

PREFACE

In the task sharing established at the Preparatory Meeting of the Study Programme on European Spatial Planning (SPESP), Brussels, 7 December 1998, it was agreed that the Work Group in charge of the development of theme 1.6, Indicators on Natural Assets, would be made up of the National Focal Points (NFP's) of Spain and Denmark. Furthermore, it was planned that the work would be carried out in close collaboration with the European Environment Agency (EEA), given the obvious relationship of this organisation with the theme under study.

Apart from this initial work structure we cannot overlook the contributions received from the rest of the NFP's, both as regards the various documents drawn up throughout the course of 1999, and also with respect to the survey on the proposed indicators prepared by this Work Group during the month of June. We should not forget the dozen of meetings of co-ordination of the Spanish Team (Oviedo, Madrid, Zamora...) that without a doubt helped to clarify numerous aspects.

The short period of time available, along with some other inconveniences, has prevented the results achieved reaching as far as this Work Group would have wished. Nevertheless, the final evaluation of this first phase of the SPESP has been very positive. If we take into account the complexity of the object under study, the European territory, we are of the opinion that a lot of ground has been covered and that it has been possible to achieve certain basic principles that will noticeably help the continuance of the work and that the European Spatial Development Perspective (ESDP) will manage to acquire a technical and practical dimension that will complement the political.

During the development period of the work three Draft Reports have been drawn up coinciding with the Meetings of the NFP: Stockholm, in February 1999, Nijmegen, in June 1999 and Rome, in October 1999. These documents

have attempted to outline and define a realistic indicator proposal which maintained a certain technical and scientific coherence.

In this document we carry out a brief review of the ground that has been covered and specify the main conclusions arrived at in that which refers to theme 1.6 Natural Assets. This summary extracts the most relevant aspects contained in the three Draft Reports drawn up to date, of the contributions of the EEA and the NFP's, as well as of the co-ordinator, above all, through the enlightening meetings.

We cannot conclude without expressing our thanks all those who have collaborated with the contribution of ideas and effort in the drawing up of this study. Without these contributions, it would have been extremely difficult to obtain any results.

INTRODUCTION

CRITERIA OF SPATIAL DIFFERENTIATION AND INDICATORS

The ESDP acknowledges the need to go into greater depth as regards the awareness of the European territorial reality and of tackling more integrated territorial analyses¹. Thus is indicated the convenience that the instruments of the Programme 5^o R+D Framework instruments support the research and investigations with respect to the same. Another of the instruments is the SPESP. This Study Programme is focused on a specific set of key themes².

According to the ESDP documents, the main function of these criteria is to make possible the carrying out of a comparative analysis of the various cities, towns or European zones and their situation with respect to the three fundamental aims of the PEOT. In short, by means of the analysis of these criteria there is an attempt to establish a classification of the regions, cities, and axes. that go to make up the European space³. There are seven criteria proposed by the ESDP⁴: geographical position, economic strength, social integration, spatial integration, land use pressure, natural assets and cultural assets.

¹ Noordwijk Document, 1997: "Further work on the spatial analysis"

² Apart from the spatial differentiation criteria the Noordwijk document proposes the creation of a typology of areas or regions and the creation of scenes in the long term as work areas. In the document Guidelines for Applicants to the SPESP the contents of the Programme is made up of three studies: Analysis of the components of the European Territory (indicators); Strategic study of the new co-operation framework countryside-city in Europe; Cartographic illustration of a series of trans-national options.

³ Guidelines for Applicants to the SPESP

⁴ Noordwijk Document, 1997: "Further work on the spatial analysis"

To draw up the classification of the components of the European territory the establishment of a system of territorial indicators is proposed, which will permit the measurement of territorial classification criteria and the drawing of maps that reflect these criteria.

A series of observations are made with regard to the indicator system in the documents of the ESDP⁵. Among them we must highlight the fact that it must deal with a reduced number (one or more), qualitative or quantitative and with the capacity to carry out a spatial differentiation in the greatest possible detail.

INDICATORS ON THE NATURAL ASSETS

As is stated in the First Official Draft of the ESDP the seven criteria make up a starting point based on the consensus reached by the Member States, although they are not the only ones possible. As far as this is concerned we believe that it is worthwhile making some complementary comments in reference to the criterion of spatial difference of the Natural Assets and their contents.

