

Topic report No 4/2000

Land Cover

Annual topic update 1999

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May 2000

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1. The European Topic Centre on Land Cover

1.1. Background

The European Topic Centre on Land Cover (ETC/LC) continued in 1999 to support the Agency's activities on land cover as described in the EEA Annual Work Programme 1999 and the Multiannual Work Programme 1999-2003.

ETC/LC is organised as a consortium of 16 partners as listed in table 1. The ETC/LC lead organisation is Satellus, a subsidiary of the Swedish Space Corporation and previously known as Miljödatacentrum (MDC). The Centro Nacional de Informação Geográfica (CNIG) and the European Commission Joint Research Centre (JRC) are co-leaders. The needs for research and development of methods identified in relation to the land cover topic are carried out and funded separately by the Joint Research Centre, Space Application Institute. Since July 1997, the PHARE Topic Link on Land Cover (PTL/LC, financed by the DG Enlargement Phare Programme) has extended the activities of the ETC/LC towards central and eastern Europe. The work of PTL/LC is integrated in the ETC/LC work plan. Specific information on products and progress of work of ETC/LC and PTL/LC can be found on the websites <http://ptl.gisat.cz/ptl/> and <http://etc-lc.eionet.eu.int/>.

Table 1: Compositium of the ETC/LC consortium

| Organisation | Acronym | Country |
|--|----------------|-----------------|
| Satellus | SATELLUS | Sweden |
| Geospace | GEOSPACE | Austria |
| Geographic Information Management | GIM | Belgium |
| National Environmental Research Institute | NERI | Denmark |
| Finnish Environment Institute | FEI | Finland |
| Institut Français de l'Environnement | IFEN | France |
| Federal Statistics Office | StBA | Germany |
| Hellenic Mapping & Cadastral Organisation | HEMCO | Greece |
| Natural Resources Development Centre | NRDC | Ireland |
| EU Joint Research Centre/Space Applications Institute | JRC/SAI | Italy |
| Centro Interregionale | CI | Italy |
| Centre de Recherche Publique – Henri Tudor | CRP-HT | Luxembourg |
| Centro Nacional de Informação Geográfica | CNIG | Portugal |
| Instituto Geográfico Nacional | IGN | Spain |
| Winand Staring Centre for Integrated Land, Soil and Water Research | SC-DLO | The Netherlands |
| Institute for Terrestrial Ecology | ITE | United Kingdom |

In 1999, Martin Krynitz took over as leader of ETC/LC from Rolf Bergström. The lead organisation MDC (Miljödatacentrum) changed its name to Satellus in September 1999.

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1.2. EIONET Primary Contact Points for land cover

Table 2: Overview of the EIONET Primary Contact Points for Land Cover

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1.3. Work programme for 1999

For 1999 the EEA Management Board decided to reduce the number of tasks of ETC/LC pending the decision to update the CORINE land cover (CLC) database. The main emphasis during 1999 was on:

- Preparation and support for the implementation of IMAGE2000 and CLC2000;
- maintenance of the CLC database as a key dataset for spatial analysis and integrated assessment;
- support to EEA on environmental assessment reporting and indicator-based reporting;
- collaboration with JRC for new developments and links to other land cover/land use programmes as well as GI and GIS development.

ETC/LC is using the EEA website and its public website to provide access to products relevant to the general public. Working documents and internal technical reports are uploaded under the 'interest group on land cover' on CIRCLE. CIRCLE is accessible to EIONET partners both through the EEA website and the website of ETC/LC (<http://etc-lc.eionet.eu.int>)

2. State-of-play on CORINE land cover information

2.1. CLC – a key database for integrated environmental assessment

In 1999 ETC/LC prepared a brochure to support the preparation of the CLC2000 update, the wide variety of applications in different sectors and the increasing number of CLC users. This brochure presents the essential elements of the CORINE land cover database and uses with the aim to make CLC better known and accessible.

Figure 1: Title page of new CORINE Land Cover brochure



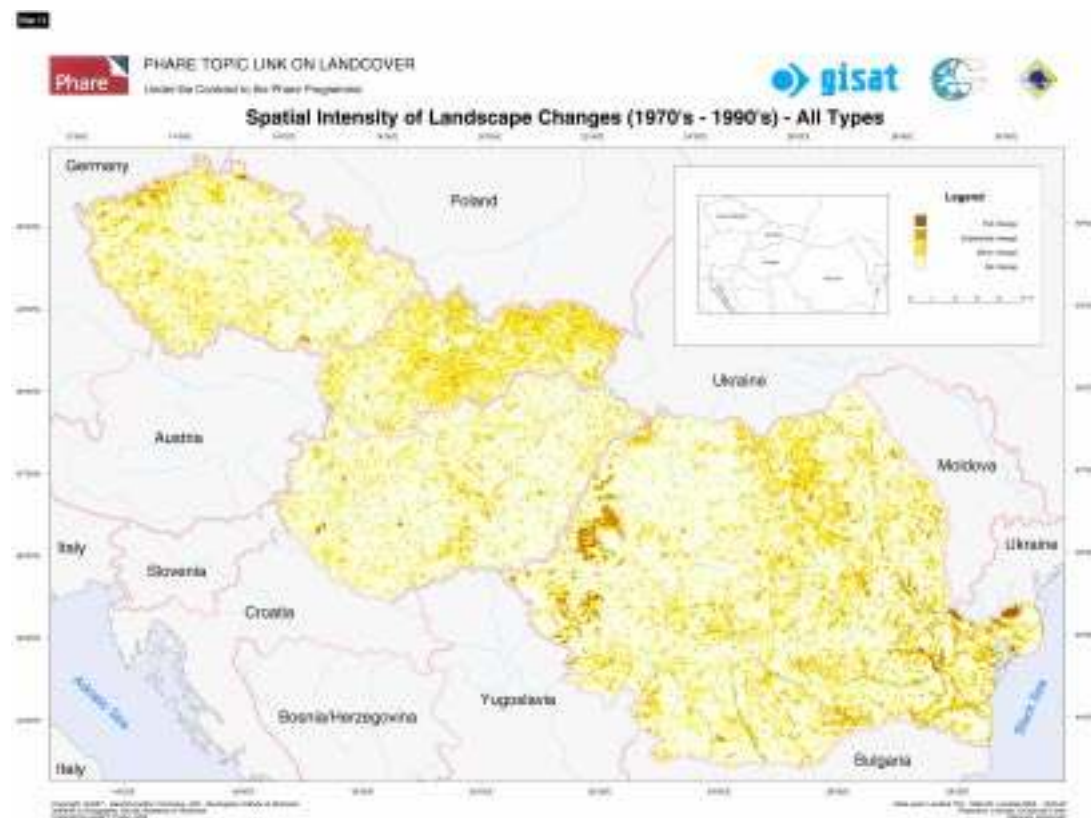
As an information source the CLC brochure, will be useful to CORINE data users, as well as a range of policy makers who require an overview of the land use footprint of the European territory as reflected via CLC. The brochure gives a brief overview of the status of this Community database, examples of recent applications, and the plans to update the information. The CLC brochure is available in both printed and digital form EEA or the ETC/LC (www.eea.eu.int or eionet-lc.eu.int).

