics related to the calamitous events: “Cartography”, “Water” and “Defence of the Land”. It seems to be evident, therefore, the role played by current news, especially with regard to emergency situations arising from calamitous events of noteworthy impact, in determining the demand for information from citizens. In light of these considerations, we believe it is worthy to focus our attention on the topic of the communication of environmental risk, especially with respect to the web and the specific role of the communication of government bodies and institutions, particularly of public research institutes.

The web and communication of calamitous events: a two-way street

The tools of web communication, and web 2.0 technologies in particular, have become increasingly important for risk managers and scholars of risk communication, with this being especially true in recent years. One of the areas in which such applications appear most promising is definitely the management of high-impact emergencies and calamitous events, during which online communication tools, and especially social media (blogs, social networks and micro-blogging platforms) have provided noteworthy demonstrations of their potential to operate in support of traditional systems of alert in terms of post-impact management. Catastrophic events such as the 2004 tsunami in the Indian Ocean, hurricane Katrina in 2005 and the earthquakes in Haiti in 2010 and in Japan in 2011 have made clear the key role of such technologies in the dissemination of alarm messages to populations exposed to calamitous events and in the collection of information of relevance on the ongoing situations (Lindsay, 2011). Internet has begun to play an increasingly important role when it comes to dealing with such emergencies, thanks to its capacity to support bidirectional processes of communication which, moving beyond the linear approach typical of the mass media, with the information flowing from the issuer to the receiver, makes it possible to achieve effective management of both outgoing and incoming information flows, improving the “situational awareness” of both risk managers and exposed populations. On many occasions, this has made possible a

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4 Author: Andrea Cerase, researcher at the University of Rome, “La Sapienza” campus
more efficient use of the available information, both in terms of organizing emergency operations and with respect to providing useful information to the people affected by the calamity, therefore providing in this way immediate and effective responses to the needs of populations exposed to the calamitous event: first and foremost, the need to “know what’s going on”, together with the need to “know what to do”, so as to improve people’s capacity for self-protection in case of technological accidents or natural catastrophes.

The strongpoint of internet, especially of social media, is their capacity to sustain interpersonal communications, activating the existing social networks, that is the set of relations that connect individuals to each other, ultimately laying the foundation for the fabric of society (Wellmann and Berkowitz, 1998). For some time now, numerous studies have shown that, on the occasion of disaster or high-impact events, the role of the media proves to be of secondary importance compared to that of interpersonal sources, especially when it comes to the processes through which the population is alerted (Drabek 1969, Drabek and Stephenson 1971). Even back in 1963, at a time when there was no internet or satellite television, more than half of the American people learned about the death of President Kennedy through interpersonal sources: the relevance of the event indeed activated an intensive word-of-mouth communication process that rapidly brought the news to almost the entire population (Greenberg, 1964).

More recently, and within a much more complex technological scenario, two research efforts on the communication processes triggered by the terrorist attack of September 11, 2001, undertaken in the United States and Italy (Rogers and Seidel, 2002; Morcellini, 2002), generated extraordinarily similar results, demonstrating not only the importance of interpersonal sources but also the role and the emerging potential of the internet in the news dissemination. Since then, the ongoing development of web technology, which has become increasingly lightweight and portable, together with its use by a growing segment of the population, as well as the increasing availability of user-friendly interfaces, have made it possible to use and share information in ways that would have been considered unthinkable just a few years ago, but that today can be employed successfully even in situations calling for emergency communications. The potential offered by this channel points to noteworthy opportunities in the future.

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On the occasion of the seismic event that hit the town of Sora and the area of Frosinone on February 16th, two key observations could be made with respect to the use of social media: 1) the rapidity of the process through which news is spread with an emergency underway; 2) the capacity to direct traffic towards the institutional sources to be found on the web. Only a few seconds after the 4.8 magnitude quake, the first messages on the event had already appeared on Twitter, contributing to the routing of a mass of contacts to the “institutional” websites of the INGV and ISPRA, with the result that users were able to obtain confirmed, reliable information on the situation as it developed, and significantly in advance of the more traditional media.

This clearly demonstrates on one hand how the social media can be employed by users to “construct” a formidable network of sensors throughout the territory, capable of monitoring and instantly carrying information pertinent to events underway; on the other hand how, once a possible threat has been learned through the new media, the majority of users tend to seek confirmation and verification from sources held to be dependable, such as the traditional media (television, radio, print media), or from the sites of the protection authorities themselves, which can fill the need for more incisive, timely information. A further, critical consideration regards the role of public communicators and the reliability of the messages conveyed on the web.

The literature on risk communication (Peters, Covello and McCallum, 1997)\(^1\), as well as the guidelines implemented by some of the leading protection agencies, such as the EPA (Environmental Protection Agency)\(^2\), highlight a central consideration: the credibility of the information sources. Information carried by sources held to be unreliable or compromised is interpreted as being irrelevant, useless or even damaging. Numerous examples of news on such events, not distributed by the traditional media (tv, radio etc.) until hours after their impact, demonstrate that also the organisation of journalistic activities can sometimes make it impossible for such channels to provide timely, effective responses to the public’s urgent need to receive certain, unimpeachable and reliable information on the calamitous event underway. For that matter, contradictory, incomplete or poorly drafted messages can be interpreted as lacking in credibility, with a risk of even greater damage from the calamitous event. Credibility and timeliness, therefore, appear to be complementary dimensions of the social need for information, meaning that the web, in light of the above considerations, can constitute a resource of critical importance when it comes to communicating such events.

