COMMISSION OF THE EUROPEAN COMMUNITIES

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COMMUNICATION FROM THE COMMISSION

to the Council and to the European Parliament
concerning the

RESULTS OF THE CORINE PROGRAMME

in accordance with

Article 3 of Council Decision 85/338/EEC

of 27 June 1985

on the adoption of the Commission work programme concerning an experimental project for gathering, coordinating and ensuring the consistency of information on the state of the environment and natural resources in the Community

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SUMMARY

THE RESULTS OF THE CORINE PROGRAMME: OPERATIONAL INFORMATION ON THE STATE OF THE ENVIRONMENT IN THE COMMUNITY AND LESSONS FOR FURTHER COMMUNITY ACTION

INTRODUCTION

On 27 June 1985, the Council adopted a decision on a Commission work programme - the CORINE programme - concerning an experimental project for gathering, coordinating and ensuring the consistency of information on the state of the environment and natural resources in the Community.[1] Midway through the programme, the Commission reported on the state of progress of the work.[2] Originally intended to last for four years, the programme was extended for two years.[3] In Article 3 of the amended decision it is laid down that at the end of the six-year period the Commission must submit a report to the European Parliament and to the Council on the results obtained. This communication constitutes that report. It describes the way in which the CORINE programme was carried out, sets out the results obtained and draws the appropriate lessons from the experiment.

The decision also says that, in the light of the results, "the Commission shall, if it considers it appropriate, submit suitable proposals to the Council on any follow-up". On this point, the Commission proposed that from the end of the first four-year period this work would continue in the European Environment Agency[4] (EEA), and this was taken up in the regulation adopted by the Council.[5] This communication therefore includes recommendations based on the lessons drawn from the execution of the CORINE programme, which the Commission feels the Agency might usefully take into account when carrying out its work.

RESULTS

The results of the CORINE programme (described in Chapter 2) may be put into three main groups, corresponding to the general objectives of the programme: (i) collection of the information, (ii) coordination of related activities, (iii) making the data and methods consistent.

(i) The data on the priority applications in the programme (biotopes, acid rain, natural resources in the Southern regions of the Community) were collected, verified and supplemented by reference data, and all put together to make the CORINE information system. This system is being used in the application and orientation of the Community's environment policy, as well as for other Community policies (Chapter 3 gives a number of examples of operational applications).

1 OJ No L 176, 6.7.1985; Decision 85/338/EEC.
2 Communication of 22 July 1988 to the Council, COM(88)528.
3 OJ No L 81, 28.3.1990.
4 OJ No C 217, 23.8.1989.
5 OJ No L 120, 11.5.1990, Article 2.

(ii) A systematic effort was made to concert activities with all the bodies involved in the work relating to the priority applications. Agreements were concluded which made it possible to establish common methodologies and optimize data gathering (e.g. with the Council of Europe and the OECD). The CORINE programme was also a decisive factor in improving, or even establishing, coordination between the Member States in the field of environmental information. The object here was to survey and to promote the convergence of many activities that were under way or planned, at both the national and regional levels, pursuant to environmental or other policies (agricultural, land use, etc.).

(iii) Nomenclatures and methodologies were developed for carrying out the priority applications of the CORINE programme. From now on these will be used as the reference in the areas concerned at the Community level. In addition, in several Member States CORINE nomenclatures have been improved beyond the common Community stem in order to describe specific regional features (e.g. Land Cover, Spain and Luxembourg). The system has also gained use in non-member states (e.g. CORINAIR methods and nomenclatures: countries of continental and Eastern Europe; Land Cover method and nomenclature: Algeria and Tunisia).

LESSONS FOR FURTHER COMMUNITY ACTION

The regulation concerning the EEA lays down a considerable part of the action to be taken by the Community in respect of information on the state of the environment. The task which the regulation confers on the EEA consists, in particular, of maintaining what has been achieved by the CORINE system and developing it by working on a set of new themes. The transition from an operational prototype to a permanent system is both technically and organizationally complex. It is, therefore, particularly useful to take advantage of the lessons of the CORINE programme, which are the subject of Chapter 4 of this communication. The analysis of these lessons, and the recommendations derived from them, are directly associated with a central feature of all Community policies: application of the subsidiarity principle and its corollaries.

From 1985 to 1990 the CORINE programme was in fact an opportunity to carry out a specific experiment in applying the subsidiarity principle:

- for one thing, the Council decision relating to CORINE stipulated "the limitation of the Community data base to information needed to implement the Community's environmental policy";

- for another, the environmental data come almost entirely from local sources, where the measurements, inventories, observations, surveys, etc., are carried out. Even satellite data need local data as well for their interpretation.

The CORINE experiment showed that the production of a piece of information that is useful at the Community level requires tasks to be carried out that involve coordinated action at different levels of responsibility: local, regional, national, Community. To obtain high-quality synthesized information that is useful at the Community level one has to start from detailed data of a high quality. The availability of such data still leaves much to be desired. It is not enough for data to be available for assembly into homogeneous information, useful to the higher levels (regional, national, Community), these data have to be comparable. To meet the need for information for carrying out the environmental policies at the different levels, a large number of data collection activities have been undertaken and are still on the increase. It has been possible to focus a number of these initiatives on the action themes of the CORINE programme, so as to ensure that the data produced are comparable, but much still remains to be done in the area. For the compilation of the innumerable local data to provide consistent and comparable information that is useful to the higher levels, it is essential to make a major effort at Community level in concert with the other levels of responsibility, along the following lines:

- precisely identifying the nature of the characteristics of the "information needed to implement the Community's environmental policy" and making the data producers aware of its implications;

- coordinating the many different data collection activities in order to make them useful at several levels of responsibility. This need for coordination is not limited, incidentally, to the data produced in the framework of environmental policies. For preparing information on the state of the environment recourse has to be had to data collected by specialist bodies (cartographic, geological, statistical institutes, etc.), and it is therefore essential for the programmes of all of these bodies to be concerted in order to take account of the data needs of environmental policies;

- establishing Community methods and nomenclatures and seeing that they are used, in order to ensure comparability of information. Two further types of action are necessary in order for nomenclatures and methods which have proved their technical validity to be used: the data producers have to be made to understand the need for homogeneous data, and standards relating to data gathering have to be systematically incorporated in Community law;

- guaranteeing the conditions for a permanent dialogue between the information users and the data producers. The CORINE experiment has confirmed that the data producers have little knowledge of users' needs and that the users for their part have little knowledge of the possibilities offered by or the gaps in the existing information. This situation, common to many areas, is particularly acute in the case of information of use to the Community environmental policy on account, as mentioned above, of the multiplicity of data sources, to which is added, moreover, our still very fragmentary understanding of environmental phenomena. The CORINE experiment has, fortunately, also provided concrete evidence that it has been possible, within DG XI and the Commission's other departments, to narrow this gulf between the data producers and the information users. Keeping up a permanent dialogue between these two groups requires an interface, at Community level as well as at the other levels, the purpose of which is to interpret the needs of those responsible for carrying out the policies to the data suppliers, and to help the former to put their needs into words and to make use of the existing information.

As regards information on the environment, the different levels of responsibility - Community, national, regional and local - are therefore entirely dependant on each other. The full and complete implementation of the subsidiarity principle requires a concerted division of labour in which - to put it very simply - the "higher" geographical levels depend on the local level for obtaining their data, and where the "lower" levels depend on the first levels for the establishment of nomenclatures, the development of consistent methods, and the supply of synthesized information making it possible to place oneself in a more general context. This enforced solidarity between the territorial levels shows all its significance with the imminent advent of the large European area, in which management of the environment at this territorial level will more and more require comparable information.

1. OBJECTIVES AND IMPLEMENTATION OF THE CORINE PROGRAMME

1.1 Origin and context of Council Decision 338/85/EEC

From the time when the environmental policies were established in the 1970s, the need for a better knowledge of the environment - its state, its development, the causes of disturbance - has made itself felt very distinctly, both in the Member States and their regions and at the level of the European Community and the international organizations. To meet these needs, many inventories, data collections and measurement campaigns have been conducted. This work has, however, almost always been carried out piecemeal, in accordance with the specific problems encountered. One of the results has been that the environmental information coming from these many unconcerted initiatives was not comparable from one country to another, nor even between the regions of one country.

This situation is particularly troublesome for the implementation of the Community's environment policy. It is obvious that in order to be able to guide this policy, to assess its effects and, above all, to integrate environmental aspects into the other Community policies, it is indispensable to have a better knowledge of the subject: the distribution and state of natural resources and wildlife, the quality and quantity of water and soil resources and their uses, the quantities of harmful substances discharged into the environment; the natural hazards which have to be taken into account in management processes.

At the Council's request,[1] the Commission, assisted by the "ecological mapping" group of national experts, evaluated the national and regional experiments and carried out a programme of research and a set of regional case studies which made it possible to work out the action to be taken in this area at Community level, and to draft a proposal to the Council.[2] Examination of this proposal by the Council, the European Parliament and the Economic and Social Committee led to the adoption of the Corine Programme.[3,4]

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1 Council request of 7 November 1974 "to carry out the work necessary to classify the territories of the Community on the basis of its environmental characteristics", in reply to the memorandum of 20 June 1974 from the Italian Government.

2 COM(83)528 final.

3 OJ No L 176, 5.7.1985, as amended by OJ No L 120 of 11.5.1990.

4 The acronym CORINE was adopted at the beginning of the programme to underline the importance of coordination (COoRdination of INformation on the Environment).

1.2 Guidelines for the CORINE programme

1.2.1 A programme which is both operational and experimental

The task assigned to the CORINE programme was a double one. It was designed to provide "results which will be of direct use in implementing the Community's environmental policy and make it possible to judge the advisability of going ahead with the establishment of an information system on the state of the environment in the Community".

The decision was intended to satisfy two needs at the same time:

- the need to have "practical results ... on a number of priority matters";
- the need to implement an "experimental project". Owing to the poor knowledge of environmental phenomena, the lack of reliable data and also the numerous difficulties encountered previously in Europe and elsewhere in the creation of information systems, it was necessary to be certain of the feasibility of a permanent and definitive European information system.

In order to put this pragmatic approach into effect, it was therefore necessary to establish a permanent balance between the "operational" and "experimental" components of the programme. Experience has shown that there is very little room for manoeuvre between, on the one hand, users demanding fast information that is often concerned with a single problem, and, on the other hand, the scientists who emphasize the need to refine the methods and techniques first of all before gathering the data.

In carrying out the CORINE programme the Commission was therefore required to manage the available budget in such a way as to satisfy the following two requirements as well as possible:

(i) fast operational results;
(ii) development of a consistent system that is going to be useful in the long term.

These two requirements cannot always be reconciled. It was sometimes necessary to give up the prospect of a fast result which would have been too imperfect, or conversely, to postpone until later the gathering of detailed data or the working out of more sophisticated methods, which would have delayed the operational results.

1.2.2 The opinions of the European Parliament and the Economic and Social Committee

In the Resolution of the European Parliament and the Opinion of the Economic and Social Committee, two points in particular were made with regard to the Commission's proposal:[1]

- from the geographical angle, it was asked that the programme should extend to the seas around the Community;

- from the point of view of data sources, it was asked that the system to be developed should be based on data supplied by the Member States pursuant to Community environment law.

Finally, it was stated that funds for the programme should be geared to the scale of the whole undertaking whether they are agreed with the Member States or come from appropriations in the Community budget.

1 OJ No C 337, 17.12.1984.
OJ No C 140, 25.5.1984.

1.3 Objectives, structure and components of the CORINE programme

The title of the decision setting up the CORINE programme is a clear indication of the three central objectives of the programme:

(a) gathering of information on the state of the environment for a certain number of priority Community applications;
(b) coordinating initiatives in Member States or at international level to improve information;
(c) ensuring consistency of nomenclatures, definitions, etc., and, generally, creating the conditions necessary to ensure comparability of data.

These three objectives are inseparable.

A first lesson to be drawn from the CORINE programme is that the collection of data on the state of the environment can in practice can begin only if:

(i) agreement has been reached in advance on the nomenclatures and methods to be used, and
(ii) initiatives with related aims have been carefully analysed with a view, if possible, to combining the efforts of bodies working on the same subjects, or at least to avoiding duplication of effort.

Figure 1.1 shows the structure and the main components of the CORINE programme. These break down into three groups of activities:

- preparing and laying the foundations for the programme and the information system: data processing aspects, collection of geographical reference data, inventory of data sources and related activities, data on human activities;

- preparing and setting up thematic data bases: biotopes inventory, atmospheric emissions inventory, land cover, soil erosion risk and land resources, water resources, coastal erosion;

- collating the thematic elements and the reference data: creation of the CORINE information system on the state of the environment.

It should be noted that a number of the activities undertaken were not explicitly provided for in the Council Decision but had to be introduced either because they proved essential for priority applications (collection of basic digital data on topography, climate, administrative boundaries, etc.), or because they had been expressly requested by Parliament or the Economic and Social Committee. Annex 2 gives a detailed breakdown of the relationships between these projects and the references to the Council Decision, Parliament's Resolution and the Economic and Social Committee's Opinion.

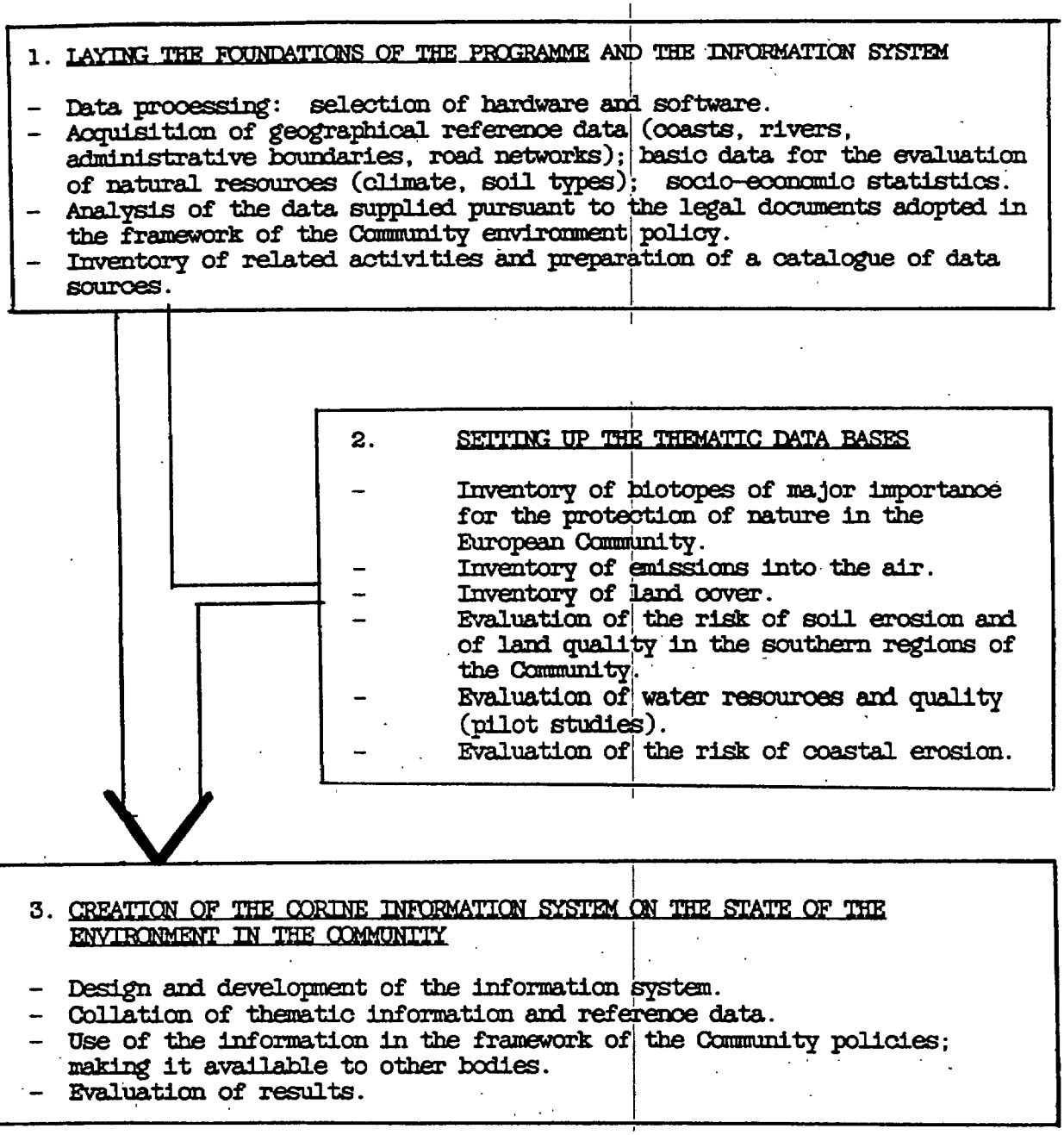

Figure 1.1 Structure and main components of the CORINE programme

1.4 Organization and functioning of the CORINE working parties

Figure 1.2 shows the different groups of partners who collaborated on setting up the CORINE programme. Annex 3 lists them.

The group of national experts

The Council Decision states that the Commission shall undertake the CORINE programme with the assistance of a committee consisting of representatives of the Member States. This assistance is essential in view of the very large number and the diversity of the bodies involved in the programme and of the related projects. The role of these national experts in their own countries was to coordinate and promote activities and to provide information. To various degrees they had to act as go-betweens between the Commission and the specialized national bodies, work together with these bodies, facilitate access to data or respond directly to requests for information. In a number of countries national experts organized, during the course of the programme, meetings between data "producers" and "users". For certain projects (Biotopes, Land Cover), meetings were held between the regions and the national authorities and showed that coordination was not only indispensible for carrying out the CORINE programme but also very useful nationally.

The programme secretariat

As early as the second year of the programme's life, work on programme creation and management began to assume considerable proportions both in terms of volume and the scientific quality required. The Commission set up a scientific and technical secretariat in DG XI to coordinate this task. This small multi-disciplinary group had suitable experience in geographical information systems, environmental data, mapping, data processing and project management. Its functions were as follows:

- preparing and monitoring the projects;
- seeing to consistency between the projects (e.g. when the data are common to several projects), and helping with carrying them out (e.g. supplying basic data, basic maps, etc.);
- preparing the meetings of the group of national experts and the various technical groups;
- identifying, monitoring and if possible influencing in an appropriate way activities related to the CORINE programme, especially in the framework of the international organizations;
- checking and evaluating the results;
- publicizing the programme (exhibitions, conferences, publications, etc.);
- above all, making use of the CORINE information system in order to meet the needs of the users in DG XI, other Commission DGs, other Community institutions or other bodies.

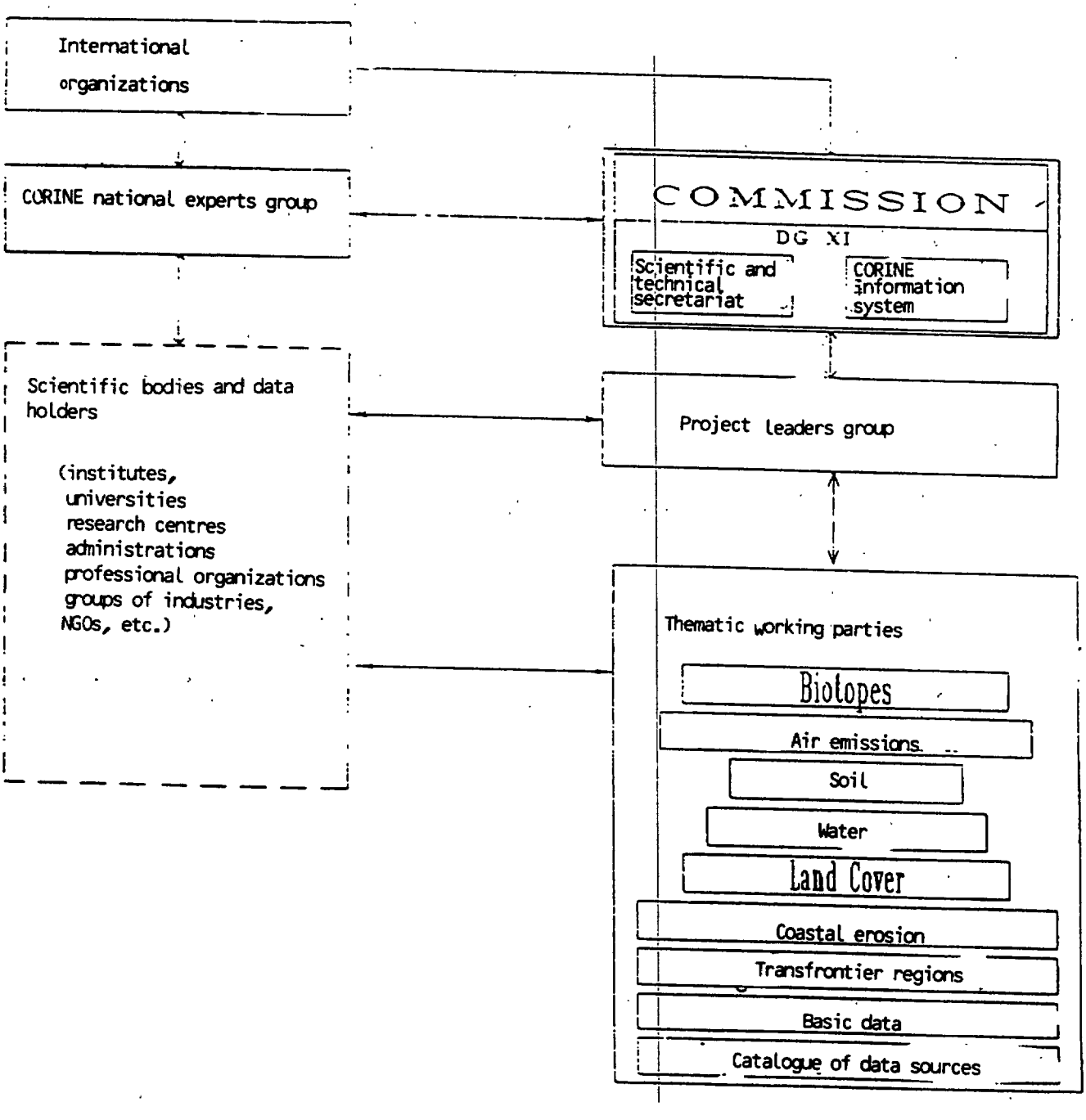

Figure 1.2 Flow diagram of the CORINE programme

Project leaders

The project leader had a twofold function:

- to carry out the project for which he had technical responsibility. This involved preparing a work plan and methodology, setting up a European team, discussing the plan and methodology with the team and adapting them if necessary, compiling a manual and any other documents required for the project, supervising data collection, collating and checking data and forwarding them to the CORINE secretariat for incorporation in the CORINE information system, in that order;

- participating in the work of the group of project leaders which provided the Commission and the CORINE secretariat with scientific advice.

At the different stages of the work, the Commission and the national experts were given progress reports on the project at the group meetings or individually. Permanent contacts were maintained with the secretariat.

The thematic working parties

These usually consisted of leading scientists from each Member State concerned. The international organizations and research groups working for other Community policies were represented in the thematic working parties. These consisted of five to fifteen persons accounting for a total of over 150 scientists in all Member States (see Annex V). Many of these scientists did not work alone but were assisted by colleagues, assistants, students, etc. Consequently the actual number of persons working on the CORINE programme was very high.

The Land Cover working party was much larger for two reasons:

- the working scale (mapping at 1:100 000) means a volume of work 10 to 20 times greater than for the other projects;
- the information that results concerns apart from environmental policy, the policies of land use, regional development and agriculture. In each country concerned, interministerial working parties have been set up to monitor the project.

The international organizations

When the CORINE programme began, there were several activities under way at international level (OECD, Council of Europe, ECE Geneva in particular) aimed at collating information useful to the implementation of environmental policies at these levels.

These activities were therefore systematically subjected to scrutiny, and whenever it proved appropriate the international organizations were represented in the thematic working parties and agreements were concluded to ensure that there was no duplication of effort.

The DG XI user group

From the third year of the programme, with the information collected becoming more and more voluminous and operational, a user group was set up. This is made up of representatives of the various units of DG XI and of the CORINE secretariat; this group plays an essential role at the meeting point of supply and demand for information. Its discussions have made it possible to specify the users' often vague requirements and to make additions to the supply where necessary so that it is better able to meet the present or future needs of environmental policy.

"The Geographical Information System" group

This group, in which a dozen Commission DGs were represented, was set up pursuant to the "Informatics major project" procedure. The project was led jointly by DG XI and Eurostat and technical support was provided by DG IX. The aim was to evaluate the Commission's needs as regards geographical information systems (software, hardware, data) and to propose a strategy to the Commission in this regard. One of the main results was to make it evident that many Commission departments had common needs and to work out a concerted approach, not only for the acquisition of hardware and compatible software, but also for setting up a data base and a service to the user DGs for European geographical reference data.

The Commission's departments

As well as these groups there are a number of users in the Commission's various DGs concerned with specific subjects (e.g. DG VI: climate, soils and forests; DG XVII: emissions into the air; DG XVI: land cover; etc.), which have developed close working relations with the CORINE secretariat.

1.6 Setting up the CORINE information system on the state of the environment in the Community

1.6.1 Data flow and preparation of information

There are two technical conditions that have to a large extent determined the possibilities and limits of the programme as well as the results obtained:

- the information had to be prepared from the available data. In other words, the programme did not provide for any measurement or data gathering campaigns but only compilations of data from existing sources: maps, yearbooks, data bases, statistics, etc.;

- the data processing would be based on the available models and methods, since the programme did not provide for any research work.

The financial limits and the timeframe set by the Council Decision reflect this decision to use existing data and methods. Obtaining new data requires hardware ranges and measurement campaigns whose costs are of an entirely different order of magnitude entirely different from that of the CORINE programme, as, incidentally, the Economic and Social Committee mentioned in its Opinion at the time.

Figure 1.3 places the CORINE programme:

- upstream of the bodies specializing in data gathering;
- downstream of those responsible for implementing environmental policy and other information users.

CORINE's own task was to convert the raw data into information which could be used for environmental policy. It consisted in:

- obtaining the necessary data from a multitude of sources scattered throughout the Member States;
- making them homogeneous and producing comparable information;
- collating the results into an operational information system;
- processing them to satisfy the users' requirements.

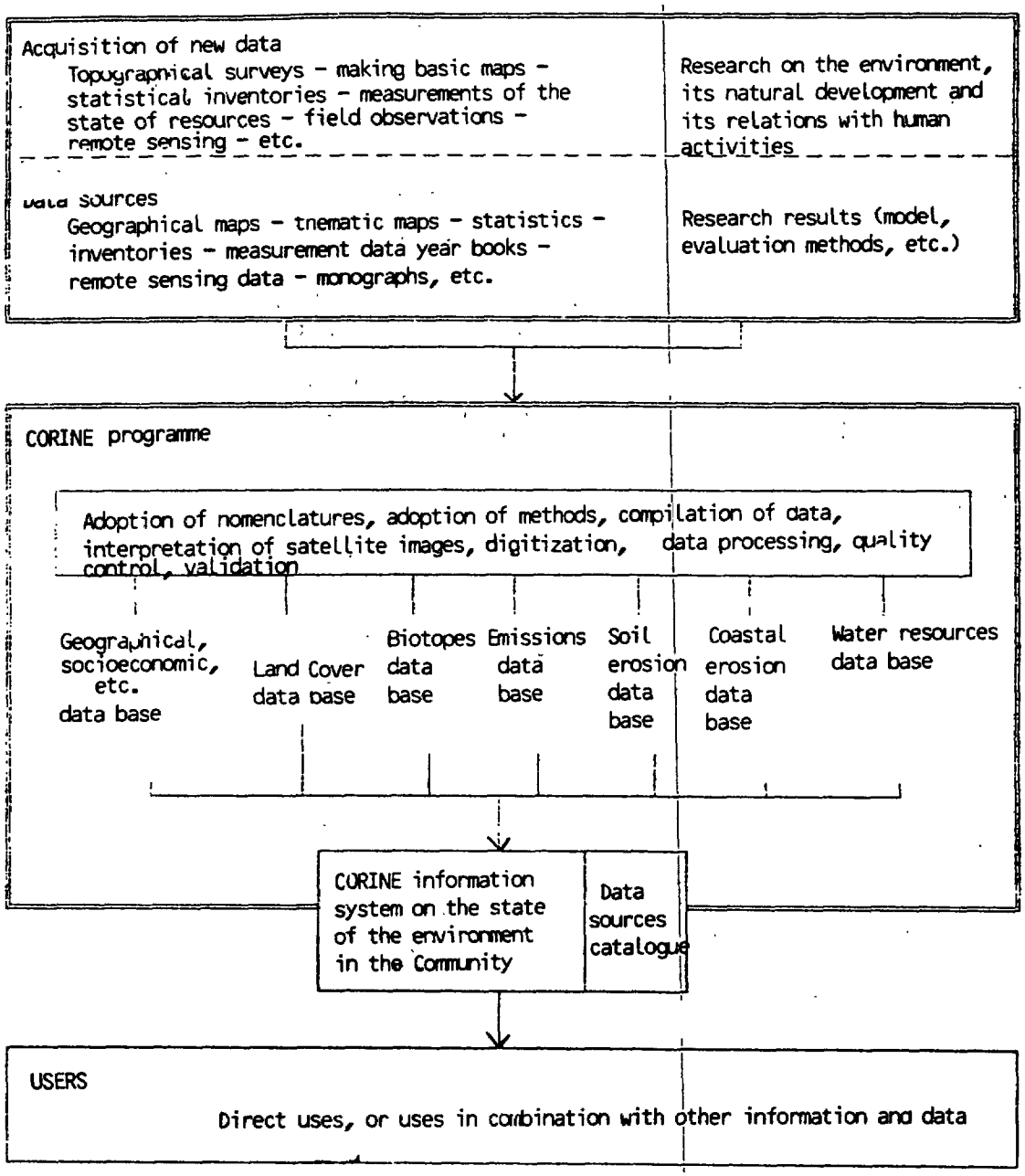

Figure 1.3: Scope of the CORINE programme

1.5.2. Work phases of the thematic projects

Work on the priority projects follows the general pattern shown in Figure 1.4; this consists of four main phases and a verification-validation loop. Basic data collection follows the same pattern but it will be noted that the first phase - preparation - often lasted as long as the other three phases put together. It takes a long time at the European level to obtain inventories of activities in hand and agreements on nomenclatures and methods, even in working parties made up of scientists.

