ESPON project 2.4.1

Territorial Trends and Policy Impacts in the Field of EU Environmental Policy

Executive Summary

Co-financed by the European Community through the Interreg III ESPON Programme

Foreword

This executive summary formulated from the final report presents the results of the project "2.4.1 - Territorial Trends and Policy Impacts in the Field of EU Environmental Policy", which was conducted within ESPON 2006 Programme.

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1 ESPON Environment in a nutshell

The aim of the ESPON 2.4.1 project "Territorial trends in environment and impacts of EU Environment Policy" is to prepare for the improvement of knowledge on environmental issues and trends as well as impacts of EU Environment Policy related to the development of the European territory. The work of the project covers three main tasks.

Territorial trends related to environmental issues

The ESPON 2.4.1 project presents territorial trends, situations and structures at European scale in relation to the main environmental issues of relevance for the development of regions and larger territories. The interpretation of CORINE Land Cover data shows interconnections between territorial development and environmental structures. Socio-economic data, information on infrastructure and data of the Natura 2000 network are combined to identify, how their interrelation may affect spatial development.

Proposal for a Territorial Impact Assessment

The project proposes a feasible Territorial Impact Assessment (TIA) of EU Environmental Policy based on test studies related to three elements of European environmental policy (water management, nature and biodiversity, civil protection). The TIA methodology that is suggested has two levels: At the first level, basic connections and influences between policies, territorial trends and territorial objectives are identified and quantified. At the second level, TIA estimates the territorial effects of EU environmental policies on a certain region, taking into account the regional performance of chosen indicators. The TIA methodology was tested in five case studies on different spatial levels: In the Emsland (Germany) on the local level, in Andalusia (Spain) on the regional scale, in Finland on the national level, in Slovenia on the transnational level, and on European level. The TIA methodology utilises the indicators that describe the territorial trends related to environmental issues and sets the results into relation to general territorial objectives.

Recommendations for future applied research

The ESPON 2.4.1 project gives also recommendations and proposals on future research projects linked to environmental trends and EU Environment Policy that can foster the integration of environmental concerns into territorial development strategies at different scales. The recommendations for future applied research are based on the outcomes of a comprehensive literature review and review of European Environmental Policy documents. The experiences of the application of the TIA approach and the process of

developing indicators for territorial trends related to environmental issues revealed additional data gaps and needs for research.

2 Main results

2.1 Review of literature and policy documents

The most explicit document in terms of territorial impact of environmental policy is the "Scoping document and summary of political messages for an assessment of the territorial state and perspectives of the European Union" launched in 2005. The document mentions explicitly the Strategic Environmental Assessment (SEA), the Habitats and Birds Directives and the Water Framework Directive (WFD) having a strong territorial impact. It can be seen as basis for the follow-up policy document that is currently under preparation and will be endorsed by the Ministers for Spatial Development in 2007.

The Third Report on Economic and Social Cohesion (3rd Cohesion Report) refers to territorial cohesion. Especially for areas constrained by their geographical features, the accessibility and the availability of essential services have to be maintained or developed. However, the need to safeguard the environment has to be taken into account in this context, as well as development strategies for other spatial types.

The Lisbon Strategy was adopted in 2000, and re-launched by the EU Council in 2005 in order to prioritise growth and employment. The environmental policies contribute to the envisaged goals of the Lisbon Strategy at least by maintaining a good status of the environment as important factor for economic growth.

The EU Sustainable Development Strategy (Gothenburg Strategy) calls for an Impact Assessment of all EU policy proposals in order to ensure that they include a sustainability impact assessment covering their potential economic, social and environmental consequences. Based on this the goal, the Commission, the EU Parliament and the Council have agreed on an Impact Assessment in 2002.

Related to the analysis of territorial or spatial impacts on the background of the existing spatial policies, the policy framework of the European Spatial Development Perspective (ESDP) has three fundamental goals: economic and social cohesion, sustainable development and the competitiveness of the EU territory. The term Territorial Impact Assessment (TIA) is used in the ESDP and understood as an assessment tool for evaluating major projects. It

is defined as "a tool for assessing the impact of spatial development against spatial policy objectives or prospects for an area".

2.2 Territorially and spatial planning relevant elements of EU Environmental Policy

The elements of European environmental policy were analysed in the ESPON 2.4.1 project according to their territorial and spatial planning relevance. The identified elements have an explicit territorial dimension and their implementation might lead to either a conflict, duplication or to coherence with spatial development goals and/or spatial planning policies. The table below gives an overview how the experts of the Transnational Project Group (TPG) of the ESPON 2.4.1 project estimated the relevance of policy elements.

Based on the review in table 1 the ESPON 2.4.1 project had a closer look on the following elements of European environmental policy: *Air*, *Civil protection and environmental accidents*, *Nature and Biodiversity*, and *Water*. These elements stress either a side-related dimension (Civil Protection) a network dimension (Nature and Biodiversity), or an area-wide dimension (Water Management, Air).

Table 1 Overview of environmental themes that are part of the EU environmental policies and their spatial relevance (++: strong; +: moderate; 0: low) (source: own elaboration)

EU environmental theme	Territorial relevance	Explicit spatial planning dimension
Air	+	+
Biotechnology	0	0
Chemicals	0	0
Civil protection and environmental accidents	++	++
Climate change	+	+
Land use	++	++
Nature and biodiversity	++	++
Noise	+	+
Soil	++	++
Waste	++	++
Water	++	++
Environmental economics	+	0
Health	0	0
International issues	0	0
Environment and enlargement	++	Some, but very broad set of policies included which are also parts of other policy areas
Sustainable development	++	Some, but very broad set of policies included which are also parts of other policy areas
Industry	+	Some, but also part of other policy area

2.3 Review of models and tools for Territorial Impact Assessment

The ESPON 2.4.1 project reviewed existing EU approaches (EU Commission Guidelines on Impact Assessment, Environmental Impact Assessment and Strategic Environmental Assessment), approaches developed in the ESPON programme and other models and tools for territorial impact assessment.

The EU Commission's internal Guidelines on Impact (European Commission, 2005) provide a useful step-by-step guidance to carry out the impact

assessments of major legislative and policy-defining initiatives set out in the Commission's annual Work Programme.

Table 2 Possible assessment steps of a TIA for EU environmental policies. (source: own elaboration)

Elements of assessment procedures under EU legislation or EU activities	SEA Directive equivalent	EIA Directive equivalent
1. Description of the intervention and identification of significant effects	Art. 5, p. 1	Annex III (1)
2. Consultation of authorities	Art. 6, p. 3	-
3. Description of significant effects	Art. 5, p. 1	Annex III (3)
4. Evaluation of significant effects	Art. 5, p. 1	Annex III (4)
5. Consultation of the public	Art. 6, p. 4	-
6. Assessment of significant effects	Art. 3	Annex III (4)
7. Integration of considerations into the programme or policy	Arts. 8, 9	-
8. Identification of reasonable alternatives	Art. 5, p. 1	Annex III (2)
9. Measures envisaged to reduce or eliminate contradictory or negative effects	Art. 7, p. 2	Annex III (5)
10. A non-technical summary of the information provided under the above headings	Annex II	Annex III (6)
11. Monitor the significant effects of the implementation	Art. 10, p. 1	-

A Territorial Impact Assessment as envisaged in the ESPON programme has to be carefully distinguished from a general policy impact assessment as described above. A TIA focuses on territorial effects of a policy and is of a more general nature because it is related to "territory" and thus comprises several elements of the spatial structure such as infrastructure, settlement areas etc.

Certain assessment steps of the TIA for EU environmental policy have to be seen in relation to the frameworks of the Environmental Impact Assessment (EIA) Directive (85/337/EEC) and the Strategic Environmental Assessment (SEA) Directive (2001/42/EC). The table below shows the equivalent parts as mentioned in the SEA and EIA Directives.

EIA and SEA applications in EU Member States show a large variety despite the existing common framework. In some countries (e.g. Finland, Netherlands, Germany) both assessments are complementary. In other countries (e.g. Sweden) EIA and SEA are overlapping.