At the same time, knowing the technologies and the platforms is not enough: once again, the critical skill regards content, meaning the ability of those who work below the line to collect, summarise and publish the most accurate and up-to-date information, providing an irreplaceable service both to citizens and to operators in the traditional media.

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Before an internet dialogue can be established, however, networks must be constructed so that the various institutes and agencies responsible for protecting the environment can cooperate with each other, providing clear, timely and reliable information. A similar capability cannot be improvised, but calls for know-how, coordination and adequate organisational and technological structures, in order to service citizens when their need is most acute.

Figure 12.2: The distribution of an alert within a social network

Figure 12.2 shows a graphic illustration of the process of distributing an alert within a social network: the process is triggered from a single node of the network, meaning that an individual draws up an alert (having personally witnessed a calamitous event, or having learned of it from another source, such as a media) and transfers it to other nodes, normally family members, relatives and friends, which in turn send it to still other nodes, utilising the various channels of interpersonal communication, such as direct interaction (word of mouth), land-line telephones, mobile phones, social networks and e-mails, to quickly reach all the nodes of the network. The concentric circles (T₀, T₁ … Tₙ in the legend) correspond to the intervals of time that calibrate the process.

Instruments of communication on institutional websites

Numerous research efforts have confirmed the role of the internet, in particular social media, when it comes to distributing messages of alarm, together with the information needed to heighten the level of “situational awareness” not only of the exposed populations but of public decision-makers as well, in order to provide a decisive response to the social demand for information, structuring it around two key considerations: credibility and timeliness in communicating “what is going on” and “what to do”. Are government bodies and agencies taking this situation into consideration? Is it possible to estimate the levels at which the main public institutions that, for various reasons, deal with the environment, use tools of on-line communication?

The institutions that deal with the environment are meeting the challenges, and taking advantage of the opportunities, presented by new web technologies, venturing into social media in order to set up a channel that, in the event of a calamity, could be used to distribute information.
The indicator *Environmental Communication on the Web* is an initial attempt to do so. Published in the 2012 Environmental Data Yearbook issued by ISPRA, it is established through the monitoring of 29 websites, and specifically the websites of the regional agencies of environmental protection, of the Ministry of the Environment, Land and Sea and of seven public research institutions\(^\text{14}\), including ISPRA.

The results of the monitoring for January 2013 (Figure 12.3) show that the institutional websites have met the challenge and taken advantage of the opportunities offered by new web technologies and also social media, establishing a channel that, in the event of a calamity, could be used, whenever held appropriate, to disseminate the information.

![Institutional sites have met the challenges and taken advantage of the opportunities offered by new technologies, venturing into social media as well.](image)

**Figure 12.3: Tools for communication on the institutional sites of 29 public institutes that deal with the environment in various ways (2012)**\(^\text{15}\)

Figure 12.4 illustrates the differences in the way the various instruments of on-line communication are used by the websites of the group of environmental protection agencies, as opposed to the public research institutions monitored. As can be seen, while a period of maturity has been reached in terms of traditional instruments, meaning that no differences can be observed (e-mail, PEC and news of events are to be found on all the sites monitored), the more innovative instruments, such as social media, are utilised to a greater extent on the sites of public research institutions, showing that they are more acutely aware of the need to establish new channels of communication capable of supporting bidirectional processes while providing citizens with timely and widely distributed information, when necessary.

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\(^{14}\) CNR, CRA, ENEA, INGV, INFN, ISPRA and ISTAT

\(^{15}\) Source: ISPRA-ARPA/APPA/MATTM/research institutes data processed by ISPRA
Library services and resources for users
Libraries and documentation centres in Italian territory specialised in environmental topics make a noteworthy contribution to spreading information and knowledge in the fields of environmental protection and the earth sciences. As institutions whose inherent vocation is to serve as forums for encounters and exchanges furthering research and innovation, libraries play a key role in promoting the culture of sustainability, becoming promoters of increasingly towards beneficial transformations in society. The most engaged are those that belong to national cooperation networks (SBN, NILDE, ACNP, SBA, MAI etc.). The sharing function can regard a variety of strategic activities:

- subscriptions (consortiums can obtain more favourable conditions in negotiations with publishers and news aggregators, spreading out the considerable economic burden while handling the thorny issues tied to licenses for on-line periodicals);
- cataloguing (joint management);
- searching through collective on-line catalogues (METAOPAC);
- exchange and supply of documents.

The libraries serve not only scholars and freelance professionals (for example, to hydrological risk), but also students working on school research projects, as well as citizens who wish to stay up-to-date on environmental topics, in order to exercise their rights in a fully informed manner or start up business activities related to clean and renewable energy.

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16 Source: ISPRA-ARPA/APPA/MATTM/research institutes data processed by ISPRA
17 The site of the ISPRA library has a page on Italian libraries specialised in environmental topics, listing telephone numbers, internet sites and the services offered:
(http://www.isprambiente.gov.it/it/biblioteca/servizi/biblioteche-di-interesse-ambientale-1)
The main services provided to users are:

- opening the facilities to the public, with access to information free of charge;
- on-site reading and consultation, plus computer stations available for use;
- bibliographic orientation, reference services and localisation of information resources at other library institutions;
- internal and inter-library loan (ILL) and document delivery (DD);
- on-line consultation of resources (OPAC, electronic periodicals, databases on the environment and the law and on technical regulations).