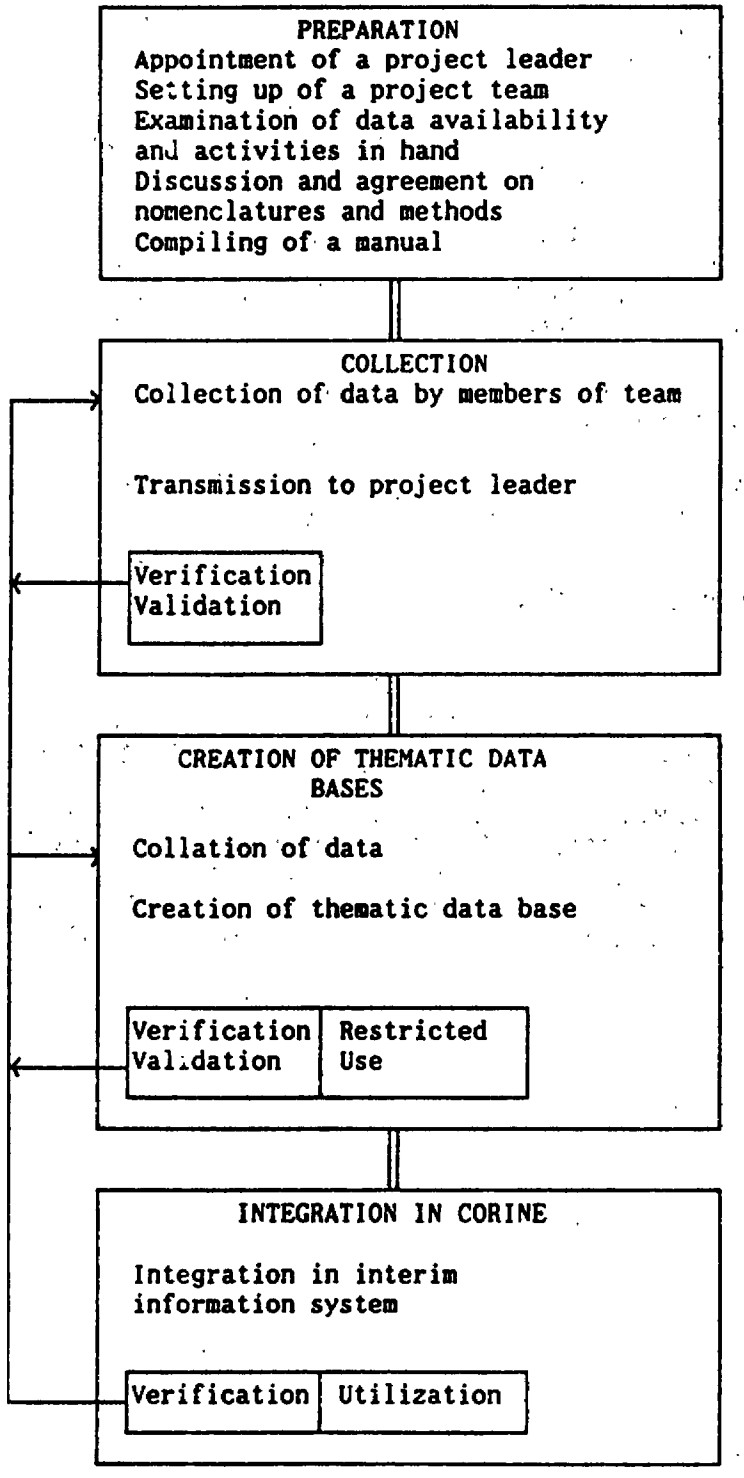

Figure 1.4: Work flow chart of a priority project

2. RESULTS OBTAINED

Each of the main objectives set out in the title of the CORINE programme has produced a specific type of result:

- the GATHERING of data has led to the creation of the CORINE information system;
- COORDINATING the related activities has made it possible to improve the efficiency of work at the national and international level and to create and maintain networks of experts and bodies;
- ensuring CONSISTENCY has produced a standardization of nomenclatures and evaluation methods.

As was pointed out in 1.3, it would not have been possible to achieve the results corresponding to the first objective without working simultaneously, or beforehand, on achieving those for the other two. For the presentation of the results in 2.1, it was therefore decided to describe the present content of the CORINE information system, subject by subject, showing the results obtained for each of them, beginning with COORDINATION followed by ensuring CONSISTENCY and ending with COLLECTION. An overall view of the content of the system can be seen in Annex 4.

Item 2.2 examines the additional results, relating to availability and the comparability of environmental data.

Point 2.3 summarizes the results obtained in the area of cooperation and presents various "repercussions" of the programme.

2.1 The CORINE information system

2.1.1 The data processing hardware

Data gathering under the CORINE programme resulted in the creation of numerous relatively large data files covering geographical reference data (topography, hydrography, etc.), basic data (climate, soil types, etc.) or thematic environmental data (biotopes, emissions into the air) etc. These files from various sources were put together into a consistent geographical information system (GIS). For this it was necessary to make sure of the quality of the data, to structure them in such a way as to allow data management, data research and analysis and the production of graphs and maps.

The main functions of the system may be summarized as follows:

(i) reception of digital data. Most of the data were supplied in digital form, so that the efforts of the CORINE Secretariat could be concentrated on converting the data rather than digitizing them, which had been done by the project leaders or the experts in the technical working parties;

(ii) integration of data and setting up the data base. This phase comprises in particular adjustment of the national data files to the frontiers and adjustment of the data from different sources (for example, it is obvious that only one reference coastline should be used and all the other sets of data should be made to correspond to it no matter where they come from). This phase of the work also consisted in verifying the geographical references of the thematic data, and in establishing cross-references between the files;

(iii) system and data management. This is not exclusive to the GIS, but is a necessary obligation, together with updating of the data, file safeguard procedures, development of the system and its utilities, standardization of procedures for routine functions, etc.;

(iv) research and spatial analysis functions. Herein lies the originality and interest of the GIS, giving the possibility of combining data from different sources to obtain a synthesized piece of information, for example the risk of soil erosion on the basis of climatic, topographical and pedological data. These functions also allow data to be prepared for use in models, for example the transposition of data for atmospheric emissions on to a regular grid, presented according to administrative units or point by point;

(v) data processing, the production of reports and cartographic documentation. This function was carried out by the data processing workshop of the CORINE Secretariat in accordance with the needs of the Commission users and of the CORINE technical working parties (aid to data validation).

The information system set up in DG XI is of a decentralized design (see Figure 2.1). The local network consists of four workstations, a digitizing table, tape readers and disk drives and printers. The workstations were provided with GIS software.

The architecture, hardware and software were chosen in accordance with the Commission's "major project" data processing procedure. When this procedure is completed, specifications will be adapted for Commission guidelines on GIS.

This procedure, initially set up to meet the data processing needs of the CORINE programme, made it possible to identify similar needs in different departments of the Commission and to adopt a consistent and concerted inter-services approach to hardware and GIS software, the same as for the collection and management of the data.

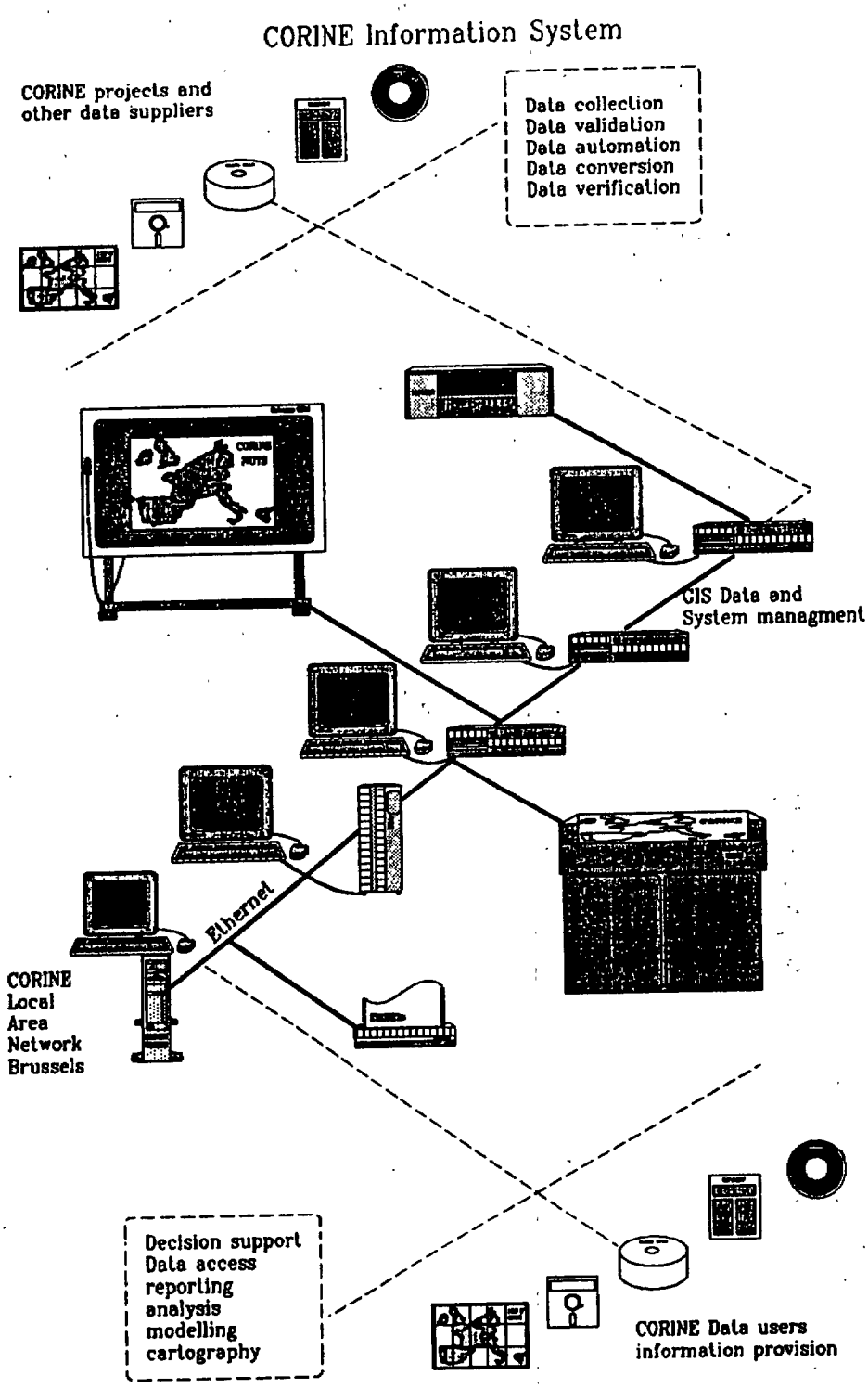

Figure 2.1: Schematic of the CORINE data processing equipment installed in DG XI.

The following conclusions can be drawn with regard to setting up and using the CORINE GIS:

(i) the techniques necessary for constructing the GIS are commercially available. The main problems are not to do with data processing, but with the insufficient availability and comparability of the data, as well as the existence of a permanent dialogue between data suppliers and information users;

(ii) the existence of geographical reference data of high quality in digital form is a prerequisite for the proper functioning of GIS. Obtaining such data involves a considerable amount of work which has to be done ahead of the creation of a GIS and by specialist bodies;

(iii) the collation of thematic files, their referencing to the geographical framework and cross-referencing amongst themselves - a key to the proper functioning of the GIS - will be made all the easier if the need for this is taken into account in the data specifications (before any collection starts);

(iv) to meet the needs of users for CORINE information the GIS software has been supplemented by software better suited to certain functions: a master system for combinations of large volumes of data, statistical analysis and result presentation software and a low-cost cartographic software;

(v) in order to be efficient and pay its way, the installation of a GIS and the reference data used have to be designed to serve the whole of an organization - for example the Commission - and not an isolated project or programme. This approach does not rule out decentralized operations such as that which was decided on for the Commission after the CORINE GIS major project;

(vi) awareness of the advantages of GISs is growing. Their potential uses and the value of operational prototypes should be made known. At the same time requirements for data and the need to perfect existing systems should be underlined. In this respect the availability of a GIS in the Commission, close to the user (DG XI and other DGs) has proved to be a great advantage from the point of view of the speed of service to the user and also as a way of making known the potential of this new technique.

2.1.2 The geographical framework of the Community

It is obvious that data on the geographical framework form the basis of any analysis of data or presentation of results on the environment. Although many countries might have set up digital data files of their medium scale topographical maps, the results are not consistent. The only Community coverage available is on a scale of 1:1 000 000. It was acquired, added to, corrected and integrated in CORINE GIS.

In the framework of the CORINE programme a not inconsiderable effort has had to be put into creating the digital data file described below.

In connection with and in support of this activity the CORINE Secretariat participated in the work of CERCO[1] aimed at harmonizing the digital topographical data on the European level.

COASTLINE AND NATIONAL FRONTIERS

The 1:1 000 000 scale data were acquired from IfAG, supplemented with the data for Greece and the southern shore of the Mediterranean and made generally available on a scale of 1:300 000.

HYDROGRAPHIC NETWORK

The data on a scale of 1:1 000 000 were acquired from IfAG. Their use is limited by the fact that creation of the file was not completed. Work to verify, correct, supplement and reorganize the file was started but had to be interrupted in view of the size of the task. For immediate needs, the 1:3 000 000 map was digitized. Figure 2.2 gives an illustration of the content of the data files at the two scales.

BOUNDARIES OF THE TERRITORIAL STATISTICAL UNITS

In very many cases, the pressures on the environment have to be evaluated on the basis of statistical data on human activities. These figures are available for each "statistical unit". The boundaries of the statistical units of level III, or 470 regions referred to as NUTS III, were therefore digitized on a scale of 1:3 000 000. In addition to this, by way of a test, a file of the municipal boundaries of the Benelux (NUTS V) was collated on the basis of the national data files (see figure 2.3).

SLOPES

For the southern regions of the Community a file indicating the average gradient per km^2 was created from two sources: a digital land model for the Iberian Peninsula; topographical maps at 1:100 000 for the South of France, Italy and Greece.

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1 See Annex 1.

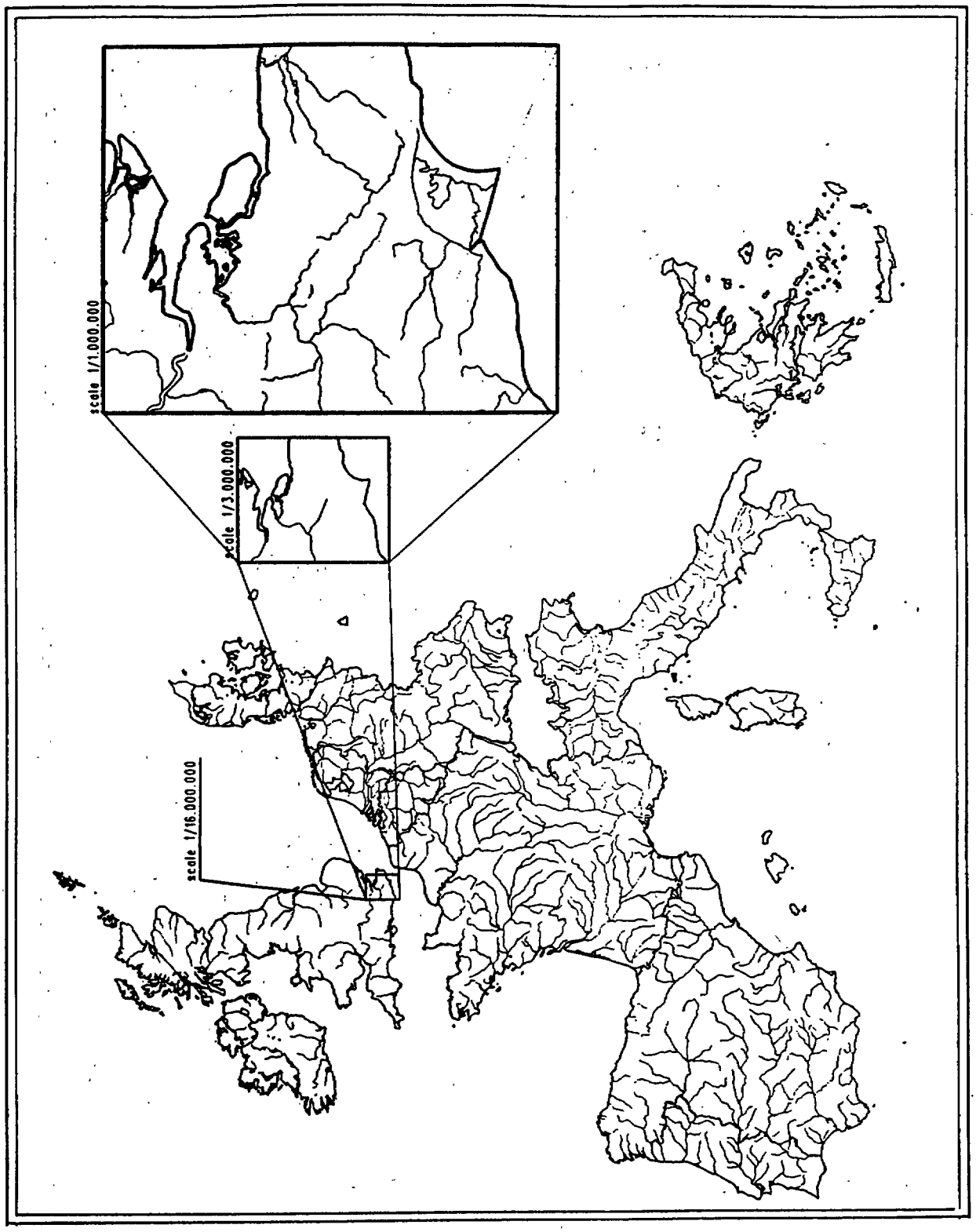


Figure 2.2: Illustration of the contents of the hydrographic network file

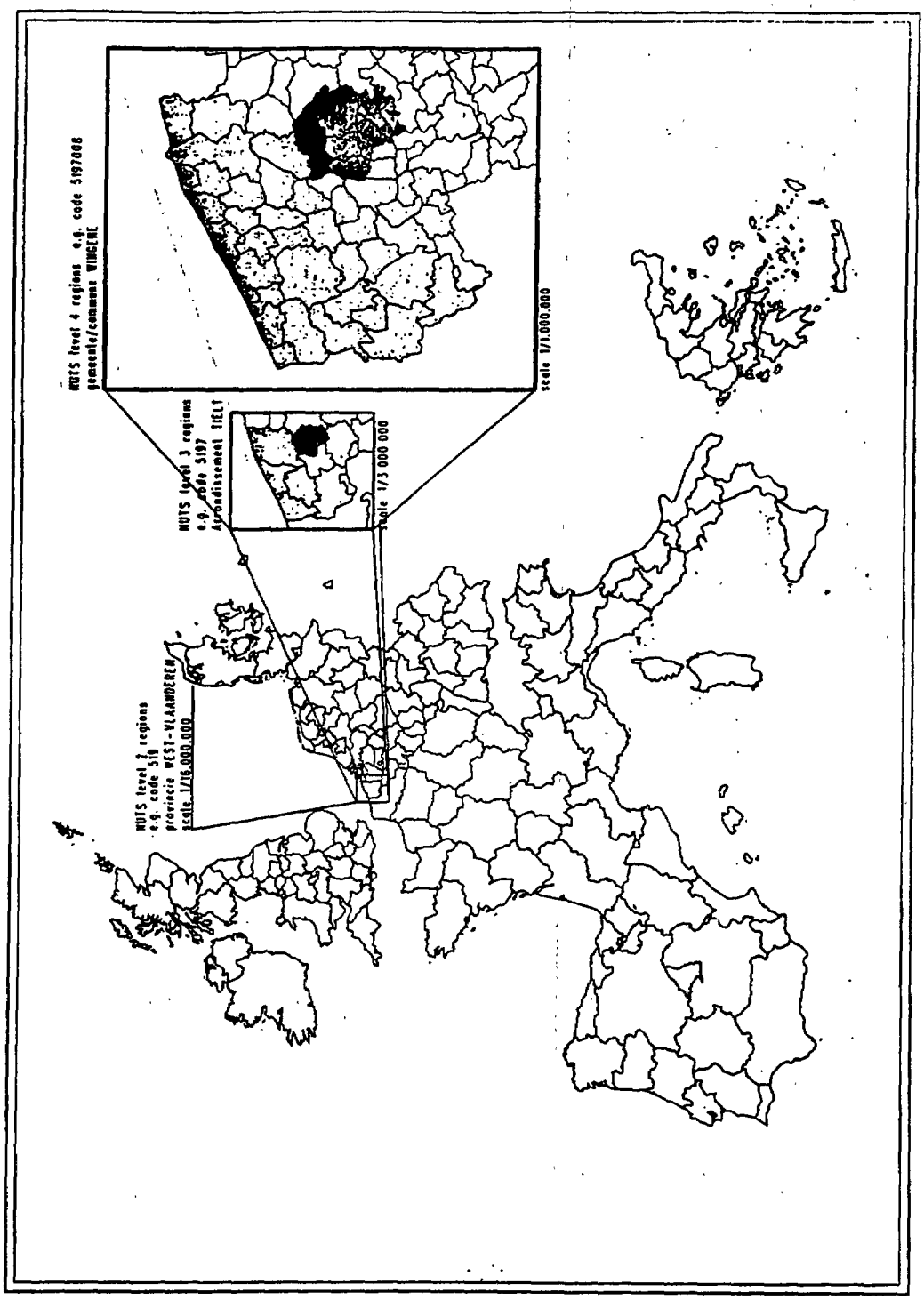


Figure 2.3: Illustration of the contents of the file of territorial statistical units of the Community.
NB: NUTS V level collated for the Benelux only.

CLIMATE

A data base was set up containing the monthly rainfall and temperature averages for more than 4 700 stations distributed over the Community, as well as other parameters for a smaller number of stations. These data are necessary for numerous analyses on natural resources.

POTENTIAL NATURAL VEGETATION

The 1:3 000 000 map of natural vegetation produced by the Council of Europe was digitized and published jointly with the Commission of the European Communities. It shows the distribution of 140 classes of vegetation for the countries of the Council of Europe and the Community Member States.

CONURBATIONS

For more than 1 500 conurbations with more than 20 000 inhabitants, the data base contains the following information: name, location, number of inhabitants.

GEOGRAPHICAL INDEX

This file links the names of map features to their locations (towns, villages, lakes, rivers, streets, mountains, etc.).

* * *

For more information see:

The geographical framework of the CORINE information system (to be published).

The natural vegetation of the Member States of the European Communities and of the Council of Europe (1:3 000 000). Publication available from the Office for Official Publications of the European Communities in Luxembourg (ISBN 92-825-7266-8).

2.1.3 The thematic data bases on the environment: the priority applications of the CORINE programme

BIOTOPES OF MAJOR IMPORTANCE FOR NATURE CONSERVATION

COORDINATION

The CORINE Biotopes working party was made up of experts coming, for the most part, from the national nature conservation institutes. At the international level, the Council of Europe, as a member of the Biotopes group, was fully involved in the preparation and production of the inventory. The cooperation was formalized in an exchange of letters between the Council of Europe and the Commission. The descriptive sheets and the respective nomenclatures were harmonized. There was also technical cooperation with ICBP, UICN, WWF.

The CORINE Biotopes project was also used for internal coordination in certain Member States, between the regional and national levels (notably Germany, Spain and Portugal).

CONSISTENCY

The project led to the development and adoption of:

- selection criteria for biotopes of major importance at the European level. The selection criteria are a fundamental component of the method. In the Federal Republic of Germany, for example, more than 150 000 biotopes are described in the data bases of the Länder, information which could not of course be transferred just as it was into a Community system, but which had to be evaluated and subjected to selection;

- a standardized descriptive sheet (see Figure 2.4);

- a European classification of habitats containing more than 1 200 definitions (see Figure 2.5).

The way in which these tools are used for putting together a consistent inventory is described in a technical manual.

COLLECTION

More than 5 600 biotopes were registered and described: location, surface area, type of habitat, type of conservation, animal and vegetable species (see Figure 2.4). Digitization of the contours of the biotopes was undertaken (440 biotopes, Portugal and Belgium).

In addition, an effort was made to set up a data base of conservation areas (more than 12 000 areas). An important subset of this consists of the areas designated by the Member States pursuant to the Community Directive on the protection of birds.

An Example of the Biotopes Standard Site Record

Site Code	900000081 Date 198612 Update 198809 Complex Code
Respondent	SKOV- OG NATURSTYRELSEN, SLOTSMARKEN 13, 2970 HOERSHOLM
Site Name	KARREBAEK, DYBSOE AND AVNOE FJORDE:
Site Complex	EQUAL TO RAMSAR S. NO.20 WHICH INCL. NAT.BIOL. S. NO.86,89 + MAR BIOL. S. NO.36. EEC BIRD S. NO.81.:
Sub-Site Codes Desig. Areas Region Name	STORSTROMS AMTSKOMMUNE:
District Name	/035/,(373),(353),(397):
Region Codes	9022: Area 19200 Long/Lat +11:43:45 55:07:14
Alt-mean	0 Alt-Max 19 Alt-Min 0
Habitat Codes	11.35 /**,12. /**, 81. / , 82. / , 15.13 / 34.3 / , 41. / :
Habitat Cover	11/040, 12/032, 81/010, 82/010, 15/005, 34/001, 41/002:
Desig. Codes	11.9.03/025, 11.9.01/100, 03.9.00/005, 09.9.01/002, 11.9.04/014 09.9.04/003, 11.9.02/100:
Motivation	02, 06, 07, 08, 11, 12, 13, 14, 16, 17, 04, 05, 21:
Human Act.	01/066, 05/077, 06/072, 07/077, 21/072:

SPECIES

Mammals	Phoca vitulina/30,Phocaena phocaena/:
Birds	Sterna paradisaea/n = 243p///,Recurvirostra avosetta/n = 76p//m = 260i/,Sterna albifrons/n = 45p///,Anas acuta/n = 1p//m = 2500i/,Calidris alpina/n = 1p///,Sterna hirundo/n = 25p///,Sylvia nisoria/n = 1p///,Oriolus oriolus/n = 1p///,Lanius collurio/n = 3p///,Circus aeruginosus/n = 5p///,Circus cyaneus//w = 13i//,Branta leucopsis///m = 77i/,Pluvialis apricaria///m = 1600i/,Cygnus olor//w = 3000i//,Cygnus cygnus//w = 900i//,Fulica atra//w = 14000i//,Aythya fuligula/w = 25000i//,Limosa lapp onica///m = 1350i/,Anser fabalis//w = 900i//,Haliaeetus albicilla//w = 31//,Aquila chrysaetos//w = 1i//:
Amphib/Rept	Bombina bombina/,Bufo viridis/,Triturus cristatus/,Pelobates fuscus/,Bufo calamita/,Rana arvalis/,Rana dalmatina/,Lacerta agilis/, Vipera berus/
Fish Invertebrates	Astacus astacus/,Helix pomatia/:
Plants	Gentianella uliginosa/,Orchis morio/,Ranunculus polyanthemos/,Herminium monorchis/,Silene vulgaris ssp. maritima/:

SITE DESCRIPTION

Character	Shallow sea area with shoals, banks, two large lagoons. Islands, several of which have cultivated land and scattered habitation. Long peninsula, partly with cultivated areas and scattered habitation. Commons, saltmarsh and reedswamps. Woodland:
Quality	Area of national biological importance. Very rich flora in different habitats. Freshwater ponds with extremily rare amphibian Bombina bombina. Avnoe Fjord breeding area and haunt for Common Seal. Water quality in fjord still good with very rich marine algae flora and fauna. Rich breeding bird fauna. Very important resting area for waterfowl and waders. Wintering area for rare raptors:
Vulnerability	Shooting. Boating. Tourism. Leisure. Disturbance. Cultivation. Pollution of water:
Designation	EEC Bird directive site. Ramsar site. Includes two Nat. Biol. sites and a Mar. Biol. site. Game reserves at Gavnoe and Karrebaeksminde. Nature protection of Enoe Overdrev, Dybsoe, Stejlebanken, Svinoe, Kostraede and Knudshoved Odde:
Ownership	
Documentation	SKOV- OG NATURSTYRELSEN, SLOTMARKEN 13, 2970 HOERSHOLM:
History	

Figure 2.4: Specimen of a descriptive sheet for a biotope in the CORINE inventory

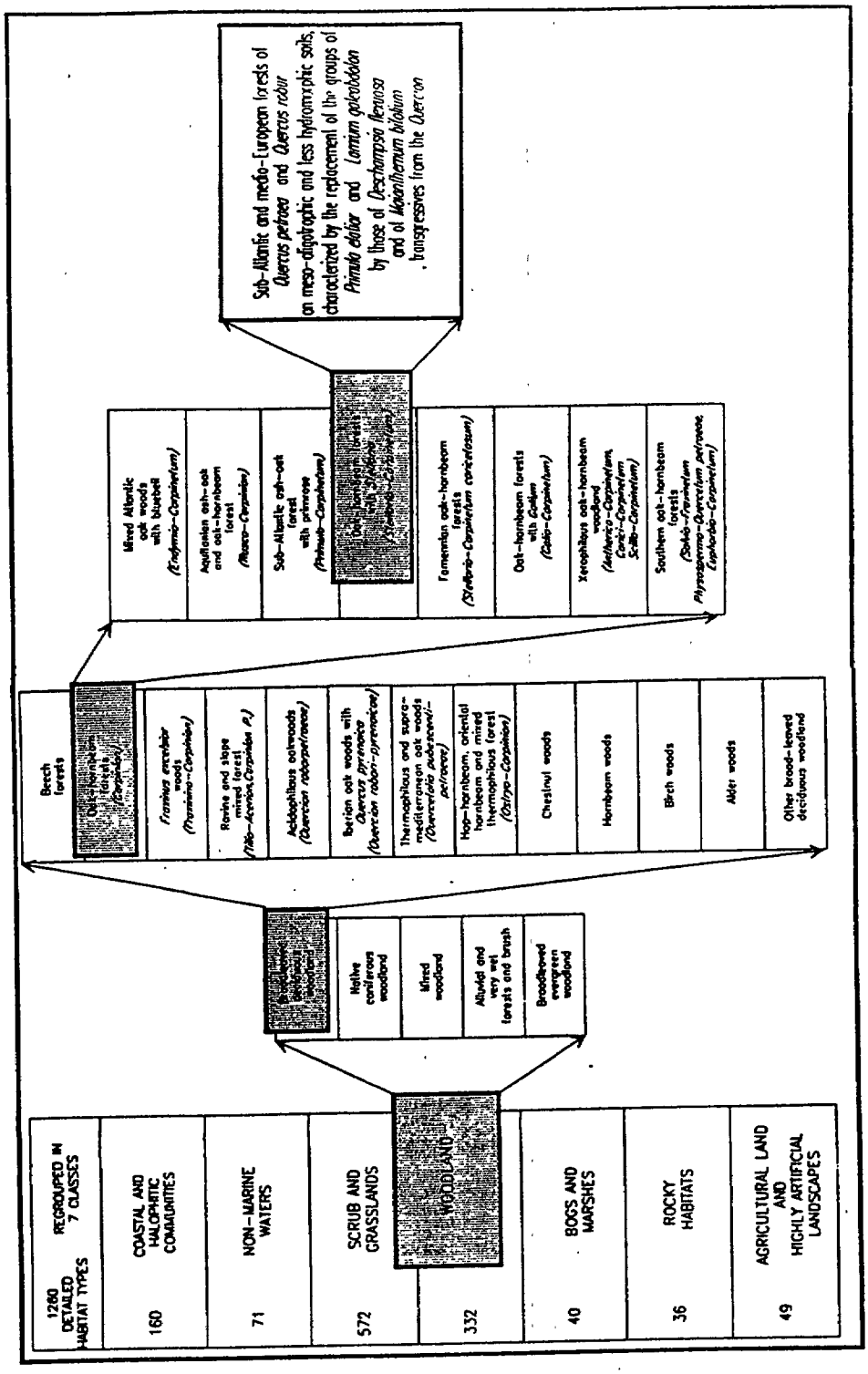


Figure 2.5: An extract from the European habitats nomenclature

Figure 2.6 shows the location and surface area of the major biotopes and of the areas designated by the Member States pursuant to the Directive on the protection of birds.