Similar to the large variety of application and implementation of the SEA Directive also the EIA Directive's application shows this fact. The report "On the Application and Effectiveness of the EIA Directive" in EU Member States (European Commission, 2003) "has revealed several shortcomings and weaknesses. In the Commission's view, in some Member States there are examples of very good practice, e.g. in relation to encouraging public participation or providing for clear quality control procedures. In others (and sometime in the very same Member States that have elements of good practice), there are still weaknesses." (European Commission, 2003, p. 6)

These differences and shortcomings of the implementation of a Directive or at least an assessment framework shall also be kept in mind for the future application of any territorial impact analysis.

The review of ESPON policy impact projects showed interesting attempts, which partly have been considered as a basis for the development of procedural steps for a TIA for EU Environmental Policies. However, the assessment of TIA approaches of the first ESPON phase has shown some difficulties concerning a quick progress to apply and further develop a common TIA (ESPON project 3.1, 2004, p. 434):

- The present orientation of EU policy programmes is still far away from actually taking into account spatial development goals and concepts;
- Hence, as a direct consequence of that orientation, there is a lack of territorial differentiation of policy implementation data;
- Finally, the elaboration of spatial development goals and concepts in the wake of the ESDP has not yet achieved operational results appropriate for assessment.

One of the important tasks of the cross-thematic project ESPON 3.1 "Integrated Tools for European Spatial Development" was to contribute to the methodological development of territorial impact assessment, as proposed initially in the ESDP. It describes territorial cohesion to be the most important goal a territorial impact assessment has to refer to. One of the

project's outcomes is a ten-point list of "TIA minimum requirements", structured in three phases:

- Scoping (Reference to policy interventions; Hypothesis on cause-effect-relations; Regional scale of observation; Reference to past and future);
- Analysing (Interventions and effects measured; Quantitative/qualitative appraisal; Technique of analysis);
- Assessing (Goals referred to: polycentric spatial development/territorial cohesion; Applied meaning of 'spatial/territorial'; Territorial coverage of outcome).

The cross-thematic project ESPON 3.2 "Spatial Scenarios and Orientations in Relation to the ESDP and Cohesion" presented a working paper that concludes that the goal of assessing policy impacts is to develop a tool for ex-ante evaluation of policies (ESPON project 3.2, 2005). Such an ex-ante evaluation can only be very approximate and depends on a series of hypotheses concerning cause and effect relationships. Further, it requires in-depth knowledge about the complexity and diversity of regional contexts in which a given policy is applied.

This sets the frame for the ESPON 2.4.1 project in order to guarantee compliance with the ESPON project 3.2: Cause-effect chains that are used at scoping phase should ideally link elements of EU environmental policies with those territorial trends which have been identified by the ESPON 3.2 project and which can be measured by indicators. Thus, a qualitative but logical connection between policies and their effects exists – at the same time changes in territorial trends can be measured quantitatively.

In recent years, the EU funded several initiatives and projects in the areas of Impact Assessment and sustainable development, many of them focusing on the effects of EU environmental policies (mainly climate change policies and research policies).

When comparing different Impact Assessment approaches it becomes obvious that especially the modelling of the system shows large varieties, depending on the objectives and complexity of the assessment. The I.Q. Tools, which is a web-based software to support the process of the EU Impact Assessment procedure, contains an inventory of models and indicators that can be used for undertaking Impact Assessment. This inventory holds a section on environmental impact assessment models.(I.Q. Tools, 2006).

Concerning the (IMP)³ project (IMProving the IMPlementation of Environmental IMPact Assessment), the following aspects should be

highlighted: As a result of the five-year-report, the Commission aimed at a deeper evaluation of problematic aspects of the EIA Directive and launched a project within the 6th Framework Programme (European Commission 2001) The project (IMP)³ is based on the results of this report.

Concerning risk assessment six policy options (from "do nothing" to "major amendment to the EIA Directive plus new technical guidance package plus support for implementation") were presented by (IMP)³ project, designed to operate mainly along the three major axes of guidance, supporting measures, and regulatory or legislative measures.

SENSOR (Sustainability Impact Assessment: Tools for Environmental, Social and Economic Effects of Multifunctional Land Use in European Regions) is an Integrated Project within the 6th Framework Research Programme of the European Commission, which develops science based ex-ante Sustainability Impact Assessment Tools (SIAT) to support decision making on policies related to multifunctional land use in European regions. SENSOR directly responds to the European sustainability objectives as applied to land use and regional development.

Some of the envisaged elements of the approach seem to be promising also for the development of a territorial impact assessment, such as the orientation at certain targets, the inclusion of expert consultations and regional stakeholders, taking into account user requirements and finally the validation of the assessment results in case studies.

2.4 Proposal for a Territorial Impact Assessment

The ESPON 2.4.1 project developed a methodological approach that assesses the territorial impacts of EU environmental policy. The TIA approach was developed on the basis of the general methodological framework suggested in the ESPON 3.2 project and is inspired by the findings of the review of existing models and tools for territorial impact assessment. A territorial impact assessment was carried out in five case studies at different scales (EU, transnational/national, regional/local) for three elements of European environmental policy (civil protection policy, nature and biodiversity policy, water policy).

The TIA methodology that is suggested has two levels:

At the **first level** (or general/European/abstract level), basic connections and influences between policies (e.g. regional or environmental policies), territorial trends (e.g. socio-cultural, economic, transport, etc.) and territorial objectives (in the first instance territorial cohesion) are identified and quantified. This approach follows the three phases of scoping, analysis

and finally assessment. The assessment is done against the goal of territorial cohesion and results in a general **Potential Impact (PIM).**

At the **second level,** an estimation of the territorial effects of EU environmental policies on a certain region, taking into account the regional performance of chosen indicators, is carried out, called **TIM**: "**Territorial impact model** for assessing the impact on single regions" by the ESPON project 3.2.

First Level: PIM – The Potential Impact of a Policy

As a first stage or scoping phase, the impact of the several policy elements on certain territorial trends is identified. The effects of the policy elements on the territorial trends have to be defined separately for each policy element in the scoping phase. Sometimes there is a strong link between the policy element and the territorial trend, but often the impacts are side effects of a focused policy element affecting the territorial trend only marginally. The territorial trends themselves can have positive or negative effects on the three objectives of territorial cohesion (territorial quality, territorial efficiency and territorial identity).

For the application of the TIA methodology on elements of European environmental policy a set of general territorial trends defined by ESPON project 3.2 was used. A clear relation to territorial objectives characterized these trends, but the influence of environmental policy elements on the territorial trends was less pronounced. Therefore, some specific environmental trends clearly affected by the elements of European environmental policy were added to the analysis.

The results of the scoping phase are presented as diagrams of cause-effect chains (see figure 1). By these hypotheses, the question what is changed by the intervention(s) is answered. This phase of evaluation refers to an abstract territory, and the impact chains can be seen as general political impact chains.

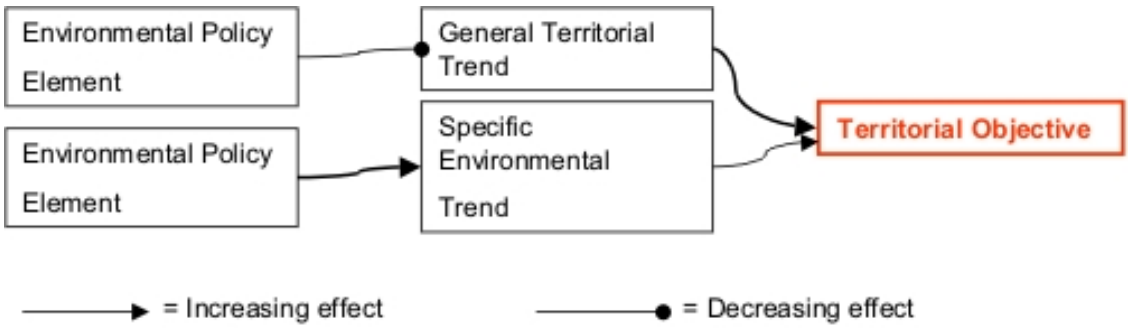


Figure 1 General example for cause-effect chains in the TIA for environmental policy (source: own figure)

The observed cause-effect chains are classified into two groups according to their overall effects:

- Cause-effect chains with an overall positive effect on the studied territorial objective
- Cause-effect chains with an overall negative effect on the studied territorial objective

In the next phase, these recognised cause-effect chains are described using a story line: a short text, which describes the potential territorial effect of a policy instrument. The story lines aim at the identification of useful indicators for each cause-effect chain. Indicators can be based on the sensitivity (or vulnerability) of the territory to certain changes or the potential of the territory to benefit from the changes or a measure of actual implementation (e.g. money spent to implement a policy) or even measured changes in the general or specific trends.