The information services and resources made available to the users of the libraries and/or documentation centres of the environmental protection agencies system are not supplied in the same way throughout the national territory. In fact, in 2012 some of the agencies had neither a library nor a documentation centre, and were even lacking library services (Valle d’Aosta, Trentino Alto Adige, Veneto, Friuli-Venezia Giulia, Calabria, Basilicata and Sardinia).

“Green” libraries or “eco-libraries” play a key role in today’s society, providing the instruments of knowledge needed to address environmental issues in an informed manner.

Figure 12.5: Regions where there are libraries and/or documentation centres of the environmental protection agency system (2012)\textsuperscript{18}

Green libraries
There can be no questioning about the repercussions of environmental issues, given the evidence of a close connection between emissions of toxic substances traceable to anthropic activities and the damage done by pollution to the health of living beings.

\textsuperscript{18} Source: ISPRA-ARPA/APPA data processed by ISPRA
In response to the environmental emergencies of recent decades, policies focussing on respect of the environment and sustainable development must be implemented. New approaches centred around more limited levels of production, reduced energy consumption and protection of “limited” natural resources are called for.

About this aspect, with the goal of providing the tools of knowledge needed to deal with environmental issues in an informed manner, “green” libraries and “eco-libraries” play a key role in today’s society.

The category of “eco-libraries and green libraries” can be rightfully said to include all library institutions that, in staying in step with the times, with technological development and with the needs of their users, decide to promote the spread of environmental “best practices” for the salvation of our planet’s health.

Based on categories outlined at a recent convention 19, three different types of “eco-libraries” can be identified:

- those that are “architecturally” (and energetically) green;
- those that are wholly or partly specialised in environmental issues 20;
- those that promote initiatives and projects in support of the protection and optimisation of the environment and the spreading of ecological culture within the territory, for the benefit of the user basin 21.

In short, investments should be increased and library networks should be given an increasingly dynamic, tangible role as tools to promote environmental knowledge and encourage a transformation in awareness in the direction of sustainable lifestyles – as called for under the principles of Long Life Learning (LLL).

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20 For example, the libraries of the ARPA and APPA environmental agencies and of ISPRA, as well as the library network of the WWF and the library of the European Academy of Bolzano
21 For example, the “Mediterranean Showcase” Library in Bari.
ENVIRONMENTAL TRAINING STRATEGIES AND TOOLS AND SUSTAINABILITY-ORIENTED EDUCATION

The challenges of global sustainability facing the generations of today and tomorrow, including financial crises, climate change, deterioration of the environment, social inequality and imbalances in access to resources, prove that the current model of development is not sustainable, but rather suffers from critical shortcomings, as does the approach to knowledge, based on a schematic division between the various fields and disciplines, that has held from the start of the industrial era to the present.

Indeed, it has been clear for some time now that, given the complexity of current developments and problems, an effort should be made to restore an all-encompassing, systemic vision of reality that places each element in a broader context, analysing the resulting interactions and interrelations, though without losing the wealth of scientific knowledge already acquired.

It is no accident that the formulation of the concept of “sustainable development”, from the Rio de Janeiro summit onward, has been accompanied by a parallel effort to emphasise the need to radically transform models and systems of teaching, education, training and communication, bringing the related contents and methodological approaches in line with the new vision. The distinguishing elements of this ongoing cultural shift essentially consist of a cross-disciplinary outlook, a focus on local subjects and settings in programs of training and education and an approach to lifelong learning (permanent training and education), as recently confirmed by strategies and guidelines on the national, European and international levels (the Lisbon Strategy, Europe 2020, the UNECE Strategy for Education to Sustainable Development, the International Implementation Scheme of the UN Decade of Education for Sustainable Development – UNESCO 2005). These are also the constituent elements of the new “science of sustainability”, which, starting from university instruction, is meant to serve as an innovative model for creating professional skills and know-how that fit with new models of development oriented towards constructing more sustainable societies.

Looking to the future, environmental training must be capable of covering the innovative factors introduced by measures of environmental protection, supporting the growth potential of new professional skills and meeting training needs for the rapidly expanding areas of employment in the green economy. At the same time, environmental education should favour activities of research and interdisciplinary professional training that combine scientific and humanistic learning, so as to facilitate informed and responsible participation of citizens in the affairs of their own areas and communities.

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22 Agenda 21, chap. 36 - Promoting education, awareness and training, Rio de Janeiro, 1992
As specifically regards ISPRA and provincial and regional environmental protection agencies network, an institutional step towards achieving such objectives is the intention of the Ministry of the Environment to plan, develop and organise activities of training and ongoing education on regulations and operating instruments in the field of the environment, while also promoting and carrying out initiatives of environmental education, eventually through the creation of a specific structure of excellence.

Environmental training supply
Environmental training nowadays is one of the main tools for applying training policies to the creation of a society capable of promoting intelligent, sustainable and inclusive growth, such as the Europe that José Manuel Barros hopes to achieve.

Since 2000 with the Lisbon Strategy, emphasis has been given to the critical role of training as a tool for reinforcing European competitiveness and as a way to ensure social cohesion. As have the other member states, Italy has transposed the provisions of the European directives into national measures. For instance, Law no. 92 of 28 June 2012, “Measures for Reforming the Labour Market with an Eye towards Growth”, legislation based on the “Europe 2020” Community strategy, highlights the need to promote and sustain systems of ongoing training able to provide tools and responses for the current phase of rapid technological change and to meet the labour market’s demand for professional skills.