Due to the establishment of the CORINE biotopes inventory, national computerized data bases were also set up in a number of countries (Denmark, Germany, Belgium, Ireland, Portugal, Spain, Italy, Greece).

* * *

For more information see:

- Biotopes of major importance for nature conservation in the Community. Final report, technical manual and cartographic annexes (to be published).
- Atlas of biotopes of the Community (to be published).

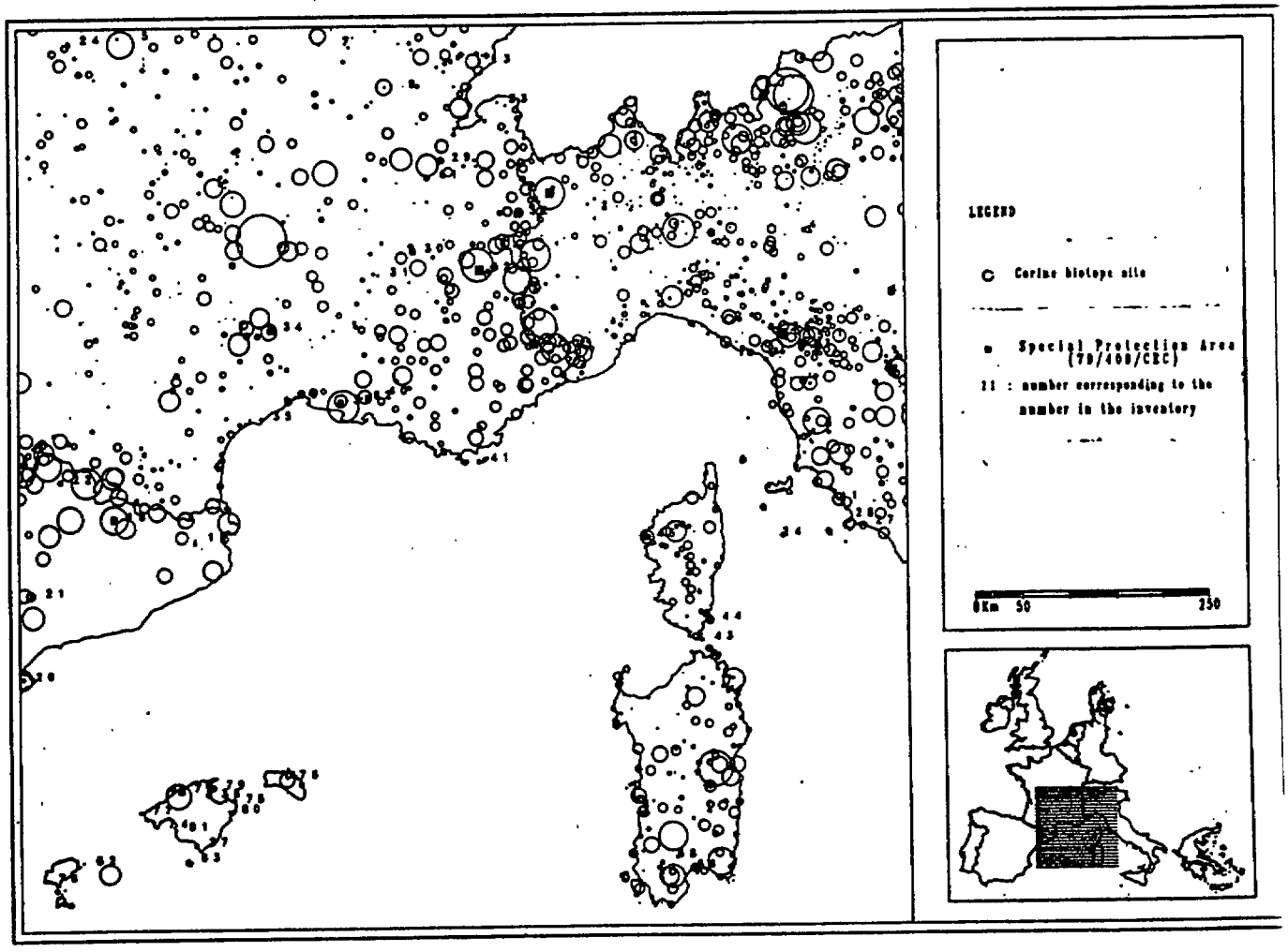


Figure 2.6a: Biotopes of importance for nature conservation and areas designated pursuant to the Directive on the protection of birds: S.E. France and N.W. Italy.

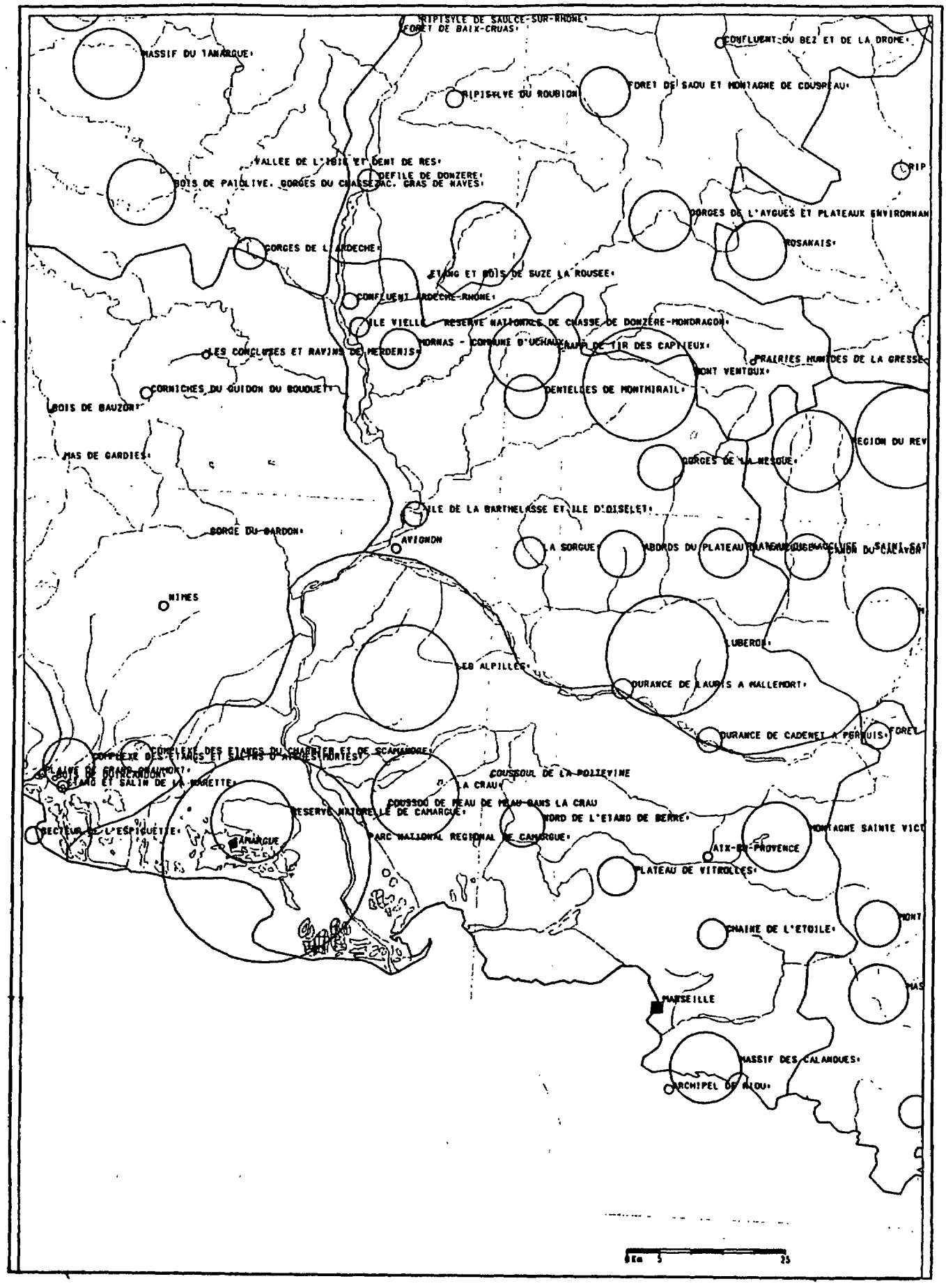


Figure 2.6b: Biotopes of importance for nature conservation and areas designated pursuant to the Directive on the protection of birds: Rhône and Vaucluse river mouths.

ATMOSPHERIC EMISSIONS INVENTORY: CORINAIR

COORDINATION

When the Council Decision on CORINE was adopted, there were several data collection campaigns in progress at international level (OECD, Economic Commission for Europe, PHOXA). In preparing the CORINAIR project the stress was therefore laid on analysing these activities and determining the relevance of their results for Community policy. It turned out that these various inventories were not consistent with each other and were insufficiently detailed for Community needs. The OECD's inventory provided the most appropriate methodological basis and formal cooperation was established (exchange of letters) in order to take advantage of the OECD's experience and develop a joint EEC-OECD method for CORINAIR. The exchange of information continued with the other partners at international level (ECE) with a view to a future inventory (1990).

Industrial (UNICE, CEFIC) and scientific (EUROTRAC, IIASA) bodies were also involved in the project.

CONSISTENCY

On the basis of past experience an improved method was developed for an emissions inventory. This is based in particular on:

- a new nomenclature (since the NACE did not meet environmental needs) (see figure 2.7);
- a manual of emission coefficients based broadly on the OECD and PHOXA results, but also introducing new developments;
- the use of a software specially developed for inputting data and calculating emissions. The data base is designed to ensure that the inventory is "transparent", i.e. that it is possible to check how each value was obtained (see figure 2.8).

COLLECTION

The CORINAIR data base provides figures on the quantities of three pollutants (SO_2, NO_x, VOC) discharged into the atmosphere in 1985. For each of the 470 statistical regions of the Community the contribution of the different emission sources (power stations, industry, transport, altogether more than 60 categories) was calculated. In addition, the emissions from more than 1400 major point sources were registered individually. Table 2.1 gives an overview of emissions by sector and country. Figure 2.9 shows that the spatial distribution of the emissions is very homogeneous in the Community.

The CORINAIR project has also contributed to the completion of the inventories begun by the OECD (base year 1980-82) and the Commission (1980-83).

For more information see:

. CORINAIR. Inventory of the emissions of pollutants into the atmosphere in the European Community in 1985. Final report, technical manual and cartographic annexes (to be published).

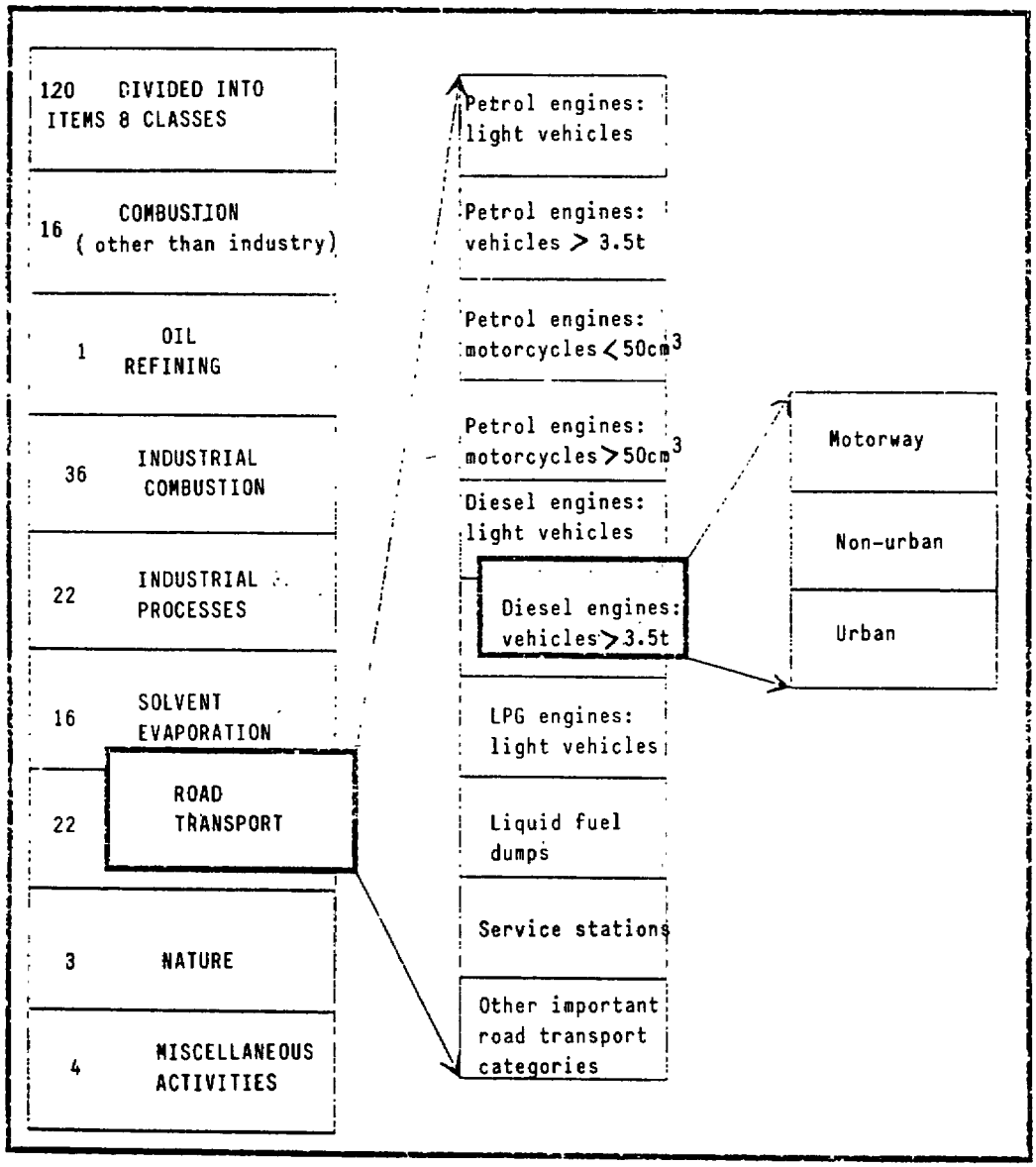


Figure 2.7 Extract from the nomenclature for CORINAIR activities

In 1985 the *département* of Upper Normandy emitted 172 868 tonnes of SO_2, of which:

(i) 124 769 tonnes/year from 14 large combustion plant;

(ii) 76 670 tonnes from the following non-specific sources:

- non-industrial burning	9 299 tonnes/year
- industrial burning	31 422 tonnes/year
- production processes	3 945 tonnes/year
- road transport	3 433 tonnes/year

Each of these totals was obtained on the basis of a knowledge of the activity and an emission coefficient. For example:

the SO_2 emissions from heating (part of the activity of non-industrial combustion) were obtained by the following calculation:

20 829 730 gigajoules/year x 187 g/gigajoule = 3 895 t/year

The way in which the results were obtained can therefore be checked for each region and for each category of emission source.

Figure 2.8: "Transparency", an important characteristic of the CORINAIR database: it is possible to check how a total is arrived at.

NOx emissions

EMISSIONS (TON/YEAR)	B	Dk	D	Gr	E	Fr	Ir	I	L	Nl	P	UK	EC
Combustion	64504	148642	833617	147837	265667	257920	35744	441960	2205	134764	13969	855083	3201911
Oil refinery	6177	1620	27528	3721	12964	18051	414	27085	0	19961	2227	40920	160688
Combustion industry	37109	12738	227323	8429	39507	124182	8184	115765	682	28258	10917	299874	912948
Production processes	28919	4759	141890	28170	67543	109660	5304	125748	8361	17214	12265	12510	560343
Solvent evaporation	0	0	0	0	0	0	0	0	0	0	0	0	0
Road transportation	182395	102830	1484617	120050	453531	1096037	36451	683366	10477	271036	56948	918168	5592104
Nature	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	317104	270589	2715175	308207	839232	1804830	85097	1573924	21725	471233	96325	2124553	10427994

EMISSIONS % Percentage by country	B	Dk	D	Gr	E	Fr	Ir	I	L	Nl	P	UK	EC
Combustion	20,3%	54,9%	30,7%	48,0%	31,7%	16,1%	42,0%	28,1%	10,1%	28,6%	14,5%	40,2%	30,7%
Oil refinery	1,9%	0,6%	1,0%	1,2%	1,5%	1,1%	0,5%	1,7%	0,0%	4,2%	2,3%	1,9%	1,5%
Combustion industry	11,7%	4,7%	8,4%	2,7%	4,7%	7,7%	9,6%	7,4%	3,1%	6,0%	11,3%	14,1%	8,8%
Production processes	9,5%	1,8%	5,2%	9,1%	8,0%	6,8%	6,2%	8,0%	38,5%	3,7%	12,7%	0,6%	5,4%
Solvent evaporation	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Road transportation	57,5%	38,0%	54,7%	39,0%	54,0%	68,2%	41,7%	54,9%	48,2%	57,5%	59,1%	43,1%	53,6%
Nature	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Miscellaneous	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Percentage of total	3,0%	2,6%	26,0%	3,0%	8,0%	15,4%	0,8%	15,1%	0,2%	4,5%	0,9%	20,4%	100,0%

SO2 emissions

EMISSIONS (TON/YEAR)	B	Dk	D	Gr	E	Fr	Ir	I	L	Nl	P	UK	EC
Combustion	188578	241387	1548609	373365	1899180	609694	79065	1185891	3810	71248	85945	2948527	9033297
Oil refinery	34522	3949	144637	27807	96929	223924	800	147547	0	81800	12900	121000	895415
Combustion industry	98993	61363	418203	81139	283345	444062	55412	549934	4610	14521	68918	558466	2616966
Production processes	54440	15703	149004	17830	63210	104587	1689	130535	8259	21119	23448	95766	685390
Solvent evaporation	0	0	0	0	0	0	0	0	0	0	0	0	0
Road transportation	15920	11184	59179	0	67274	99289	4377	75770	586	11070	6867	43480	394776
Nature	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	392451	333586	2315632	499741	2189938	1481556	141143	2089677	17265	199758	197878	3767239	13625864

EMISSIONS % Percentage by country	B	Dk	D	Gr	E	Fr	Ir	I	L	Nl	P	UK	EC
Combustion	48,1%	72,4%	66,8%	74,7%	77,6%	41,2%	56,0%	56,7%	22,1%	35,7%	43,4%	78,3%	66,3%
Oil refinery	8,8%	1,2%	6,2%	5,5%	4,4%	15,1%	0,4%	7,1%	0,0%	40,9%	6,5%	3,2%	6,6%
Combustion industry	25,2%	18,4%	18,0%	16,2%	12,0%	30,0%	39,3%	26,3%	26,7%	7,3%	34,8%	14,8%	19,2%
Production processes	13,9%	4,7%	6,4%	3,5%	2,9%	7,1%	1,2%	6,2%	47,8%	10,6%	11,8%	2,5%	5,0%
Solvent evaporation	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Road transportation	4,1%	3,3%	2,6%	0,0%	3,1%	6,7%	3,1%	3,6%	3,4%	5,5%	3,4%	1,2%	2,9%
Nature	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Miscellaneous	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Percentage of total	2,9%	2,4%	17,0%	3,7%	16,1%	10,9%	1,0%	15,3%	0,1%	1,5%	1,5%	27,6%	100,0%

VOC emissions

EMISSIONS (TON/YEAR)	B	Dk	D	Gr	E	Fr	Ir	I	L	Nl	P	UK	EC
Combustion	17782	14020	100457	1751	35847	189105	18621	48647	430	6513	637	89704	519514
Oil refinery	10729	3285	29446	6002	22324	31018	667	36405	0	11673	3596	31104	188247
Combustion industry	2815	1636	20862	541	2226	6609	568	5331	33	10284	658	56028	107390
Production processes	28583	1810	91041	4420	20620	99074	1080	44768	317	10878	16736	241737	526044
Solvent evaporation	82448	58468	1119657	27925	327055	457597	21102	396554	2681	163747	52149	666000	3357363
Road transportation	192528	96460	1186382	114568	489239	1188894	24300	989231	6248	216573	53235	791296	5328952
Nature	28069	7102	263788	195807	876191	423875	20817	221037	2586	13981	65000	79998	2188231
Miscellaneous	70748	25008	3089154	282550	367707	432388	24374	1203034	1752	0	7108	1984497	7428316
Total	433502	207788	5850867	613564	2141209	2775658	109689	2945007	14045	433649	199117	3922364	19846059

EMISSIONS % Percentage by country	B	Dk	D	Gr	E	Fr	Ir	I	L	Nl	P	UK	EC
Combustion	4,1%	6,7%	1,7%	0,3%	1,7%	6,8%	16,2%	1,6%	3,1%	1,5%	0,3%	2,3%	2,6%
Oil refinery	2,5%	1,6%	0,5%	1,0%	1,0%	1,1%	0,6%	1,3%	0,0%	2,7%	1,8%	0,8%	1,0%
Combustion industry	0,6%	0,8%	0,4%	0,1%	0,1%	0,2%	0,5%	0,2%	0,2%	2,4%	0,3%	1,4%	0,5%
Production processes	6,6%	0,9%	1,6%	0,7%	1,0%	2,4%	1,0%	1,5%	2,3%	2,5%	8,4%	6,2%	2,7%
Solvent evaporation	19,0%	28,1%	19,1%	4,6%	15,3%	16,5%	19,3%	13,5%	19,1%	37,8%	26,2%	17,0%	17,1%
Road transportation	44,4%	46,4%	19,9%	18,7%	22,8%	42,8%	22,2%	33,6%	44,5%	49,9%	26,7%	20,2%	27,1%
Nature	6,5%	3,4%	4,5%	31,9%	40,9%	15,3%	19,0%	7,5%	18,4%	3,2%	32,6%	2,0%	11,1%
Miscellaneous	16,3%	12,0%	52,8%	42,8%	17,2%	15,6%	22,2%	40,8%	12,5%	0,0%	3,6%	50,1%	37,4%
Percentage of total	2,2%	1,1%	29,5%	3,1%	10,9%	14,1%	0,6%	15,0%	0,1%	2,2%	1,0%	20,0%	100,0%

Table 2.1 Emission of atmospheric pollutants in the Community in 1985, by country and major source category.

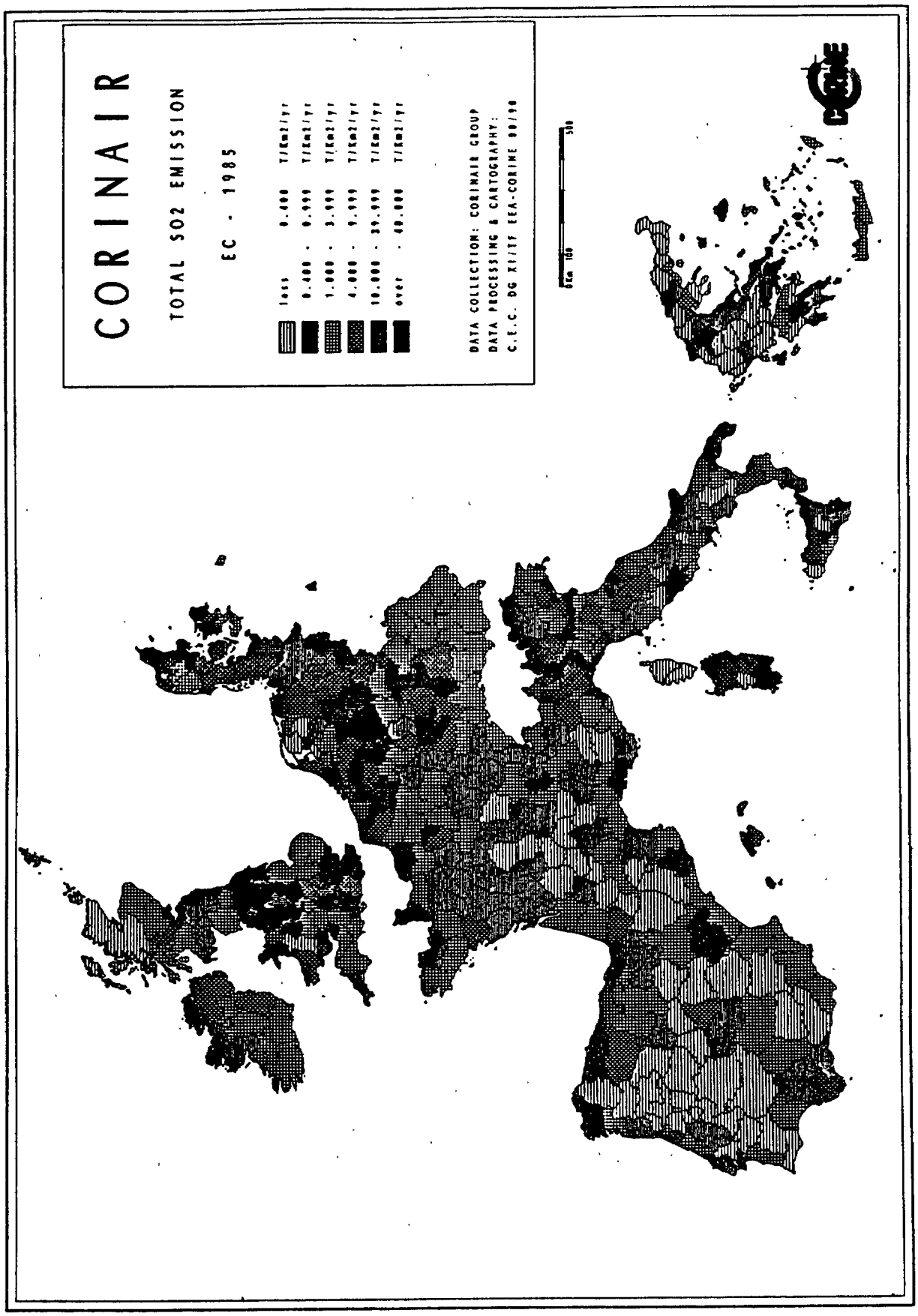


Figure 2.9a: Total annual emissions of SO_2 (1985)

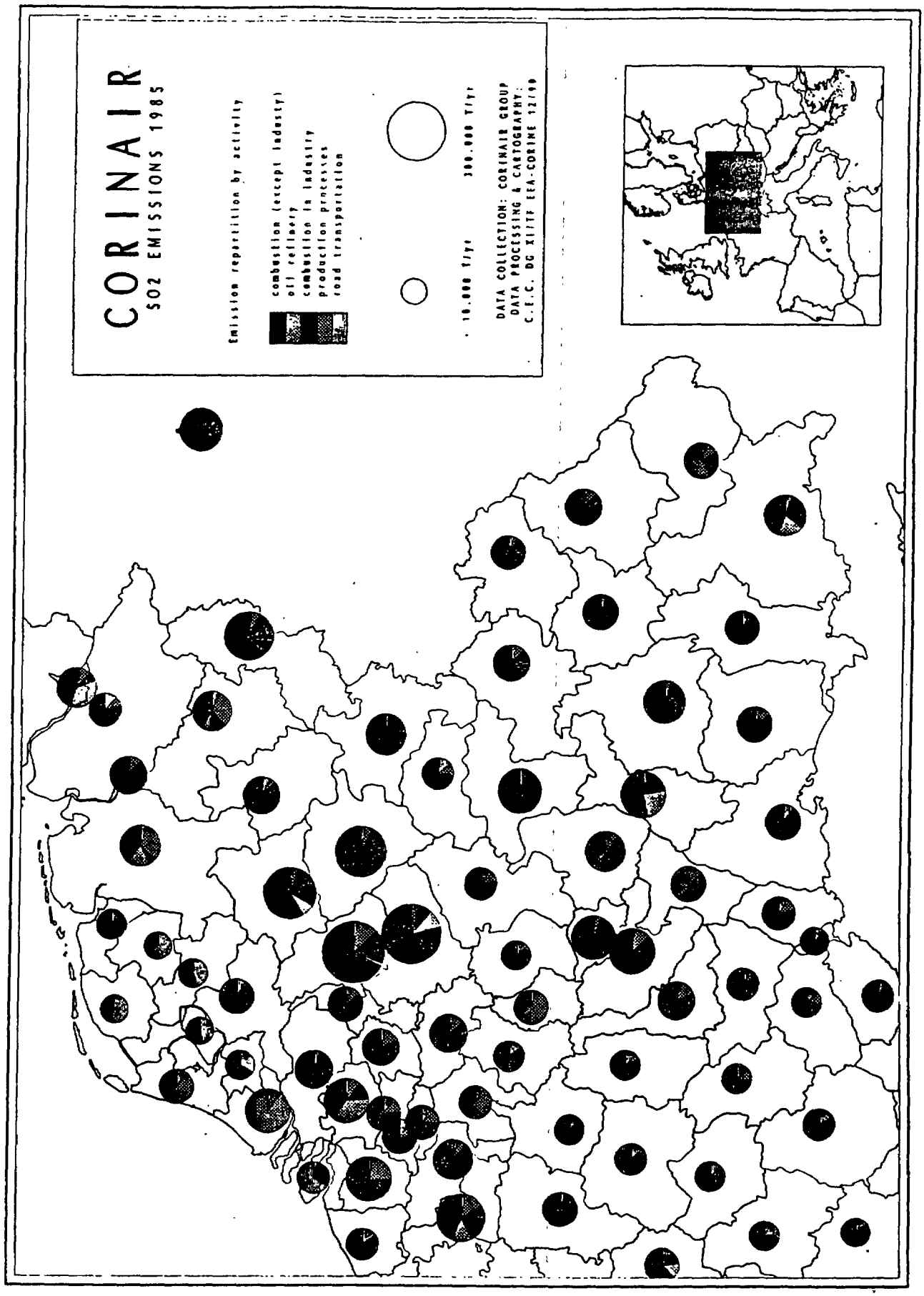


Figure 2.9b: Annual emissions of SO_2 (1985) by source categories for the Benelux and Germany.

ACID RAIN

Evaluation of the state of health of forests was carried out by DG VI under Council Regulation EEC/3528/86 (17.11.1986). CORINE assisted in determining the geographical location of the 1900 sample plots covering a total of almost 46 000 trees, and in producing cartographic results. In addition, the soil types data base was used for identifying the soils most vulnerable to acid rain (see figure 3.6).