2.2. Progress on CLC data collection

CORINE Land Cover (CLC) was initiated in the framework of the CORINE Programme (Decision 85/338/EEC) with the aim of providing consistent and comparable land cover information in Europe at scale 1:100 000. The CLC nomenclature includes 44 classes, grouped in three hierarchical levels. The minimum mapping unit is 25 ha.

ETC/LC has integrated the national land cover databases into one seamless European land cover database, resulting in an operational Land Cover database now covering 13 of the 18 EEA member countries and 10 accession countries (status December 1999).

Figure 2: Present coverage of the CORINE land cover database (status 1999)



The CLC inventory of Great Britain was completed in 1999. Sweden has completed the pilot production and is planning full production within the framework of CLC2000, which is expected to be complete in the year 2003.

Data collection for the central and eastern European countries was coordinated as part of the Phare Programme since 1991. This extended the CLC database to 13 countries, of which 10 (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) are integrated in the European CLC database. The Baltic Republics and Slovenia were included during 1999. The data of the Phare non-accession countries (Albania, Bosnia-Herzegovina and Former Yugoslavian Republic of Macedonia) will be available in the CLC database from 2000 onwards.

The CLC database is available in raster format in 100 m and 250 m resolution. The database can be previewed and ordered on-line via the EEA (www.eea.eu.int) and ETC/LC (etc-lc.eionet.eu.int) websites.

2.3. New methodological developments

2.3.1. British national CORINE land cover

The first CORINE Land Cover map of Great Britain was completed in 1999. The CLC Great Britain is based on a more detailed Land Cover Map of Great Britain (LCMGB), which was produced in accordance with national needs within application areas such as agriculture, ecology, conservation and forestry. The LCMGB was produced through automated classification of Landsat TM data (1989-1990). The LCMGB gives a raster database that identifies 25 cover-types, with a minimum mapping unit of 0.125 ha, recording landscape patterns at the field-by-field scale.

The British land cover map differs from CLC in several respects, including its spatial resolution, the land cover classes mapped and the method of production. A pilot study successfully demonstrated semi-automated procedures that can be used to convert the LCMGB to CLC specifications. These procedures involve generalisation from the 25 m resolution, reassignment of LCMGB classes to the CLC categories, generation of CLC mosaic classes in heterogeneous regions, and use of knowledge-based operations to add relevant land use information.

The semi-automatic conversion of the LCMGB to the CLC standards was completed in December 1999. The procedure has been validated against standard CLC manual methods with considerable success. The conversion ensures that CLC land cover data for Britain are calibrated against the existing national map and against proven ground reference data available from the Countryside Survey. The approach also ensures that information about CLC in Britain is entirely consistent with the national dataset. There were significant financial benefits of automated conversion of the LCMGB to CLC format, a process which is estimated to have cost about 15 % the price of a new CLC mapping of Britain.

2.3.2. Swedish national CORINE land cover

The pilot production of the Swedish CORINE Land Cover database was completed in 1999 and the main production is planned to start in 2000 and take 3 years. The National Land Survey will carry the principal responsibility for its implementation, and for ownership and utilisation issues.

The Swedish CORINE Land Cover project involves an innovative approach which combines generation of the CLC database according to the specifications of the European Topic Centre on Land Cover, with a considerably more detailed mapping tailored to the requirements of the main Swedish user organisations (National Land Survey, Environmental Protection Agency and Swedish Armed Forces).

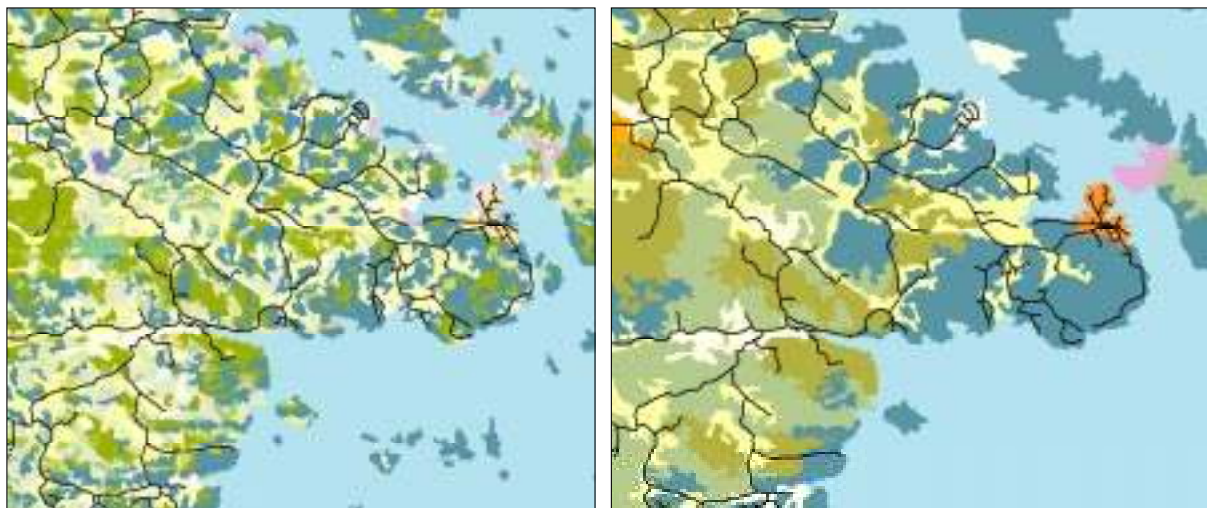
The basic descriptive unit for the more detailed national product, 'Swedish Land Cover Data' (SLD), is 1 to 5 hectares rather than CORINE Land Cover's 25 hectares. The number of thematic classes is extended to 52 classes. In addition, a pixel-based product called 'compiled pixel data' will be an output from the integrated production system.