To this end, it is also important use tools to make vocational learning processes more flexible and easy. E-learning is one of the training methods that could be applied to meet the challenge of establishing a society of knowledge, improving the quality of learning and facilitating access to instruction by meeting specific training needs. The objective of the European Union in this field is to further sustain and develop the effective use of information and communications technologies (TIC) as part of systems of ongoing training and instruction. The adult learner becomes an active subject of his training to increase skills for professional development.

Therefore sustainability, or the improvement of social and economic conditions, plus the quality of life, can be seen as a key element in reformulating policies and systems of production and consumption, while environmental defence and protection can constitute an opportunity for professional and job-related development.

In other words, environmental education is a tool for stimulating innovation by creating professional figures capable of dealing with the complexity of environmental problems through a multidisciplinary approach that successfully mediates the wide

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range of interests and conflicts. All this assumes training that involves values and behavioral aspects which are of critical importance for a proper ecological approach able to ensure effective environmental action. As is made clear by the latest ISFOL Report, which examines environmental education offerings for the years 2004-2009, training initiatives are increasingly called upon to meet a demand for high-level training designed to develop top-flight professional skills and knowledge. This growing need has been addressed by the university system, and specifically by the first-level degrees introduced under the university reform measure (Ministerial Decree 509 of 1999), which reinforced the system’s training autonomy. The three-year degree curricula have met this need of environmental training through a significant innovation and diversification of the paths of study. In the period 2007-2008, environmental degrees accounted for 14% of all the three-year and specialised degree curricula implemented in universities. The universities were also, as shown once again by the ISFOL study, the main promoters of environmental masters programs. This sector of training shows strong growth, as almost 300 masters programs were established in the academic year 2007-2008.

Generally speaking, the survey shows the training outlook to be growing and developing on the national level, with the addition of many curricula on environmental subjects, such as pollution and controlling and saving resources. Professional training is increasingly an instrument of ongoing professional retooling and updating, of short periods, but at a medium to high level.

The need of training comes mainly from the market and from companies that need to comply with current regulations, retool or reassign human resources or diversify and update their production processes and the services they offer.

The survey also reports that ongoing and permanent training is the favoured approach: it accounts for more than 77% of the different kinds of environmental training offered in the period 2008-2009.

The ISFOL survey points to a developing outlook enriched by the addition of numerous curricula on key subjects.

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28 Three-year environmental degrees: job placement and continuation of studies, ISFOL, 2012
Table 12.2: Environmental education by types of courses and by year – ISFOL survey\textsuperscript{20}

<table>
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<td></td>
<td>v.a.</td>
<td>% v.a.</td>
<td>% v.a.</td>
<td>% v.a.</td>
<td>% v.a.</td>
<td>% v.a.</td>
</tr>
<tr>
<td>During mandatory schooling</td>
<td>19</td>
<td>1.3</td>
<td>9 0.7</td>
<td>13 0.9</td>
<td>51 4</td>
<td>6 0.7</td>
</tr>
<tr>
<td>After mandatory schooling</td>
<td>33</td>
<td>2.3</td>
<td>77 6.1</td>
<td>138 10</td>
<td>16 1.2</td>
<td>53 6</td>
</tr>
<tr>
<td>Post secondary school</td>
<td>231</td>
<td>16.4</td>
<td>161 12.7</td>
<td>119 8.6</td>
<td>125 9.7</td>
<td>199 22.7</td>
</tr>
<tr>
<td>Ongoing training</td>
<td>881</td>
<td>62.6</td>
<td>893 70.3</td>
<td>921 66.8</td>
<td>968 75</td>
<td>557 63.5</td>
</tr>
<tr>
<td>Permanent training</td>
<td>49</td>
<td>3.5</td>
<td>37 2.9</td>
<td>18 1.3</td>
<td>39 3</td>
<td>26 3</td>
</tr>
<tr>
<td>Professional licenses or certifications</td>
<td>19</td>
<td>1.3</td>
<td>5 0.4</td>
<td>13 0.9</td>
<td>6 0.5</td>
<td>12 1.4</td>
</tr>
<tr>
<td>Training for business creation</td>
<td>24</td>
<td>1.7</td>
<td>4 0.3</td>
<td>3 0.2</td>
<td>1 0.1</td>
<td>3 0.3</td>
</tr>
<tr>
<td>Training for users at risk of exclusion</td>
<td>36</td>
<td>2.6</td>
<td>32 2.5</td>
<td>20 1.5</td>
<td>30 2.3</td>
<td>6 0.7</td>
</tr>
<tr>
<td>Training for the unemployed</td>
<td>91</td>
<td>6.5</td>
<td>40 3.1</td>
<td>128 9.3</td>
<td>43 3.3</td>
<td>17 1.9</td>
</tr>
<tr>
<td>Training for equal opportunity</td>
<td>25</td>
<td>1.8</td>
<td>11 0.9</td>
<td>5 0.4</td>
<td>11 0.9</td>
<td>1 0.1</td>
</tr>
<tr>
<td>Other activities</td>
<td>-</td>
<td>-</td>
<td>1 0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>1,408</td>
<td>100</td>
<td>1,270 100</td>
<td>1,378 100</td>
<td>1,290 100</td>
<td>877 100</td>
</tr>
</tbody>
</table>

Initiatives of ongoing environmental training have also been carried out by the provincial and regional environmental protection agencies and by ISPRA. The provincial and regional agencies have also shown an ongoing commitment to offering paths of professional training, though the number of initiatives has varied over the years, with a decrease registered for the period 2011-2012, when the training courses held during each year amounted to slightly more than 12% of the total of the training initiatives organised during the period 2004-2012.