STUDY ON AIR QUALITY IN THE BENELUX

DG XI carried out a pilot study to determine the feasibility of an air quality inventory in the Community. The results of the study were incorporated in the CORINE GIS. They contain data on the concentrations of SO_2 and lead and on black smoke. Figure 2.10 reveals two things in particular:

- the concentration of NO_2 is very close to the EEC limit in a number of towns;
- the spatial distribution of the measurement is very different in Belgium (concentrated in the population centres) and the Netherlands (spread more homogeneously over the territory).

On the basis of this study a pilot inventory was prepared for the whole of the Community, providing data on half a dozen parameters for more than 1 000 measurement stations in the Community.

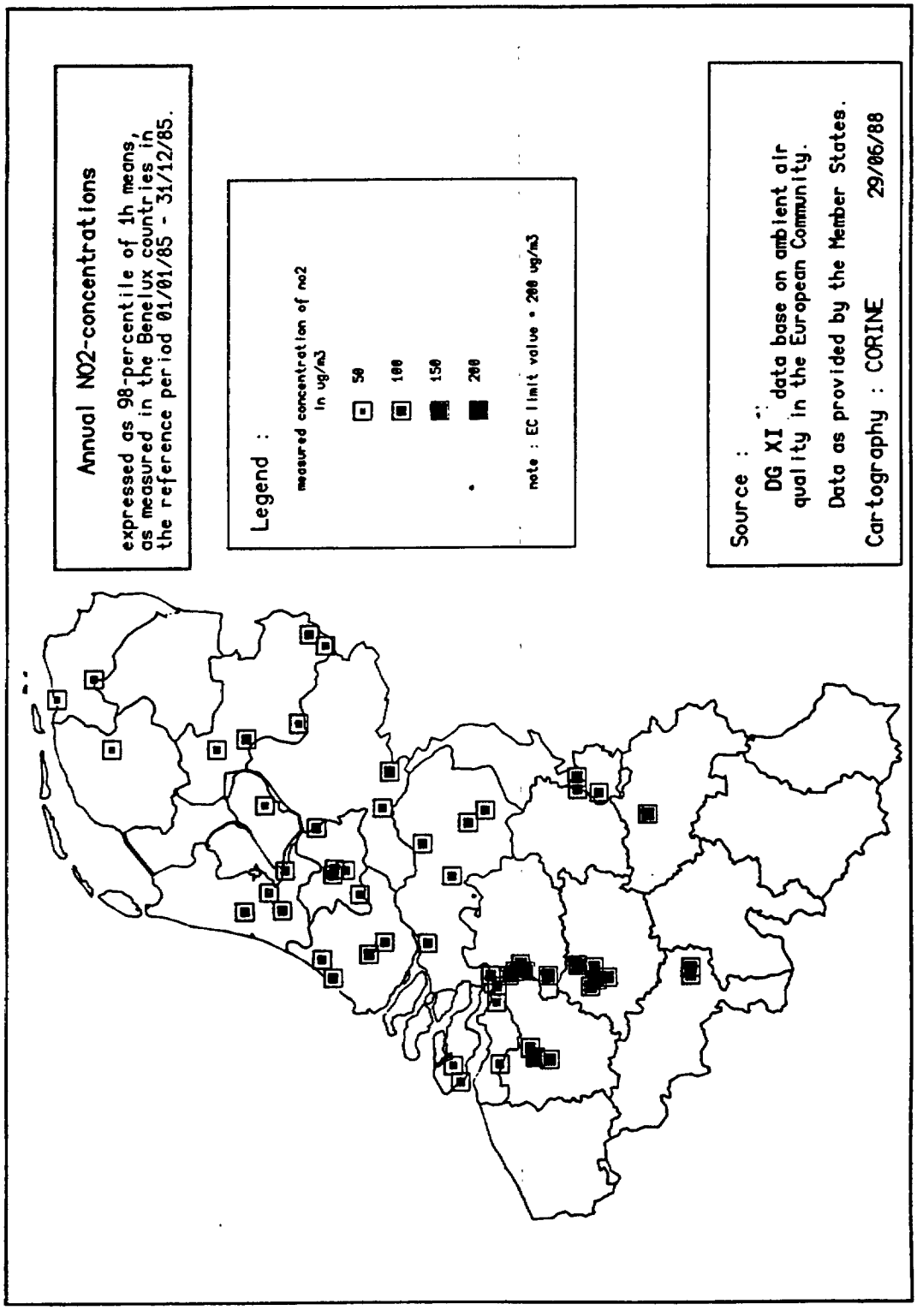


Figure 2.10: Air quality in the Benelux

INVENTORY OF BIOPHYSICAL OCCUPATION OF THE LAND: LAND COVER

COORDINATION

Two characteristics of the project, namely the nature of the information and the scale, make coordination even more necessary than in the other CORINE projects.

(i) The occupation of the land concerns not only environmental policy, but also policies like agriculture, land use, regional development and research. Inter-disciplinary and inter-ministerial cooperation has therefore been set up to monitor the projects in the different countries.

(ii) Owing to the almost universal lack of information on this subject in the Member States it was not possible - as was done for the other CORINE projects - to put together the synthesis of information useful at the Community level on the basis of the available data. It was necessary to collect the detailed data (scale 1:100 000). The product that resulted, the CORINE Land Cover digital data base, is therefore useful at the regional, national and Community levels at the same time. Experts and representatives of the administrations at all three levels were involved in carrying out the project.

At the Commission level, several DGs are closely monitoring or actively participating in the work: DG Regional Policy (co-financing); JRC (development of an updating method); DG Social Policy (training seminar under the COMETT programme); Eurostat and DG VI (joint organization of an international seminar).

CONSISTENCY

A nomenclature has been developed for describing the occupation of the land from the environmental angle. It is broadly compatible with the international land use nomenclature adopted by the ECE in Geneva. The CORINE Land Cover nomenclature has a hierarchical structure which makes it possible to detail certain level 3 items to satisfy national or regional needs. The nomenclature has thus been supplemented to meet the specifically national needs in Europe (see figure 2.11).

Maintaining consistency in the application of the Land Cover method (see figure 2.12) and particularly in the interpretation of the satellite photographs posed a problem far more complex than for the other CORINE projects. The working parties are much more numerous (e.g. in Spain there are six regional teams of 3 to 4 members working in parallel). A guide to the CORINE Land Cover method was therefore made available to the work teams. Experience quickly showed that this was not enough and that it was vital to hold frequent technical meetings with the European project leader and his team, and likewise between the national coordinators and the regional teams, in order to ensure consistency in the production of the results. This procedure also makes it possible gradually to build on the experience gained by solving problems of interpretation specific to certain regions or types of environment.

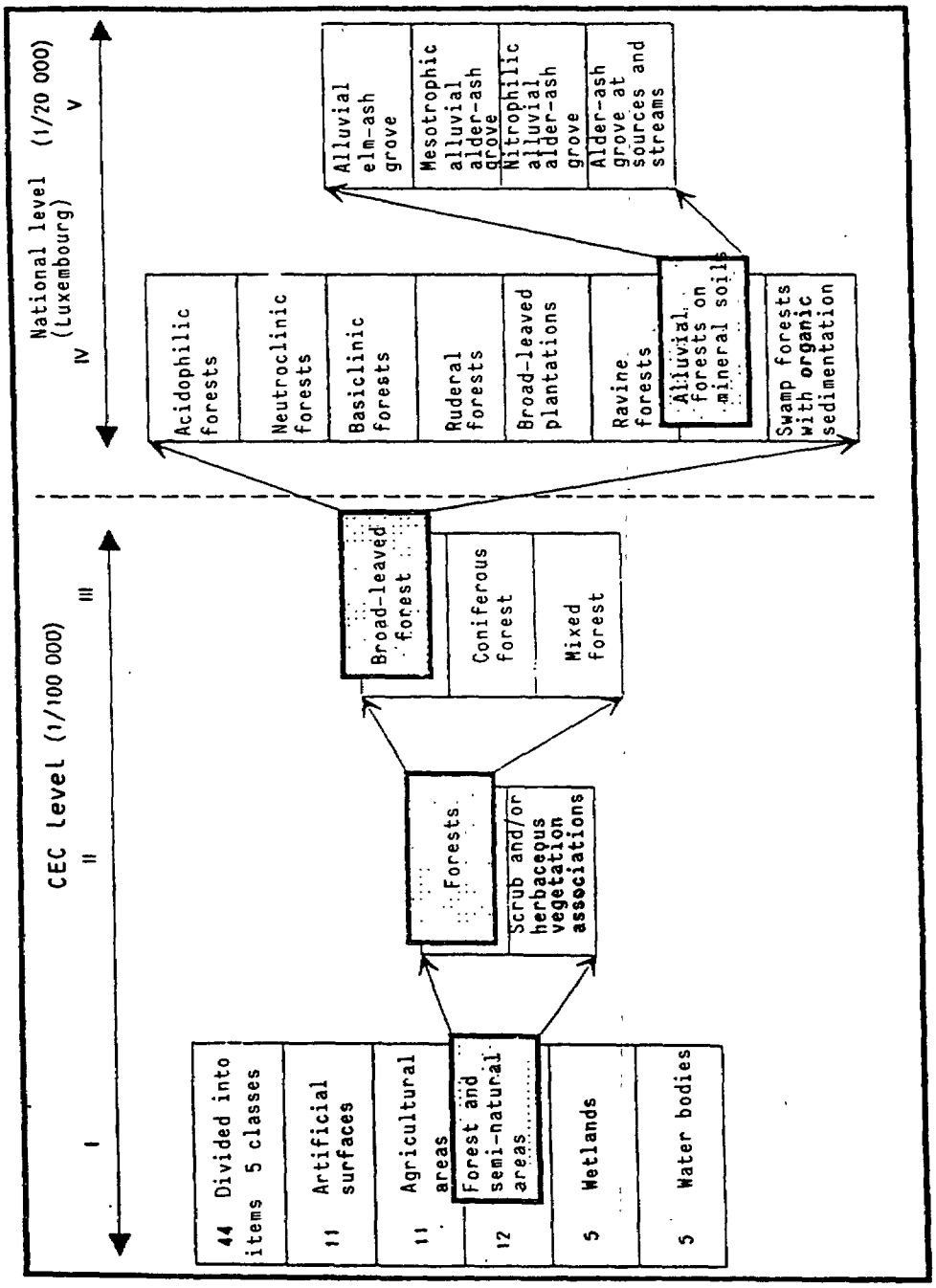


Figure 2.11: Extract from the CORINE Land Cover nomenclature and example of compatible addition to meet national/regional requirements.

COLLECTION

The project consists in mapping land cover in accordance with a nomenclature with 44 items, using satellite photos and other documents, at a scale of 1:100 000 or 1500 map boards for the whole of the Community. Figure 2.13 gives a simplified illustration of the content of the Land Cover data base.

The computerized data base was assembled by digitizing draft maps.

By the end of 1990 progress with the project (see figure 2.14) was as follows:

- data bases completed: Portugal, Luxembourg
- interpretation completed: 80% Spain, 30% France, 50% Netherlands
- work in hand: Greece, Italy, Denmark, Tunisia
- work teams set up: Germany, Belgium, Algeria, Morocco

* * *

For more information see:

. CORINE Land Cover. Final report, manual and cartographic annexes (to be published).

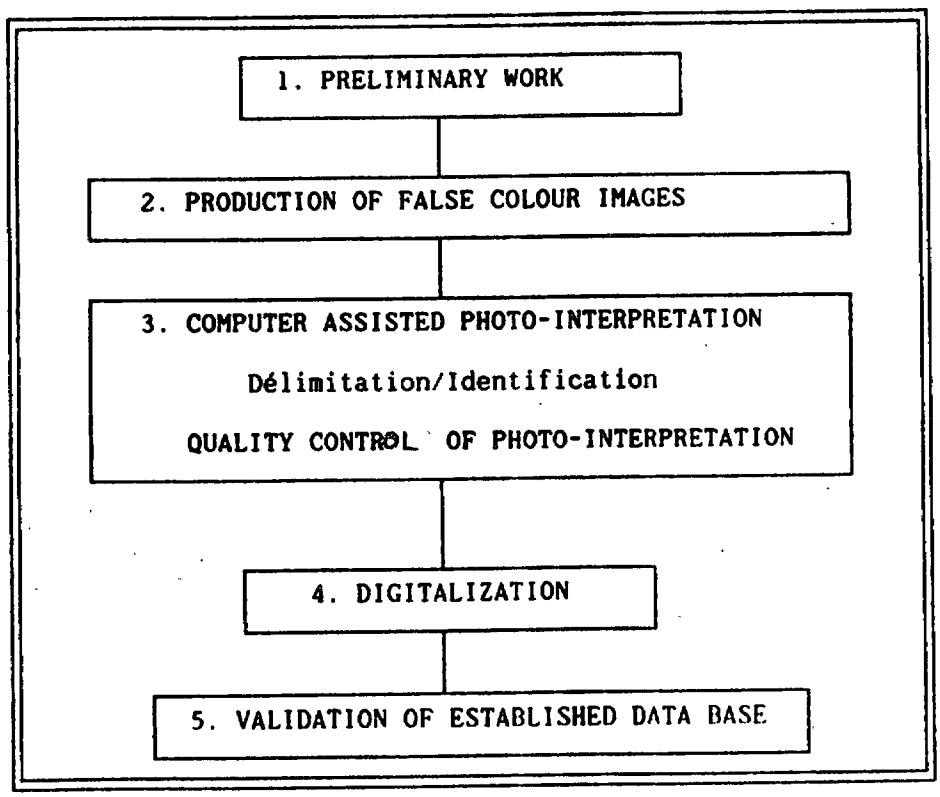


Figure 2.12: Schematic of the CORINE Land Cover method

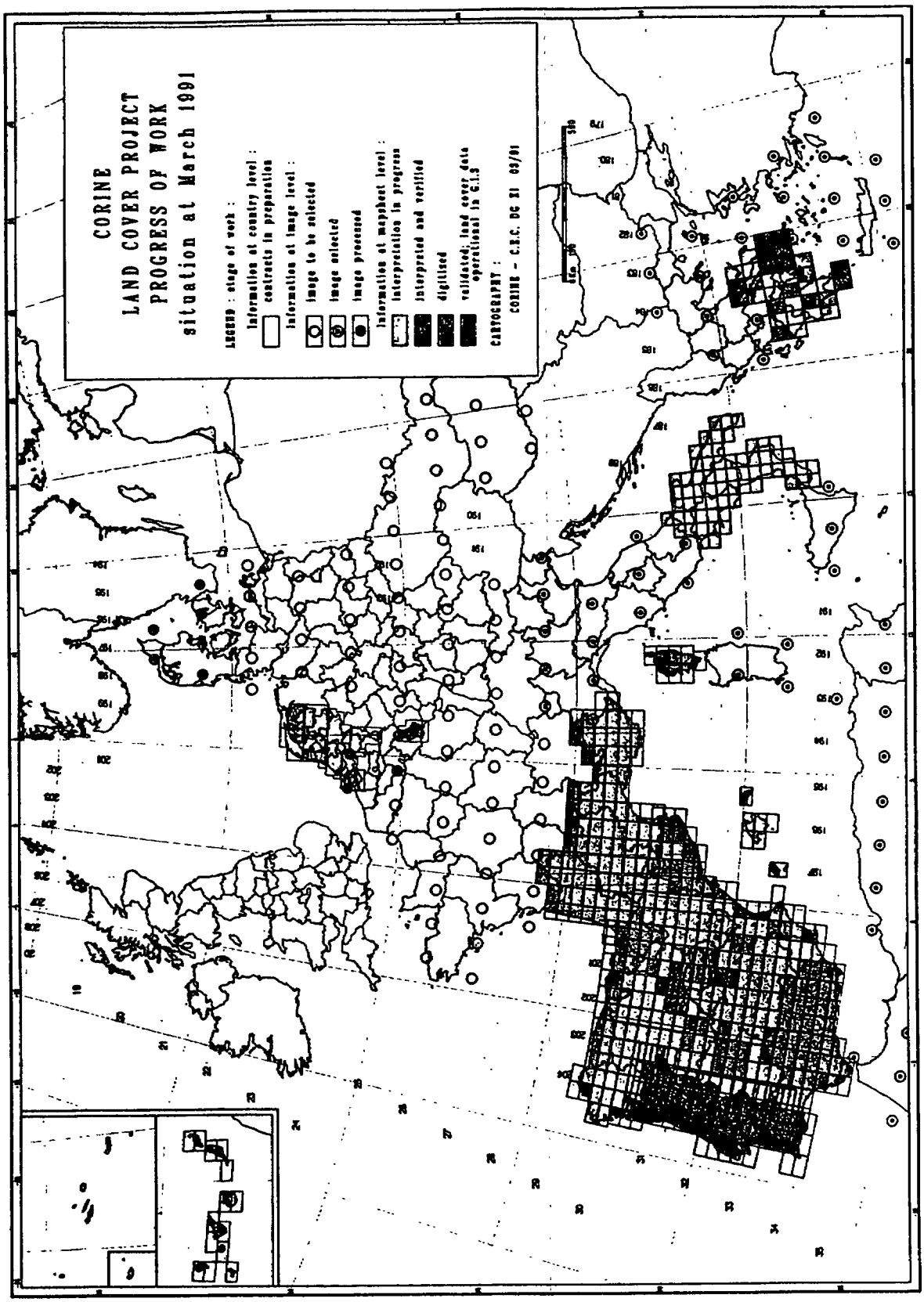


Figure 2.13: State of progress of the CORINE Land Cover project at the end of 1990

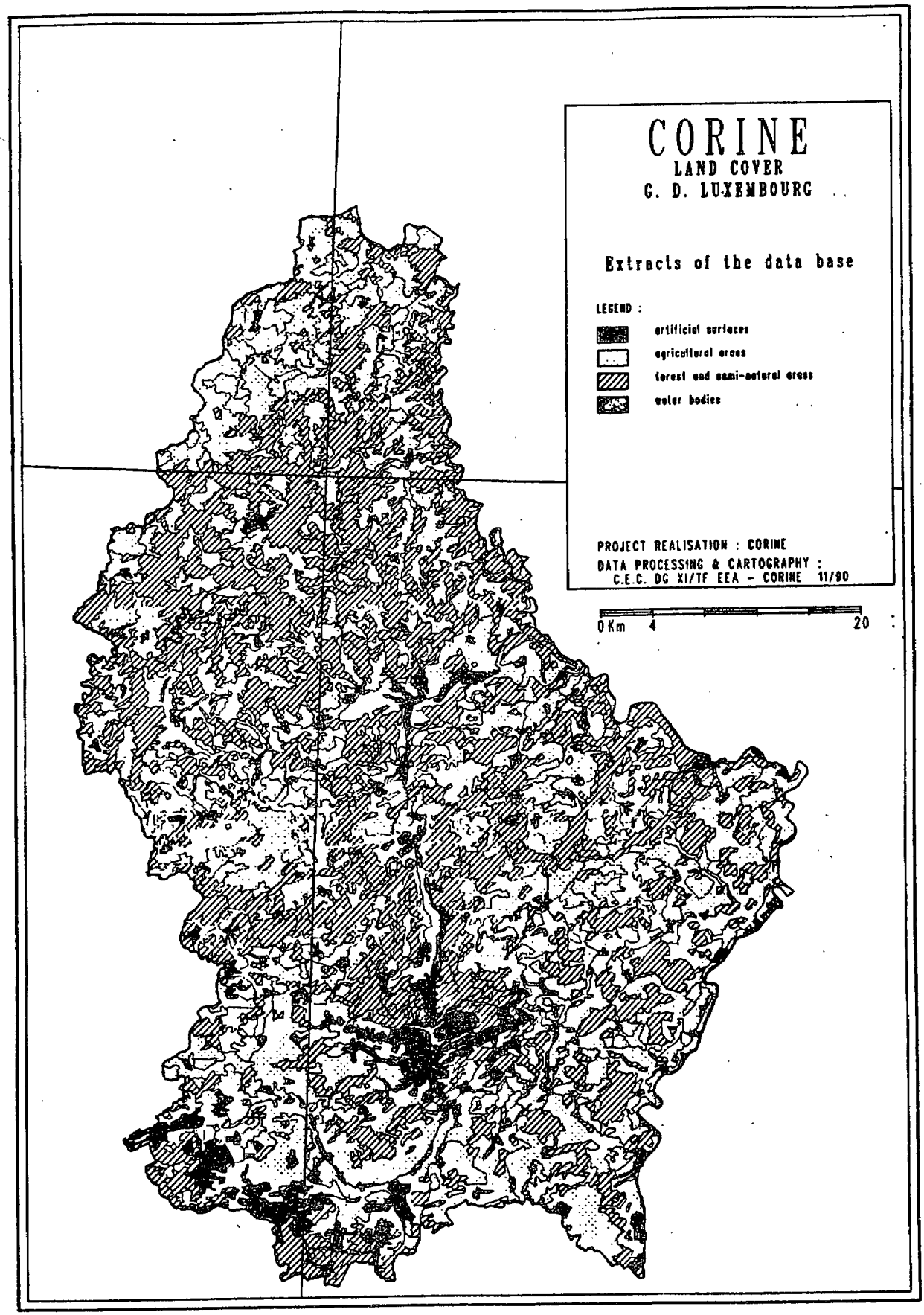


Figure 2.14: Biophysical occupation of the territory of Luxembourg. The black and white representation and the small scale allow only the general level of the nomenclature to be represented. The table opposite gives the results for all the items in the nomenclature.

Artificial surfaces	Km²
. Continuous urban fabric	12,92
. Discontinuous urban fabric	140,94
. Industrial or commercial units	21,40
. Road and rail networks and associated land	1,32
. Airports	3,7
. Mineral extraction sites	2,33
. Dump sites	6,71
. Construction sites	0,4
. Sport and leisure facilities	1,16
Agricultural areas	
. Non-irrigated arable land	286,23
. Vineyards	21,68
. Fruit trees and berry plantations	0,9
. Pastures	217,24
. Annual crops associated with permanent crops	16,96
. Complex cultivation patterns	623,22
. Land principally occupied by agriculture, with significant areas of natural vegetation	266,64
Forest and semi-natural areas	
. Broad-leaved forest	352,24
. Coniferous forest	95,82
. Mixed forest	513,07
. Natural grasslands	5,54
. Sclerophyllous vegetation	1,33
. Transitional woodland-scrub	0,77
Water bodies	
. Water courses	6,09
. Water bodies	4,18
Total km²	2602,79

Table 2.2: CORINE Land Cover nomenclature applied to the Grand Duchy of Luxembourg

SOIL EROSION RISK - IMPORTANT LAND RESOURCES

COORDINATION

The work benefited from active assistance from DG VI's Land Use committee. Collaboration also developed with DG VI, DG XII and the Ispra JRC for using climate and soil data in agro-meteorological models.

In some cases the work was extended on a national basis, notably in Italy and Greece.

CONSISTENCY

The methodology developed was based on the results of work carried out by the FAO and DG VI.

COLLECTION

To evaluate the soil erosion risk and the quality of the land, four types of data were combined: climate, slopes, vegetation cover, types of soil. Pending the results of the Land Cover project, the "vegetation cover" factor was reduced to a distinction between the presence or absence of vegetation.

A data base was set up by digitizing the Community soil map (320 types of soil) at a scale of 1:1 000 000.

All of these components were assembled to obtain:

- a data base on the potential and actual soil erosion risk in the Southern regions of the Community, classifying some 180 000 homogeneous zones into three risk categories;

- a data base on the importance of land resources, classifying some 170 000 zones into three quality levels.

Figure 2.15 shows the result obtained for potential erosion risk for a particular area of the Community

* * *

For more information see:

. Evaluation of soil erosion risk and of the importance of land resources. Final report and cartographic annexes (to be published)
. Soil map of the European Community 1:1 000 000, Office for Official Publications of the European Communities, Luxembourg - ISBN 92-825-4220-3 and 92-825-5427-9

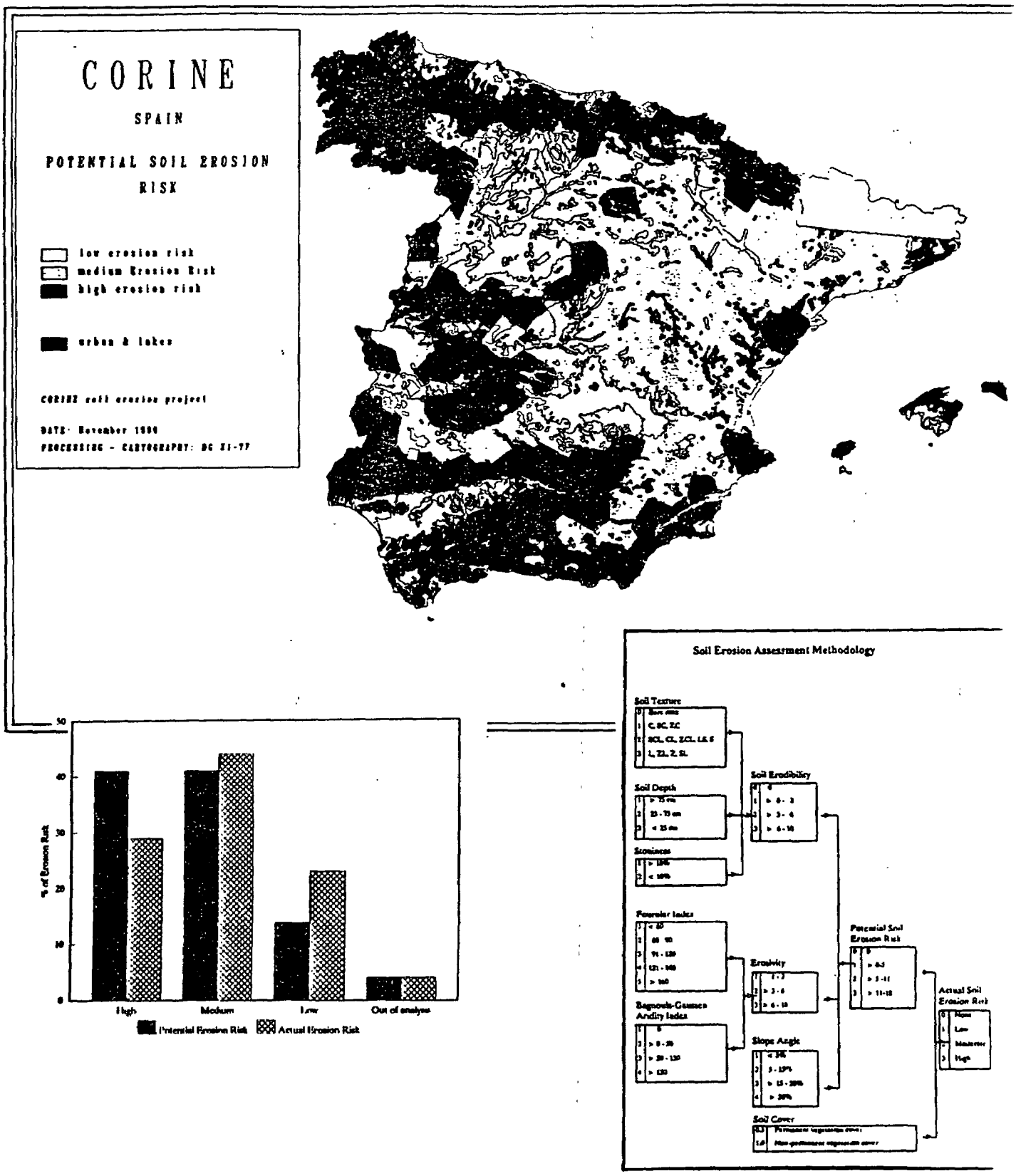


Figure 2.15: Combined data for the evaluation of potential soil erosion risk and result for Spain.

WATER RESOURCES

COORDINATION

In all of the countries studied, the data on water resources are held by different bodies, often according to the use to which the resource is put (drinking water, navigation, irrigation, bathing water, etc.). The bodies holding the data may have national or regional responsibilities. The need for, and the possibilities of, cooperation have therefore been given particular attention in the project in order to identify the conditions for setting up a European network of data bases.

CONSISTENCY

The definitions of the parameters to be collected were taken from Community legal texts adopted or in preparation or, otherwise, from nomenclatures adopted at international level.

COLLECTION

Unlike in the other CORINE projects, the stress was laid less on data collection than on the development of a methodology for setting up a Community data base on water resources, capable of supplying the information necessary for the environmental policy.

The development of this methodology was based on:

- the creation of a digital data file on water course flow rates in the Southern regions of the Community (12 parameters recorded for 1 061 measuring stations);
- a pilot water quality mapping system based on a harmonized methodology for three countries (Portugal, Spain, France; 5 quality classes);
- a set of regional tests (see figure 2.16) which made it possible to check the availability and the means of obtaining data corresponding to the parameters of the proposed methodology.

* * *

For more information see:

. CORINEAU. Final report (to be published)

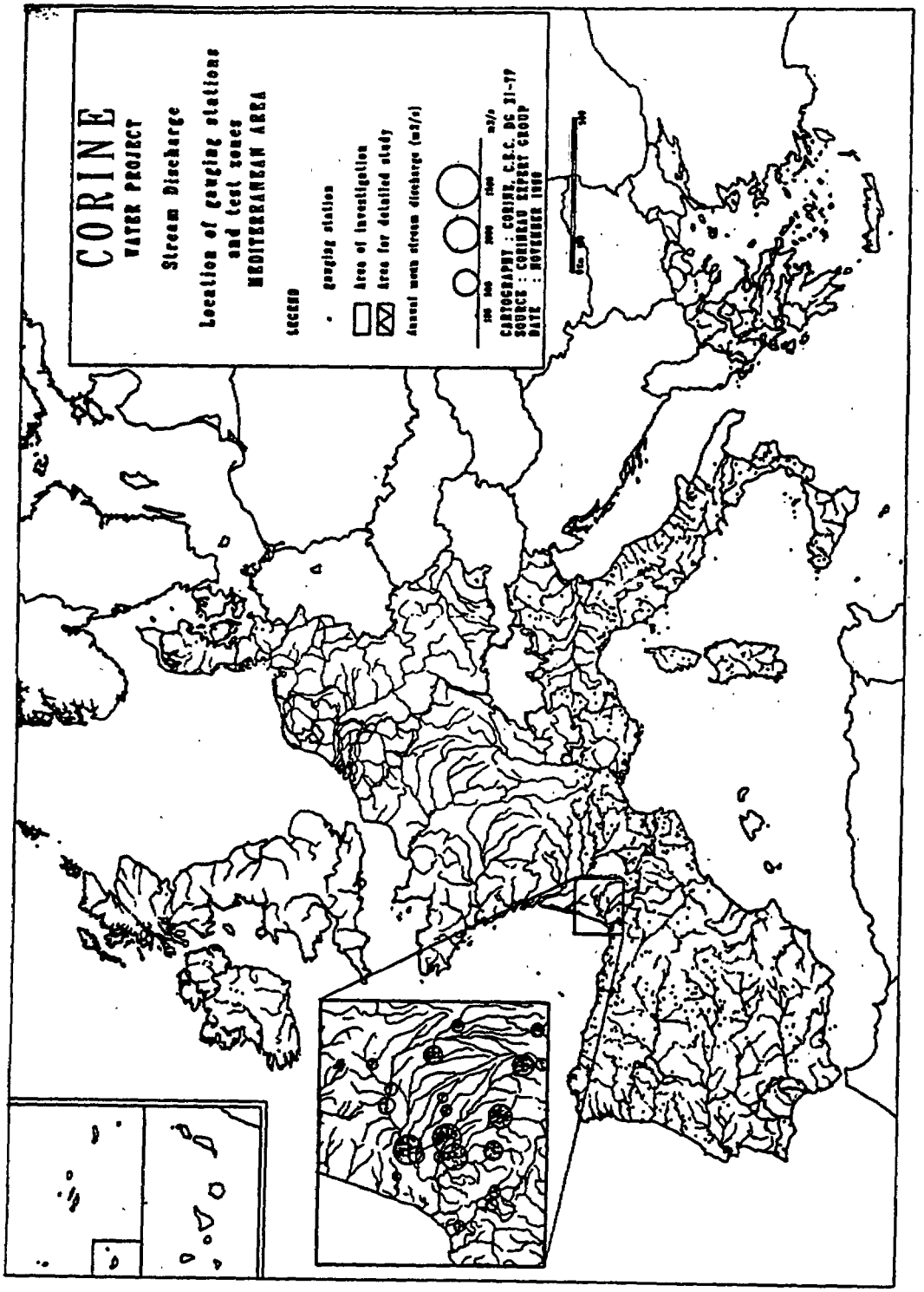


Figure 2.16: Location of measuring stations and test zones for setting up a Community water resources data base.