Second Level: TIM – Territorial Impact Model for assessing the impact on specific regions

The final judgement on policy elements and observed or expected trends on specific region is made by using so called Territorial Efficiency Quality Identity Layered Assessment Model (TEQUILA Model) (Camagni, 2006). This assessment helps to recognise does an environmental policy element have a positive or negative impact on the three predefined territorial objectives in a specific region based on the indicators developed in the PIM phase.

Based on the TEQUILA model the TIM values are calculated as follows:

$TIM_{x,r} = \Sigma_c \Theta_c PIM_c S_{r,c} PI_{r,c}$,

Where:

$TIM_{x,r}$ = territorial impact on NUTS3 region r for territorial objective x (territorial quality, territorial efficiency, territorial identity),

r = NUTS3 region,

c = cause-effect chain from political element through trend to territorial objective,

Θ_c = weight of the c chain (only in the regional applications),

PIM_c = potential impact of policy for chain c from PIM diagram (overall negative or positive effect nominated as –4, – 2, -1, +1, +2, +4),

$S_{r,c}$ = value of the selected indicator for chain c in region r scaled to 0-1,

$PI_{r,c}$ = policy intensity for chain c in region r (0 or 1; 0 if the chain c from policy instrument to territorial objective is not relevant in region r).

The recognised indicators representing cause-effect chains as identified in the PIM phase can be calculated for single regions within the area under study, e.g. for all NUTS3 regions in Europe. To make different indicators comparable the values of indicators are reclassified into a relative scale from 0 to 1($S_{r,c}$). The different cause-effect chains can also be weighted (Θ_c).

The policy intensity of a policy element ($PI_{r,c}$) is set 0 in case the policy is not relevant at all in a region (e.g. coastal zone policies are not relevant for Austrian regions).

The sums of cause-effect chains show the degree of territorial impact (TIM) of Policy area A on Territorial Objective x in Region r. The end product consists of three maps showing the overall impact of the studied environmental policy on regions for the three territorial objectives (efficiency, quality, identity; see Figure 2 below).

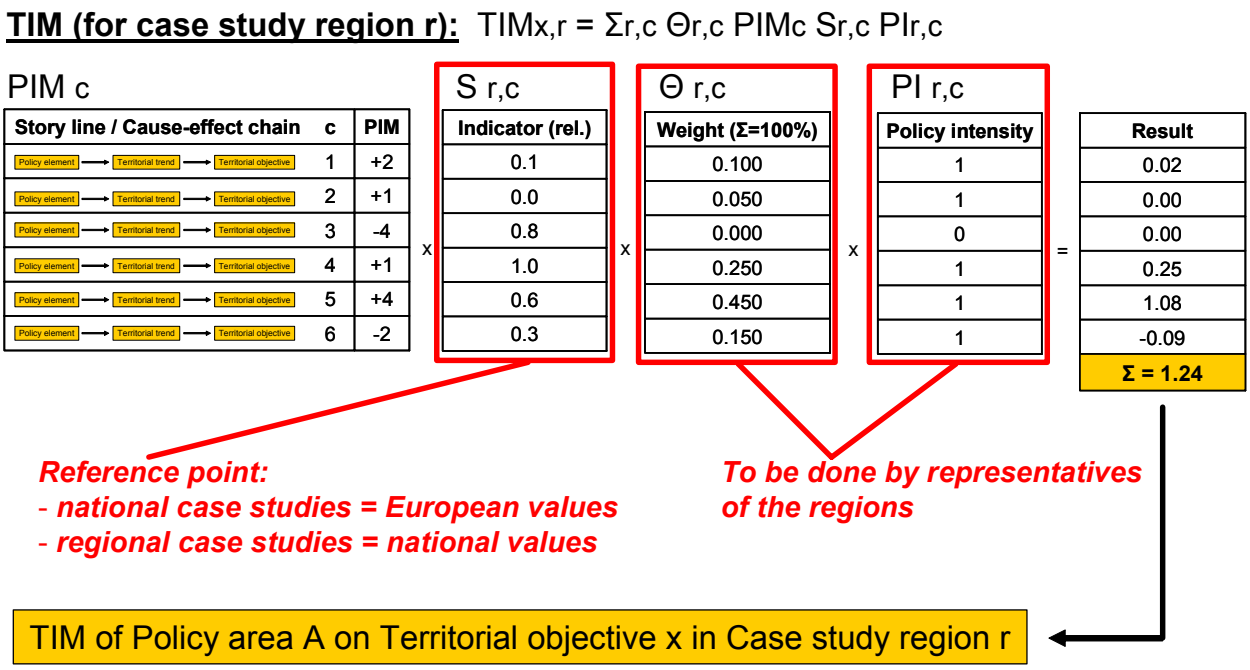


Figure 2 TIM application in case study region (source: own figure)

A final aggregation of the results related to the three elements of territorial cohesion into one overall impact might be useful. This will be discussed in view of the real results, gathered from the assessment of the impact of EU environmental policies on each NUTS3 region.

The TIA methodology was applied in five case studies in order to estimate its applicability under different circumstances for three environmental policy elements that are spatially relevant:

- *Coverage of different perspectives:* ex-ante (EU case study, Slovenia, Finland, Emsland) and ex-post (Andalusia),
- *Coverage of different spatial scales:* EU level (EU case study), transnational/national (Slovenia, Finland), regional/local (Emsland, Andalusia),
- *Coverage of test cases:* Civil Protection (EU case study, Finland, Emsland), Nature and Biodiversity (EU case study, Slovenia, Emsland, Andalusia), Water (EU case study, Slovenia, Emsland, Andalusia).

The spatial relevance of all three test cases was proven by means of the five case studies. The territorial impact of Civil protection policy is obviously quite positive assessed, as visible by Table 3 below. Water policy has positive effects for territorial quality and identity, whereas the negative impact on efficiency calls for a stronger consideration of the economic effects of the WFD (e.g. by means of supporting funds to be spent in particular for

those actors and regions that are primarily negatively affected). It is an open question if an ex-ante approach (based on indicators to measure certain developments) is suitable for effects, which only occur in the (far) future. Nature and Biodiversity has to be seen as the most controversial policy element, causing strong negative effects, in particular to territorial efficiency, but this depends obviously on the sensitivity of the affected territory. At the same time, the intended positive impact on the environment (i.e. the preservation of habitats and species) was proven by both ex-post case studies. This ambivalent character of nature policy – effective, but related with strong negative side-effects – calls for more attention to be paid to counterbalanced measures for those areas that are obviously negatively affected from this policy due to their spatial characteristics.