This criterion has been defined as⁶: characteristics of ecosystems and other natural areas - their relative importance, sensitivity, size or rarity. It can supply a basis for the assessment of related functions of different natural assets across Europe and the habitat of different species. It may also supply the basis for a certain division of tasks regarding the development of specific types of nature. It is, therefore, a conception strictly focused towards a sectorial vision: the assessment of the territories according to importance, sensitivity, size or the rarity of its natural elements.

Nevertheless, the reflections that are made by the ESDP apply a vision of European territory including the main environmental aspects and not only the natural resources. Both the Noordwijk Document⁷ as well as the Potsdam

⁵ Noordwijk Document, 1997: "Deepening of the work on territorial analysis"; Orientation Document for the Tenderers to the Study Programme on the Management of European Territory. One or more indicators per criterion; Quantitative or qualitative; Capacity to assess the European territorial components in accordance with the criteria that has been laid down; They must include references to the innovating capacity and to the infrastructure repercussions on a large scale; and they must serve to carry out a spatial differentiation in the greatest possible detail.

⁶ Noordwijk Document, 1997: "Further work on the spatial analysis"

⁷ The main environmental issues pointed out by the Noordwijk Document (1997) are: Waste reduction and management; Climate change; Loss of biodiversity; Acidification and pesticides; Freshwater management; Forest degradation

Documents⁸ review the main environmental aspects that are a source of preoccupation in the European political context. Thus the ESDP takes over the principle that the environmental aspects, and not only the natural ones, will be turned into one of the three fundamental pillars of any sustainable development proposal and of any territorial vision that there may be an attempt to apply to the policies.

This approach is confirmed by other documents such as the Dobris Assessment or Europe's Environment, The Second Assessment, on the environment in Europe, those issued by other international organisations such as OECD, ECE, or the European Union, or by countries such as Canada, the Netherlands, Sweden, Norway or Spain. The 5th Action Programme on the Environment reflects this vision, and considers integration of environmental assessment in different economic sectors as one of its key principles⁹.

This principle also seems to have been reinforced in the successive documents of the ESDP. Thus the Potsdam document reinforces this idea about the necessity of adopting an environmental perspective when treating the natural component of the European territory. Throughout the text they are had in consideration like components of the European territory and of the regions urban and rural areas like: protected areas; environmental sensitive areas; high biodiversity areas; and endangered areas.

ENVIRONMENTAL INDICATOR SYSTEMS

There are several theoretical frameworks that may be used as a method for the identification and development of any type of indicators, in general, and environmental indicators, specifically¹⁰. Also, there are there are several

⁸ The Potsdam document makes a review of the biggest environmental concerns, from an environmental perspective. The significant topics that appear in the document are: Biological diversity; Nature conservation; Destruction of soils; Greenhouse effect; Acidification; Salinisation; Eutrophication; Water resources and quality; Water consumption; Overuse of ground water; Risk of flood; Fragmentation of ecosystems; Spatial fragmentation of protected areas; Links between nature site and protected areas of regional, national, trans-national and UE-wide importance.

⁹ The environment in Europe – 1995, European Environmental Agency, 1998: This 5th Programme, named Towards sustainability, brings out the fundamental causes of environmental degradation as a way to create a more sustainable economy and society

¹⁰ Manuel Winograd; Conceptual Framework for the Development and Use of Environmental Indicators for Decision Making in Latin America and the Caribbean. Mexico D.F., Mexico; November 1995. <http://www.ciat.cgiar.org/dland/indicators>

conceptual frameworks to organise the information¹¹. Of all these, the one that has received the greatest acceptance is that which is called the “causal framework”. This conceptual framework pays particular attention to the environmental decision-making process. It is based on a causality pattern. Anthropogenic actions make some pressures on the environment modifying its quality and properties. Society then reacts to keep the balance and to reach sustainable development.