COASTAL EROSION RISK

COORDINATION

The membership of the working party was taken from the IGU's network of experts. Information was exchanged with the relevant committees of UNESCO and the Mediterranean Action Plan (MAP).

CONSISTENCY

The working party prepared a simplified European nomenclature and a method for describing and evaluating the risk of coastal erosion.

Encoding of the data was standardized.

COLLECTION

A data base was set up detailing the Community coasts in about 17 500 coastal segments, each being described and evaluated from the point of view of:

- its morpho-sedimentological characteristics (rocks, cliffs, beaches, waddens, vegetated foreshores);
- the erosion risk (stable; in erosion; in accretion; in probable erosion; in probable accretion).

The data was collected on a scale of 1:100 000. Using this data base simplified smaller-scale maps or statistical analyses can be produced (see example in Figure 2.17).

* * *

For more information see:

. Evaluation of the coastal erosion risk on the European Community's coasts. Final report (to be published).

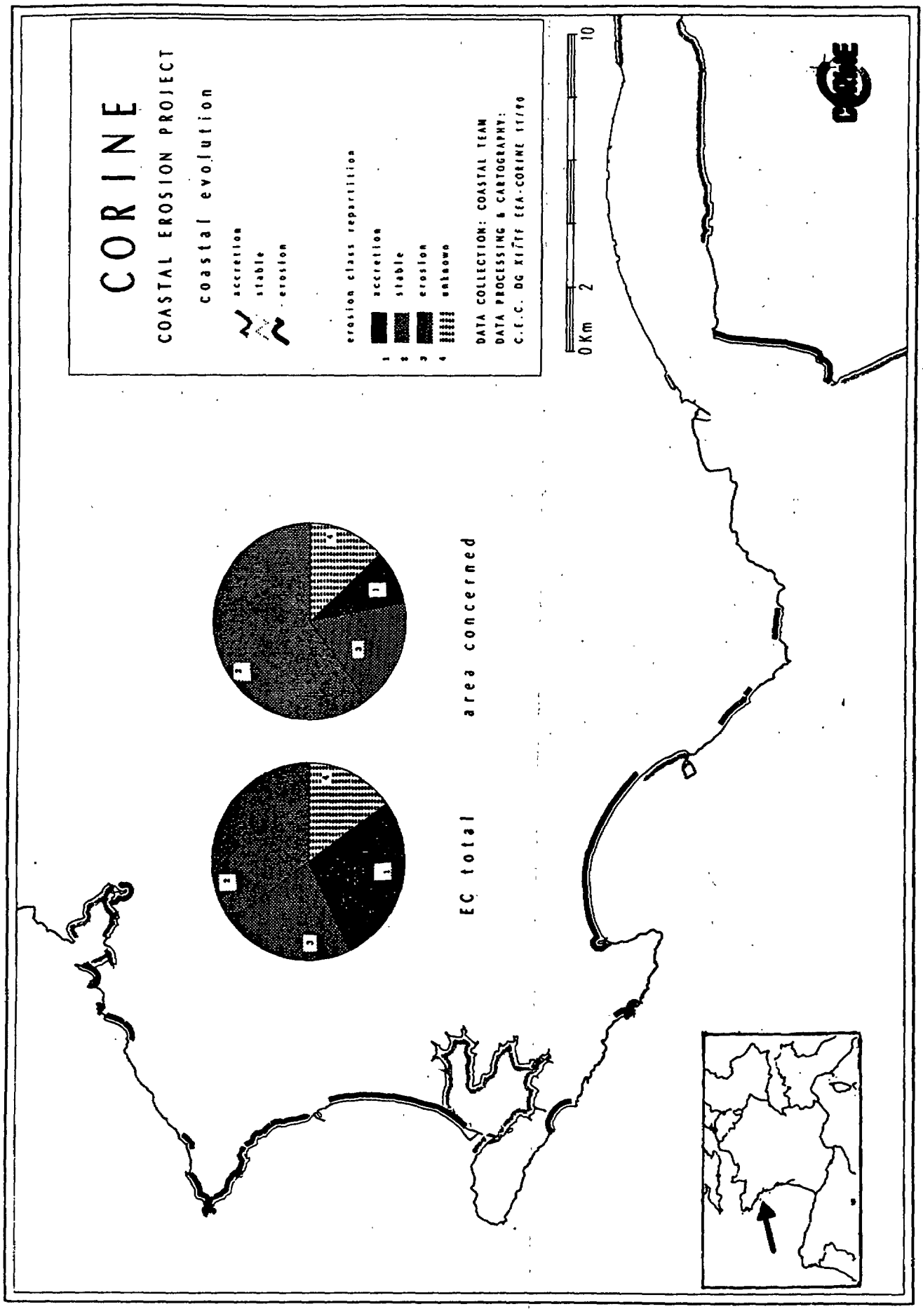


Figure 2.17: Evolution of the European Community's coasts: the Northern shore of the Loire estuary.

2.1.4. Data on human activities

Human activities (production of energy, agriculture, industrial production, leisure, transportation, etc.) exert pressure on the environment. It is therefore essential to have information on these activities (on this see point 2.2.2).

Other than for emissions into the air, the CORINE programme did not provide for any data collection in this area. This is the purpose of the statistical programme of the European Communities[1] which includes a programme aimed at developing the regular official statistics on the environment, on the basis of which the Commission presented to the Council a proposal for a Council decision.[2]

Data compilation efforts were therefore limited to incorporating in the CORINE system directly available data for the whole of the Community:

- Eurostat's REGIO data base, comprising sets of statistics in eight areas, i.e.:

  DEMO: Demographic statistics
  ECON: Economic accounts
  CHOM: Unemployment
  EFDT: Community manpower survey
  INDU: Industrial statistics
  AGRI: Agricultural statistics
  TRAN: Transport statistics
  FINA: Community investment support

- a data file on air traffic (see figure 2.18).

1 OJ No C 161, 28.6.1989.
2 Proposal for a Council decision - OJ C 209, 22.8.1990.

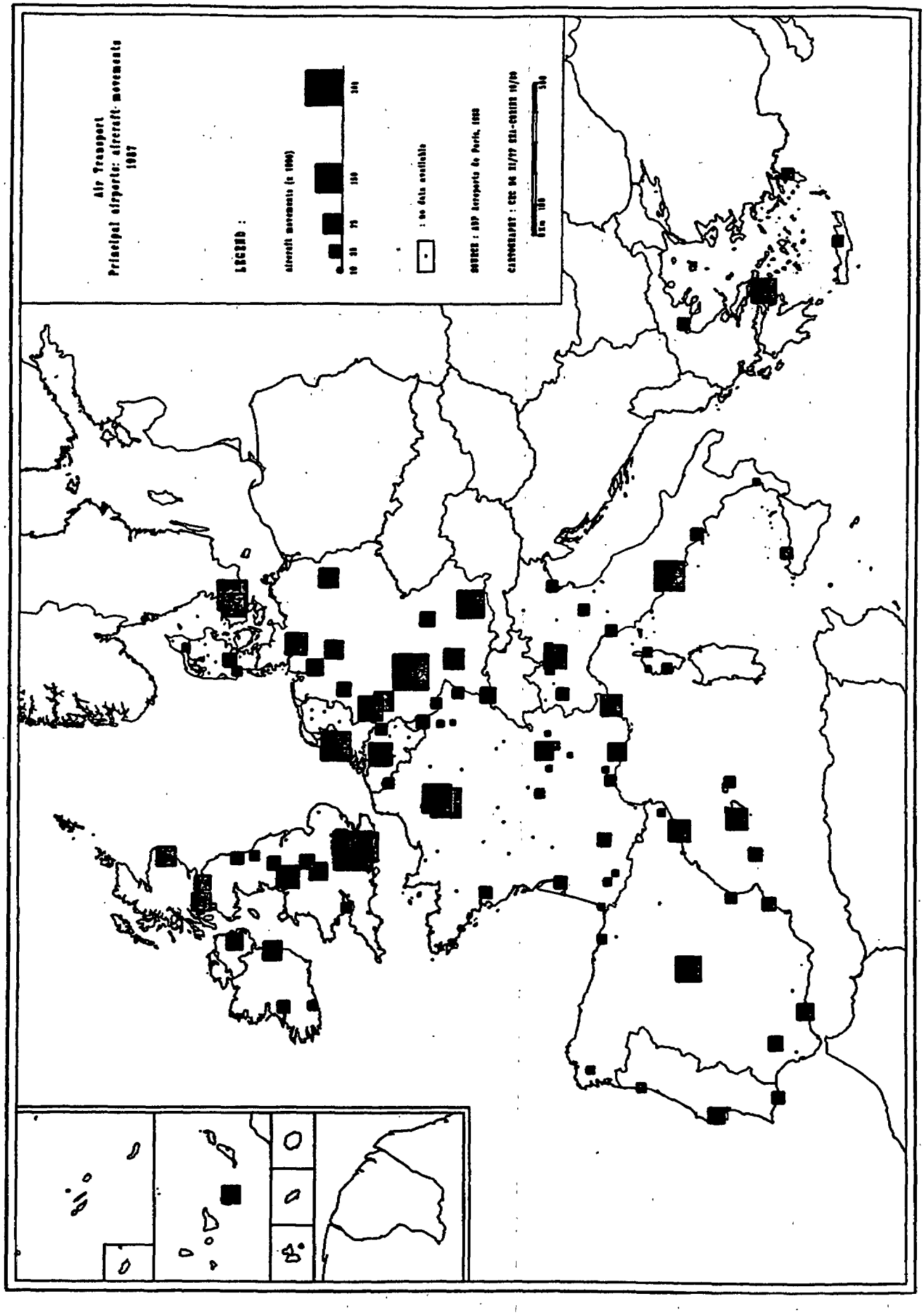


Figure 2.18: Volume of air traffic in the Community's airports.

2.2 Availability and comparability of environmental data

In parallel to the projects described above, which provided the components of the CORINE experimental information system, a series of studies and other work were carried out which brought additional information on the conditions of operation of a final and permanent system, as well as on the information to be included in such a system.

Common to all this work is the question of availability and comparability of data.

2.2.1 The "information on the information"

The Council Decision (85/338/EEC) and the Resolution of the European Parliament and the Opinion of the Economic and Social Committee underline the importance of:

- knowing what activities are in progress or planned with regard to data collection or research;
- knowing where and in what form the data on the state of the environment can be found;
- having a "common language", which may if necessary involve the adoption of definitions and nomenclatures at Community level.

These guidelines were systematically taken into account in carrying out the priority thematic projects described in 2.2. In addition, three catalogues were prepared.

(i) CATALOGUE OF DATA SOURCES

One of the essential conditions for being able to prepare consistent information on the European environment is to have quick access to the data produced and held by a considerable number of organizations dispersed through the Community and elsewhere. This is the type of question that comes up:

"Where can I find sets of data on the pollution of the Rhine in Alsace for 1988? What data are available and how can I gain access to them?"

A prototype for a computerized catalogue was developed by testing various possible solutions by an iterative method. The work proved to be very complicated, from three points of view:

- how to describe the information content appropriately in order to go beyond the generality of the usual lists without going too far the other way?

- what software to choose?

- how to ensure that the catalogue is updated?

The data kept in the CORINE system are those which have to be frequently used in the framework of Community environment policy. The CORINE data therefore represent only a very small proportion of all the data available. For the requirements of environment policy, it is sometimes necessary to be able to use the data held in the Member States at national, regional and local level. Another tool is therefore necessary in addition to the CORINE GIS: the data source catalogue (DSC).

This tool is made up of:

1. A coding system

The traditional documentary tools are used: forms, thesauri, manuals, documentary data bases on portable PCs, etc. UNESCO's ISIS software, which is available free of charge, has been programmed for this and can therefore be put to widespread use. It offers numerous possibilities of local cataloguing on PC, including the publication of paper printouts in various layouts and forms of internal management of the Thesaurus.

2. A system of access to and dissemination of the information, comprising:

. a computerized catalogue that can be queried on-line by telecommunication;
. an access port to more than 100 public data banks accessible by telecommunication;
. an electronic mail system.

The catalogue:

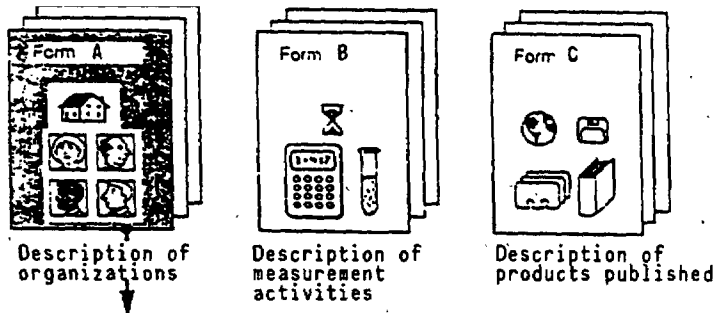
The DSC has to be able to provide information on the data producers, their distribution channels, the measurement and processing activities, the maps, the data bases, the documents, etc. After different ways had been tried out for describing these many different characteristics, a three-part catalogue was adopted:

- A: the bodies producing and/or distributing the data;
- B: the activities for measuring the various environmental parameters;
- C: products that can be distributed, such as maps, data bases, documents, photographs, etc.

Each of these three parts has a corresponding form (figure 2.19), the structure of which is simple and flexible. There are very few fields (maximum 25 per form) and these are defined in such a way as to allow a large variety of organizations, activities and products to be described. More detailed descriptions, (measurement units, frequency of issue, information storage media, etc.) are written in plain text, there is no restriction on field length and the search can be made on each of the words used (all the fields can be indexed). The three forms are independent, i.e., each part of the catalogue gives its own initial reply to the questions put. For example, by consulting part 1 (organizations), the user can identify the data available. If he wants more details on measurement activities, he will consult part B, possibly making use of parts of the replies obtained from part A. If he also wants information on distributable products and their conditions of access, he will then consult part C. The order is not important and depends on the type of question put. There are not *a priori* any relational links between the forms but links can be set up.

Access port to other in-line data banks:

The interface also allows easy consultation of about 50 other environmental data bases connected on the networks, including, for example, catalogues from earth observation satellites. Brief documentation is provided for each data base. The user is therefore informed as to what he can find there and how he should carry out his consultation.



Form A

- Documentary references
- Organization's identity card
- Characteristics of the organization
- Description of field of activity

Objectives and structure

Organizing and coordinating activities to collect data on surface and underground water resources and to protect aquatic environments. Carrying out and coordinating specific studies and studies on the water regime and quality (management of hydrometric and piezometric networks; water sampling and quality analysis by the water chemistry and hydrobiology laboratory of the SRAE). Studies of Alsatian rivers.

MDS key words	Own key words	Geographical area covered
data recording, processing and storage; water resources; groundwater, surface water; nature protection; aquatic fauna	IPEE; Rhine	Alsace region (Upper Rhine), département of the Upper and Lower Rhine (2421, 2422)

Comments and additional notes:

The following types of data are involved: statistical and numerical data - recorded charts - files and maps relating to the flow rates and qualities of surface waters, the levels and qualities of the waters of the ground water reservoir of the Alsatian plain - data accessible by correspondence.
Publication and accessibility: the SRAE is willing to place data at the disposal of the INFORHIN system, while pointing out that they have to be accessible via the HYDRO bank (run by the Ministry of Agriculture), the Rhine-Meuse Water Board basin bank and the SGAL/BRGM water regional bank.
Unfortunately, there is only one measurement station listed in the HYDRO bank for the Rhine (Pont de l'Europe in Strasbourg) and it should be added that the data for this site has not been updated since 1973.

Figure 2.19: Structure of forms for encoding the data.

Electronic mail

To encourage communication between those responsible for the management of the environment and to formulate comments on the contents of the catalogue during a working meeting (updating of addresses, for example), the system makes it possible to exchange messages and to ask questions using an electronic mailbox.

Catalogue consultation interface

The catalogue can be consulted using any conventional terminal fitted with a modem, the communication language being CCL (Common Command Language), a very widely used standard, the result of a DG XIII initiative.

However, in order to make the system more user-friendly, a graphic user interface was developed. This interface makes it possible to locate data sources, to display the characteristics of the data and of the organizations concerned, etc. The data sources which correspond to the criteria laid down during consultation of the central host are mapped directly on the screen. In addition, all the geographical elements (regions, provinces, towns, etc.) which come up in the man-machine dialogue, are interactively selected on screen in a set of maps which the operator can "leaf through".

Finally, research is made easier by the use of a thesaurus built into the interface and making it possible to select the key words proposed.

Implementation

The DSC/CORINE system is now an operational prototype. The catalogue has been loaded into the CEC's ECHO experimental host in Luxembourg. The content of the catalogue is currently limited to a set of examples for demonstration, notably the products of the CORINE programme and activities related to CORINE.

The literature shows that all of the experience accumulated in setting up and managing data bases of all kinds agrees entirely on the difficulty of keeping this type of tool in operation (updating, making available to the maximum number of users). In the case of the DSC just the same, maintenance and development are directly linked to users' interest in it. Only a limited proportion of the supply of data can come from obligatory data description procedures imposed, for example on the recipients of Community support for a data collection campaign.

(ii) CATALOGUE OF CORINE-RELATED ACTIVITIES

The various types of activities which have some connection with CORINE have been catalogued and described. These may be data collection initiatives (which are likely to allow updating or improvements of the CORINE base), or, conversely, research work (in which the CORINE data can be used as input data), or research into methods of combining data to obtain synthesized information (erosion risk, for example). The gathering of information on these activities began with those conducted by the Commission or the international organizations.

(iii) CATALOGUE OF DEFINITIONS USED

The catalogue created for the internal use of the CORINE working parties supplies the following information on the main terms used: definition, source, projects concerned, environments concerned, links with other terms.

2.2.2 The data supplied pursuant to Community environment law

A large number of Community legal texts on the environment include an obligation for Member States to supply "information" (report, etc.); in some cases, this information consists of data on explicitly defined parameters.

This situation led the European Parliament, in its resolution on the CORINE programme, to call on the Commission to:

> "collate all the data relating to the environment submitted to it to date by the Member States and to use it as the basis for the information system and for its next report on the state of the environment".

One of the first tasks undertaken by the CORINE Secretariat was therefore to examine, together with those responsible in DG XI, the content of the information provided by the Member States. The main legal texts including an obligation to supply relevant data for monitoring the state of the environment are as follows:

- Decision on the exchange of information relating to atmospheric pollution (75/441/EEC, replaced by Decision 82/795/EEC);
- Directives on air quality limit values and guide values (SO_2: 80/779/EEC; PG: 82/884/EEC; NO_2: 85/203/EEC);
- Directive on pollution caused by certain dangerous substances discharged into the aquatic environment (76/464/EEC) and daughter directives;
- Decision on the exchange of information on the quality of surface fresh water (77/795/EEC);
- Directives concerning the quality of bathing water (76/160/EEC); fresh water to support fish life (78/659/EEC); shellfish waters (79/923/EEC);
- "Seveso" Directive on the major-accident hazards of certain industrial activities (82/501/EEC);
- Directive on the surveillance and monitoring of waste from the titanium dioxide industry (82/883/EEC);
- Directive on the conservation of wild birds (79/409/EEC).

The study showed that the data supplied by the Member States were not sufficient as a basis for the information system. The main reasons were as follows:

- the measuring stations selected by the Member States for the exchange of information on air and water do not provide a representative sampling of the territories of the Community;
- the directives provide only partial information linked to specific problems;
- the data are not always comparable from one country to another (time series, number of parameters measured, analytical methods).

A few examples to illustrate the above statements:

(1) Directives on air quality:

The information transmitted by the Member States and relating to measured concentrations concerns only cases where the limit values have been exceeded. The criteria adopted for setting up measurement networks may differ considerably from one country to another; in addition, coverage of the territory is not the same.

(2) "Seveso" Directive: risks of major accidents from certain industrial activities

In the case of certain countries, the information supplied on hazardous installations is confidential.

(3) Exchange of information on the quality of water:

The network consists of only about 100 stations for the whole Community. The sets of data are sufficiently complete for the parameters reported on. There are, however, substantial differences in the frequency of measurements, the measurement methods and the units in which the measurements are expressed. Despite these limitations, the existing data show some interesting phenomena: a general decrease in organic pollution, an increase in the concentration of nitrates (see figure 2.20).

(4) Directive on the quality of bathing water:

For the first year of application of the directive, the data supplied by the Member States were comparable for no more than three countries. The information is supplied in summary form (conforming or not conforming to guide or limit values), but the way in which the data are synthesized varies so much from one country to another that the results are not comparable.

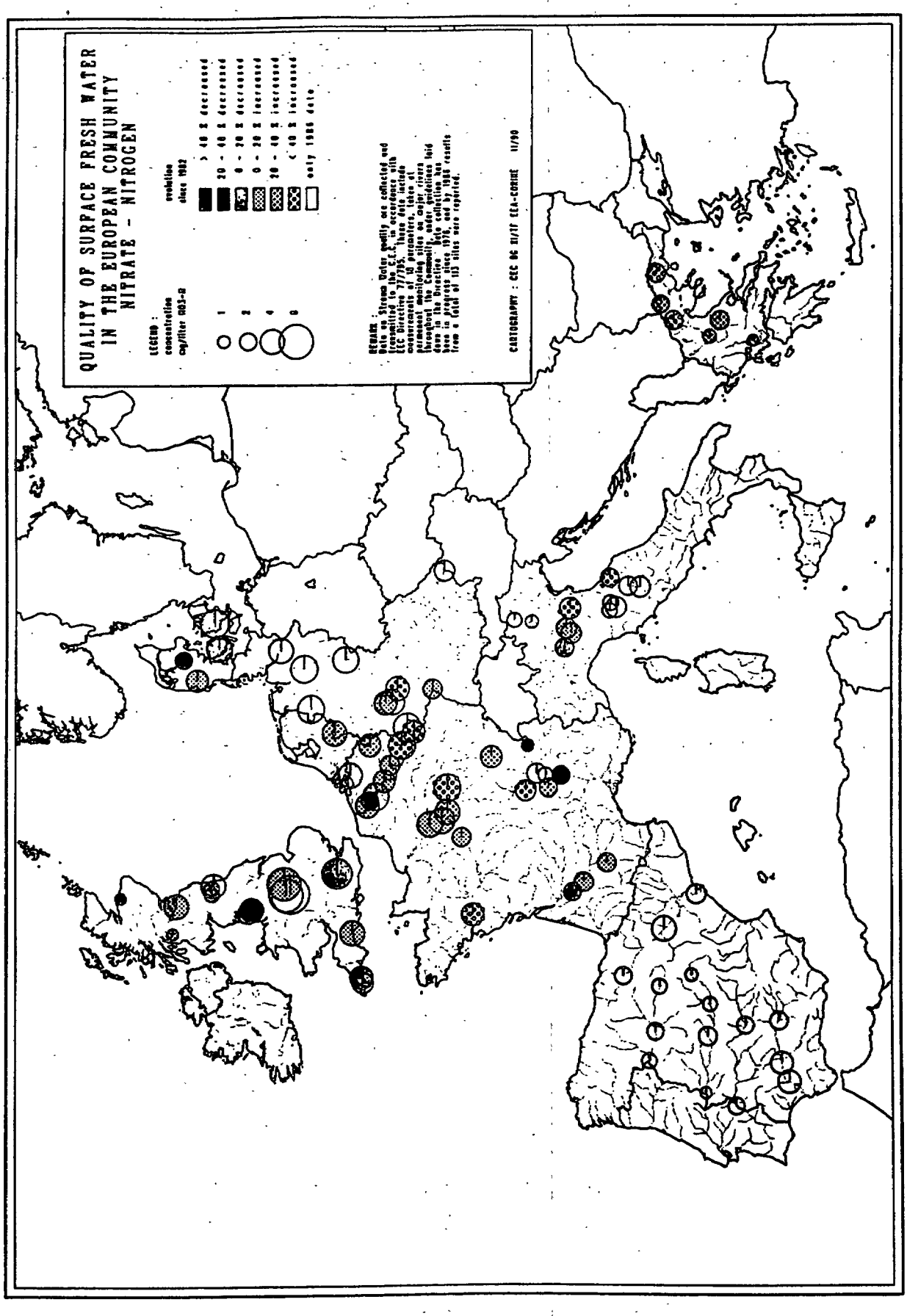


Figure 2.20: Development of the quality of surface fresh water in the Community (1982-1986)

The fact that data supplied were not suitable as a foundation for the CORINE system can be explained entirely by the fact that none of the legal texts mentioned has the explicit objective of supplying data on the state of the environment. It is not, therefore, surprising if at present they can serve this aim only in a very limited way. On the other hand, examination of the data also showed that interesting elements can be used for presenting problems in the reports on the state of the environment (see 1986 report, for example). These texts also offer a potential source of data, which it would be advisable to use in the future while:

- modifying the existing texts so as to specify the obligation to supply data and to make the networks more representative;

- making use of the expert working party set up to monitor the application of the texts. Over the years these groups have clearly gained a motivation for Community action and they have shown themselves ready to contribute to improving the conditions necessary for effective application of the texts, including a better knowledge of the environment and its development;

- systematically providing for the supply of data in future texts, defining in detail their nature and the way in which they fit into the overall system.

2.2.3 Statistics on the environment

DG XI and the SOEC jointly carried out a study of activities at international level and in the Member States. Comparing this inventory with the Commission's requirements helped in preparing the proposal for a Council decision concerning a programme of statistics on the environment.[1]

Apart from this general evaluation, the work of the CORINE programme together with the SOEC dealt in detail with two priority matters and resulted in:

- a study of the requirements for and availability of statistics on relations between the economy and the environment;
- a pilot inventory (Portugal) of the production of dangerous waste (figure 2.21).

This work has revealed in particular the fact that environmental policy depends to a considerable extent on statistics produced by and for other policies (e.g. fertilizers and pesticides: agricultural policy; road traffic, transport policy; industrial emissions, standard of equipment and anti-pollution investment: industrial policy, etc.).

The problem is that the nomenclatures for these statistics have been designed to provide information on economic activity and not to supply the information necessary for environmental action (e.g. statistics on pesticides express only global quantities without taking account of the biocide nature nor of the spatial distribution of the quantities spread).

Use of the available statistics is therefore very limited at the present time. Some basic work needs to be carried out by the statisticians in close collaboration with those responsible for environmental policies in order to add an environmental aspect to the traditional statistics and, when justified, collect statistical data for purely environmental purposes. This will be a priority line of action for the above programmes.

For more information, see:
Towards a Community programme on environmental statistics
(to be published)

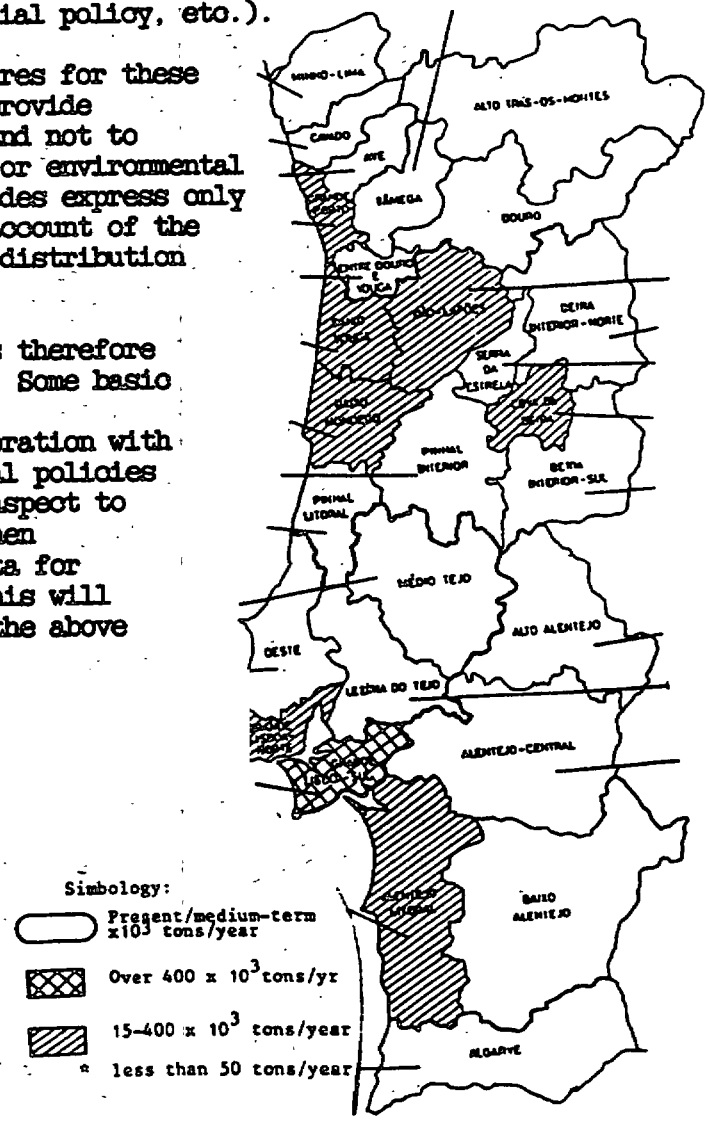


Figure 2.21: Production of dangerous waste in Portugal.

1 OJ No C 90/209/07.

2.2.4 The marine environment

Parliament in its resolution, and the Economic and Social Committee in its Opinion, underlined the importance and urgency of having comparable data on the state and development of the seas around the Community.

An analysis of the availability of data was carried out. The report shows that in spite of the many initiatives that have been undertaken with regard to the seas, it is virtually impossible to draw up a balance sheet on their state of health. Apart from a very few exceptions, the data are not comparable either in time or in space. There now seem to be signs of a sudden awareness of this state of affairs and initiatives are being prepared for systematizing the measurement campaigns so as to have homogeneous information available. This trend is illustrated by the setting up of a network of monitoring stations in the North Sea by the North Sea Task Force, in which CORINE is represented (see figure 2.22).