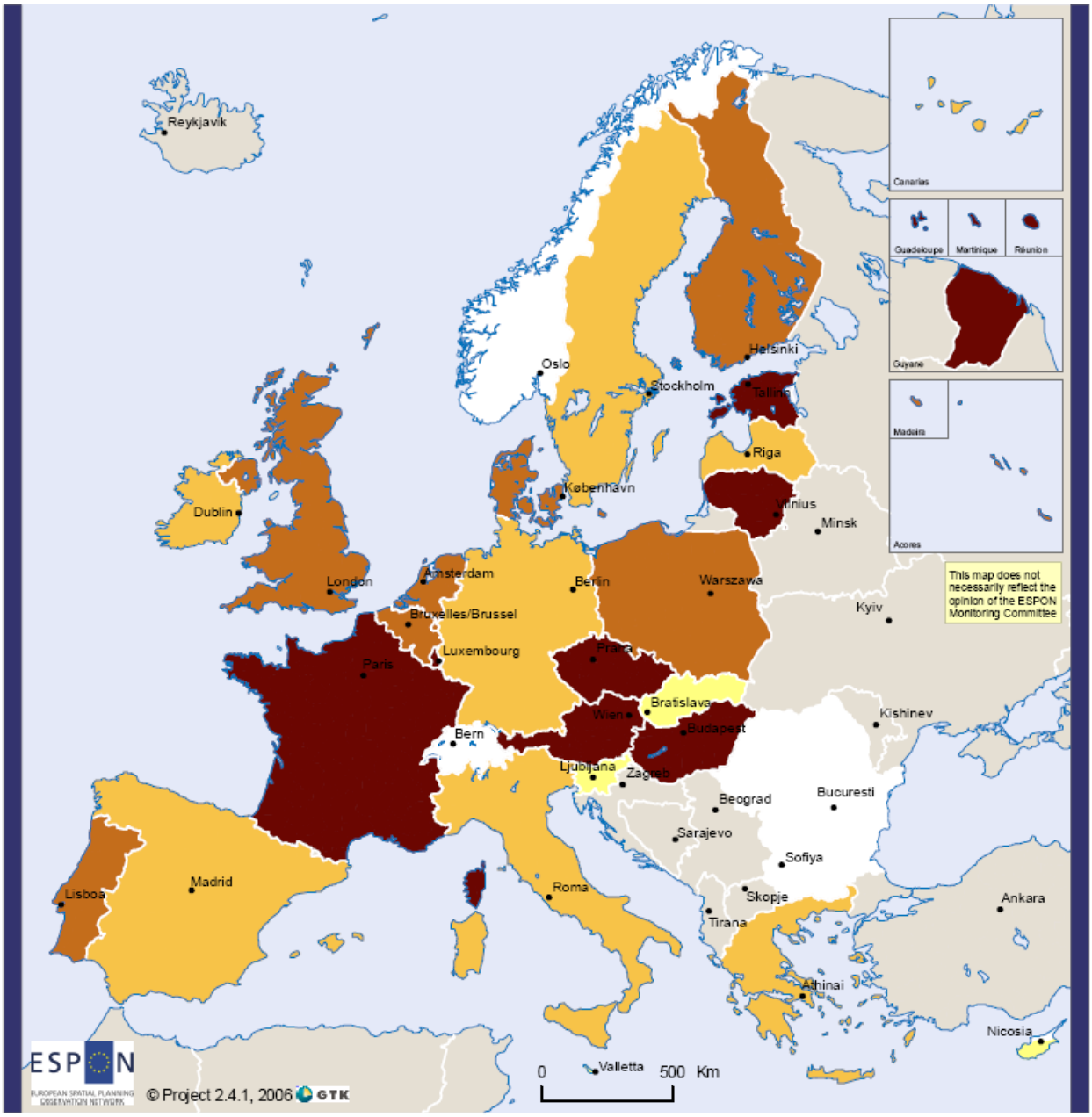
EU Case Study

Based on the TIA methodology the Territorial Impact of European civil protection policy on territorial quality at European level was calculated. The storylines in the following table describe the Potential Impact (PIM) of the policy element. Most indicators are based on requirements of the SEVESO II directive.

Table 3 Storylines and PIM-values for the territorial impact on territorial quality of civil protection policy

Story line	Best available indicator (BAI):	Impact of policy on trend	Impact of trend on objective	PIM
The territorial quality of living and working environment may suffer from a steady increase in risks related to natural and technological hazards, but the Seveso II emergency plans (Art. 11) aims at avoiding major accidents	Existence of emergency plans (available at NUTS0 level)	- 2	- 2	+ 4
The territorial quality of living and working environment may suffer from a steady increase in risks related to natural and technological hazards, but the inspections by the public authorities (Art. 18) aim at avoiding major accident hazards	Percentage of inspected establishments in relation to the overall amount (available at NUTS0)	- 1	- 2	+ 2
The territorial quality may suffer from a decrease in public expenditures, but aid, spent by the solidarity fund, may counterbalance this effect	Financial aid spent/year by the solidarity fund in relation to pop. of a Member State	- 1	- 2	+ 2
Sum				**+8**

The result of this ex-ante assessment of the territorial impact on territorial quality is shown in Map 1 below. The dark brown colour indicates the regions that can expect the most positive influence of European civil protection policy on the development of territorial quality, while the yellow colour indicates regions with small positive impact.



TIM for the territorial quality of the civil protection policies on NUTS0 level

- 0.0 - 2.0
- 2.1 - 4.0
- 4.1 - 5.0
- 5.1 - 6.0
- Non espon space
- No data

Origin of the data: Report on the application in the Member States of Directive 96/82/EC (SEVESO II Directive)
European Union Solidarity Fund Annual report 2004

Source: ESPON Data Base

The application data of the SEVESO II Directive does not exist from Norway, Switzerland, Romania and Bulgaria.

Map 1 Impact of EU civil protection policy on territorial quality (NUTS0).

2.5 Indicators for environmental structures and trends and the impact of EU Environmental Policy

Environmental indicators simplify, quantify and communicate complex environmental data and tell about the state or quality of the environment. They allow monitoring environmental trends and tracking progress towards stated objectives and policy goals. These indicators will allow in the context of TIA Methodology:

- Estimating whether environmental quality is improving or getting worse;
- Assessing whether policies, laws and other actions are having the desired effect (ex-post TIA);
- Assessing which territorial impacts policies, laws and other actions may have in future (ex-ante TIA);
- Identifying emerging issues;
- Informing the development of environmental policies.

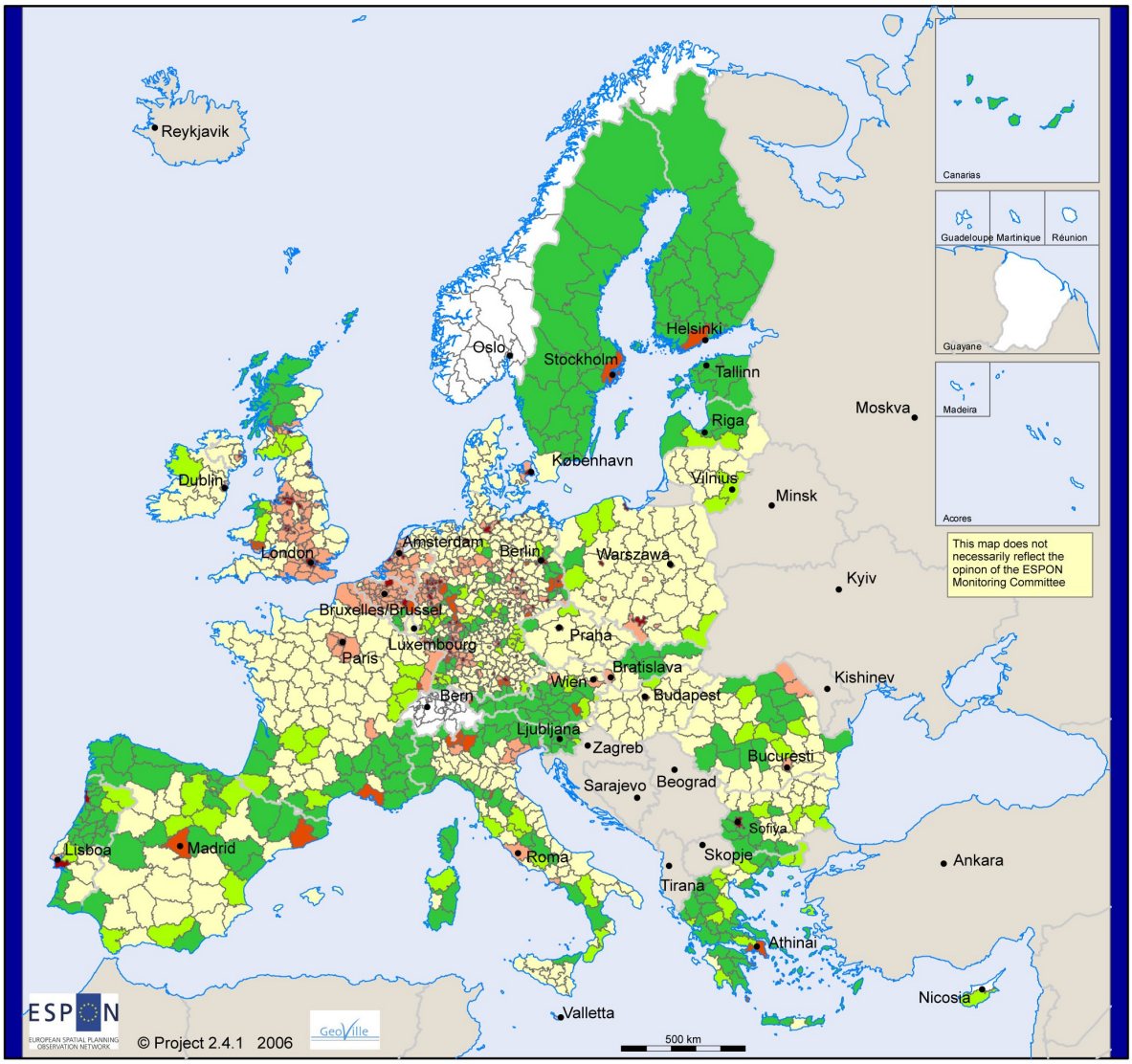
A number of indicators for the TIA and for the description of environmental structures and trends in relation to territorial development were developed. However, for the final realisation of the indicators some limitation had to be taken into account: the availability and the spatial coverage of data and the possibility to combine spatial and statistical information.