Despite the decrease registered, more than 2,000 courses were offered during the period in question and over 40,000 environmental technicians were trained.

In the years 2011 and 2012, the number of technicians involved in training initiatives totalled more than 9,000 units.

\textsuperscript{20} Source: ISFOL Environment Project - Ifolamb 2009
The average number of courses held and apprenticeships sponsored by each agency is almost identical to the figures for earlier years.

In keeping with the national overview that emerges from the ISFOL study, the courses promoted by the regional and provincial environmental protection agencies have also been primarily short-term initiatives, especially in recent years, when a further decrease in their average duration was recorded. This downward trend can be seen as a repercussion of more rigorous budget policies brought about by the recent economic-financial crisis, a situation that has forced government bodies to reduce the funds available for the training of human resources.

Short-term courses have gone from accounting for 95% of the total in 2004 to 98% in 2011 and 2012, when courses calling for more than 50 hours of training accounted for only 2% of the initiatives promoted.

Figure 12.6: ISPRA-ARPA/APPA environmental training offerings

Short-term courses have gone from accounting for 95% of the total in 2004 to 98% in 2011 and 2012.

Source: ISPRA-ARPA/APPA data processed by ISPRA


Table 12.3: ISPRA-ARPA/APPA environmental training offerings, average duration of the courses^{31}

<table>
<thead>
<tr>
<th>Agencies surveyed by year</th>
<th>Average hours of instruction per course</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 - 10 Agencies and ISPRA</td>
<td>31</td>
</tr>
<tr>
<td>2005 - 9 Agencies and ISPRA</td>
<td>22</td>
</tr>
<tr>
<td>2006 - 17 Agencies and ISPRA</td>
<td>19</td>
</tr>
<tr>
<td>2007 - 14 Agencies and ISPRA</td>
<td>22</td>
</tr>
<tr>
<td>2008 - 18 Agencies and ISPRA</td>
<td>19</td>
</tr>
<tr>
<td>2009 - 13 Agencies and ISPRA</td>
<td>30</td>
</tr>
<tr>
<td>2010 - 16 Agencies and ISPRA</td>
<td>31</td>
</tr>
<tr>
<td>2011 - 18 Agencies and ISPRA</td>
<td>16</td>
</tr>
<tr>
<td>2012 - 18 Agencies and ISPRA</td>
<td>14</td>
</tr>
</tbody>
</table>

At the same time, the percentage of courses financed by funds from outside the sponsoring organisations rose to respective figures of 11% and 12% of all the initiatives held in the years 2011 and 2012, as compared to a figure of 6% for 2004. As a rule, the courses held in the period 2011-2012 were meant to heighten professional skills and know-how in terms of monitoring and controls, especially with respect to water resources, air quality, waste and physical agents. Looking at examples of more flexible training methods adopted by the regional and provincial environmental protection agencies, in 2011 the Piedmont ARPA instituted an e-learning training course, as was done in 2012 by the Emilia-Romagna ARPA and by ISPRA. The latter, on the strength of the positive response to the on-line training initiative provided in 2012, also planned e-learning and “blended” courses for 2013, for example the second course on Good Laboratory Practices for certification of the laboratories of the agency system and the course for technicians in environmental acoustics, an initiative recognised by the Lazio Region. In terms of tools of environmental training aimed at creating high-level professional figures in the field, mention should also be made of the internships and apprenticeships organised in collaboration with Universities and other educational institutes. During the period 2004-2012, more than 3200 apprenticeships were organised by the environmental protection Agencies and by ISPRA, including approximately 870 in the years 2011-2012 alone. The abovementioned Law no. 92 of 2012 also introduced major innovations in terms of apprenticeships, tasking the Conference of State and Regional Governments the task of drawing up the guidelines whose provisions were to be followed by the regions in stipulating the specific measures governing this training tool. Not until the second half of 2013, the deadline within which the Regions must include the points indicated by these guidelines in their legislation, can the effects of these regulatory modifications in terms of the professional training of young university graduates begin to be assessed.

^{31} Source: ISPRA/ARPA/APPA data processed by ISPRA
The scenario for which a brief description has been given illustrates a sector of training – namely environmental training – that is rich in potential and constantly evolving, though, as was also pointed out by ISFOL, what is lacking is an overall vision, a coordinated set of actions designed to identify and monitor training needs while evaluating the effectiveness of the training, all in response to the growing demand for specialised, highly qualified education. It was to this end that the Ministry of the Environment, in its General Directive of 2 August 2012, stressed the need to create a structured system for specialised environmental training, assigning the task to ISPRA. The goal is to establish a Specialised School of Environmental Studies able to develop top-flight and ongoing training in the field of the environment, especially as regards new regulatory developments and techniques for carrying out activities of monitoring and control. The school’s guiding principles would be efficiency, in order to optimise the economic resources invested by the public sector in the training of human resources (as per art.11 ‘Restructuring of Public Training Institutes’ of Legislative Decree no. 95/2012) along with effectiveness, ensuring that the courses created meet the training needs already voiced, or that will be put forth in the future, by the provincial and regional environmental protection agencies, by the Ministry itself and by the other public bodies and research institutes.

**Sustainability-oriented education**

Sustainability-oriented environmental education topic presents a number of different points for reflection. In cultural and strategic terms, there is the potential role of such education in light of the critical shortcomings shown by the economic and social models that held sway during the last century.