The analysis of the availability of data on the marine environment was carried out in close collaboration with the competent authorities: the secretariats of the Paris and Oslo Conventions, the ICES, the North Sea Task Force, the Secretariat of the Barcelona Convention.

* * *

For more information see:

- State and availability of data on the marine environment. Final report (to be published).

2.2.5 Seismic risks

The Council decisions provided for the collection of data on seismic risks. These data are already being collected by the European Global Monitoring Centre in Strasbourg and in the framework of DG XII's research programme. To avoid duplication of effort, CORINE action has been limited to maintaining contact with the working parties concerned so as to be able eventually to integrate the data into the CORINE system. At the end of 1990, the DG XII working party had not yet completed its work.

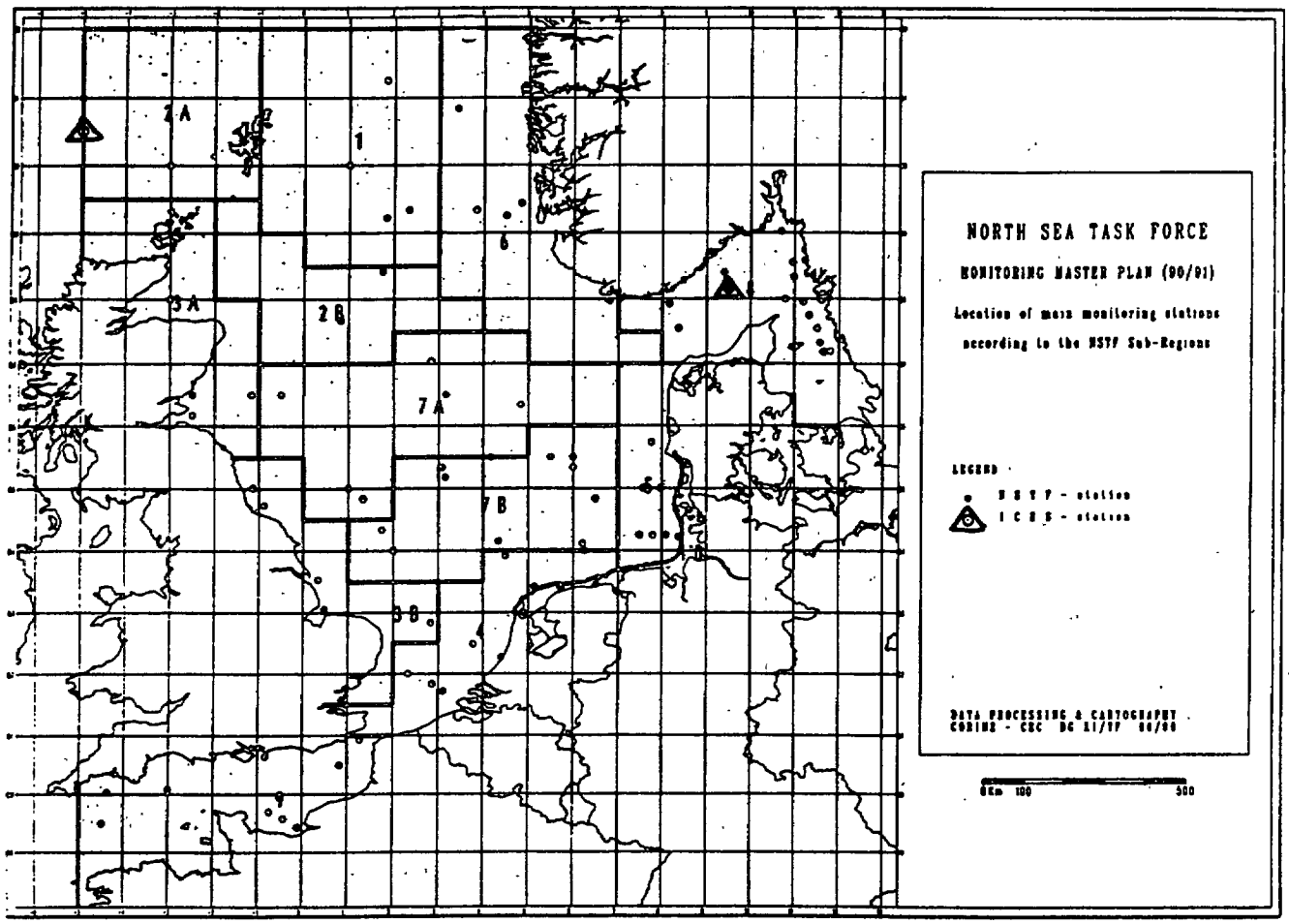


Figure 2.22: Network of stations for monitoring the state of the North Sea (currently being set up) for the 1990-91 campaign.

2.2.6 Transfrontier regional projects

Two transfrontier projects, Algarve-Andalusia and Luxembourg, were set up in order:

(i) to contribute to the testing of methods to be used in priority applications at Community level. Most of the effort was concentrated on this first aspect. The Algarve-Andalusia project contributed towards developing the methods for the Biotopes, Land Cover, Soil Erosion and Water Resources Projects, or towards testing their applicability on a regional scale. The Luxembourg project contributed to the Land Cover and CORINAIR projects.

(ii) to study the comparability of the data and the compatibility of the information systems. The transfrontier projects contributed towards developing the prototype of the data source catalogue (see 2.2.5), notably by preparing the inventory of regional data sources with a view to testing information description methods.

These two projects thus made it possible to study in a practical way the relation existing between the degree of spatial and temporal detail of the information and the level of action by the user: Community, national, regional. The information collated in the Algarve and Andalusia formed part of operational programmes at regional level intended to contribute to the incorporation of environmental information in the processes of economic development.

2.3 Coordination, motivating effects and repercussions of the CORINE programme

The fact that the creation of the CORINE system required a considerable coordination effort can clearly be seen from the preceding pages. Table 2.3 summarizes the results of this at the level of the Commission and the international organizations.

Apart from the results of direct interest for Community policies, the CORINE programme had a number of repercussions at national level. These were, mainly:

(i) help in setting up national data bases

For many countries, the CORINE programme was an opportunity to set up thematic data bases consistent at the national level and compatible at European level (Biotopes, CORINAIR, Land Cover). In certain cases, work on developing the CORINE base is continuing in order to refine the information to meet national needs: (e.g. Biotopes-Greece, with the support of the MEDSPA Programme). The creation of national information systems was speeded up by the existence of a Community prototype (Portugal, Italy, France).

Projects	COORDINATION		
	Commission (other than DG XI and SOEC)	International level	National level
Biotopes	VI, XII, KIB	Council of Europe, IUCN, IRSEP	D and E: inter-regional cooperation
Air	XII	OECD, ECE-Geneva, EUROTRAC IIASA, CEFIC, UNICE	Industrial sectors
Land Cover	V, VI, XII, Ispra JRC, XVI	EARSEL	Inter-ministerial working parties; CNES
Soil erosion	VI, XII	FAO, PAP	Agricultural research
Water resources	XII	European Water Institute	Ministries of Agriculture
Coastal erosion	XII	IGU, UNECSO	Ministries responsible
Marine environment	XII, XIV	Euromar, OSPAROOM, ICES, Conference on the North Sea MAP	MARIS (NL)
Climate	VI, XII	WMO	National Meteorological Offices
Topography	VII	CERCO	IGN
Data processing	IX, XIII, SOEC, group of "project owner" DGs	IGU: Preparation of world conference on Global Data Bases	System suppliers
Catalogue of related activities and data sources	By definition, all organizations concerned		

Table 2.3: Coordination activities for the implementation of CORINE

(ii) support for inter-regional and trans-sectoral coordination at the national level

Of course, the responsible authorities had not waited for CORINE to coordinate the many different bodies involved in the environmental information field in their countries, but the Community programme was often used as an additional possibility for improving coordination. Thus, several national seminars bringing together producers and data users were organized: Lisbon (1986), Faro (1988), Madrid (1988), Rome (1989), Copenhagen (1989). At the last seminar, representatives of the non-Community Scandanavian countries also took part. In some countries, technical seminars on specific themes were organized, e.g. Biotopes (Madrid 1989), Land Cover (Paris 1988).

Application of the CORINE methods was the subject of discussions in the framework of inter-regional cooperation (e.g. in Germany, Biotopes: "Länderausschuss für Naturschutz" working party; Geographical Information Systems: "Bundesländer-Arbeitsgruppe für Umweltinformation - BLACK" working party.

(iii) acquiring and transferring know-how

The use of methods and nomenclatures developed in the framework of the CORINE programme was extended to certain non-Community countries (e.g. Land Cover, Tunisia and Algeria). The EFTA and east European countries are intending to carry out CORINE projects with a view to participating in the European Environment Agency. The World Bank is interested in applying them in African countries to the south of the Sahara.

In the Commission itself, the programme was an opportunity to gain practical experience in the use of geographical information systems and to promote the use of satellite remote sensing data.

(iv) distributing knowledge

The execution of the CORINE programme demanded from the groups of technical experts and from the CORINE Secretariat a number of methodological developments and the use of advanced techniques (GIS and remote sensing). The experience of the CORINE programme scientists was increasingly called for as a matter of routine in projects on environmental information, both in the Community and in non-member States (colloquia, expert opinions, etc.). The publication of manuals and reports is part of the response to this considerable demand for communication of scientific knowledge.

3. Using the information

3.1 Access to and dissemination of information

The Council decision on CORINE foresaw a large range of users for the results of the programme: "information .... should be usable in implementing environmental policies at Community level and also at national and regional levels as well as in informing public opinion".

The information was to be made public, the only restriction being that this should be subject to the usual rules of confidentiality applying at the Commission and in the Member States. Points 3.2 and 3.3 show how these guidelines were put into effect in practice. Point 3.4 gives examples of the use of information, chiefly for action at Community level.

3.2 Types of users and products

As pointed out in the preceding chapters, the first years of the programme were devoted to the development of procedures and working methods, and then to the collection, collation and validation of the data, and finally to the creation of the information system. Thus it was only a little less than two years ago that systematic use of the results of the CORINE programme began. This relatively recent experience in using the results has, however, already allowed their value for various types of user to be verified and the information to be used in different forms. Figure 3.1 shows the main partners and current or potential products of the CORINE system. Besides the Commission departments (environment, research, regional policy and agriculture in particular), other Community institutions are present, as well as international organizations, national and regional administrations, scientific bodies, design offices. In order to be able to determine information needs as well as possible, a CORINE user group was set up within DG XI, made up of representatives of various units.

There is a very wide variety of requests:

(i) for the simple supply of data
- either in printed form (listings, maps, tables, graphs, report);
- or on digital media (flexible disk, magnetic tape);

(ii) processing of the data and provision of summary information, requiring from the CORINE Secretariat:

- either the routine use of software commands (e.g. for creating isolines from a file of points, the intersection of two information layers);
- or the writing of special programmes for analysing the data or using them in models.

The information activity which was the subject of the Opinion consisted first of all in making known the programme, the progress made with it and the results as they were obtained. This activity took the form of an exhibition, publication of brochures, video films, lectures. The final phase of the CORINE programme focused on the large-scale dissemination of the results by the publication of reports, manuals and maps produced in the context of the various CORINE projects. Besides this, the by-products should also be mentioned, such as the map of areas of ecological interest prepared under the aegis of DG X (1 million copies) or the atlas of biotopes of the Community. Publishing houses have also expressed to the Commission their interest in distributing digital files on CD ROM.

In addition, the CORINE information system will supply a large proportion of the information in the next report on the state of the environment in the Community.

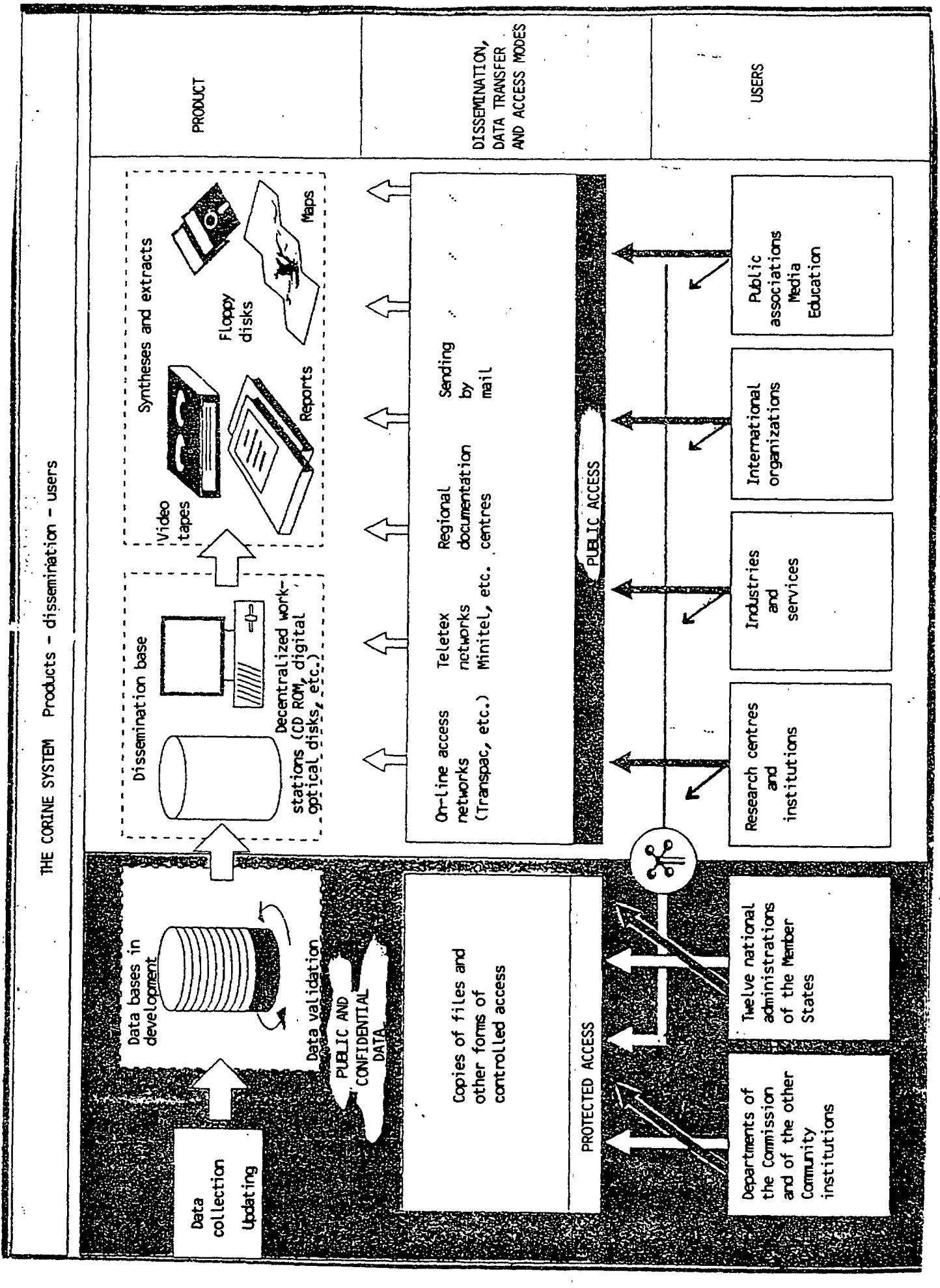


Figure 3.1: Access to the dissemination of CORINE information

3.3 Confidentiality of data

A certain amount of the data necessary for preparing information that can be used for the environmental policies is of a confidential nature. The problem is, however, less sensitive than for other subjects, such as personal or income data, for example. In just one of the CORINE projects, the CORINAIR project, it was necessary to study the rules relating to the confidentiality of data and to agree on procedures making it possible to obtain and use some of the data.

The evaluation of emissions into the air is largely based on levels of activities (energy consumption, production of goods, etc.). Some of these data are subject to the rules of statistical secrecy, which require that it must not be possible to identify an individual person or producer. Accordingly, the data concerned may be accessed or disseminated only if there are at least three persons or producers in a statistical unit. Other data are subject to commercial secrecy, such as, for example, the characteristics of the major point sources.

In order to have available the confidential data necessary for calculating emissions, a procedure was adopted by which this information is not published and is classified in the information system. Access is reserved for managers of the system and authorized users, subject to special agreement.

The creation of the CORINE Biotopes inventory revealed a particular case where it was necessary not to disseminate certain data. The dissemination of information on the location of certain rare species may sometimes result in increasing the threat to these species (e.g. by attracting the attention of collectors of rare plants). The Biotopes group therefore agreed not to mention the presence of these species in the descriptive files. This did not present any problems, since in every case the biotopes in question deserved to be included in the inventory for other reasons.

3.4 Examples of use of CORINE information

Example 1: **Implementation of internal procedures for evaluating programmes or projects submitted to the Structural Fund or to the EIB**

Prior to any decision on the granting of financial support from the Community structural funds or from the European Investment Bank to a project or programme, DG XI is consulted on the environmental impact. Figure 3.2 shows two cases of requests for financial support addressed to the EIB for the construction of motorways which could affect biotopes of major importance to the conservation of nature. The information in the CORINE Biotopes and CORINE Classified Areas data bases was used in preparing the file for the EIB's reply.

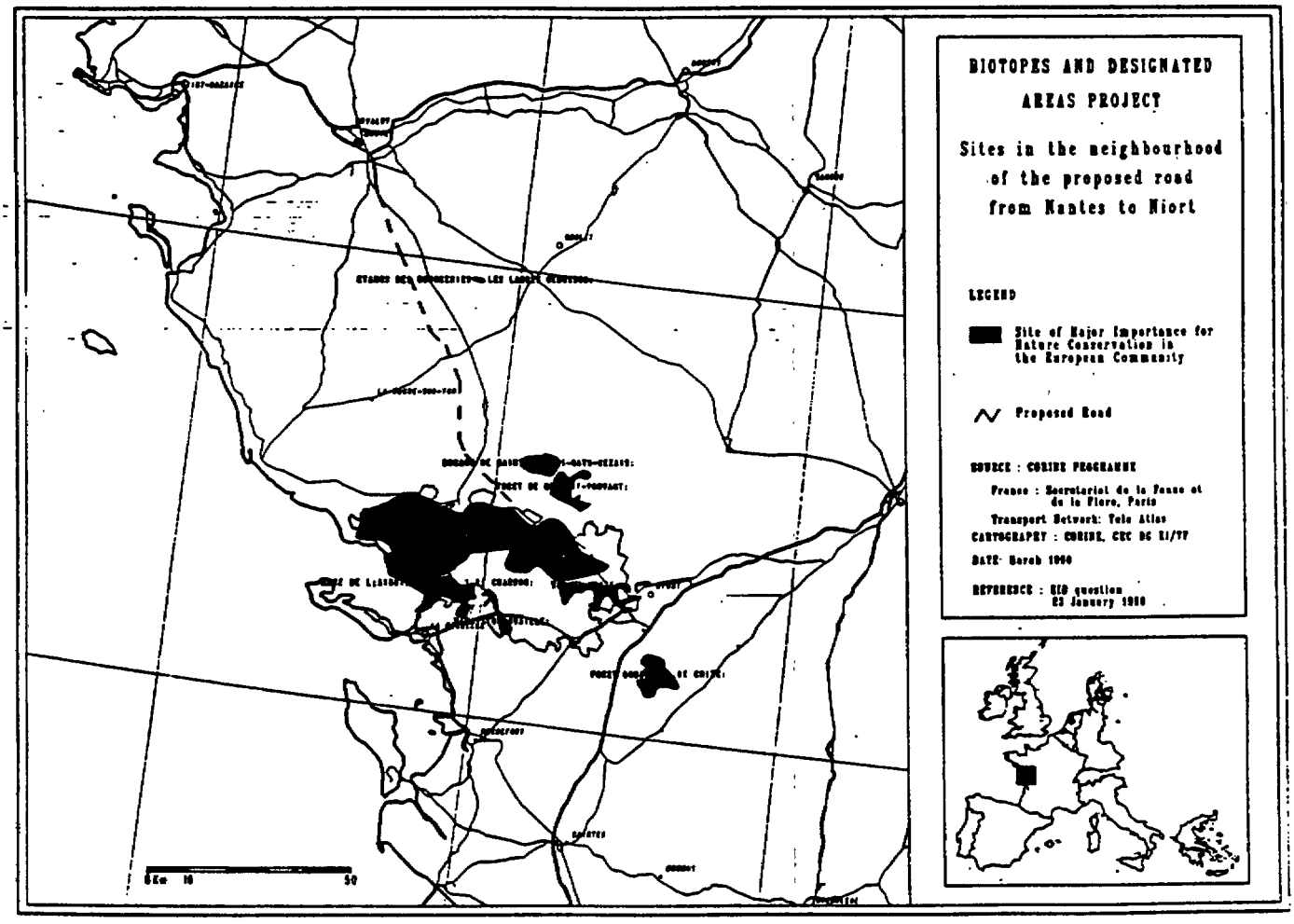


Figure 3.2: Identification of biotopes affected by motorway construction projects.

Example 2: Implementation of the Directive on the conservation of wild birds (409/79/EEC)

The information supplied by the Member States on the areas which they undertake to protect pursuant to Article 4, or on those which they intend to classify to this end, is recorded in a "classified areas" file of the data base (see point 2.1.3). This makes possible a global analysis of the situation, where the number and distribution of the declared zones are compared with the situation which would be desirable from the scientific point of view.

For example, the number of special protection zones which a species has within its current distribution area and in its potential distribution area can be examined (see figure 3.3). For example, in the Pyrenean massif, the presence of Gypaetus barbatus is mentioned in 20 sites of the CORINE Biotopes inventory. Four of these sites - all of them on Spanish territory - were designated, totally or partially, pursuant to the Directive on the conservation of wild birds. The scientists are therefore furnished with one of the criteria for judging whether the species has enough protected areas.

Repeating the exercise for all the species covered by the Directive provides information which makes it possible gradually to achieve the goals set by the Directive in collaboration with the Member States.

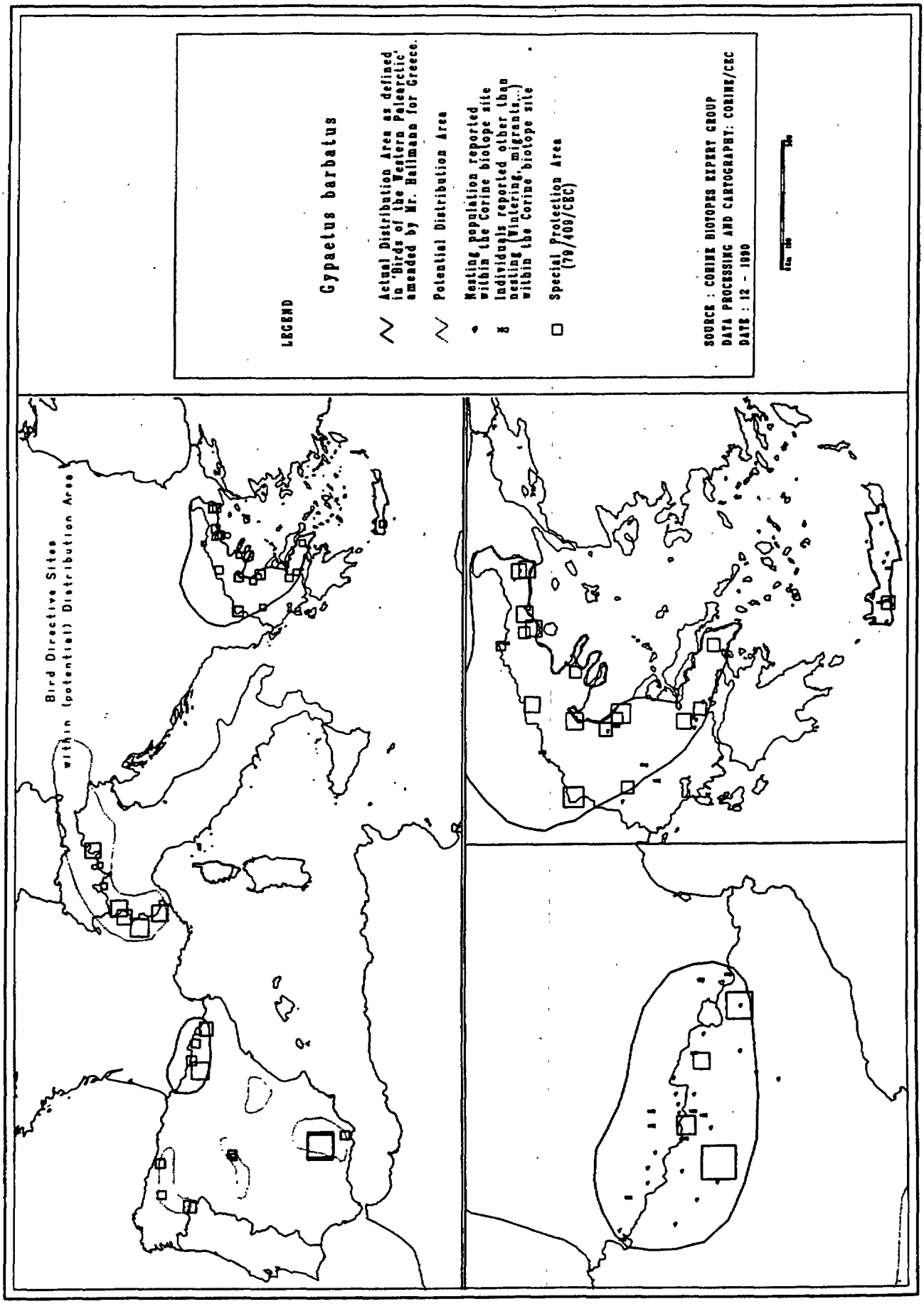


Figure 3.3: Areas of current and potential distribution of Gypaetus barbatus and presence of the species on the sites.

Example 3: **Application of a resolution of the European Parliament on the conservation of nature**

In its Resolution[1] on the establishment and conservation of Community nature reserves, the European Parliament pointed out in 1987 "... that a chain of biogenetic wetlands should be set up in Europe to act as a genetic reservoir...".

The CORINE Biotopes data base used by the wetlands experts may serve as a response to this requirement.

Maps showing the distribution of sites of major importance including wetland habitats (e.g. bog heathers, see figure 3.4), accompanied by the full factsheet for each of these sites, are presented to specialists on these habitats. On the basis of this, and with their own knowledge, they can propose a chain of sites which satisfies as far as possible the requirements for conservation of the wetlands. This proposal for a chain of wetlands is, therefore, the ecological objective which those responsible for the Community's and the Member States' environmental policy have to aim at, and provides the basis for their discussions with those responsible for other policies.

This example shows the type of working procedure which can be followed for gradually setting up the "NATURA 2000" network once the Directive on the protection of wild flora and fauna and their habitats[2] has been adopted.

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1 OJ No C 246, 10.7.1987.
2 OJ No C 247, 21.9.1988.

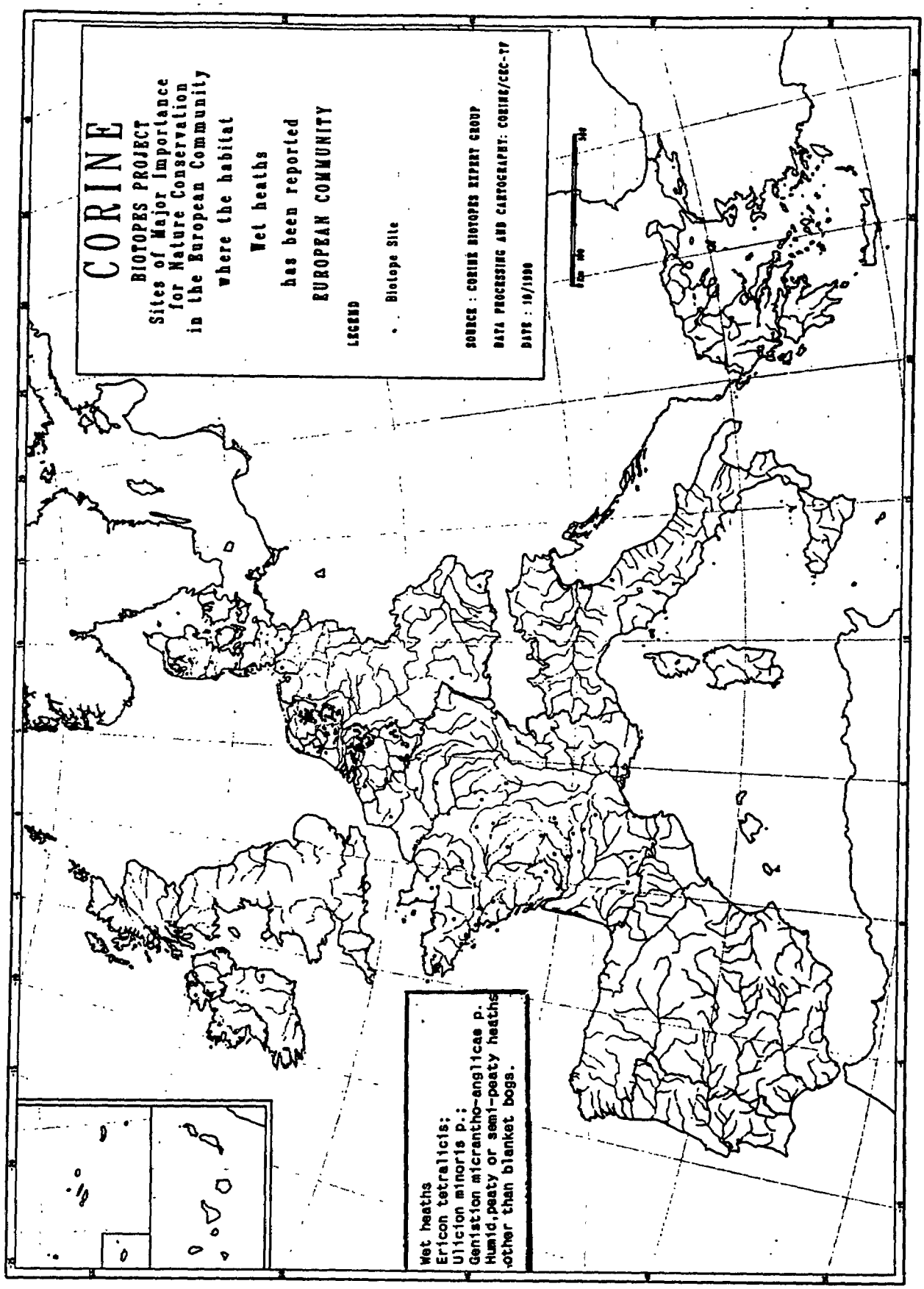

Figure 3.4: Distribution of the biotope sites containing the habitat of "bog heathers".

Example 4: Air pollution development scenario

On average in the Community, more than half of air pollution by nitrogen oxides (NO^X) is due to road transport. Between 1970 and 1987 there was a substantial increase in the number of vehicles on the road, even in those countries which already had large numbers of vehicles in 1970 (see table 3.1).