One group of indicators for the environmental structures and trends is based on CORINE Land Cover data. The indicators provide valuable spatial overviews about key aspects of environmental developments and trends within the EU territory. Many indicators are developed related to urban growth and related impacts:

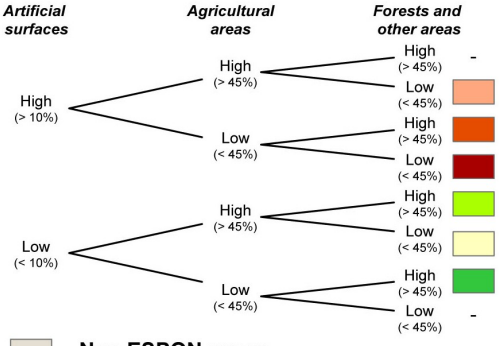
- Urban growth 1990 – 2000
- Growth of residential areas 1990 – 2000
- Growth of industrial areas 1990 – 2000
- Urban growth and population development 1990 – 2000
- Productivity of land consumption in 2000
- Agricultural intensity in 2000
- Degree of urban dispersion in 2000
- Land cover replaced by built-up area 1990 – 2000
- Usage of land in 2000
- Loss of natural areas 1990 – 2000

The map 2 gives an overview on the usage of land on the European level. It presents a classification of the major land cover composition, based on CORINE 2000 Land Cover data. Even though the EU area in general is highly urbanised, the number of NUTS3 regions with a share of artificial areas of 10% and more appears moderate. This highly urbanised type dominates Belgium and the Netherlands, covers a large contiguous area in southern and central UK and several larger regions in Germany. In all other countries, it is restricted to major single urban agglomerations, often only the capital cities. Altogether, the map conveys the image of an EU territory that is predominantly shaped by agriculture, forests and semi-natural areas, with a few large and several smaller regions of urban agglomerations.

Usage of land 2000



Land use composition of NUTS-3 units



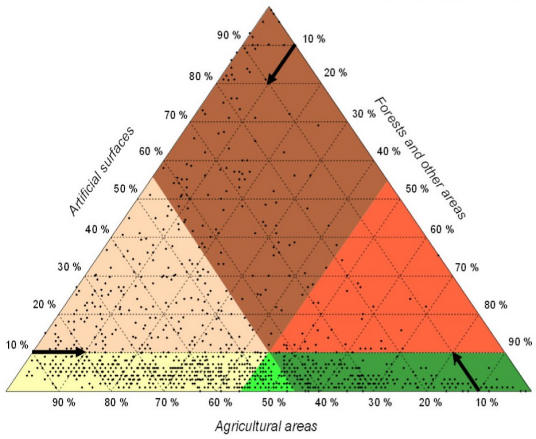
Non ESPON space

No data

CORINE 2000 data do not exist for Norway, Switzerland and the remote areas of France and Portugal.

Origin of data: CORINE 2000: European Environment Agency
Regional level: NUTS 3

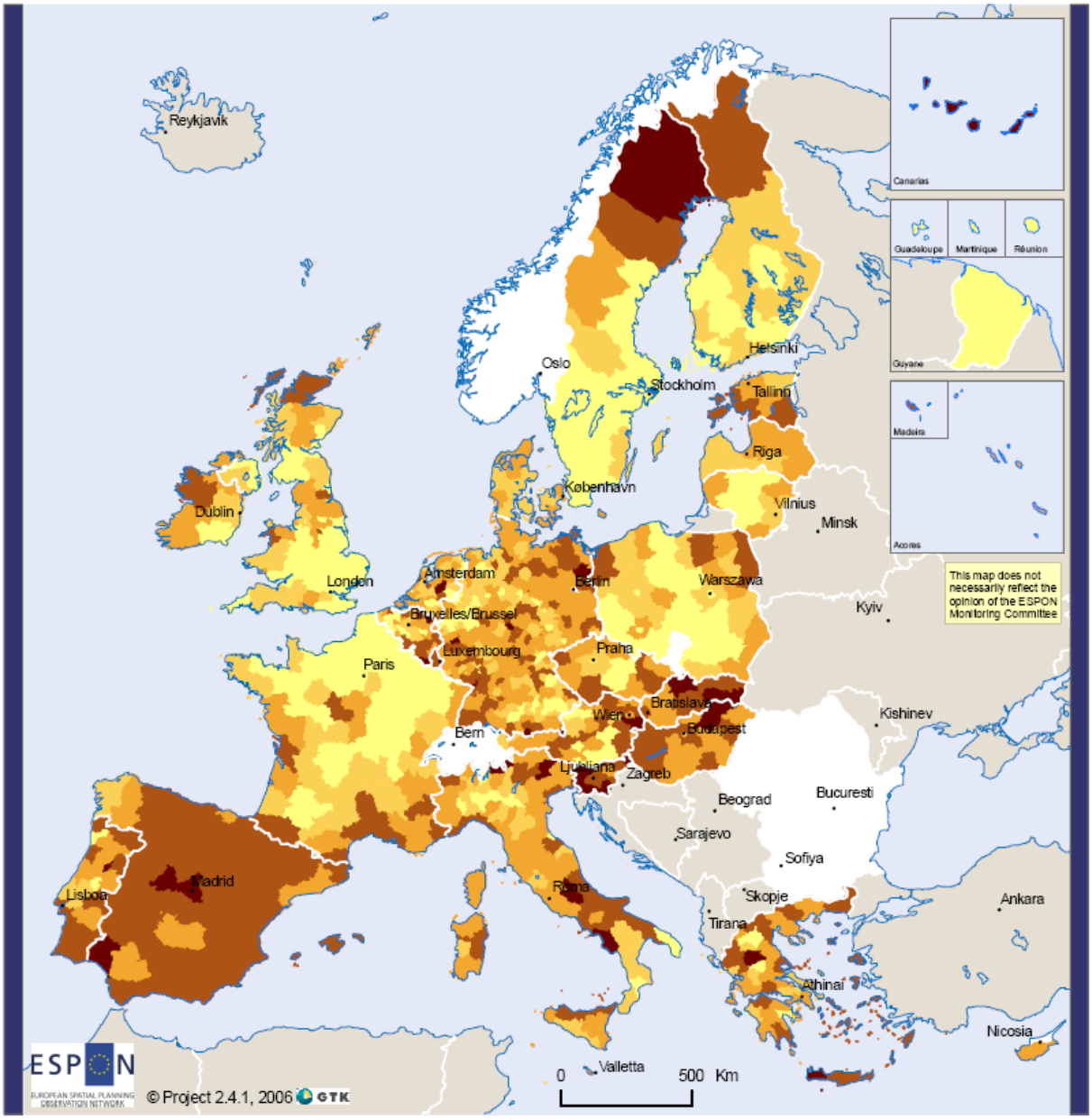
Source: ESPON Data Base



Map 2 Usage of land in 2000

Many indicators related to the impact of the environmental policy element "Nature and Biodiversity" depend on information of the Natura 2000 network. Data of Natura 2000 network offer a good estimation of the protection of nature and biodiversity and its spatial distribution. However, the coverage is limited to the EU Member States.