The causal framework Pressure/State/Response (P-S-R), developed by the OECD, may probably be the most used among all of them. It has also been used as the basis of a group of potential regional scale sustainability indicators for the United Nations Sustainable Development Commission (DPCSD) and for the World Bank (UNEP-DPCSD, 1995; World Bank, 1995), enabling the measurement of the sustainability of land use in Latin America and the Caribbean area (Winograd, 1995). Thus, the model classifies indicators into three categories:

- Pressure. Referring to pressures on the environment as a consequence of the development of human activities.
- State. Environmental indicators of status are set out here as descriptors of environmental state, of the quality of the environment.
- Response. It includes the existence of measures, actions or programmes aiming to mitigate the effects of pressures, to keep and upgrade the status or to programme a rational use of natural resources.

The use of this model allows for the drawing up, according to these three categories, of synthesis indicators describing territorial areas according to the degree of pressures suffered, environment quality, reaction ability and commitment to mitigate the effects of the pressures or achieve the objective of sustainable development.

On the basis of this P-S-R model other models have been developed. In some proposals the concept of pressure has been substituted for that of “Driving Forces”. In the DPCSD system “Driving Forces”¹² includes the concept of “Pressure” along with some other basic socio-economic indicators. This concept has been used, for example, by EUROSTAT in a pilot study for the creation of a system of sustainable development indicators¹³. For its part the

¹¹ Environmental indicators; A proposal for Spain. Ministry of Environment. 1996: thematic framework; structure by habitats; sectorial framework; causal framework; spatial perspective according with the spatial scale; ecosystem framework.

¹² The Concept of Environmental Space, Implications for Policies, Environmental Reporting and Assessments. EXPERTS' CORNER NUMBER 1997/2. Prepared by John Hille. August 1997. <http://themes.eea.eu.int:80/showpage.php/?pg=37493>

¹³ European Communities: Indicators of sustainable development; Pilot study in accordance with the methodology of the Sustainable Development Commission of the United Nations. 1998. Catalogue number: CA-01-96-519-ES-C.

EEA has adopted the D-P-S-I-R model¹⁴. This is based on the P-S-R original and introduces two further concepts: “Driving Forces” and “Impacts”. An approximate definition of the significance of each one of the criteria is

- Driving forces: human activities such as production, consumption, transport, housing...;
- Pressure: emission of pollutants, deposition of waste, extraction of natural resources, land use;
- State: effects of pressure on the physical media (quality);
- Impacts: effects of pressure and of the quality of physical media on the state of the ecosystems and the public health and conditions of life;
- Response : the societal responses to environmental problems.

However, we should not forget that indicators try to reflect a very complex reality, with multiple agents and close relationships among them. There is no single perspective and the organisation of indicators depends very much on the final use of the information. If we also consider that the organisation frameworks described above are not exclusive, we will not find it strange that the organisation of indicators will use more than one framework. This is, for instance, the national indicator system developed by the U.S. Environmental Protection Agency (USEPA)¹⁵. The model uses a combined structure by habitats (water, air, ecosystems...) with sectorial and thematic frameworks (pollution, waste, climate change...) and a causal perspective (pressure, status, reaction).

THE IMPORTANCE OF THE ENVIRONMENTAL CRITERION FOR THE SPATIAL DIFFERENTIATION

At the present time, it seems to be unnecessary to justify the importance of the environmental aspect in territorial analysis and in the diagnosis, the schemes and the proposals which must be encouraged and promoted by societies in the search for a balanced and sustainable development. Consideration of environmental quality, the maintenance of natural processes and biodiversity constitute aims that cannot be waived in all responsible political statements, and represent a deeply seated aspiration of society.

It may be said that, after decades of intense alteration of the natural processes and environmental degradation, European society finds itself, at

¹⁴ EEA: List of Contents 1999 Yearly Indicator Report; DRAFT.

¹⁵ Environmental Indicator Technical Assistance Series. USEPA y Florida Centre for Public Management of Florida State University. October 1996. <http://www.fsu.edu/~cpm/segip.html>.

present, in the vanguard of these preoccupations concerning environmental aspects, and, in response to this social demand, the various administrations have promoted intense action in the defence of sustainable development models compatible with the declared principles.