Country	B	DK	D	GR	E	FR	IRL	I	L	NL	P	UK
Cars/inhabitant 1987	.35	.31	.45	.15	.44	.41	.21	.40	.44	.35	.18	.35
Increase 1987 in % over 1970	68	48	100	540	340	79	79	123	71	108	218	68

Table 3.1

Assuming that the vehicle numbers stabilize at slightly above today's figure in the countries with the most vehicles (0.5 vehicle/person), if the technology remains the same we will see a considerable increase in NOx pollution in the countries where emissions are lowest today (see figure 3.5). The scenario assumes that the ratio of the number of vehicles to lorries will remain constant and that the rate of population increase will be that adopted for the "Strategy 2000" report.

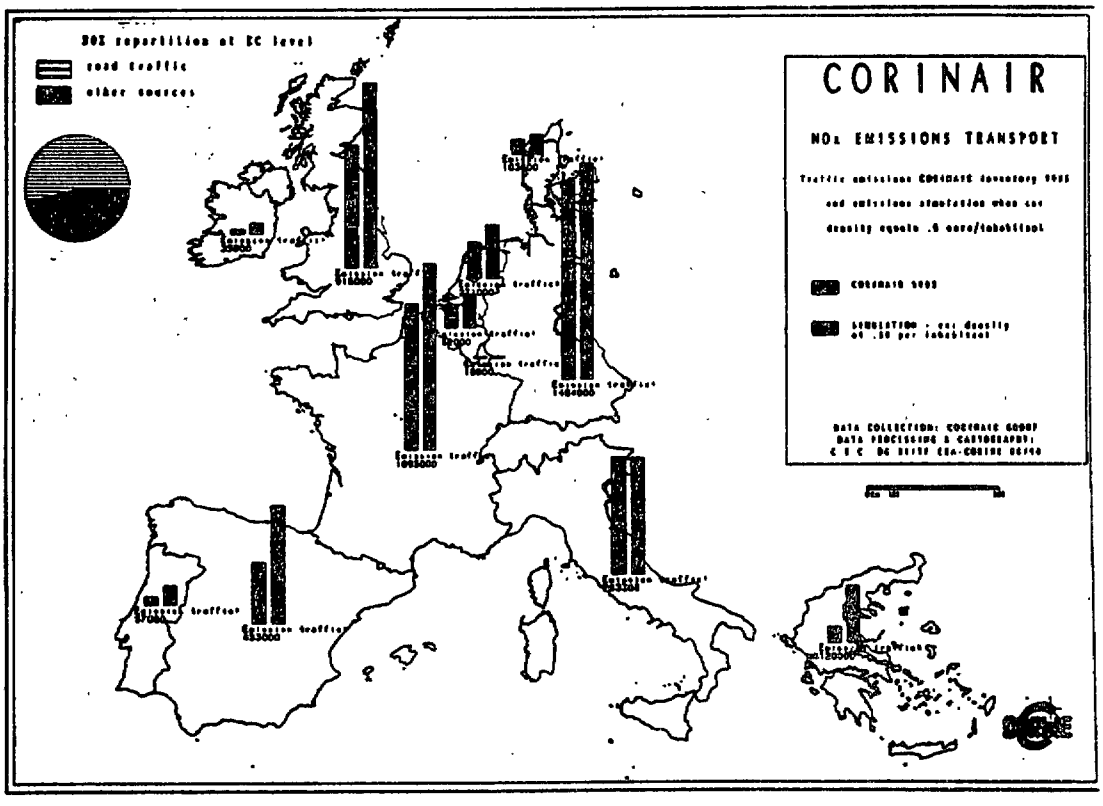

Figure 3.5: Scenario of the increase of NOx emissions between 1985 and of stabilization in the numbers of motor vehicles (0.5 vehicle/inhabitant)

Example 5: **Acid rain and vulnerability of the soil**

Figure 3.6 shows an evaluation, at three levels, of the vulnerability of soils to acid rain. This overview was obtained by dividing up the 350 classes of soils into three large groups according to their buffering power. Sandy soils, for example, are much more vulnerable than heavy clay soils, and their acidity can decrease rapidly even when they are subjected only to limited acidifying burdens.

It is also interesting to compare this information with the CORINAIR results (emissions of SO^2, NOx), when it can be seen that many of the sensitive soils are found in areas where there are substantial emissions of pollutants into the air.

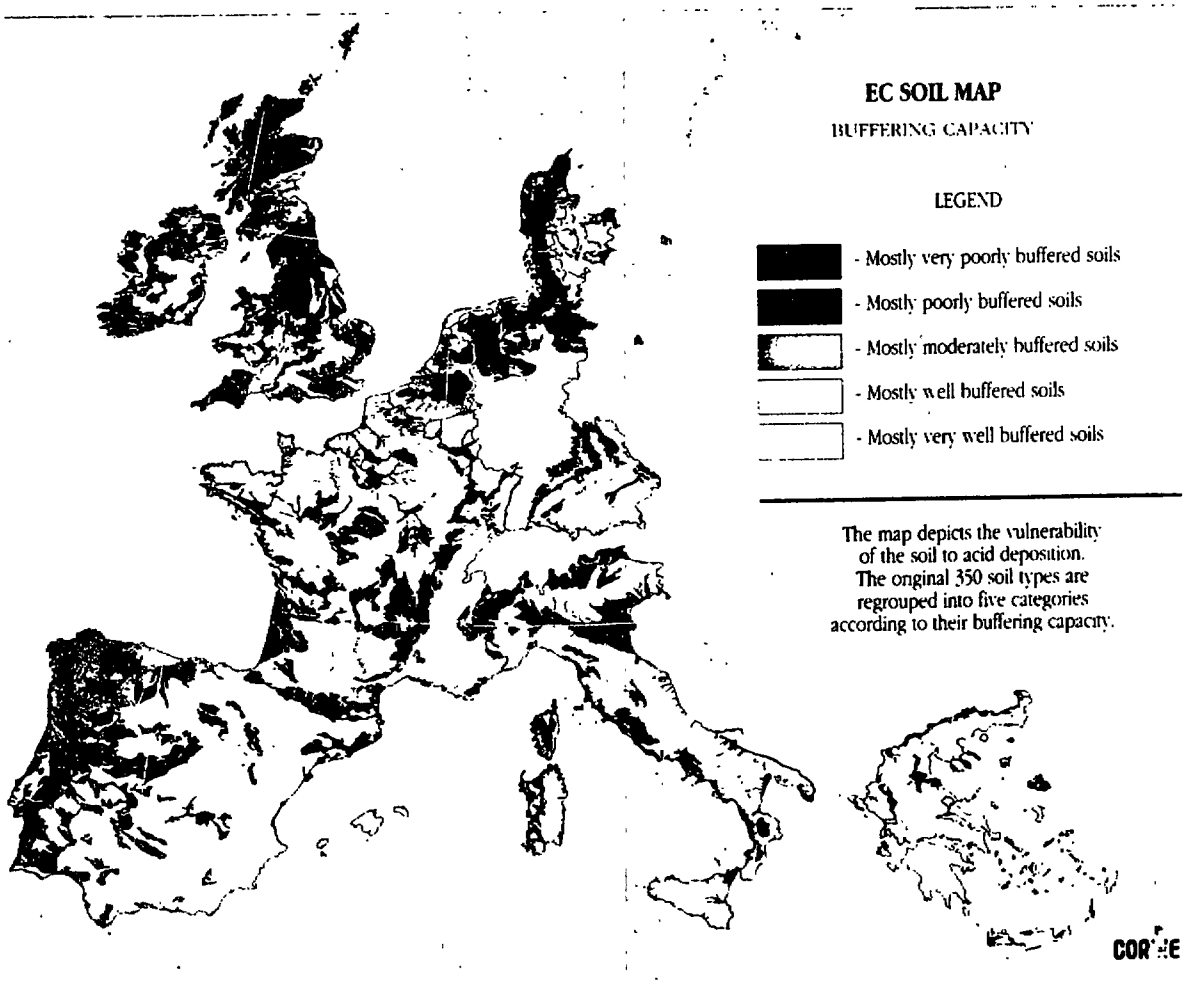

Figure 3.6: Vulnerability of soils to acid rain

Example 6: Modelling of long-distance transport of pollutants

Due to the limited calculating power of computers, the input data for pollutant dispersion models have to be presented in the form of a geometrical grid. A conversion procedure has therefore been developed for recalculating the CORINAIR data collected by statistical units (see figure 2.9) and spreading them over a regular grid system. Figure 3.7 shows the result for the OECD grid (50 x 50 km).

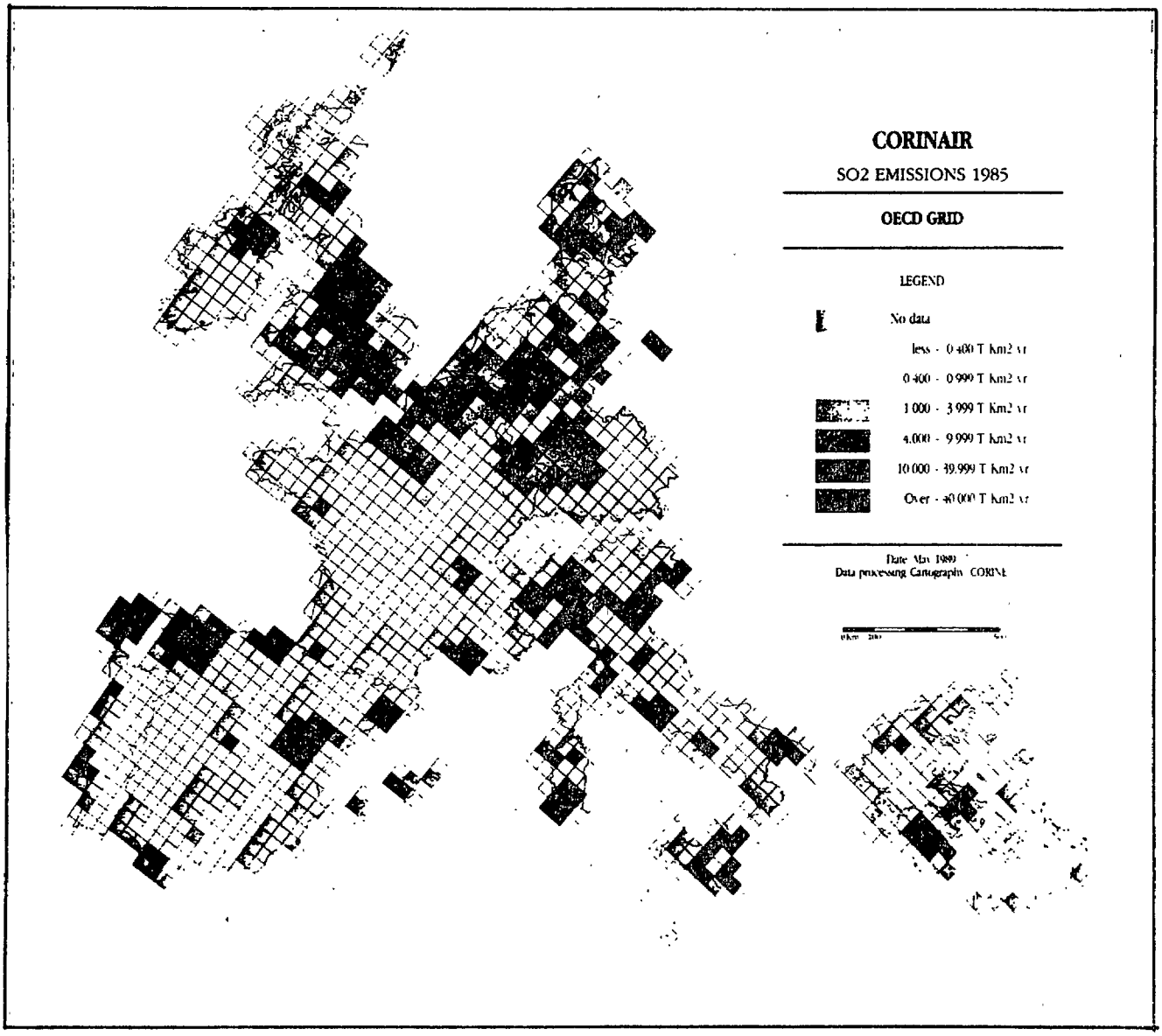

Figure 3.7: Emission of SO^2 into the air according to the OECD grid ($t.km^{-2}.year^{-1}$)

Example 7: Evaluation of soil erosion risk for the southern regions of the Community

The CORINE Soil Erosion data base makes it possible to classify the territory into three risk groups (high - medium - low) and to map the phenomenon (see figure 2.15). In practice, the agricultural, forestry or regional development programmes generally concern administrative regions. In order to supply information that is useful at this decision level, the information in the soil erosion risk map was related to the limits of the regions and the percentage of land affected by a high erosion risk was calculated. Figure 3.8 shows that in 31 out of 254 areas more than 80% of the land has a high potential erosion risk if the soil is not protected. In two areas more than 80% of the land is currently exposed to a high risk of erosion either because the soil is insufficiently protected or because the risk is inherently very high.

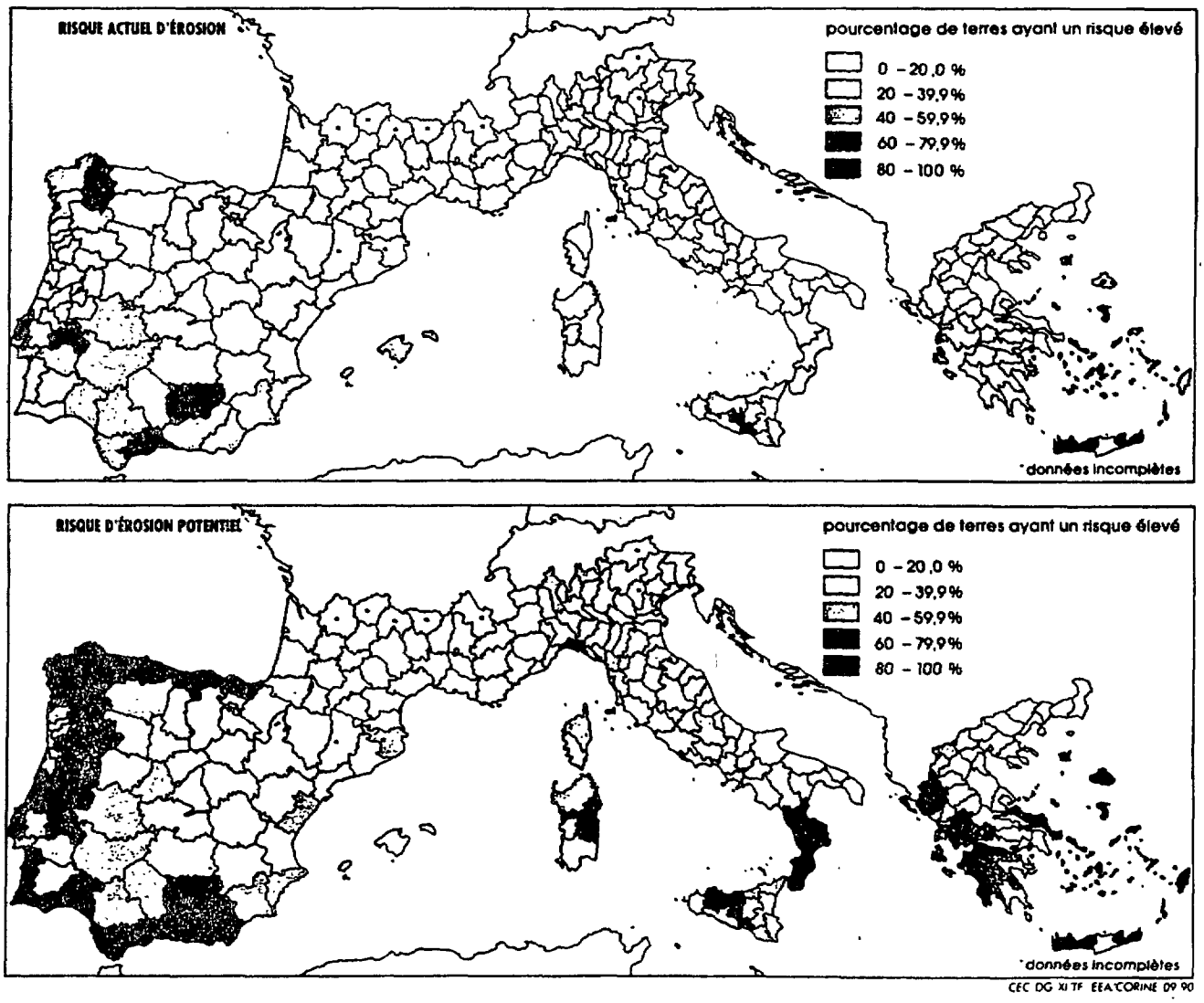

Figure 3.8: Location of current and potential high soil erosion risk relative to the NUTS regions

Example 8: Evaluation of the impact of urbanization on soil resources

As early as 1972, the Council of Europe's soil charter drew attention to the need for proper management of this rare and non-renewable resource. The Charter required in particular that urbanization should be concentrated and organized so as to avoid as far as possible occupation of good-quality soils.

In the southern regions of the Community, high-quality soils are particularly rare (see table below).

Quality in % of territory	High	Medium	Low	Not analysed
E	7	30	59	4
Gr	19	18	57	6
It	31	26	39	4
P	8	25	66	1
Fr	6	27	45	22
Southern regions	14	27	52	7

Unfortunately, as these are often flatland soils as well, urbanization has been taking place there for a long time and the process has been stepped up considerably in the last few decades.

Example 9: Development of land cover in sensitive areas

The CORINE Land Cover data base gives a detailed picture of biophysical occupation of the territory at the end of the 1980s (see 2.1.3).

This uniform point of departure for the Community offers very many possibilities of studying the development, past or future, of the territory.

The geographical information, digitized at a scale of 1:100 000, will for example be placed at the disposal of the EFEDA project being run by DG XII. This project, which is intended for understanding the process of desertification thanks to a series of studies centred on the Castille della Mancha region, will include in particular an analysis of the development of vegetation cover over the last few decades.

Similarly the Land Cover base offers information extremely rich in detail for DG XI and DG XVI programmes on the development of soil occupation in urban areas. A study is in progress on these changes in the Athens conurbation.

Example 10: **Identification of the areas to be protected**

Figure 3.9 shows for Portugal:
(i) the areas of high risk of potential soil erosion;
(ii) the biotopes of major importance to nature conservation.

Where these two types of zones overlap there are clearly areas where there are two reasons for conservation.

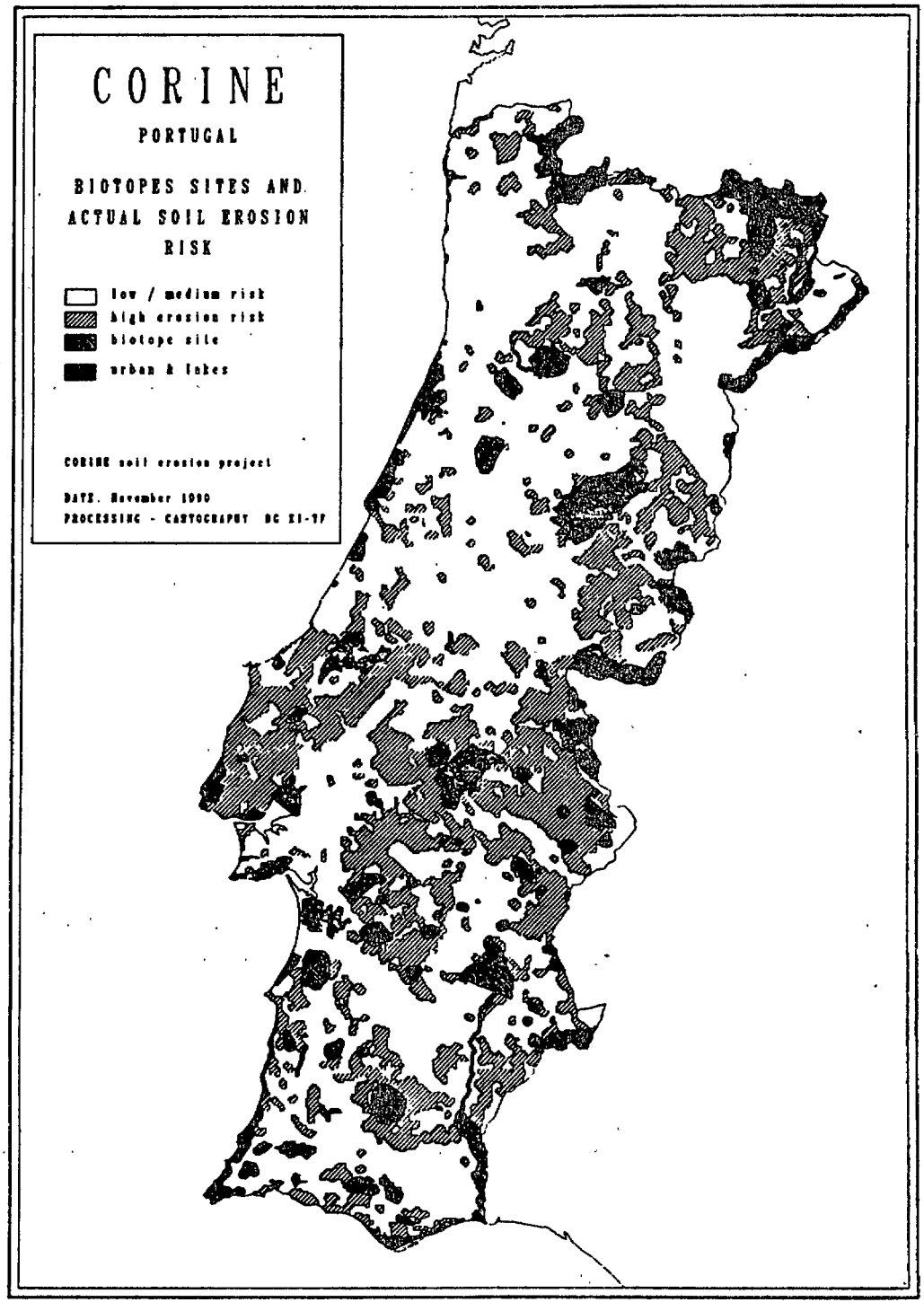

Figure 3.9: Location of biotopes on soils where there is a high risk of erosion.

Example 11: Deposits of radioactive caesium after the Chernobyl disaster

After the Chernobyl disaster, data on the radioactive fallout were collected in the Community Member States in the framework of the JRC's REM project. For Greece, a data file covering 1 774 sampling points was created and used for producing analysis maps (see figure 3.10).

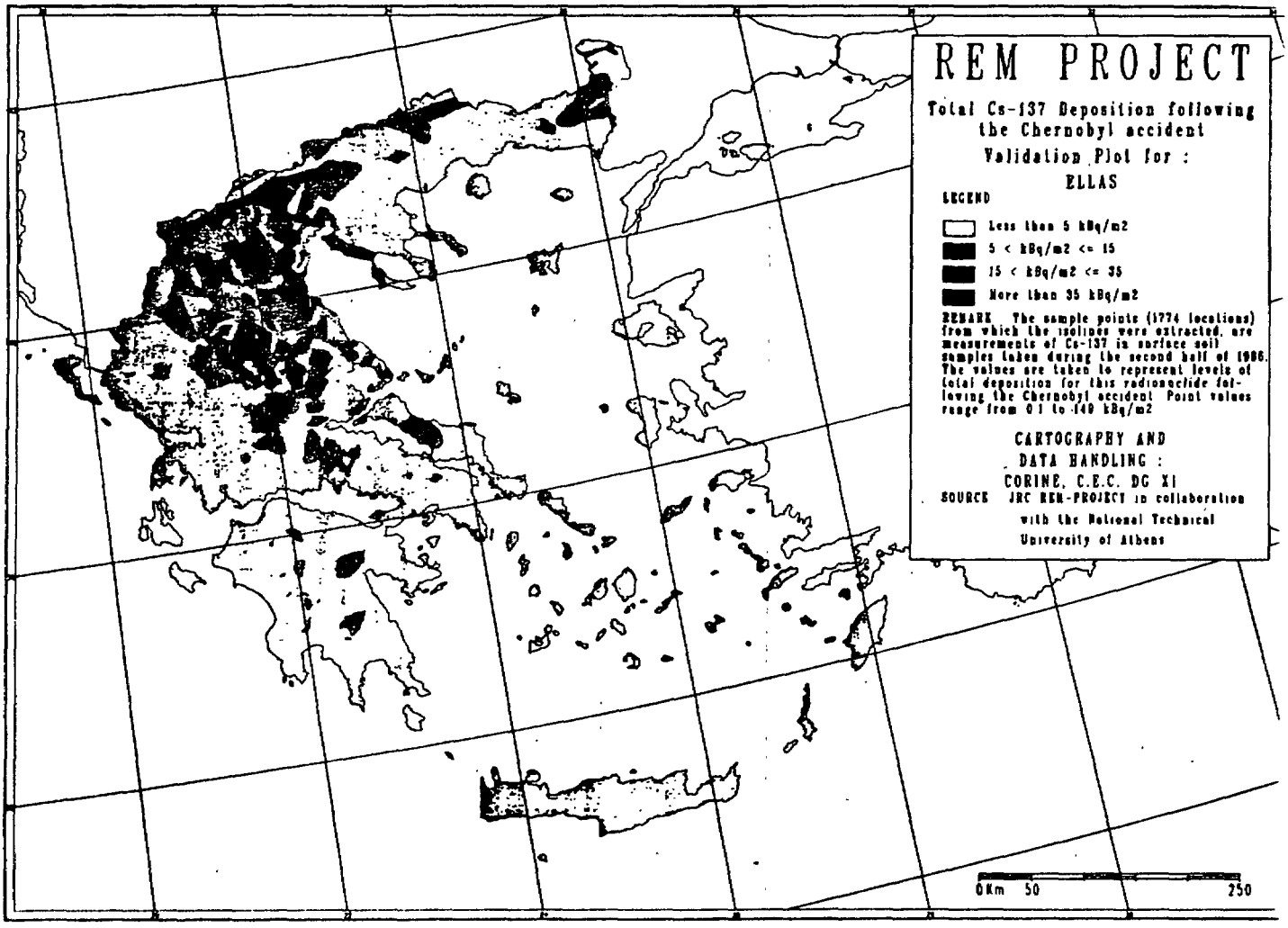

Figure 3.10: Measurements of caesium-137 in soils after the Chernobyl accident.

Example 12: **Contribution to the viticultural zoning programme**

A number of data bases set up for the requirements of the CORINE programme have found a much wider usefulness. This is the case with the climatic data base (created for evaluating land resources), which was also used for identifying, within the framework of DG VI's programme, areas of equal suitability for wine production from the climatic point of view. Figure 3.11 shows the result of interpolating Winkler index values* calculated for 370 climatic stations in Italy and presented in the form of isolines indicating the solar energy available for vegetable production. Other heliothermic or agro-climatic indices have also been mapped in this framework.

* W = total of daily average temperatures over 10°C in the period 1 April-30 October

Figure 3.11: Isolines showing the solar energy available for vegetable production.

4. LESSONS AND RECOMMENDATIONS

4.1 Satisfying the need for information on the European environment: general conditions

It was during the execution of the CORINE programme from 1985 to 1990 that most of the problems presented by putting together and making available comparable information on the state and development of the environment on the Community scale actually arose. Technical and organizational solutions were developed which enabled the Commission and its partners to bring the programme to a successful conclusion. When the solutions applied are analysed, lessons and recommendations are obtained which may prove useful for the continuation of Community action in the field of information on the environment. This action will be continued in particular by implementing the programmes of the European Environment Agency and Eurostat, in close collaboration with the information users within the Commission, the other Community institutions and the Member States.

The experience gathered in the framework of the CORINE programme has shown that a number of interdependent conditions have to be fulfilled in order to attain the goal of making available to those concerned with the protection and management of the European environment comparable, reliable and up-to-date information on the state and development of the environment in the Community. Figure 4.1 shows schematically how these conditions are linked together, and the linkage is also described in the text of the Council regulation on the EEA. At each of these levels of preparation of the information, from the raw data to the users, there are particular technical or organizational conditions which apply. However, it is not enough for these conditions to be fulfilled in isolation: for the final result to be assured, it is essential for the responses to these conditions to be coordinated and kept in progress. In the rest of this chapter these six conditions are made into work goals and examined in turn in order to derive from them, if appropriate and possible, lessons for the setting up and operation of the European Environment Agency and the European Information and Observation Network, and for other related actions to be carried out at Community level.

With a view to adding more substance to these messages, the Commission will be holding a working symposium in the Spring of 1991. This symposium will be an opportunity to examine and discuss the lessons of the CORINE programme in the light of other experience at international, national and regional level. The participants will be the architects of the CORINE programme, decision-makers and technical staff of the European Environment Agency, representatives of the Community institutions and of the Member States, as well as bodies at different levels and in different sectors concerned by information on the environment. The Commission wishes this event to be the point of departure for national symposia which will produce more detailed results taking into account each country's individualities.

AIM: To make available to those who are responsible for or interested in the PROTECTION and MANAGEMENT of the EUROPEAN ENVIRONMENT, COMPARABLE, RELIABLE and UPDATED INFORMATION on the STATE of the ENVIRONMENT in the COMMUNITY.

CONDITIONS:

- The USERS have to have ACCESS to the INFORMATION whenever and in whatever form they need it.
- A PERMANENT INFORMATION SYSTEM on the ENVIRONMENT in the Community has to be developed and kept up to date.
- An INFORMATION NETWORK has to be set up and operated.
- The availability of the necessary DATA and METHODS, as well as the relevant INITIATIVES that are underway or envisaged (data collection campaigns, environmental research) have to be known and well documented.
- Improvement of the conditions of COMPARABILITY of the data has to be continued and the collection of missing data must be promoted.

There must be permanent coordination and encouragement to ensure the consistency of technical solutions in response to the above five conditions.

Figure 4.1: The conditions for satisfying requirements for information on the environment at the European level.

4.2 Conditions associated with the stages in the preparation of information

4.2.1 Improving the conditions for comparability of environmental data. Collection of missing data

The level to which environmental data are comparable at Community level depends in particular on the following factors:

- the differences in the parameters and nomenclatures for describing a phenomenon;
- the differences in the measurement or the evaluation methods in the selection criteria for the location of measuring stations, in the frequency of measurement, in the care taken in the following procedures for measurement and analysis of results;
- the unequal availability of data (number of parameters, frequency, geographical resolution) from one country or region to another.

The problem is especially complex since the data necessary for conducting environmental policies are very varied in their forms and origin. Roughly one can distinguish three categories of data source:

i) data collected when carrying out environmental measures (e.g. water or air quality, background noise levels, surveys of flora and fauna species);

ii) data on the geographical framework and the natural resources that have long been collected by specialist institutes (e.g. relating to topography, hydrography, climate, geology, soils);

iii) data on human activities collected by the statistical institutes on behalf of the sectoral policies (transport, agriculture, energy, etc.) which may serve as a point of departure for evaluating pressures on the environment (e.g. road traffic, consumption of fertilizers and pesticides, energy consumption).