A very general indicator shows Natura 2000 network area as percentage of the NUTS3 area. Map 3 shows, how the reported Natura 2000 network areas are distributed in Europe. While some countries such as Spain, Slovakia, Slovenia and Hungary but as well Luxembourg and Estonia have a high percentage of Natura 2000 network area (>10%) all over their territory, other countries (France, Poland, Sweden, Finland and UK) have mainly in peripheral areas a high protection level. Large parts of the Canaries and Madeira belong to the Natura 2000 network, but the percentage of protected areas in the French overseas areas and the Acores is low.



Percentage of the NATURA2000 Network areas inside NUTS3 (99) region

Origin of the data: DG ENV NATURA2000 Network
Source: ESPON Data Base

- 0 - 5
- 6 - 10
- 11 - 20
- 21 - 40
- 41 - 60
- Non espon space
- No data

The Natura2000 Network data does not exist from Norway, Switzerland, Romania and Bulgaria.

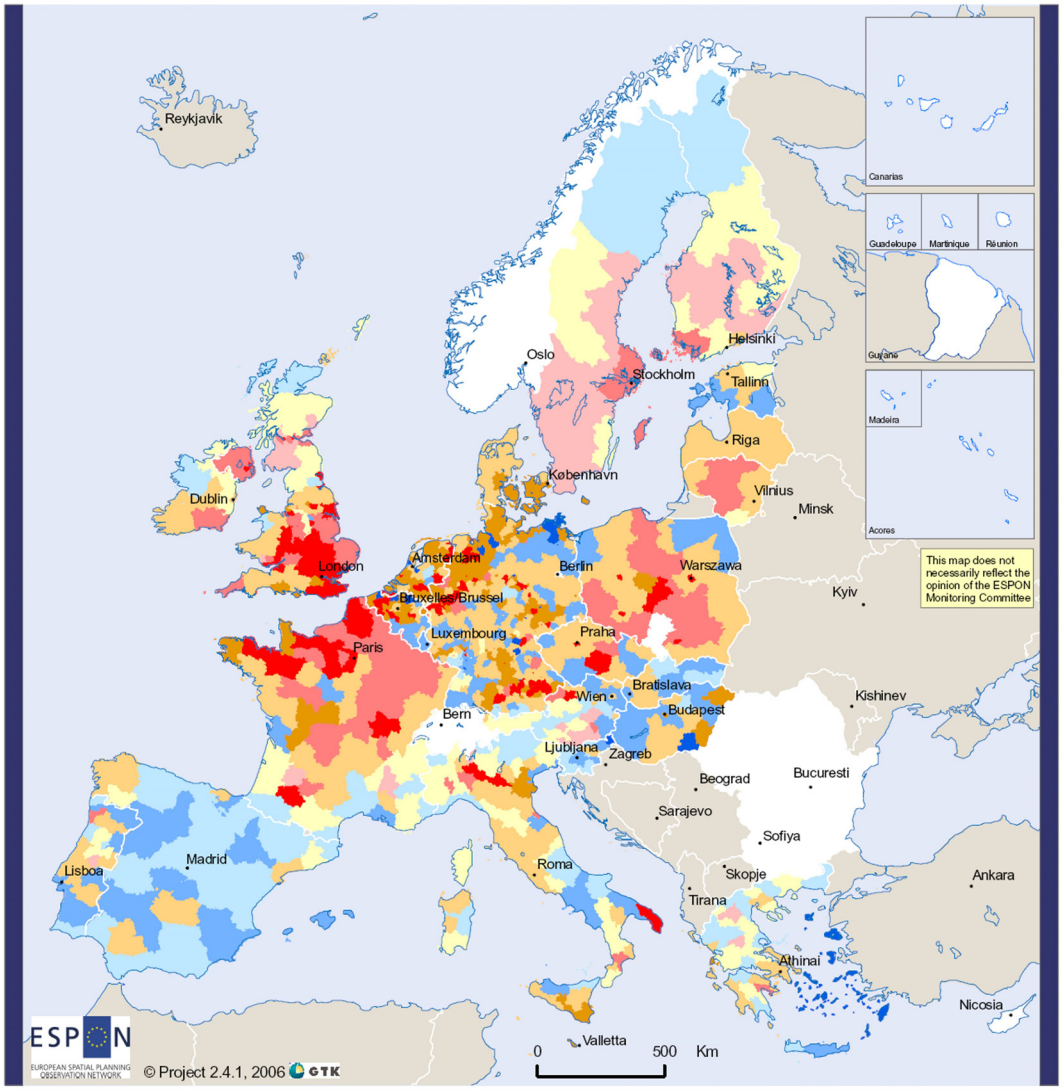
The processed NATURA2000 data set does not cover three NUTS3 99 regions in Poland (PL0C1, PL0C2 and PL0C3) and two NUTS3 (99) regions in Germany (DE301 and DE302). These values has been calculated on NUTS3 (03) regions.

Map 3 Percentage of Natura 2000 network areas per NUTS3 region

Additionally to this basic indicator several indicators were calculated that contribute to the TIA for Nature and Biodiversity. These are:

- "The proportion of the population working in mining and quarrying industry vs. the extent of the Natura 2000 network areas per NUTS2 (99) region". This indicator points on a possibly negative influence of large areas reserved for the Natura 2000 network on the activity rate of a region and, hence, on the territorial cohesion. For example mining and quarrying industry provides employment and economic growth in regions, which have difficulties attracting other forms of investment. In other words, the mining industry offers economic activity in many peripheral areas (European Commission 2006).
- "The existence of the natural hazards vs. the extent of the Natura 2000 network areas per NUTS3 (99) region". The designation of areas for the Natura 2000 network might enhance the resilience of a region towards natural hazards. For example Natura 2000 network areas might serve as buffer zones in case of floods, storm surges or landslides.
- "The potential multimodal accessibility vs. the extent of the Natura 2000 network areas per NUTS3 (99) region". While good accessibility may enhance the territorial efficiency and quality of a region, large areas designated for the Natura 2000 network can limit future possibilities for increasing accessibility. Especially areas with low accessibility and high percentage of Natura 2000 network area may face problems, whereas areas with good accessibility and high percentage of Natura 2000 network area obviously found solutions that comply with the goals of nature protection and territorial cohesion at the same time.
- "Agricultural intensity 2000 vs. the extent of the Natura 2000 network area per NUTS3 (99) region". Agriculture and species richness and habitat diversity are closely linked. On the one hand mechanisation and intensification of agriculture may increase territorial efficiency, but contributes to the elimination of many landscape features such as hedgerows, wetlands and semi-natural grasslands. On the other hand the abandonment of agricultural areas may cause as well a loss of biodiversity and heritage landscapes. In between these two extremes are areas, which generally contain more of a patchwork of semi-natural and natural habitats and varied farmlands.
- "The proportion of fragmentation of the natural and semi-natural areas vs. the extent of the Natura 2000 network area per NUTS3 (99) region". This indicator is based on the addition of the elements

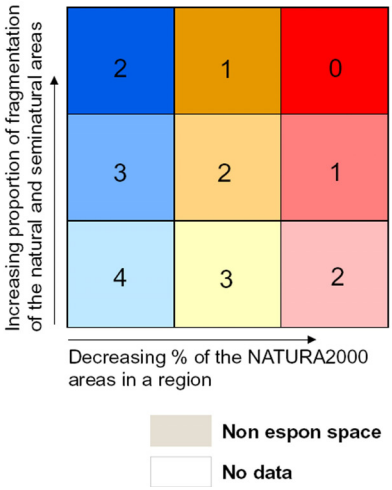
“fragmentation of natural and semi-natural areas” (or rather its reciprocal value) and “percentage of Natura 2000 network area”. Contiguous natural areas contribute to the territorial quality. Further fragmentation can be slowed down by a higher percentage of Natura 2000 network area. This indicator is shown on map 4 as an example of indicator used in TIA for EU nature and biodiversity policy.