The production methods and use of different information sources are defined in Sweden so as to meet the best combination of the requirements for both the CLC

and the Swedish Land Cover Data products, production costs and production time. To achieve this a combination of automated methods has been chosen with operator support and on-screen visual interpretation of special classes. The classes obtained through computer-based classification are classes within forest, water, mires, bare rock and urban fabric. The results from the different mapping processes are merged into one thematic layer within an automated merging process, according to defined rules. Thereafter, the thematic layer is generalised in a user-controlled and fully automated generalisation process to SLD and thereafter to CLC. Automated spatial generalisation procedures were also used in Great Britain and Finland for CORINE Land Cover data collection.

A main advantage with the Swedish CORINE Land Cover project is that it is user oriented at different scales. It has been approved by the principal user agencies and has been accepted by the National Land Survey as part of the national mapping plan. Advantages of the Swedish production system are the use of a digital production line, the high degree of automation, cost-effective quality control and coordination with other national map production systems.

Figure 3: Swedish Land Cover data (left) and CLC (right), covering 10 x 8,5 km. Road network from the topographical map is overlaid.



2.4. Preparation of the CLC2000 update

Interest and demand for using land cover as a basic layer for spatial analysis within integrated environmental assessment is increasing rapidly at local, regional and European level. To respond to these user needs, a proposal for update of the European CORINE Land Cover database, called CLC2000, providing European wide consistent information on land changes was prepared during 1999. The decision to update the CORINE Land Cover database was taken in late 1999 upon EEA's evaluation of the present and future needs of different users at national and European level. The experience and lessons learnt from the original CORINE project were taken into account.

On the basis of this evaluation, a proposal for CLC2000 was submitted by EEA together with ETC/LC and EU Member States at the 3rd EIONET Land Cover Workshop, which took place 12-13 January 1999 in Brussels. The CLC updating will serve both European and national needs. The satellite images that are the basic input source for updating the land cover database will provide a common reference

between national and European demands. This common image reference database is called IMAGE2000. Countries will envisage aggregation from national land cover inventories towards a consistent CLC European inventory.

A baseline commitment for funding with cost sharing between Member States and the European Commission was established in 1999 and 11 EEA member countries committed themselves to participate in the update

ETC/LC produced a technical reference document for the CLC2000 project that describes the project set-up and task descriptions in detail. In brief, the update will be based on mapping of land cover changes using satellite image comparison. This will require a review of the geometric and thematic quality of the first CLC inventory to assure a fully consistent CLC2000 product.

The novelties of the CLC2000 update are:

- agreement with all partners on the reference year 2000;
- creation of an image reference database IMAGE2000 based on satellite data that will be used at European level as well as national level;
- improved consistency between existing national land cover inventories and the European CLC;
- reduced production time for making information available on land cover changes;
- reduced costs for data collection compared to the first inventory;
- improved documentation of the land cover meta-data;
- agreement on dissemination of information and improved accessibility.

IMAGE2000 is not just a by-product of CLC2000, but should be seen as a multi-purpose product in itself, since it will establish a multi-spectral satellite database with a complete EU coverage. IMAGE2000 is a digital satellite data mosaic covering the Member States, based on an agreed European reference system. It will be a unique GIS layer, which can serve as basic geometric reference layer and will provide a snapshot of Europe during the summer season 2000 +/- one year as reference.