The role of environmental aspects has been noticeably strengthened in the conception of European construction. This is well illustrated, for example, by the Treaty of Amsterdam which understands that all policies must contribute to sustainable development and incorporate an environmental component in all of said policies. The environment has thus become another element of the transversal character of European policy. To have a set of spatial differentiation criteria of the components of the European territory available, as is proposed in the ESDP Studies Programme implies a considerable advance when it comes to introducing the territorial component into European Union development. The analysis of these criteria and their indicators may aid decision making as regards the most suitable measures and programmes for each territory, thus avoiding disfunctioning as a result of concurrent incompatible policies in the space. Furthermore, however, the study of the temporary evolution of these spatial indicators will enable us to evaluate the success of the policies, measures or programmes applied. In this context, the environmental component surfaces as a basic part, and as a transversal element as regards all sectors, the consideration of which must incorporate an integrated analysis of all the components of the territory.

The state and the quality of the environment have become a key factor for development, which in practice implies that there are distinct opportunities and potential among the various European territories. The state of the environment has become, in effect, a factor of life and territorial quality. Just as is happening, for example, with the cultural assets, the presence or the proximity of natural areas of extreme value, or of protected natural spaces, grant advantages both to these territories, and their immediate surroundings, as compared to those spaces with environmental problems, or areas that are suffering from strong anthropic pressure. As a result, the environmental criterion must be looked on as one of the fundamental criteria when it comes to tackling a balanced and sustainable development of the European territory, in harmony with those aims and ends that are being pursued by the ESDP.

CHOICE OF INDICATORS

GENERAL COMMENTS

Once the principal aspects to be kept in mind when the time comes to focusing the work on indicators on Natural Assets have been examined within the context of the SPESP, we can establish the following general considerations:

1. The main aim pursued by the SPESP with the construction of a system of indicators is the characterisation of the components of European territory. This characterisation will be carried out in the greatest possible detail and in compliance with certain established spatial differentiation criteria. Therefore, the assessment of policies and their effects do not enter into or figure among the functions of the system of indicators. On the other hand, we believe that the joint analysis spatial incidence policies and territory characteristics will be easily carried out once the indicator system has been defined and is in operation, as long as it has spatially referential data of the policies developed. Furthermore, we are of the opinion that the conclusions that may be reached in this way are much more useful.
2. On analysing the official ESDP documents, particularly the Potsdam document, as well as other reports on the state of the European environment, one comes to the conclusion that the characterisation of the components of the European territory must not only focus on the evaluation of natural resources. The characterisation must also include other aspects such as the quality of the environment, and not only on

the natural resources, their evaluation in the European context or the pressures and answers that the various countries exercise and apply.

3. By going deeper into the above point it becomes necessary to change the name of the criterion from “Natural Assets” to “Environmental Assets”. It is also necessary to draw up a new definition of the criterion for which the following is proposed: Environmental characteristics of the European territory and their relation to the environment. This relationship must be analysed in various terms such as: natural and ecological characteristics; the assessment of ecological, habitat and ecosystem conditions in a European context; the incidence of human activities on the medium and viceversa; or the preservation effort, improvement or management carried out by each territory in order to reach a development balance.
4. The ESDP indicator system is based on seven criteria, including environmental indicators. It is clear that the development of all criteria would include features, topics and data relevant to the environmental criterion, both from the pressure and from the status or the response point of view. For this very reason it has been decided not to include certain indicators in the proposal, although they might appear to be obvious, given that they belong to other criteria through which they can be already included in the system of indicators of the EDP. Notwithstanding, once all the proposals have been made specific, the system as a whole should be revised¹⁶.
5. In spite of the fact that the proposal should be backed up by the concepts and ideas that the environmental indicator systems contribute, it cannot be understood as a system of environmental indicators in the strict sense of the term. Therefore, for example, the simplest model has been adopted, the P-S-R, valid enough to maintain a coherent organisation with regard to the theme.
6. The objectives and peculiarities of the ESDP make it necessary to drastically reduce the number of indicators that normally go to make up a traditional system of environmental indicators. Therefore the proposal must focus on a set of significant themes. On occasions we are dealing with extremely complex themes that do not encounter an adequate reflection in an index obtained on the basis of the treatment of a single environmental indicator or of just one data source. Therefore, some of the proposed indicators must be based on