The proportion of fragmentation of the natural and seminatural areas vs. the extent of the NATURA2000 Network areas per NUTS3 (99) region

Origin of the data: DG ENV NATURA2000 Network
Corine Land Cover 1990
Fragmentation data ESPON project 1.3.1

Source: ESPON Data Base



Story line: Man has always changed natural areas into agricultural, industrial and housing use. This contributes to a declining biodiversity and hence affects the territorial quality. The biodiversity and hence affects the territorial quality. The biodiversity strategy should slow down this process, preserving biodiversity and territorial quality as well.

PIM value: +4

The Corine Land Cover data 1990 is not available from Cyprus, Norway and the remote areas of France, Portugal an Spain.

The Natura2000 Network data does not exist from Norway, Switzerland, Romania and Bulgaria. The processed NATURA 2000 data set on NUTS3 (99) does not cover three regions in Poland (PL0C1, PL0C2 and PL0C3) and two regions in Germany (DE301 and DE302).

Map 4 The proportion of fragmentation of the natural and semi-natural areas vs. the extent of the Natura 2000 network area per NUTS3 (99) region

Another group of indicators is related to the territorial impact assessment of European civil protection policy. The SEVESO II directive (96/82/EC) requires the inspection of establishments by public authorities, the development of internal and external emergency plans and information of the public and minimum distances of SEVESO II establishment from other facilities. These indicators were available and developed:

- Percentage of inspected establishments in 2002
- Existence of emergency plans in 2002
- Information of the public in 2002
- Financial aid by the EU solidarity fund / Population 2002 – 2004

2.6 Primary research objectives and proposals for future applied research themes

It is in fact more a requirement than a recommendation for future applied territorial research to integrate the environmental dimension in territorial analysis, when following strictly several key European documents from the European Community Treaty to the latest "Draft Declaration on Guiding Principles for Sustainable Development" (EU Commission, 2005a). Two out of ten Policy Guiding Principles in this last document address coherence among policies in the EU as a key issue for sustainable development.

The integration of the environmental dimension in the sectoral policies does not guarantee that the actual decision-making would in the end really contribute to the goals of sustainable development. Firstly, for the implementation of the sectoral policies the spatial context is important in terms of existing qualities and secondly, the synergies among sectors should be established afore implementation measures.

The approach of Environmental Policy Integration should be adapted on all three spatial levels: EU, transnational/national, regional/local. In particular spatial planning at various levels can be seen as an important instrument to deliver EPI (EEA 2005, p. 25) by means of bringing together policy and decision-makers from different sectors. It is recommended to apply the IA approach in order to identify possible contradictions between environmental objectives and other spatially relevant interests, in particular those, which are designated in regional or urban land-use plans.

Research objective 1: Identification of factors that negatively influence the implementation of the SEA Directive in both, material and procedural respect due to specific national and/or regional/local institutional settings.

Relevant spatial level: EU level

Strategic projects should cover multiple (sub-)projects and investments and aim at improving (trans-)European territorial governance by developing common approaches, networks and integrated development strategies.

Strategic projects may be in the near future one of the very few tools applying the spatial planning approach on the EU and transnational level. Through their cross-cutting role, bridging the gaps between different sectors, as well as between policy and decision-makers on different levels, they can also be seen as an instrument delivering EPI on the EU and transnational level.

Research objective 2: Define the necessary elements of strategic projects, in order to effectively implement the coherent approach set by EU policy documents.

Relevant spatial level: *EU level*

Research objective 3: Investigate the factors for success or failure of transnational initiatives in the implementation of the coherent approach.

Relevant spatial level: EU level

Considering the application of the TIA approach in the different case studies, some lessons were learned. As it is recommended to use the TIA for real policy-making, the authority responsible for setting up a programme or policy has to carry out the TIA, but with scientific support for the methodological, respectively analytical part. However, the state of development of the TIA approach leads to the following research recommendations:

Research objective 4: Further empirical analysis of identified cause-effect chains in order to minimise estimations that are based just on experts' options.

Relevant spatial level: primarily regional level

Research objective 5: Testing of scenario techniques for the TIA in order to get data for the territorial impact of policies that are not implemented so far.

Relevant spatial level: EU and transnational/national level

Research objective 6: Development of a common TIA framework for the territorial effects of European policies.

Relevant spatial level: Transnational/national and regional/local level

While mapping environmental trends and structures it became clear that a weak point for most of the indicator sets is the integration of data sources from other organisations than the "home" organisation, i.e. EEA indicators

are mostly based on EEA data and Eurostat indicators mostly on Eurostat data. A better integration of data and information from different sources would enhance the analysis of interactions between objects and support multi-scale analyses, which allows to exchange and compare data and information at different levels of scale and administrative levels.

Research objective 7: Multi-scale and multi-criteria analysis of environmental degradation trends from the point of view of the territorial objectives.

Relevant spatial level: EU and transnational/national level

Research objective 8: Integration of environmental data and spatial analysis of interaction between objects of various environmental themes (e.g. soil and land degradation, fresh water resources, marine and coastal zones) in different regions.

Relevant spatial level: primarily regional level

Project 2.4.1 is asked for future applied research themes in order to integrate the environmental dimension stronger into future territorial analysis. This calls for a discussion of the perspectives of the TIA as well as the SEA and possible synergies as well as conflicts in-between. Both instruments are principally able to link territory and environment; the TIA from the territorial perspective and the SEA, as well as the EIA, from the environmental side.

Research objective 9: Clear definition of goals for what background the policy impacts have to be assessed by means of a TIA and criteria for the relevance of impacts.

Relevant spatial level: EU level

Research objective 10: Development of differentiated implementation strategies for EU policies according to existing spatial structures, both on EU as well as member state level.

Relevant spatial level: EU level, transnational/national level

Future territorial research can develop territorial typologies and indicators, which could on the one hand widen the knowledge through integration of different aspects of territory, and on the other hand deepen the knowledge through extended data sets and more detailed analyses.

Through the process of selecting the relevant indicators for the project, the question of availability of indicators was at least as much if not more important than the relevance itself. Reliable time series are desperately needed. It would be most useful to have any kind of comparable territorial

data for two or more different years, in order to be able to display some dynamics in the territory and monitor the impacts of policies. Also ESPON typologies often display the territorial state in fixed years rather than the development of the territory.

Developing the territorial indicators has highlighted the uncertainty of knowledge in many areas of the environment and the impact of EU territorial policies on it. Therefore it is important for future territorial research to continue regular monitoring of the European territory with the help of core territorial indicators on the one hand, but on the other hand also to extend the use of these indicators to smaller geographical scales.

Research objective 11: Develop territorial typologies that would be able to display the dynamics of territorial development, and typologies combining dynamic and static aspect of territorial development. Readability of final outcomes should remain an important objective as well.

Relevant spatial level: EU level

Research objective 12: Extend the existing ESPON database with data for regular time series, for instance each 5 or 10 years. Efforts should also be made to ensure regular time series from other sources. This would allow displaying the dynamics of territorial development.

Relevant spatial level: EU level

Research objective 13: Stimulate the Member States to implement research based on ESPON indicators also on smaller geographical scales, e.g. on NUTS 5 level.

Relevant spatial level: EU level, national level, regional/local level

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ESPON
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ESPON project 2.4.1

Territorial Trends and Policy Impacts in the Field of EU Environmental Policy

Scientific Summary

Co-financed by the European Community through the Interreg III ESPON Programme

Scientific Summary

One of the main aims of the ESPON programme is to identify and regionalise territorial impacts of policies. Main aim of the ESPON project 2.4.1 is to identify territorial effects of EU environmental policies at different spatial levels. The development of a methodology for the assessment of territorial impacts of EU environmental policies can be seen as the major scientific output of the project. Further, new indicators were developed.