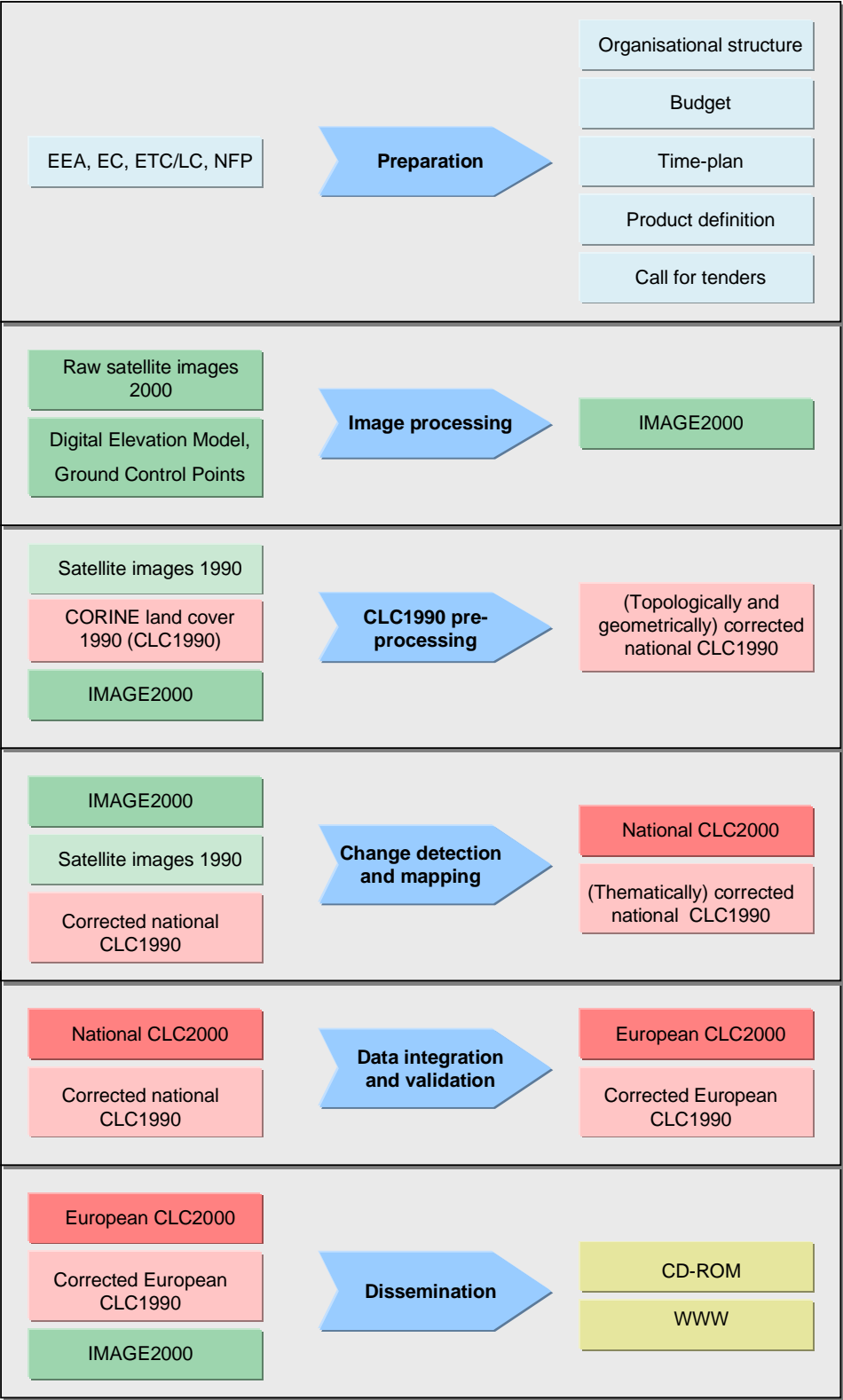
IMAGE2000 is the main input to the CLC2000 production, as shown in the production flow in figure 4 shows. IMAGE2000 is planned to be available by the end of 2001.

The following products are the main outputs of CLC2000:

- IMAGE2000 ortho-corrected multi-spectral satellite reference database for the year 2000 at 25 m ground resolution.
- Updated CORINE land cover database for the year 2000
- Database of land cover changes larger than 5 ha between CLC1990 and CLC2000

It is envisaged that the CLC2000 project will be completed in 2003.

Figure 4: Production flow of CLC2000



2.5. NATLAN: EEA website access to land cover data and information

ETC/LC provided support on data processing and documentation for a new key product of EEA called NATLAN which was made accessible on EEA website in March 2000. NATLAN (acronym for NATure/LANd cover) is an information package designed for viewing and distributing EEA information, data and applications on land cover and nature in a comprehensive and easy-to-use way for policy makers, specialists and the general public. NATLAN was developed by EEA in close collaboration with its European Topic Centres on Land Cover and Nature Conservation.

In both EEA and its Topic Centres large amounts of datasets and applications are being produced and used in environmental assessment reports. Geo-referenced data are not easily accessible through the reports or their statistical compendia. The aim of NATLAN is therefore to bring to public use this wide range of geo-referenced datasets, applications and information.

This first NATLAN product, called NATLAN version 1.0, is a data carrier containing the latest version of land cover and some nature datasets as well as a selection of map applications from *Environment in the European Union at the turn of the century* (EEA, 1999).

NATLAN, which can be used on standard PC platforms with publically available browsers, allows navigation and viewing of separate layers of datasets and documentation on these datasets (see figure 5). It contains simple tools for viewing, zooming and downloading. No GIS facilities are installed. Explanatory text and reports relevant to understand and use the data are also included.

The NATLAN map applications are presented in table 4, grouped by environmental theme.

Figure 5: NATLAN home page on EEA website (<http://natlan.eea.eu.int>)



Table 4: Overview of land cover map applications on NATLAN vers.1.0

| |
|---|
| <p>Biodiversity change</p> <ul style="list-style-type: none">• Areas remote from urban and transport pressures• Pressure from urban areas on internationally designated areas• Pressure from railways on internationally designated areas• Pressure from roads on internationally designated areas• Pressure from agricultural areas on internationally designated areas• Fragmentation of large forest complexes(>600 km²) by major roads• Regional predominant pressures on coniferous forest• Regional predominant pressures on dry grassland• Regional predominant pressures on wet grassland• Fragmentation of land by urbanisation, transport infrastructure and agriculture• Agricultural intensification of grassland• Agricultural abandonment of grassland• Grassland and sparsely vegetated areas (EUNIS habitat types)• Agricultural areas (EUNIS habitat types)• Wetlands and water bodies (EUNIS habitat types)• Wooded species (EUNIS habitat types)• Forested areas (EUNIS habitat types)• EUNIS Habitat types per Biogeographic Region <p>Societal developments and use of resources</p> <ul style="list-style-type: none">• Pressures by urban areas and transport network• Built-up land by major river catchment area• Forest and semi-natural area per inhabitant by administrative unit• Ratio of forest and semi-natural areas to agriculture and urban areas by administrative unit• Fragmentation of large forest complexes(>600 km²) by major roads• Regional coincidence of some environmental pressures and impacts (hot-spots) <p>Urban areas</p> <ul style="list-style-type: none">• Comparison of population distribution by administrative unit and by land cover unit• Zoom in on urban and rural Area Bonn-Brussels-Paris• Urban expansion in Porto• Urban expansion in Dublin• Forest around capitals in Europe <p>Mountain, rural, coastal areas</p> <ul style="list-style-type: none">• Zoom in on mountain and coastal areas Perpignan-Turin• Population density and land cover in coastal areas• Forests |
|---|

3. Regional assessments of land cover changes

3.1. Introduction

Land use, land cover and their changes reflect to a certain extent the interaction of both the human response to land management policies and the response of environment to the human intervention. To predict what land use and land cover may be in future and to assess the environmental impact of current or future human activities, under assumed socio-economic conditions, the understanding of changes which occurred in the past is fundamental. Historical land cover databases and the associated information on land use are becoming more and more important to developing the understanding. This is happening at the same time when concerns about sustainable development of the territory are increasing at European level. Land use systems, their characteristics and spatial patterns are important indicators of sustainable development.