¹⁶ Some indicators included in the Summary Reports of other criteria of spatial differentiation that can be interesting for the 1.6. are: Geographical latitude and longitude (1.1.); Mean elevation above sea level (1.1.); Length of seashores (1.1.); Mean annual sunshine (1.1.); Population density (1.3.); Population change (1.3.); Households (1.3.); Indicators of agricultural development (1.5.); Indicator of Land prices (1.5.); Indicators for cultural landscapes like yearly tourist stays (1.7.).

interpretative models of the territorial reality or must be the result of the spatial aggregation of various environmental indicators.

7. In this initial phase the data sources will have to be Pan-european, that is to say, the idea of drawing up a compilation of data sources of the Member States is dropped from the very beginning. In spite of the fact that at the beginning the idea was to use data sources coming exclusively from the European Administration, in practice, data from other international organisations or from some national services, but ones which offered data for the whole European territory, were used.

On the basis of this set of observations an indicator proposal is made that must be understood as the first approach to the development of models and concepts about environmental indicators from the ESDP.

PROPOSED SYSTEM OF INDICATORS

In our opinion there are two organisation frameworks that should be used in the ESDP environment indicator system :

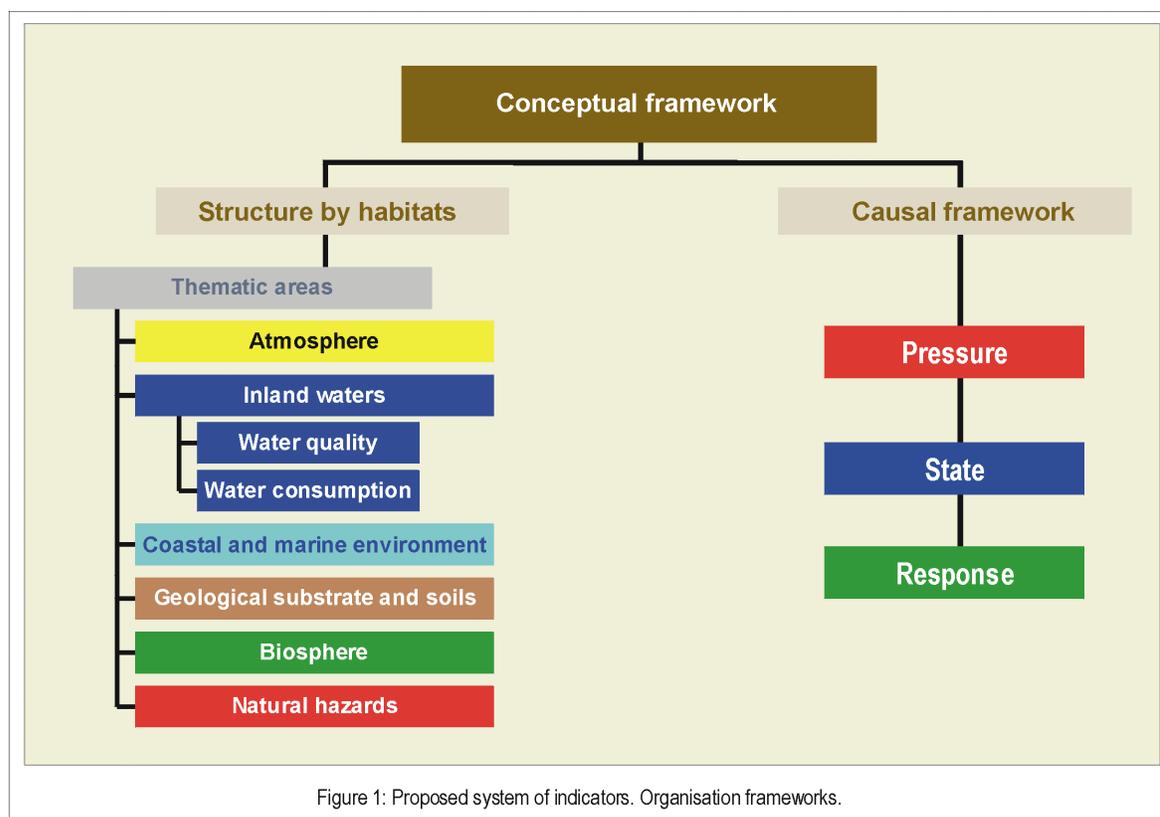


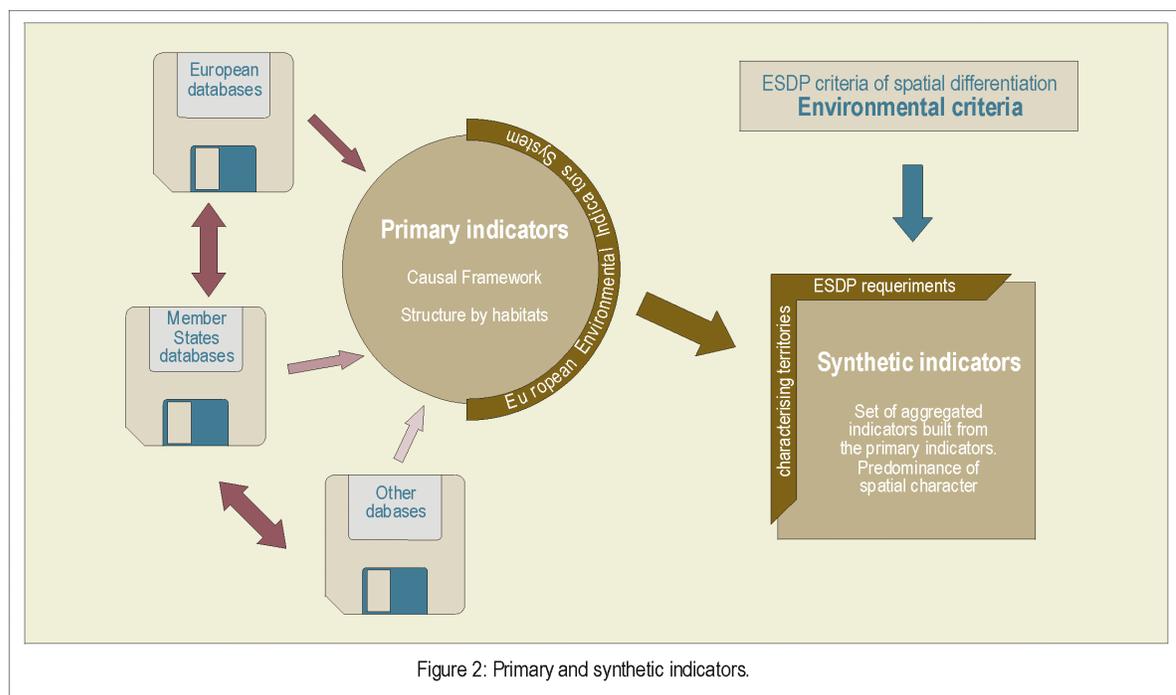
Figure 1: Proposed system of indicators. Organisation frameworks.

- Structure by habitats, which allows for an organisation of the indicators giving scientific coherence to the system.
- Causal framework, which allows for the taking into account of the main elements involved in the decision-making process within each environment.

According to the structure by habitats, six thematic areas are to be established. Indicators will then be referred to them: Atmosphere, Inland waters (Water quality / Water resources), Coastal and marine environment, Geological substrate and soils, Biosphere and Natural hazards.

Paying heed to the causal framework, the indicators are classified in pressure, state or response indicators according to the range of environmental process that is expected to analysed.

In spite of the proposal a reduced group of indicators is specified in the theoretical conception of the same two types of indicators are included:



- **Primary indicators:** or environmental indicators that would form part of a future European Environment Indicator System¹⁷. From these, and from the data bases from which they feed, the synthetic indicators would be calculated.

¹⁷ We refer to a wide and extensive system similar to that proposed in the Environmental Indicator Technical Assistance Series. U.S. EPA y Florida Centre for Public Management of Florida State University. October 1996.

- Synthetic indicators: or aggregate indicators, built from the primary indicators. These must fulfil the requirements of the ESDP with a predominance of the spatial character and of the function of characterising the territories or components of the territory.