As a consequence of this state of affairs, improving the comparability of data and collecting missing data are tasks which have to be carried out as a concerted effort between the environmental policies and all the other policies concerned. These are, as well, long-drawn-out tasks which will only bear fruit in the medium or long term, but which it is essential to give a high priority in terms of financial and manpower investment, thereby obtaining, in ten or twenty years, more reliable information at a lower cost than now. In the meantime, we will hope to continue to use the data available in order to arrive at the best possible evaluation of the state of the European environment.

Recommendations

1. Reinforce and coordinate the existing programmes at Community (CBR, JRC, Eurostat) and international level (e.g. ISO) intended to influence the many different factors which determine the comparability of the data necessary for the environmental policies.

2. While waiting for these programmes to bear fruit, adopt, to satisfy short-term information needs, open and improvable working methods and nomenclatures, in order to draw maximum benefit from the data available. Use, when appropriate, definitions, nomenclatures and methods developed in the framework of the CORINE programme or in Community legal texts.

3. Systematically providing in the proposals for legal texts relating to protection of the environment, or to other policies when relevant, for detailed specification of the nature and characteristics of the data to be supplied pursuant to these texts, so as to obtain comparable data.

4. Encourage and support the setting-up of equipment or programmes for the collection of data relevant to the environment wherever they are lacking through the Community structural funds or financial instruments for the environment.[1]

5. Accord a particular priority, in carrying out the Community's statistical programme on the environment,[2] to taking environmental needs into account when amending existing nomenclatures or developing new ones and when conducting statistical surveys in the framework of the Community sectoral policies.

Since the data in question are geographical reference data for the whole territory of the Community and other digital data of common interest, the Commission is preparing to implement the steps necessary[3] to ensure that these data are supplied to the Commission DGs concerned, the European Environment Agency and other potential users.

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1 Notably pursuant to Article 2 of the proposal for a Council Decision on the standardization and harmonization of the reports supplied pursuant to the environmental directives (OJ No C 90/214/04).

2 Proposal for a Council Decison (COM(90)319 final - OJ No C 90/209/07).

3 See the conclusions of the feasibility report drawn up under the Informatics Procedure of the "CORINE-GIS" Major Project and the decision of the Eurostat Committee of Directors on 8 October 1990, as to the setting up of an internal Task Force.

4.2.2 Knowledge of the data available, research on environmental matters and initiatives in these areas

The rapid development of environmental policies over the last 15 years or so and the notice that has been taken of environmental issues more recently by other policies, have resulted in a plethora of data collection campaigns and research projects in this field. These initiatives come both from the administrations at different levels (regional, national, Community, international), and from the universities or even from the industrial sector. In order to satisfy effectively the information needs of the Community's environment policy, it is imperative - but very difficult - to be aware of all these initiatives. The difficulty lies in part in the absence of machinery making it possible to be informed of the existence of an initiative, but also, and above all, in how to describe it in a standardized and sufficiently detailed and precise way. These problems were studied in the framework of the project for a source data catalogue described under 2.2.5.

Recommendations:

1. Establish a procedure by which, as with the agreement on notifying the Commission and the Member States with regard to national or international draft legislative, regulatory or administrative provisions relating to the protection or improvement of the environment, the Member States notify the European Environment Agency of data collection initiatives or related projects which they intend to undertake.

2. Set up procedures with the same aim for non-member States and international organizations.

3. Develop to the operational stage the prototype of the "Source Data Catalogue", as an aid to the operation of the European Environment Agency and the European network for environmental information and monitoring.

4.2.3 Creation and promotion of a European environmental network

The guidance and monitoring of environmental policies, whether at Community or national level, needs to rely on good-quality synthesised information that is relevant to the problems arising and easy to use. In order to obtain a good-quality synthesis, it is almost always necessary to start from a very large amount of detailed data which also has to be of a high quality; these detailed data are collected locally and are usually kept, whether or not *in extenso*, near to the place where they were collected (with the notable exception of satellite data, the use of which is often tied to the existence of surface data anyway). For certain subjects (e.g. in the case of climate this was done long ago) syntheses of the detailed data have been prepared and sent to bodies whose task is to put the information together at regional or national level. In the case of the environment such procedures exist only for certain issues and a few countries.

Assembling synthesized information on the environment at the European level is therefore a large-scale problem: organizing, for several score of subjects, data flows which for each one can come from a few hundred to some tens of thousands of sources, spread over the whole territory of the Community. The final objective to be reached is to ensure that when a measure is carried out locally, the data obtained can be reused at other geographical levels and for purposes other than that for which the measure was carried out. This means that there has to be a very high degree of standardization and collaboration which is not being achieved even at the national level of the most advanced countries.

In this situation, an information network has a double role: in the short term, making it possible to collate synthesized information that is of as high a quality as possible; in the medium and long term, contributing to the standardization processes which will ultimately permit the "automatic" collation of information. A network on an experimental scale has been tested with satisfaction in the framework of the CORINE programme. To get down to this task, which is of a considerable scale and complexity, the regulation on the European Environment Agency provides for the setting-up an institutionalized and permanent network.

This network is made up of three main elements:

- the focal point, the basic function of which is coordination at the national level;

- the thematic centres, which have the technical function at the European level, of collating information on specific subjects or processing it in order to answer environmental questions (e.g. modelling);

- the data sources involved in completing the European Environment Agency's work programme.

The information network therefore provides the structure in which exchanges are to take place: vertically, of data, from details to synthesis, and horizontally, of know-how, towards more standardization. Here it cannot be stressed enough what has been proved over and over again with CORINE and with other Community or national programmes, that the operation of a structure, no matter how good it is, depends to a very large extent on the management and leadership capabilities of the persons in charge of its constituent parts.

Recommendations:

1. Involve the thematic centres closely, when carrying out the tasks which will be assigned to them, in the standardization processes intended to guarantee in the long term the automatic flows of comparable data within the information network.

2. Take account, when choosing the focal points and thematic centres, of the candidates' management and leadership capabilities as well as their technical competence.

3. Take advantage, when this is appropriate for the information network, of the know-how and the cooperative habits gained by the teams of technical experts and the group of national experts in the CORINE programme.

4. Make use of data processing techniques to facilitate the operation of the information network.

4.2.4 Development and updating of an information system on the environment in the Community

The information system can be represented as a reserve from which is taken the information which makes it possible to satisfy most of the very varied and very often urgent needs of those responsible for environmental policies and other users. Even if this system will certainly not be able to supply all the answers to all the questions, it will nevertheless have to be a match for most routine problems. Its content will have to cover a range of data that is sufficiently broad to obtain objective and reliable information on the priority themes set out in the regulation on the EEA.

In this connection, using the CORINE prototype information system has shown that:

- to be operational, an information system on the environment must have a solid foundation of geographical information and a series of non-environmental data on human activities;
- obtaining simple synthesized information may require the use of a large number of elementary variables (see, for example, the evaluation of soil erosion risk, point 2.1.3 on page 43);
- to obtain a comparable overview at Community level, the data has to be processed with relatively fine resolution (map scale of 1:1 million or better and NUTS level III at least for data of a statistical nature);
- in view of the medium and even short-term costs and advantages, it is worthwhile to keep the data in as disassembled form as technically possible: this guarantees the transparency of the information and allows the data to be used for multiple purposes;
- the organization and updating of the data has to be considered from the beginning in designing the system.

In addition, the setting-up of CORINE has made it possible to determine a number of information needs that have been expressed by users at Community level, which had not been identified as priority requirements in the 1985 decision, the relevance of which could be looked at when the draft work programme of the EEA is being prepared.

Recommendations

1. Transfer to the EEA the files of the CORINE prototype information system, while ensuring continuity in the supply of information to users.

2. Ensure that the EEA continues without interruption the "Land Cover" project as well as the updating of the Biotopes project.

3. Take account in preparing the EEA's work programme, of the themes identified in the conclusions of the CORINE project reports as important for Community environment policy:

- Nature conservation:
  . prepare a European survey of threatened animal and plant species and their habitats;
  . add to and maintain the inventory of protected areas.

- Emissions in to the air:
  . produce a CORINAIR inventory for the base year 1990;
  . prepare an air quality inventory.

- Water resources:
  . set up a Community data base on water quality and resources.

- Marine environment:
  . set up and maintain an inventory on the quality of coastal waters taking into account the Community directives concerned;
  . evaluate the natural productivity potential of the sea.

- Land cover:
  . carry out, for the north of the Community, the evaluation of soil quality and soil erosion risk done for the south.

4. Study, in the light of the requirements of the EEA's work programme, the changes to be made to the informatics structure of the CORINE prototype, while ensuring that easy data exchange with the Commission's data bases and with other data base systems on the environment in the Member States.

5. In the design and development of the EEA's information system, find the optimum balance between:
- the need to centre the content of the EEA's system on information useful to the Community's environment policy;
- the value of having elementary data available, and not only synthesized information.

6. Take account, in the preparation or implementation of the Community programmes concerned, as well as other programmes at international level, of the EEA information system's requirements for "non-environmental" data, in particular:

- geographical reference data (see Eurostat);
- data on human activities (see Eurostat, infra-regional data base; statistical programme on the environment);
- soil and climate data (see DG VI, DG XII and JRC).

Support the creation or improvement at the Community level of data bases meeting these needs.

4.2.5 Access for information users

The lessons that can be drawn from using the CORINE prototype can be summarized as follows:

(a) Users can be classified on the basis of the type of request they make, according to whether it demands more or less work on the part of the system:

(i) simple output of the result present in the system;
(ii) question demanding simple processing of the data present in the system;
(iii) question demanding complex processing of the data present in the system;
(iv) question involving simple or complex processing, but requiring, in addition to the system data, the use of data not present in the system;
(v) case (iv), but requiring in addition the development of methods for combining data.

The response time of the system increases from case (i) to case (v), whereas the number of requests corresponding to these cases in principle diminishes.

(b) The identification of users' non-specialist needs is an iterative process: using the information reveals needs which otherwise would have remained unexpressed.

(c) Dialogue between information suppliers and users is not only indispensable, but generally speaking very beneficial to both sides. In the same way, dialogue between the users of different types of information is helpful.

(d) Intensive use of the information allows its quality to be assessed and any errors to be detected.

Recommendations

1. Take steps to guarantee permanent dialogue between the managers of the EEA's information system and the various users, in particular DG XI, both in the preparatory phase of the EEA's work programme and especially also during its implementation.

2. Promote the use of the information system data (including, at the beginning, those of the CORINE prototype) by researchers or students in order to make maximum use of its potential and to improve its quality. Look into the possibilities of Community financial support to this end (e.g. scholarships) in the framework of existing programmes.

4.3 Coordination and promotion

On the basis of the results of the CORINE experiment, a number of considerations and recommendations have been set out under points 4.2 to 4.6, corresponding to parallel technical objectives to be aimed at in order to achieve the final goal of providing adequate information on the European environment.

These technical objectives concern a very large number of people and organizations scattered throughout the Community, and to a certain extent outside it, working on very different subjects and with very different time horizons. Adapting all of these elementary actions in order to make them contribute effectively to the general aim is a key factor of success. As in an orchestra, somebody has to see that all of the individual contributions make up a coherent whole. This role of "conductor", which in the CORINE programme was performed by the scientific and technical secretariat, is one of the central tasks allotted to the EEA by the regulation setting it up. It consists in:

- designing a technically feasible draft programme which responds, within fixed time limits, to political priorities and to users' needs;
- making sure that the individual actions which make up the programme jointly contribute to achieving the general aim, and being able to demonstrate the relationship between action and aims;
- preventively detecting during the programme, any requirements for adaptation or for technical additions;
- setting up, wherever necessary, technical coordination between different parts of the programme (e.g. use of the same data by several thematic centres);
- monitoring the programme as regards contents and logistics;
- ensuring that all of the participants understand the part they play in the whole;
- monitoring and guiding if necessary the initiatives related to the EEA's programme in the Member States or at international level;
- being ready to listen to users, satisfy requests and disseminate information.

Recommendations

1. Be sure that the EEA has the appropriate staff to carry out its various functions of scientific and technical coordination, promotion, development and maintenance of the information, user service and information dissemination systems.
2. At all stages of the EEA's programme, right from the initial design stage, make sure that the links between the individual elements of the programme and its final goal are perfectly clear.

ANNEXES

ANNEX 1
List of abbreviations used

EEC European Economic Community
EEA European Environment Agency

MEMBER STATES

B	Belgium	DK	Denmark
E	Spain	F	France
GR	Greece	IRL	Ireland
I	Italy	L	Luxembourg
NL	Netherlands	P	Portugal
D	Germany	UK	United Kingdom

INSTITUTIONS OF THE EUROPEAN COMMUNITY

CEC	Commission of the European Communities
ESC	Economic and Social Committee
EP	European Parliament

COMMISSION DEPARTMENTS

DG	Directorate-General
SOEC or Eurostat:	Statistical Office of the European Communities
DG V:	Employment, Social Affairs and Education
DG VI:	Agriculture
DG VII:	Transport
DG IX:	Personnel and Administration
DG X:	Information, Communication and Culture
DG XI:	Environment, Consumer Protection and Nuclear Safety
XII:	Science, Research and Development
ISPRA JRC:	Ispra Joint Research Centre
DG XIII:	Telecommunications, Information and Innovation
DG XIV:	Fisheries
DG XVI:	Regional Policy
DG XVII:	Energy

COMMUNITY AND INTERNATIONAL PROGRAMMES

COMETT:	Community Programme for Education and Training for Technology
CORINE	Coordination of Information on the Environment (DG XI)
EFEDA	Echival Field Experiment in Desertification-threatened Areas (DG XII-EPOCH)
EUROTRAC	European Experiment on Transport and Transformation of Environmentally Relevant Trace Components in the Troposphere over Europe.
ERASMUS	European Community Action Scheme for the Mobility of University Students
EUREKA	European Research Coordination Agency - International Cooperation on Scientific Innovation (CEC, EEC + 9 other European countries)
FAST	Forecasting and Assessment in Science and Technology
MEDSAP	Mediterranean Strategic Action Programme
MAP	Mediterranean Action Plan
PAP	Priority Action Plan
CAP	Common Agricultural Policy

INTERNATIONAL ORGANIZATIONS

ECE	Economic Commission for Europe
EFTA	European Free Trade Association
FAO	Food and Agriculture Organization
OECD	Organization for Economic Cooperation and Development
WMO	World Meteorological Organization
UNESCO	United Nations Educational, Scientific and Cultural Organization

STATISTICS

NACE	Nomenclature of Economic Activities
NUTS	Nomenclature of Statistical Territorial Units
REGIO	Eurostat Regional Statistical Data Base
CRONOS	Eurostat Macroeconomic Data Base

GEOGRAPHICAL INFORMATION - MAPPING

CERCO	European Committee for Official Mapping
IFAG	Institut für Angewandte Geodäsie, Frankfurt
IGN	Institut Geographique National
IGU	International Geographical Union

REMOTE SENSING

EARSEL	European Association of Remote Sensing Laboratories
ESA	European Space Agency
CNES	Centre National d'Etudes Spatiales (France)

NATURE CONSERVATION

ICBP	International Council for Bird Preservation
IRSBP	International Research Society for Bird Protection
IUCN	International Union for Conservation of Nature and Natural Resources
WWF	World Wildlife Fund for Nature

AIR

EMEP	European Monitoring Environmental Programme (ECE)
NACE	Nomenclature of Economic Activities
PHOXA	Photochemical Oxidant and Acid Depositions
CEFIC	European Council of Chemical Manufacturers' Federations
IIASA	International Institute for Applied Systems Analyses, Vienna
UNICE	Union of Industries of the European Community

MARINE ENVIRONMENT

ICES	International Council for the Exploration of the Sea
MARIS	Marine Information System, Rijswijk, NL
OSPARCOM	Oslo and Paris Commissions

LAND COVER

STABIS	Statistisches Informationssystem zur Bodennutzung

TECHNICAL ABBREVIATIONS

GIS	Geographical Information System
CCL	Common Command Language

ANNEX 2

CORINE Projects, their objectives and relationships to the Council Decision, EP Resolution and ESC Opinion

Project/Product	Aims/Functions	Relation to Council Decision or EP Resolution or ESC Opinion
Basic Data Collection (Topography, Soils, Climate, Vegetation Administrative regions, Socio-economic data, Air quality, Surface water quality, Bathing water quality, Gazetteer, Designated areas)	Provision of basic geographic data required by other projects as a basis for processing, display and use of CORINE information Compilation and coordination of data already available in the European Commission	No explicit reference in Council Decision (climatic data)'... to include detailed information on the climatic and geographical condition of the measuring stations...' (EP) '...calls the Commission to collate all data relating to the environment submitted to it to date by the Member States and to use it as the basis for the information system and for its next report on the state of the environment...' (EP)
Interim Computer System	Manage and process CORINE data ; provide output for use by CORINE projects, DG XI and other users	CONSEIL : B(b)... Choice of computer techniques for the management of information on the state of the environment
Projet Majeur	Define user needs ; provide basis for evaluating/selecting final computer system	
Biotopes	Establish an inventory of sites of importance for nature conservation ; develop consistent methodology for data evaluation and recoding	CONSEIL : A(a)... Biotopes of major importance for nature conservation A(b)... Acid deposition... gathering and organising consistent information on emissions into the air at Community level of the distribution and extent of both actual and potential damage... in the case of biotopes

Project/Product	Aims/Functions	Relation to Council Decision or EP Resolution or ESC Opinion
Atmospheric Emissions	Complete 1980 OECD and DG XI Inventories on atmospheric emissions ; develop methodology for detailed inventory for 1985	COUNCIL A(b)... Acid deposition... gathering and organising consistent information on emissions into the air at Community level
Land Cover	Develop land cover classification ; provide land cover data for Mediterranean region	COUNCIL B(b)... choice of methods of processing remote sensing data... A(c)... protection of the Mediterranean region... work will focus on land use...
Soil erosion/ Important Land Resources	Evaluate and map soil erosion risk and areas of important land resources in the European Community	...and quality, soil erosion...
Water resources	Collate data on stream discharge, surface water quality in Mediterranean region ; set up prototype regional data bases and European network on water resources	..., water quality and resources...
Coastal Erosion	Evaluate and map coastal erosion risk in the Community	...as well as problems of coastal erosion...

Project/Product	Aims/Functions	Relation to Council Decision or EP Resolution or ESC Opinion
Marine Environment	Identify and assess data availability	No reference in Council Decision... to change the name of the 'Protection of the Mediterranean environment programme' to 'Protection of the Mediterranean environment and seas' since the level of pollution observed in the Community's seas in general is a threat which must be assessed and combated on the basis of current & updated statistics in each case... (EP) ... the Committee calls upon the Commission to extend the information system at a later stage to cover the seas surrounding the Community... (ESC)
Soil Pollution	Define working programme for future data collection activities	No reference in Council Decision EP resolution on agriculture and environment calls on the Commission for a cadaster on soil pollution
Catalogue of data definitions	Define commonly-used environmental data ; provide consistent basis for CORINE projects	B(a)...organisation of a process of mutual exchange of information on work under way or envisaged, and the setting up of an inventory of sources, categories and definitions of data sources and information systems...
Catalogue of CORINE-Related Activities	Monitor progress of related projects in order to share and exploit information/ expertise	...calls on the Commission... to devise by 1987 a standardised Community nomenclature and terminology incorporating the main environment related terms... and... to coordinate... all completed, current and forthcoming research projects at Community level which have a bearing on the environment...(EP) ... it should also be ensured that the system is compatible with other information systems, concerning the quality of the urban and rural environment...' (ESC)
Catalogue of data sources	Establish prototype Catalogue ; provide consistent framework for CORINE projects	

Project/Product	Aims/Functions	Relation to Council Decision or EP Resolution or ESC Opinion
A Community Environmental Statistics Programme	To identify the themes and structures of a Statistical programme which responds to the needs of the environment of the Community and which is complementary to initiatives at international level, in particular OECD and ECE Geneva	...to draw up jointly with the Member States standardised environment statistics... (EP)
Luxembourg Regional Project	Test methods, evaluate data sources ; provide regional working information systems based on the CORINE model ; identify procedures for making data compatible	B(a)... transfrontier projects intended to improve the comparability of data (Council)
Andalusia-Algarve Transfrontier project		
Guide to natural habitats, exhibition etc.	To inform about the CORINE programme and its results	III.A... information on the state of the environment, generated by the programme, should be usable in implementing environmental policies at Community level and regional levels as well as informing public opinion (Council)

Annex 3 List of experts in the CORINE groups

NATIONAL EXPERTS

D. DEBOUVERIE	Institut d'Hygiène et d'Epidémologie	(B)
Cl. CORNET D'ELZIUS	Ministère de l'Agriculture	(B)
R. CUPEI	Bundesminister für Umwelt, Naturschutz und Reaktorsicherheit	(D)
H.W. KOEPPEL	Bundesforschungsanstalt für Naturschutz und Landschaftsökologie	(D)
K. TIETMAN	Umweltbundesamt	(D)
U. PINBORG	Ministry of Environment	(DK)
A. MAGARINOS	Direccion General del Medio Ambiente	(E)
A. GARCIA ALVAREZ	Ministerio de Obras Publicas y Urbanismo	(E)
Y. RECHNER	Ministère de l'Environnement	(F)
J.L. WEBER	Ministère de l'Environnement	(F)
D. VOURNAS	Ministry of the Environment	(GR)
J. KELLEHER	Department of the Environment	(IRL)
P. DE ANGELIS	Ministère de l'Ecologie	(I)
P. SCHRAM	Administration des Eaux et Forêts	(L)
R. JELTES	Ministerie van Volkshuisvesting, Ruimtelijke ordening en Milieubeheer	(NL)
B.H. VAN LEEUWEN	Ministerie van Landbouw en Visserij	(NL)
M. ASCENSO MARTIN PIRES	Direcçao Geral da Qualidade do Ambiente	(P)
J.M. SILVA COSTA	Direcçao Geral da Qualidade do Ambiente	(P)
P. MAC CORMACK	Department of the Environment	(UK)
D. SALATHIEL	Department of the Environment	(UK)
C.R. MORREY	Department of the Environment	(UK)

CORINE - BIOTOPES

Project leaders

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D. MOSS	" "	(UK)

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J. NONNEN		
U. PINBORG	National Agency for the Protection of Nature, Monuments and Sites	(DK)
F. RODRIGUEZ MARTIN	ICONA	(E)
C. MORILLO FERNANDEZ	"	(E)
J.C. ORELLA LAZARO	"	(E)
F. de BEAUFORT	Secrétariat de la Faune et de la Flore	(F)
H. MAURIN	" "	(F)
D. RICHARD	" "	(F)
G. SFIKAS		(GR)
B. HALLMANN		(GR)
G. MAVROMATIS	Institut de Recherches Forestieres	(GR)
D. CABOT	An Foras Forbartha	(IRL)
E.D. WYMER	Research Section Wildlife Service	(IRL)
T.G. CURTIS	" "	(IRL)
M. PAVAN	Instituto di Entomologia dell'Universita Pavia	(I)
G. PAVAN	" "	(I)

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S.E.	STUMPEL-RIENKS	" "	(NL)
J.M.	VASCONCELOS	Servicio National dos Parques et da Conservacao da Natureza	(P)
I.	BAUGH	The Nature Conservancy Council	(UK)
N.	PHILLIPS	" "	(UK)
C.	GOODY	" "	(UK)
J.P.	RIBAUT	Council of Europe	
E.	GALIANO FERNANDEZ	Council of Europe	

EROSION - LAND RESOURCES

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P.	BONFILS	INRA	(F)
C.	OLIVEROS	BRGM	(F)
N.	YASSOGLOU	Université Athènes	(GR)
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SLOPES

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CLIMATE

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WATER

Project leader

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Group-members

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M. SOLER	Centro de Estudias e Investigacion del Agua	(E)
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LAND COVER

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Technical team

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Group members

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J. ROMEU	IGN Barcelona	(E)
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JM. MOREIRA	Agencia Medio Ambiente Sevilla	(E)
A. COUZY	IGN Paris	(F)
. BOSSART	IGN Paris	(F)
G. VEIS	HCMO Athènes	(G)
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AIR

Project leader

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Technical team

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M.	VANKEERBERGEN	Ministère région Wallonne	(B)
P.	SUHR	National Agency for Environmental protection	(DK)
N.A.	KILDE	RISO National Laboratory	(DK)
K.E.	JOERSS	Umweltbundesamt	(D)
E.	GRISPOS	Ministry of Environment	(GR)
F.	SAKELLARIADOU		(GR)
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C.	CIRILLO	" "	(I)
D.	GAUDIOSO	" "	(I)
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G.	NEVES	" "	(P)
P.	CARNEIRO	" "	(P)
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H.S.	EGGLESTON	" "	(UK)
P.	LIEBEN	OECD	
B.	LUBKERT	OECD	

Emission coefficients groups

NOx (Fixed sources)

M.	BAKKUM	TNO	(NL)
	COLLIN	University of Stokholm	(S)
	HANSEN	University of Essen	(D)
G.	Mc INNES	Warren Spring Laboratory	(UK)
	OELS	U.B.A.	(D)
O.	RENTZ	University of Karlsruhe	(D)
	TARLI	ENEL - CRTN	(I)
M.	de SOETE	Institut Français du Pétrole	(F)

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G. Mc INNES	Warren Spring Laboratory	(UK)
M. JOURDAN	CEFIC	(B)
C. VELDT	T.N.O.	(NL)
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COASTAL EROSION

Project leader

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Technical team

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.	DEKONINCK	DG XII
M.	BERNARDINELLI	DG XIII
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R.	VAN CAMPENHOUT	DG XIV
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.	FORTIN	OSCE
.	SAN MARTIN	DG IX

Annex 4

Overview of the contents of the CORINE information system

Theme	Nature of information	Volume of information. Description	Mbytes	Resolution/ scale
Biotopes	Location and description of biotopes of major importance for nature conservation in the Community	5600 biotopes described according to about 20 characteristics each.	20.0	Location of centre of site
		Computerized recording of the contours of 440 biotopes (Portugal, Belgium)	2.0	1/100 000
Designated areas	Location and summary description of the areas classified under their various types of protection	13 000 areas described according to 11 characteristics (file in course of completion). Computer recording of the boundaries of the areas designated pursuant to Article 4 of Directive EEC/409/79 on the protection of wild birds	6.5	Location of centre of site 1:100 000
Emissions into the air	Tonnes of pollutants (SO_2, NO_X, COV) emitted in 1985 by category of emitter: power stations, industries, transportation, nature, oil refineries, combustion	1 figure per pollutant, per category of emitter and per region, plus data for 1 400 sources or ± 200 000 figures altogether	2.5	Regional (NUTS III) and location of major installations
Water resources	Location of measuring station, surface area of reservoir, average and minimum flow rates, period 1970-1985, for the southern regions of the Community	Data recorded for 1 061 measuring stations, for 12 variables	3.2	Location of measuring station
Coastal erosion	Morpho-sedimentological characteristics (4 characteristics), presence of works, characteristics of coastal development (erosion, stability, accretion)	± 17 500 coastal segments described	25.0	Base file: 1:100 000 Generalization: 1:1 000 000
Soil erosion risk	Evaluation of current and potential soil erosion risk by a combination of four data sources: soil, climate, slopes, vegetation	180 000 homogeneous areas (southern regions of the Community)	400.0	1:1 000 000
Important land resources	Evaluation of the quality of the land by combination of four data sources: soil, climate, slopes, land improvements	170 000 homogeneous zones (southern regions of the Community)	300.0	1:1 000 000

Theme	Nature of information	Volume of information Description	Mbytes	Resolution/ scale
Potential vegetation	140 classes of potential natural vegetation (Europe)	2 288 homogeneous areas	2.0	1:3 000 000
Land Cover	Inventory of biophysical occupation of the territory; nomenclature: 44 classes	Vectorized data base for Portugal, Luxembourg	51.0	1:100 000
Hydro-graphic network	Navigability, categories (river, canal, lake, reservoir)	49 141 river segments digitalized	13.8 0.3	1:1 000 000 1:3 000 000
Quality of bathing water	Annual values for up to 18 parameters, 113 stations, during the period 1976-1986, supplied pursuant to Directive EEC/76/160	2 650 values	0.2	Location of stations
Soil types	320 soil type classes mapped	15 498 homogeneous areas	9.8	1:1 000 000
Climate	Rainfall and temperature (other climatic variables: irregular data)	Monthly averages for 4 773 stations	7.4	Location of stations
Slopes	Average slope per km^2 (southern regions of the Community)	1 value per km^2 or 800 000 figures	150	1:100 000
Adminis-trative boundaries	NUTS (nomenclature of statistical territorial units) regions of the EC, 4 hierarchial levels	470 statistical regions	0.1	1:3 000 000
Coasts and states	Coastline and national frontiers (Community and adjacent countries)	62 734 km	0.3 3.2	1:3 000 000 1:1 000 000
Coasts and states	Coastline and frontiers (planet)	196 countries	1.5	1: 25 000 000
ERDF regions	Eligibility for structural funds	309 classified regions (3 types)	0.01	Eligible regions
Towns	Name, location and population of urban centres > 20.00 inhabitants	1 542 towns	0.1	Location of urban centre
Socio-economic activities	Sets of statistics taken from the SOEC's and REGION base	Population, transport, agriculture, etc.	40.0	NUTS III statistical units
Air traffic	Name, location of airports, type and volume of traffic (1985-87)	254 airports	0.1	Location of airport
Nuclear power stations	Capacity, reactor type, energy production	97 power stations, updated 1985	0.03	Location of power station

Annexe 5

CORINE publications -1991

Titles

0. Results of the CORINE Programme (1985-1990): overview and lessons learnt.

1. Land Cover of the territory of the European Community.

M.1 CORINE Land Cover Manual. A method to map consistently the Land Cover of the territory of the European Community and create a computerized geographical data base

2. CORINAIR. Inventory of the emissions into the air in the European Community.

M.2 CORINAIR Manual. A method to assess consistently the emissions into the air. Developed jointly with OECD.

3. Biotopes of major importance for nature protection in the European Community.

M.3 CORINE manual. A method to identify and describe consistently the biotopes of major importance for nature protection in the European Community.

4. Designated areas in the European Community.

5. Coastal erosion in the European Community.

6. Important Land Resources and Soil erosion risk in the South of the European Community.

7. CORINEAU. Study on the establishment of a European Community data base and information network on water resources.

8. Geographic framework of the European Community: Basic data in the CORINE information-system.

9. Towards a programme for environmental statistics of the European Community.

10. Environmental quality of the seas around the European Community. An evaluation of data availability.

11 Access to CORINE information.

12 CORINE data directories: sources, definitions, and related activities.

13. Transfrontier project Algarve-Andalousia.

14. Study on industrial wastes in Portugal.

15. Examples of use of results from the CORINE Programme (1985-1990).

ANNEX 6: List of figures and tables

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