PTL/LC in 1999 focused on the analysis of land cover changes in central and eastern Europe, while JRC/SAI was leading on a number of case studies on land cover changes, as presented below.

3.2. Land cover changes in Central and eastern Europe

An inventory and analysis of major land cover changes in Central and eastern Europe over the past 20 years were carried out by the Phare Topic Link. The two main objectives of this task were:

- assessment of major land cover changes between the 1970s and 1990s;
- inventory of land cover changes between 1990-1998 using high resolution data.

Major land cover changes were identified and mapped for the Czech Republic, Hungary, Romania and Slovakia. Data on land cover changes were collected by means of image-to-image comparison between archived Landsat MSS data and Landsat TM data using the CORINE Land Cover 1990 map as reference. The major land cover changes were identified up to the second level of the CLC nomenclature (15 classes).

Land cover changes that occurred in the late 1990s were examined on four test sites located in different bio-geographic regions in the Czech Republic, Lithuania, Romania and Slovakia. Using the latest available satellite data, a detailed inventory of land cover changes on the 3rd level CLC nomenclature was mapped (44 classes).

The analysis of landscape changes by combining satellite images and CLC1990 opened new possibilities to monitor landscape changes.

Some preliminary conclusions:

- In Czech Republic, Hungary, Romania and Slovakia, built-up areas increased by over 60 000 ha between the mid 70s and early 90s, an increase of at least 10 ha/day.
- The most significant land cover changes which occurred during the period 1970s-1990s were connected to the changes in agriculture practices and changes in forest area. After the political reforms in the period 1989-1991, agriculture land was returned to former owners resulting in an extensification of agriculture activities. This extensification affected over 350 000 ha of agriculture land in Romania, 75 000 ha in Slovakia, 22 000 ha in Hungary and 17 000 ha in Czech Republic.
- In contrast, an intensification of agriculture could be detected for instance by improved water management measures on agricultural land. This intensification was most extensive in Slovakia, where over 100 000 ha of land transferred to intensive agriculture could be mapped.
- Table 5 summarises the extent of deforestation and afforestation over the period mid 1970s – early 1990s.

Table 5: Deforestation and afforestation for the period mid 1970s to early 1990s

| | Deforestation (in ha) | Afforestation (in ha) |
|----------------|-----------------------|-----------------------|
| Czech Republic | 167 700 | 26 300 |
| Hungary | 66 600 | 48 200 |
| Romania | 285 900 | 278 100 |
| Slovakia | 94 900 | 13 100 |

A topic report on assessment of land cover and land use changes in Central and eastern Europe will be published by the end of 2000.

3.3. Land cover change in coastal zones in relation to pressure from urbanisation and tourism

JRC/SAI- ARIS unit together with the Centro de Investigação da Universidade Atlântica (CIUATLA) Portugal conducted a study to design a methodology to better understand land use change patterns in coastal areas through the analysis of the impact of human and biophysical dynamics. The project, called Alencoast, is based on the results of the Lacoast Project (Land cover changes in the European coastal zones). The study area was the coast of the Alentejo region in Portugal.

The project was based on a cross-disciplinary approach to examine societal driving forces – political, economic, institutional and social – that influence the development of coastal areas and modify the landscape by changing landforms, land use and land cover.

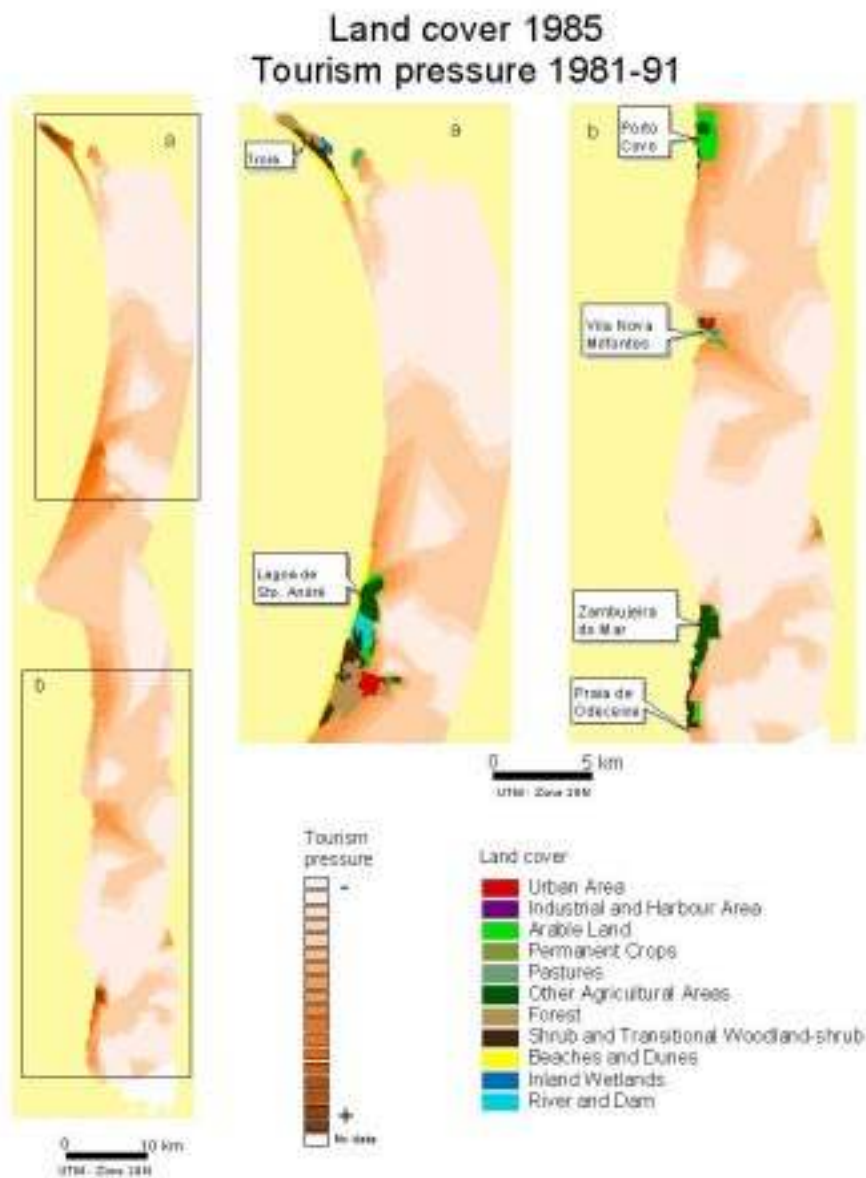
The main objectives were to:

- examine the influence of socio-economic and biophysical driving forces on land use changes in the coastal zone of the Alentejo region;
- identify the various actors within the territory to allow better understanding of how their behaviour and strategies explain land use changes;
- contribute to the development of the application of methodological tools for integrated analysis to achieve spatial comparability of various kinds of data.

Figure 6 presents a spatial representation of the increase in pressure by tourism on the coastal zone region of Alentejo as monitored between 1981 and 1991. The land cover footprint of 1985 is represented in overlay for a number of coastal locations.

Analysis of the processes of change in coastal areas and their relation with external driving forces, such as land management policies, was made possible only by considering regional dynamics. The methodology is designed to analyse the problem progressively by different administrative level – national, regional and local – and by using different techniques according to the specific characteristics of the aspects, which are the objects of analysis. The project benefits from the results of other projects carried out by the team focused on the Alentejo region.

Figure 6: Preliminary results of assessing changes in tourism pressure in the coastal Alentejo region



Source: JRC/SAI, CIUATLA, 1999

Conclusions of the report indicate that:

- areas with the greatest increase in tourism pressure are the beaches, lagoon areas (estuary of the rivers Sado and Mira, and the Santo André lagoon), and the rocky coast marked by very steep slopes. These are areas that should be preserved, given their landscape beauty, the existence of unique flora and fauna, and the scarcity of human occupation. A natural park in this coastal band has been demarcated.
- the main land cover changes that occur are related to the increase in urban areas to the detriment of essentially agricultural areas. This trend corresponds to pressure exerted in this region by various recent private investment plans for tourism. Their establishment has however been stopped by fiscal restrictions by various territorial ordinance tools such as the Coastal Fringe Ordinance Plans and the Coastal Alentejo Natural Park Ordinance Plan.

The report on the Alencoast Project was completed at the end of 1999 and is available from the website of JRC Space Applications Institute (<http://www.sai.jrc.it/>).

3.4. Land use and land cover changes in the Oder catchment

An analysis of land use and land cover changes in the Oder river catchment was launched in 1999 by JRC/SAI and IGIK, Poland, identifying biophysical and socio-economic drivers affecting opportunities and constraints for decisions concerning land use inside the catchment between 1975 and 1992, and over the past 150 years. Data from the first half of the 19th century was used (Prussian topographic maps at scale 1:100 000 issued in 1816-32), maps dated 1945-48 and other data sources covering the 150-year period.

The analysis is designed to:

- interpret the changes in land cover and land use between the period of 1975 and 1992;
- spatialize them, based not only on the information derived from the geo-referenced databases, but also integrating information provided by other sources, in particular socio-economic data relevant for this period;
- use available historical information on land cover in order to analyse the major (human or environmental) causes of land cover changes in different historical contexts and different socio-economic conditions.

Results from this assessment will be made available to the public during the second half of 2000 through the website of JRC Space Applications Institute (<http://www.sai.jrc.it/>).

4. Support to EEA environmental reporting

4.1. Development of spatial and territorial indicators using land cover data

ETC/LC collaborated with the ETC on Nature Conservation on the preparation of the indicator fact sheets for the EEA indicator based report *Environmental signals 2000*, EEA 2000. ETC/LC supported the ETC on Nature Conservation by producing an extensive statistical data set describing the types of land use and land cover classes which occur in or near protected European wetland sites (RAMSAR and SPA) by country. The main achievement was to aggregate several heterogeneous datasets into a proxy-indicator indicating the pressure from different land use types (transport, urbanisation, agriculture) on wetlands. Table 5 shows the selected indicators based on land cover and land use information that were included in the EEA report *Environmental signals 2000*.

Table 5: Selected indicators for EEA's first indicator based report based on land cover information

| Indicator | Policy issue | Assessment |
|---|--|------------|
| Land cover in and around Ramsar areas | What are the pressures on wetlands? | K |
| Proximity of transport infrastructure to Ramsar areas | What are the pressures on wetlands? | L |
| Designated area under the Ramsar convention | How much wetland is protected from damage or loss? | J |

The methodology applied for these spatial indicators was developed by ETC/LC during 1999 and described in a technical report on 'Development of environmental indicators using land cover data: spatial and territorial indicators', to be published by EEA in 2000. This technical report presents an overview of different spatial indicators based on land cover data together with a summary of the political importance of the CORINE land cover database side by side with the technical scope possible with the data set. The report includes a chapter on best practices for using the data when addressing a range of issues and at different levels of interest (EU, national and even local levels are considered).