Faced with the lack of an operative system of European environment indicators, in the first proposals a list of primary indicators was drawn up. This long list is organised according to the proposal described above, that is to say, by means of a conceptual framework (P-R-S) and a structure by habitats. At first there was an attempt to determine a series of characteristics for each indicator; characteristics like the data sources available or the scale and spatial resolution of the results. This exercise enabled us to make our first approximation to the complexity of the theme. It was already seen at this initial stage that the greatest limitation that we would encounter was related to the lack of data bases suitable for the objective of the SPESP.

SYNTHETIC INDICATORS

Obviously the list of primary indicators drawn is excessively long. On the other hand, the conclusion arrived at was that the ESDP did not need an environmental indicator system, among other reasons, because this was just one of the seven spatial differentiation criteria contemplated. As a consequence, an indicator proposal was drawn up that could turn out to be viable, at least from the theoretical point of view, and adapted to the project.

The aim was, therefore, to create a short list of aggregate or synthetic indicators in an attempt to maintain the main proposals that had been established initially. For this, apart from the observations made for the set of indicators in the official documents of the ESDP, the observations described in the section of general observations were taken into account. After various revisions the list of indicators proposed was cut down to 12 synthetic indicators that we believe can cover the needs of ESDP. These indicators are:

- S1. Pressures on the environment (pressure)
- S2. Emissions of polluting gases (pressure)
- S3. Water quality (state)
- S4. Water resources (state)
- S5. Coastal value (state)
- S6. Ecosystem diversity (state)
- S7. Biodiversity (state)
- S8. Value according to directive 92/43/CEE (state)
- S9. Potential Productivity (state)

- S10. Natural Hazards (state)
- S11. Threats on natural resources (state)
- S12. Designated or protected areas (response)

The proposal was submitted for consideration to the various NFP's as well as to the EEA. In spite of the fact that it is not possible to obtain general observations, given the diversity of the opinions and views that exist as regards the theme in the distinct spheres of the European territory, the conclusion arrived at is that the proposal can be valid as an initial work hypothesis. After these consultations some modifications and additional considerations have been introduced, which without a shadow of a doubt enrich the proposal even more.

It is thought that this list is far from closed and thus, for example, certain fundamental flaws or omissions, which at this moment in time it does not seem possible to rectify. These flaws or omissions occur both on the indicator cards as well as in the sections where the results and possible policy applications are explained. One of the most significant is the impossibility of drawing up, with European sources, an environmental response indicator that will assess the effort made by the territories to solve the environmental problems or to preserve and manage the natural resources. Another important flaw is the lack of a data base which enables one to evaluate the naturalness of the European territory, especially in that which refers to the tree formations and the forests or woods, this being an aspect of great importance for the Nordic countries but not less so for the rest of the European territory.

On the other hand, and in spite of drastically reducing the number of indicators, there still remains a serious problem with the data sources available. Thus, for example, there are no sources with a suitable spatial resolution to develop the indicators related to the water resource, both in order to assess its quality as well as to evaluate the availability of the resource. Nor are there spatial data available at the present time on some of the environmental measures begun by the UE such as the Habitat Directive or the European network of protected spaces.

In spite of this, and before the need to have some results available on the theme of "natural assets", for their joint analysis with the indicators of the other spatial differentiation criteria, it was decided to do tests in those cases where it was possible. The indicators for which it has been possible to do some kind of test are: S1, S2 (only acidifying gases), S5, S6, S10 and S12. The tests carried out are described in a summarised form in the cards of the respective indicators.

Some factors have reduced the reliability of the results obtained. Among the most important worthy of special mention are: unsuitable data sources with little spatial resolution or which do not cover the territory under study in its

entirety; lack of validity both of some data sources as well as the methods and their results; the use of the NUTS 2 as a spatial unit that turns out to be much too extensive for the aims of this project in the case of the environmental variables. Therefore we understand that said tests have only served as a first approximation, and perhaps as a starting point for discussion, but not to make a diagnosis of the European territory. What these tests have been useful for is to come up with a series of conclusions related to technical and methodological aspects and on the direction of future projects of the SPESP. These conclusions are included in the corresponding sections of this report.