A recent UNESCO Report on the Decade of Education for Sustainable Development, that officially ends in 2014, contends that sustainability-oriented education, far from having completed its mission, becomes more relevant with every passing day, seeing that a great deal must still be done to reach the goal of reversing negative trends, such as ecosystems deterioration and social and economic inequality instances. UNESCO is looking for education towards sustainability to become a driving force that cuts across all the various sectors in promoting innovation and transformation, though for this to happen, the member states must do more to reform their educational programs and overcome the barriers that separate the educational community (schools, universities) from the other components of society (politics, work) with which it must interact.

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The fact is that environmental education, currently viewed as a tool for facilitating processes of learning oriented towards environmental and social sustainability, could make a very real contribution to addressing the worldwide situation of crisis, promoting a holistic, constructively critical view of reality that would approach the more pressing dilemmas of today by imagining an alternative future and by looking innovative solutions that ensure a more lasting, empathetic approach to the most dramatically urgent problems.

This outlook, thanks to which education oriented towards sustainability becomes synonymous with education for change, leads to some methodological considerations:

- concrete steps must be take towards integrating content and methods, both through educational planning and by training of educators with multidisciplinary curricula formulated from the perspective of the “science of sustainability”;
- the specific professional figure of sustainable development educators is emerging, meaning an educator who mediates and facilitates the learning processes and experiences by combining different types of capabilities: theoretical knowledge, modes of thought and behaviour, practical and relational skills;
- the value, indeed the absolute need, to place a greater focus on creating and reinforcing networks and partnerships, if possible with contributions from a variety of different subjects and within accredited, coordinated institutional systems.

But given the lack of coordination among the institutions involved, the constant cuts in resources and the merging and elimination of organisational structures engaged in these activities, the national context would appear to fall short of providing what is truly needed. At the same time, a wide variety of services and activities are offered, especially at the local level, where it is relatively easier to establish working relationships between local governments, schools and associations, and where successful initiatives can be proposed that, even at low levels of funding, obtain the active involvement of the population, especially if the topics addressed are of interest to the local area and community.

Demonstrating as much is the success of the 2012 Week of Education for Sustainable Development promoted by UNESCO, during which hundreds of initiatives were carried out in Italy, with contributions from local government bodies, scholastic institutes, centres and laboratories of environmental education, and many others.

The topic proposed: “Mother Earth: Food, Agriculture Ecosystems” makes it clear that education for sustainability entails throwing light on the links between a variety of environmental, cultural and economic considerations that should be examined on both a global and local scale. On the other hand, in the case of more extensive, long-term educational projects and campaigns, the available resources...
must often be supplemented with outside funding, first and foremost programs of the European Community. Not that these are within the reach of everyone, seeing that they often come with restrictive conditions, such as working relationships with a number of partners, an integration of various types of activities and beneficiaries, effective planning and management of the assigned funds and, in what has virtually become a requirement, the use of interactive communications programs, such as social networks, e-learning and multimedia tools.

An important experience in this direction is the project LIFE Fa.Re.Na.It. (“Make Nature Networks 2000 in Italy), which currently finds ISPRA working in partnership with the CTS for the environment and other organisations. The integrated efforts of communication and training undertaken during the program to promote knowledge of the 2000 Nature Network and popularise eco-compatible practices currently includes an educational campaign aimed at schools, though less for the purpose of providing information than to stimulate the active involvement of students and teachers through a variety of means, such as the contest, “My Land is Worth It”, which calls on the classes to draw up a project for the care and reclamation of a protected area in their territory. A school with an awareness of its surroundings can serve as a critical cultural hub through which to channel the underlying values that the project is meant to promote - respect of habitats and ecosystems, farming not as exploitation but as stewardship and optimisation of the fruits of the land, the link between a healthy environment and healthy people - in order to communicate and share them with the whole society35.

This field includes also the programs, projects and activities undertaken by the system consisting of ISPRA and the regional and provincial environmental protection agencies, though uncertainty and difficulties are the rule, due to the inevitable cuts occasioned by the government spending review, whose repercussions on the national level affect the viability and operating effectiveness of the Interagency Network for Sustainability Education coordinated by ISPRA, while locally they hamper the activities carried out by the environmental protection agencies within their respective regional/provincial network, and especially efforts to interface with local areas. The overview of the situation offered by the indicator Environmental Education Initiatives for Sustainability, a part of the 2012 ISPRA Environmental Data Yearbook, shows however that the average number of environmental education initiatives remained almost constant in the years 2007 to 2012, showing a peak in 2009 for projects and another in 2010 for singular activities (Figure 12.7).

35 http://www.farenait.it/it/junior
During the period 2007-2012, the average number of environmental education initiatives remained virtually unchanged, peaking in 2009 in terms of projects and in 2010 with respect to singular activities.

An interesting point is the break-down of the different types of beneficiaries of the educational initiatives, with the projects, as a rule, being aimed at the school-age population, while the singular activities (information sessions, guided tours and exhibitions, awareness campaigns, etc.) tend to focus on adults.

An analysis of performance in terms of integration, essentially the capacity/possibility of working in partnership with the other participants, and operating results, meaning the types of services carried out in the local territory, helps to complete the overview of the contribution made by ISPRA and the regional and provincial environmental protection agencies within the context of the larger national network of education for sustainability.

A noteworthy result, drawn from the data collected to formulate the indicator Integration and Operating Performance within the Local Network of Environmental Education for Sustainability, is the long-term success of the regional and provincial environmental agencies in carrying out their role of coordination within their respective network (Figure 12.8).