The report gives a well-illustrated picture of the broad range of areas where land cover based indicators could help to provide aggregated information for EU policies. Examples are presented for the following policy areas:

- The natural environment
- Agricultural and rural policies
- Coastal policies
- Transport policies
- Climate change
- Spatial planning
- EU Accession

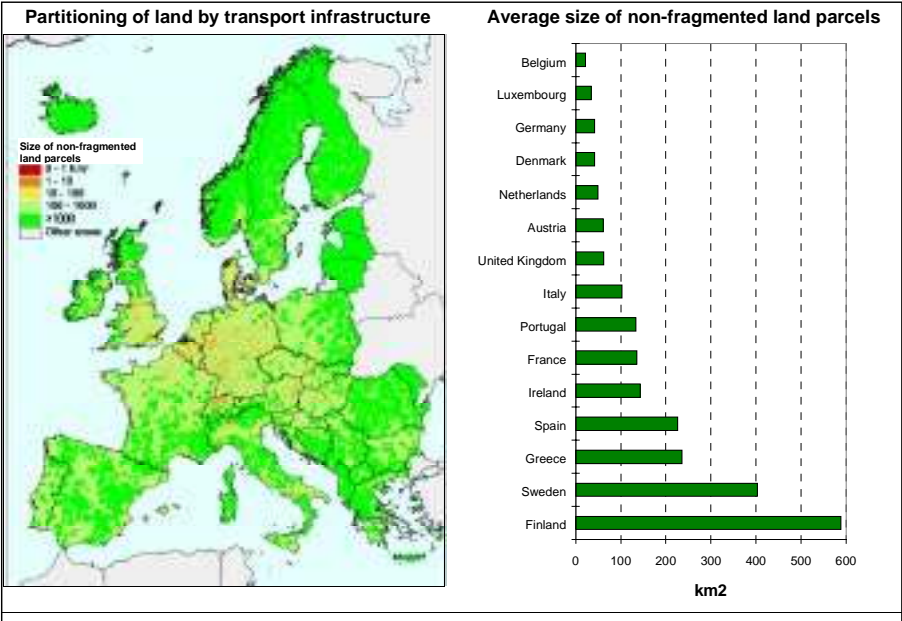
And for regional and national levels examples are shown for ‘the implementation of EU policies’ and ‘national and regional needs’. Another chapter deals with assessment using CLC and how by using geo-statistical analysis environmental and economic data can be integrated for better accounting and modelling. The report will be published in the year 2000.

4.2. Contribution to the transport and environment reporting mechanism

ETC/LC provided contributions to the report *Towards a transport and environment reporting mechanism (TERM) for the EU, EEA 2000*, which was produced by EEA in collaboration with Eurostat. The report aims to support better decision-making by integrating environmental concerns into transport policies, as required by the European Council. The Topic Centre supported the development of indicators on infrastructure influence on ecosystems and habitats (‘fragmentation’), proximity to nature conservation sites and land take by transport.

The fragmentation indicator is based on the partitioning of land by transport infrastructure (see figure 7).

Figure 7: Fragmentation of land by transport in Europe

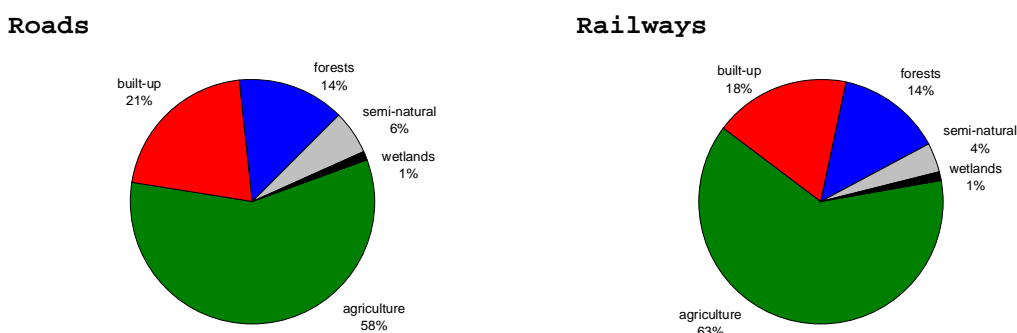


Source: EEA, Eurostat, 1999

The potential environmental impact of transport infrastructure strongly depends on the type of land affected (including its immediate surroundings). Figure 8 shows that road and rail infrastructure withdraws land mainly from agricultural use and to a lesser extent from built-up areas. The share of land take from semi-natural areas and wetlands is slightly more for roads than for railways. This information is extracted from the CLC database by superimposition of the infrastructure network on the map of major land cover types.

Other important factors are the infrastructure characteristics, which determine for example the visual impact on the landscape and the extent to which the infrastructure constitutes a barrier hampering the movement of animals or people.

Figure 8: Land take by roads and railways according to land-cover type



To compare modes, land take needs to be linked to the traffic capacity of each mode. This requires data (length according to various infrastructure types, width, geographic location, etc.) that is currently not regularly collected by Member States.

4.3. Contribution to the European spatial development perspective

ETC/LC contributed to the preparation of the first report on the European Spatial Development Perspective (ESDP) prepared by DG Regional Policy. The final report 'ESDP – European Spatial Development Perspective – Towards balanced and sustainable development of the territory of the EU' (1999), contains information and illustrative maps derived from CORINE Land Cover. This report can be found under: http://www.inforegio.org/wbdoc/docoffic/official/sdec/som_en.html.

The study programme for European Spatial Planning (SPESP) ran throughout 1999 and aimed to extend the ideas of ESDP towards an indicator-based approach. The SPESP report '1.6 Natural Assets' was supported by ETC/LC, which provided advice and comments on how to apply EEA's indicator-based approach to the subject, as well as ideas on how to build indicators. This work is being continued by the Topic Centre in 2000 when new policy relevant environmental indicators will be developed.

ETC/LC represented EEA in a number of meetings of the European Commission ESDP related programmes:

- ESDP/SPESP – meetings in Nijmegen (June 1999) and Rome (October 1999).
- The TERRA Programme, 'Workshop on Indicators as a tool for managing and monitoring a sustainable local and regional planning process' (November 1999).

4.4. Advisory Group on Spatial Analysis

The EEA Management Board in July 1999 approved the establishment of an advisory group on spatial analysis and territorial assessment to help define a work programme and steer various emerging activities on spatial and territorial analysis to be carried out by ETC/LC, other ETCs or other organisations in support to European policy development.

EEA is facing increasing demands for spatial and territorial analyses from its clients to support policy development such as strategic environmental assessment of the trans-European transport networks, environmental impact of the reformed Common Agriculture Policy, new Water Framework directive, nature conservation, soil degradation, urban environment and spatial planning. EEA itself needs to improve integration of spatial datasets from different sources and co-ordination of spatial analysis within topic centres to ensure the consistency and comparability of territorial

analysis as contributory elements for meaningful indicators for integrated assessment and reporting.

The advisory group is involving a core group of experts from EEA, EEA Scientific Committee, ETCs, NFP/NRCs and relevant Commission services.

The first meeting of the Advisory Group was held in October 1999. Common needs for spatial data, methods and capacity were identified by the group and should steer priority areas for the further development of EEA's activities on spatial integrated assessment:

1. Development of spatial indicators to improve EEA's yearly indicator based report, sectorial indicator reporting and integrated assessment reporting. Guidance, documentation of spatial data and interoperability should be further developed by EEA in collaboration with JRC. Special attention should be given to agri-environmental indicator development and spatial indicator development as proposed by the ESDP.
2. Improvement of the existing data on European watersheds for environmental assessment on catchment and sub-catchment level to support to the development of the proposed Water Framework Directive. The Environment DG, JRC, Eurostat/GISCO, Marine Conventions and EEA should develop jointly this common database on watersheds.
3. Spatial data handling and analysis of information related to biodiversity and nature to support the development of the Community Clearing House Mechanism and EUNIS, the European Information System on Nature, which provides the main information background for the support to the Commission on NATURA2000 and EEA reporting. The Environment DG, JRC and EEA should give priority to the completion and management of the database with boundaries of protected sites and exchange information with other interested DGs.

5. ETC/LC products 1999

Table 6 gives an overview of reports, databases and software produced during 1999 and available from EEA or ETC/LC.

Table 6: Overview of products prepared by ETC/LC during 1999

| Title | Available from | Content |
|---|---------------------------|---|
| <i>Assessment and topic reports</i> | | |
| Environmental signals 2000, chapter on Wetlands | EEA ETC/NC; ETC/LC; | The chapter compares indicators used and compared to allow effective assessment of wetlands (EEA Environmental Assessment report n° 6) |
| Land Cover Annual Topic Update 1998 | EEA; ETC/LC | Summary description of progress and results 1997. (EEA Topic Report n° 9/1999) |
| <i>Technical reports</i> | | |
| Development of Environmental Indicators using Land Cover Data: Spatial and Territorial Indicators | EEA | Summary of the policy importance of the CORINE Land Cover side by side with the technical scope possible with the data set. (EEA publication foreseen 2000) |
| ETC/LC contributions to SPESP report | ETC/LC | Contribution to final report on the Study Programme on European Spatial Planning within the frame of the ESDP preparation (DG Regional Policy publication foreseen 2000) |
| Indicator fact sheet for the Transport and Environment mechanism report (proximity and land take) | ETC/LC; EEA | Provision of a suitable indicator for the report 'Towards a transport and environment reporting mechanism (TERM) for the EU' (EEA publication foreseen 2000) |
| Technical Reference Document – CORINE Land Cover Update IMAGE2000 and CLC2000 | EEA; ETC/LC | This document outlines the production process for IMAGE2000 and CLC2000 and shows how these are integral parts of the overall CLC2000 update. Central questions are answered and guidelines are given. (EEA publication foreseen 2000) |
| <i>Other publications</i> | | |
| CORINE Land Cover – a key database for European integrated environmental assessment | EEA; ETC/LC | This brochure allows a quick entry to the description and status of CORINE land cover information at European scale (EEA, 1999) |
| <i>Databases</i> | | |
| CORINE Land Cover 100 m and 250 m grid database | EEA; ETC/LC | The 100-m grid database is available from ETC/LC via the Helpdesk service. The 250 m grid database is available from EEA NATLAN CDROM, (Updated CORINE Land Cover CD-ROM) via the Helpdesk service or directly from the EEA Website. (EEA, 2000) |

6. Plans for 2000

ETC/LC will continue its support to EEA in 2000. The focus in 2000 will be on the CLC2000 update, maintenance of the CLC information system, GIS support to the Agency and support to EEA reporting (*Europe's Biodiversity and Environmental signals 2001*).

The 4th Land Cover Workshop will be held to discuss issues relating to CLC2000. GIS support will be given to ETC on Nature Conservation, ETC on Inland Waters and to the Agency for several tasks.

Table 7: Summary of main events and deliverables for 2000

| Type of product/event | Title | Main user | Date |
|-----------------------|--|-------------------------|--------------------------------------|
| Work plan | Technical Work plan 2000 | EEA, EIONET | 15 Feb 2000 |
| Progress report | Quarterly Reports | EEA | 20 Apr , 20 Jul, 20 Oct, 20 Dec 2000 |
| Topic report | Annual Topic Update 2000 | EIONET | 15 Dec 2000 |
| Newsletter | News Report, Newsletter No 12 | EIONET, Public | 15 Apr 2000 |
| Newsletter | News Report, Newsletter No 13 | EIONET, Public | 30 Oct 2000 |
| Website | ETC/LC website linked to EEA website and CIRCLE Land Cover Interest Group | EIONET, Public | Continuous |
| Workshop | EIONET Land Cover Workshop | EIONET | 10-12 April 2000 |
| Database | CORINE Land Cover (Vector 1:100 000, raster 100m & 250 m) | EIONET, EC, EEA | 15 Jun 2000 + 15 Dec 2000 |
| Technical report | Implementation of CLC2000 – Phase 1 Progress report | EIONET, EC, EEA | May 2000 + Nov 2000 |
| CDROM | NATLAN, integrated land cover and other geo-referenced information | EEA, EIONET, EC, public | Feb 2000 |
| Technical report | Carbon estimate 1990 in EU vegetation and soils based on CLC and soil map | EC | May 2000 |
| Maps | Europe's biodiversity report – GIS and mapping | EEA | May 2000 |
| AGSA meetings | EEA Advisory Group on Spatial Analysis – Steering Committee meetings I&CLC2000 | EC, EIONET | March, May, October 2000 |