This shows that the regional governments still have a high level of trust in the environmental agencies, a consideration that promises to ensure the continuation of what has been built up over the years.

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36 Source: ISPRA-ARPA/APPA data processed by ISPRA
During the period 2006-2012, the regional and provincial environmental agencies enjoyed good long-term success in carrying out their role of coordination within their respective network.

Figure 12.8: Role of coordination played by the environmental agencies and ISPRA in the institutional networks of environmental education for sustainability

One last reflection regards the distinctive nature of this topic when it comes to the procedures for evaluating activities. Two elements deserve mention: the inherent dynamism of the focus on sustainability, which effects both the knowledge of environmental phenomena and educational research; then there is the central role of the subject in the learning process, a factor of such importance that it is difficult to foresee and measure its impact on the personal convictions or actions of an individual or a group, that can be influenced by many factors related to both knowledge and emotions. This is why the main systems of monitoring and evaluation established to date aim to assess the quality of programs and projects in terms of the consistency between the underlying values and theoretical framework and their transformation into activities employing specific procedures for performance. The most advanced example in Italy may be the array of Indicators of Quality for Regional Systems of Environmental Education (SIQREA)\(^\text{38}\). Put to the test in a number of different regions, it allows the subjects to assess their own performance by using a grid consisting of indicators/descriptors of quality and quantity. To conclude, the quality and the significance of the indicators used for this area of interest in

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\(^{37}\) Source: ISPRA-ARPA/APPA data processed by ISPRA

the Data Yearbook could be improved not only through the participation of more subjects but also by examining the different methods and procedures under which the initiatives are carried out. This would effectively integrate the quantitative information that is already available but used primarily for statistical studies.

**ENVIRONMENTAL PERFORMANCE IMPROVEMENT TOOLS**

With the growing awareness that environmental protection must necessarily involve stakeholders, in particular through the establishment of new ways of cooperation with market operators (producers and consumers), the improvement of the environmental quality of organisations and products has taken a key role. The primary references for this objective are the European regulations EMAS and EU Ecolabel, together with the international standards ISO 14000 series.

EMAS (EC Regulation no. 1221/2009) and EU Ecolabel (EC Regulation no. 66/2010) reflect the environmental policy initiated by the European Union under the Fifth Environmental Action Programme (1992-1999). Beside traditional “command and control” activities new voluntary tools have been conceived meant to promote better management of resources while encouraging organisations to take direct responsibility for the environment and disseminating information on their improved environmental performance of processes and products.

The enactment of the aforementioned regulations has demonstrated the importance of such tools in terms of environmental prevention and improvement. The key objective underlying the Sixth Environment Action Programme, as well as the European Commission’s new plans for action, “Sustainable Production and Consumption” and “Sustainable Industrial Policy” (COM 2008/397 def.), can be identified as the development and reinforcement of a set of measures that, based on production activities that respect the environment and on ecological consumption awareness, should lead, over medium/long term, to the creation of a “green market” along with the implementation of Sustainable Production and Consumption (PCS) principles.

In practical terms, this new approach has led to:

- the intent, as stated in the Sixth EU Environment Action Programme, to increase the use of EMAS and the EU Ecolabel Regulations, to promote Green Procurement as a way of stimulating the growth of the “green market” and to improve the flow of environmental information from businesses to businesses and from businesses to consumers, encouraging the use of, among other tools, the Environmental Product Declarations (DAP);
- requests to member states for developing strategies to integrate the voluntary tools available (EMAS, EU Ecolabel, Product Declarations, ECO Design etc.), together with the related legal measures, in order to enact the “environmental efficiency” principle;
- the innovations introduced under the EMAS and EU Ecolabel
schemes, and specifically: the extension of EMAS from the industrial sector to all areas of activity, introduction of the indirect environmental impact concept, attention focused on environmental performance indicators and the opening to the global market; consideration of social, along with environmental aspects, in formulating criteria for awarding the EU Ecolabel, as well as the certification of semi-finished products together with products meant for final consumption;

- the strategic role given to the public meant, in the more general sense of the term, as public sector and as citizens-consumers that can push the growth of “ecological demand”.

The creation of the “green market” is an effort that involves:

- companies that, in their planning and operating phases, can improve the environmental characteristics of their products and services;
- consumers that prefer ecologically worthy offerings and make correct use of what they have purchased;
- Public Administrations that can provide environmentally adequate services, play a role of smart consumer, inform citizens and direct their awareness and behaviour, introduce incentives, promote research and place development policies on a uniform footing.

In keeping with the European Commission’s new plans of action, “Sustainable Production and Consumption” and “Sustainable Industrial Policy”, under which production that respects the environment and informed consumption are synergistic elements to be stressed for achieving new modes of production and consumption, a wide variety of tools are available (EMAS, EU Ecolabel, Green Procurement, DAP etc.), all of them of proven worth: important is their right mixture that is the result of company’s strategies, based on market competition, and in case of Public Authorities, on the outcomes of development decisions and programs.

In short, the driving factors around which harmonised strategies should be formulated are:

- forms of economic leverage, finding ways to simplify administrative procedures, taxes and subsidies in order to promote the use of environmental certification by organisations;
- the development of tools and incentives, on the local level as well, in order to encourage more ecologically sound consumption, taking action to influence demand and to supply information through initiatives designed to heighten the awareness of the public authorities that manage public tenders;
- influencing offerings of ecological products and services by introducing tools for comparing information, encouraging transparency and disseminating data, encouraging eco-design and compliance with environmental compatibility.

In line with the approach taken by the European Commission, which has made EMAS, EU Ecolabel and GPP an integral part of its new policies of sustainable production and consumption, the European Council and Parliament have issued new EMAS III and Ecolabel III texts that went into effect, respectively, on 11 January 2010 and on 19 February 2010. Between 1997 (the year in which the EMAS and EU Ecolabel has grown, showing a positive annual growth rate.
Ecolabel programs effectively went into operation in Italy and today, the penetration of the two programs has risen continuously, showing a positive annual growth rate (Figures 12.9 and 12.10).

![Bar chart showing trends in EMAS registration certificates issued in Italy.](chart)

The regions with the best results for number of EMAS registered organisations are: Emilia-Romagna, Lombardy, Trent-Alto Adige, Tuscany and Piedmont. The uneven territorial development reflects the different levels of awareness and/or incentives.

Figure 12.9: Trends in EMAS registration certificates issued in Italy

Of the European states, Italy places third in terms of EMAS, behind Germany and Spain, while it holds first place with respect to the Ecolabel, followed by France and Denmark. The regions with the best results in terms of number of EMAS registered organisations are: Emilia-Romagna, Lombardy, Trent-Alto Adige, Tuscany and Piedmont. The region with the most EU Ecolabel licenses registered is Trent-Alto Adige, followed by Emilia-Romagna, Tuscany, Lombardy and Piedmont.

The EMAS and EU Ecolabel increases can be traced to, among other things, developed skills and professional know-how obtained by attending local EMAS and Ecolabel schools whose objective is to provide fundamental training to professional figures who are qualified to assist organisations (EMAS environmental auditors and consultants and EU Ecolabel consultants), in addition to establish, in collaboration with the academic world, specific university masters programs for high-level training.

But though Italy is one of Europe’s leaders, the growth is not yet structural. There are geographic discrepancies due to different levels of awareness or incentives between different regions, public authorities, production sectors, business and professional associations etc.. Despite the positive attitude shown towards EMAS by art. 18 of Law 93 of 23 March 2001 (though this was not supported by subsequent measures of application) and by the new consolidated act on the environment (Legislative Decree 152/2006), a practical and effective sponsoring of voluntary instruments by the competent government bodies and by the interested parties is still far from being a reality.

39 Source: ISPRA
In the case of EMAS, the most critically important elements appear to be:

- the absence of a policy geared towards integrating the environmental needs of the population with the competitive demands of businesses on the marketplace, in addition to developing incentive plans for the organisations that participate in the program;
- the attitude of the public enforcement authorities that are responsible for authorisations and monitoring, plus the scarce propensity to support prevention policies.

In Italy, as of December 2012, there were 287 valid EU Ecolabel licenses covering a total of 17,320 labelled products/services. The decrease in the number of license and products registered in 2010 stems from the fact that companies had to renew the contract for using the EU Ecolabel on the basis of newly established criteria.

![Graph showing trends in EU Ecolabel products/services in Italy (31 December 2012)](image)

With regard to the EU Ecolabel, the interest of businesses in this certification has remained constant. In 2010 there was a slight drop in the number of licenses, and therefore in the number of certified products and services, due to the fact that the companies had to renew their contracts for the use of the label following the implementation of new criteria (companies that sent in their renewal application late, beyond the deadline stipulated in the pertinent regulations, had their licenses cancelled from the official registers), but in the years that followed the figures once again rose, resulting in a positive trend for this instrument.

The introduction of environmental criteria into government calls for tender, please the advantageous position of companies with EU Ecolabel certified products when it comes to showing compliance with these criteria, are a further stimulus for the EU Ecolabel environmental certification of products.

Net growth was recorded in the year 2012, as compared to the figures for 2010-2011, in certain groups of products, such as detergents, paints, soaps and shampoos, as well as paper and soil improvers. As shown in

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40 Source: ISPRA
Figure 12.11, of thirteen groups of products actively sold in Italy, the category with the greatest number of EU Ecolabel products is “hard covers”, with no fewer than 13,863 certified products.

Figure 12.11: Distribution of EU Ecolabel products/services in Italy by product category (31 December 2012)

**GLOSSARY**

**Environmental certification:**
A recognition presented to companies that, through their operating systems, continuously reduce environmental impact due to their internal procedures while agreeing to work to prevent pollution.

**EU Ecolabel:**
The ecological quality label of the European Union, awarded to the best products and services from an environmental standpoint.

**E-learning:**
On-line learning procedures.

**EMAS:**
A voluntary European community system of eco-management and control, open to companies that manage their environmental impact according to high standards.

**Feedback:**
In processes of circular communication, the phase of listening to the target audience in order to gauge and confirm the success of the information and the communication initiative.

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41 Source: ISPRA
**Environmental reporting:**
The systematic collection and dissemination of data on the monitoring of the environment. The resulting presentation is the environmental report.

**Rss Feed (Rss = Rich Site Summary or Really Simple Syndication):**
A format for the dissemination of web contents. With Rss flows, internet users can be kept up to date on new articles or comments published on sites that interest them without having to actually visit each one.

**Social media:**
A generic terms indicating the on-line technologies and practices that individuals employ to share content consisting of texts, images, video clips and audio recordings.

**Social network:**
A platform that utilises the new communications media, allowing users to operate their own social networks.

**The ISO 14000 Standard:**
A series of specifications for environmental management systems, recognised internationally and developed by committees of the ISO (International Organization for Standardization).