1 Territorial impact assessment methodology

The TIA methodology that is suggested has – similar to the general methodological framework suggested in the ESPON project 3.2 - two levels:

At the **first level** (or general/European/abstract level), basic connections and influences between environmental policies, territorial trends (e.g. socio-cultural, economic, transport, etc.) and territorial objectives (in the first instance territorial cohesion) are identified and quantified. This approach follows the three phases of scoping, analysis and finally assessment as suggested in the minimum requirements of a TIA. This first level has been described by the ESPON project 3.2 as a Potential Impact (PIM): "General assessment of the impact of EU (environmental) policies on the overall European territory. This assessment refers to an abstract territory, and the impact may be seen as a general potential impact" (ESPON project 3.2, 2005, p.11). This assessment is done against the goal of territorial cohesion. Territorial cohesion has been divided into three main elements: Territorial quality, Territorial efficiency and Territorial identity.

At the **second level,** an estimation of the territorial effects of EU environmental policies on a certain region, taking into account the regional performance of chosen indicators, is carried out. This phase is similar to TIM: "Territorial impact model for assessing the impact on single regions" which was proposed by the ESPON project 3.2.

1.1 PIM – the Potential Impact of a Policy

The potential impact of a policy recognises the elements of policy that might have regional aspects. These elements can be subdivided if the overall policy has several implementation options that regions can choose.

As a first stage or scoping phase, the impact of the several policy elements on certain trends is identified. Here, two kinds of development trends have to be distinguished:

- **General territorial trends** – as defined by the ESPON project 3.2. – have clear, pre-defined positive or negative effects on the three

territorial objectives of territorial cohesion. The effects of environmental policy elements on the general territorial trends have to be defined separately for each policy element in the scoping phase. These are often side effects of a focused policy element.

- **Specific environmental trends** related to each of the three chosen environmental policy sectors. Environmental policy elements have a strong link to these specific environmental trends but the link from the trend to the three territorial objectives of territorial cohesion is often weaker.

The results of the scoping phase are presented as diagrams of cause-effect chains. By these hypotheses, the question should be answered what is changed by the intervention(s)? This phase of evaluation refers to an abstract territory, and the impact chains can be seen as general political impact chains.

In the next phase, recognised cause-effect chains are described using a story line: a short text, which describes the potential territorial effect of a policy instrument. The story lines aim at the identification of useful indicators for each cause-effect chain. Indicators can be based on the sensitivity (or vulnerability) of the territory to certain changes or on the potential of the territory to benefit from the changes or on a measure of actual implementation (money spent to implement the policy) or even on measured changes in the general or specific trends.

1.2 TIM – Territorial Impact Model for Assessing the Impact on Single Regions

In this phase, the final judgement based on policy elements and observed or expected trends on each region should be made: Does an environmental policy element have a positive or negative impact on the three predefined territorial objectives based on the indicators developed in the PIM phase?

The recognised indicators representing cause-effect chains as identified in the PIM phase will be calculated for the studied NUTS3 regions and the values are reclassified into scale 0-1 ($S_{r,c}$). The cause-effect chains are weighted (Θ_c) and given plus or minus sign according to the overall effect (PIM). The weighted sums of cause-effect chains are calculated for each of the three territorial objectives.

The TIM value is calculated as follows: $TIM_{x,r} = \Sigma_c \Theta_c PIM_c S_{r,c} PI_{r,c}$, where:

$TIM_{x,r}$ = territorial impact on NUTS3 region r for territorial objective x (territorial quality, territorial efficiency, territorial identity),

r = NUTS3 region,

c = cause-effect chain from political element through trend to territorial objective,

Θc = weight of the c chain,

PIMc = potential impact of policy for chain c from PIM diagram (overall negative or positive effect nominated as –4, – 2, -1, +1, +2, +4),

Sr,c = value of the selected indicator for chain c in region r scaled to 0-1,

PIr,c = policy intensity for chain c in region r (0 or 1; 0 if the chain c from policy instrument to territorial objective is not relevant in region r). The recognised cause-effect chain might not be valid for all European regions, for example policy mechanisms targeted to coastal areas are not interesting for Austrian regions.

A weighting of the different territorial trends was used in the regional application in order to adjust the approach to regional circumstances.

1.3 Territorial Impact Assessment of EU Environmental Policies in selected case studies

The TIA methodology was applied not only at the European level, but also in four case studies in order to estimate its applicability under different circumstances for three environmental policy elements that are spatially relevant:

- *Coverage of different perspectives:* ex-ante (EU case study, partly Slovenia, Finland, Emsland) and ex-post (Andalusia, partly Slovenia),
- *Coverage of different spatial scales:* EU level (EU case study), transnational/national (Slovenia, Finland), regional/local (Emsland, Andalusia),
- *Coverage of test cases:* Civil Protection (EU case study, Finland, Emsland), Nature and Biodiversity (Slovenia, Emsland, Andalusia), Water (Slovenia, Emsland, Andalusia).

Based on the review of the elements of environmental policy, the following environmental policies with different spatial characteristics are chosen as test cases:

- Site: Some territorially relevant EU environmental policies relate to certain installations that exist on certain sites. Thus, the territorial aim of the policy is site-specific (e.g. Civil Protection Policy)

- Network: Other EU environmental policies relate to a spatial network. Here, the territorial aim is network-specific (Nature and Biodiversity Policy):
- Area-wide: A third group relates to the whole EU territory, meaning that in any place within the EU territory, the policy shall be applied. This territorial aim can be characterised as being area-wide (Water Policy).

In so doing, both, the applicability of the methodology at different spatial levels as well as the plausibility of the cause-effect chains related to the test cases can be proven.

1.4 Recommendations for a successful application of the TIA approach

The spatial relevance of all three test cases of environmental policy elements was proven. Civil protection policy is obviously quite positive assessed on all spatial levels. Water policy is clearly related with positive effects for territorial quality and identity whereas the negative impact on efficiency calls for a stronger consideration of the economic effects of the WFD (e. g. by means of supporting funds to be spent in particular for those actors and regions that are primarily negatively affected). This, in general, raises the question if an ex-ante approach (based on indicators that measure certain developments) is suitable for effects, which only occur in the (far) future. Nature and Biodiversity has to be seen as the most controversial policy element, causing strong negative effects, in particular to territorial efficiency, but this depends obviously on the sensitivity of the affected territory. The negative impact of nature policy on efficiency was proven by the case studies Slovenia and Andalusia, but the Emsland case study came to another result. At the same time, the intended positive impact on the environment (i.e. the preservation of habitats and species) was proven by both ex-post case studies. This ambivalent character of Nature and Biodiversity policy – effective, but related with strong negative side-effects – calls for more attention to be paid to counterbalanced measures for those areas that are obviously negatively affected from this policy due to their spatial characteristics.

The success of the TIA application depends very much on the availability of appropriate indicators. In the test cases some data gaps became obvious. However, the results are plausible but the fact of missing data has to be considered carefully. However, this problem is not only related to data availability, but to a certain extent caused by the ex-ante perspective of the TIA. Here, scenario techniques might be helpful and should be subject for further research.

The Spanish (Andalusia) as well as the Slovenian case study indicated that a combined ex-ante and ex-post approach helps to understand better what are the real cause-effects between policies, trends and territorial objectives. This aspect should be considered for future research.

The different ex-ante and ex-post case studies fit well to each other. In this context, the ex-post assessments can be seen as a kind of plausibility test for the cause-effect chains that are central part of the ex-ante TIA approach. The very detailed and carefully proven impact of an environmental policy on territorial objectives in practice can be seen as the most important benefit that the ex-ante approaches contribute to the common work.

The TIA approach seems to be applicable primarily at the European and national level of policy making, but not very useful for regional actors, in charge of the implementation of policies into practical decision-making. There are mainly two reasons for this: First, the rather theoretical and abstract approach that is hard to be linked to practical decision-making, and second, the existing discrepancy between the level and actors where policies are made (EU/transnational) and where they are implemented (regional/local context). In any case, the TIA approach should be seen as an added value to the participation of the different stakeholder groups in the legislation process. Here, simulation games with local and regional actors could be seen as an added value.

2 Indicators

Environmental indicators simplify, quantify and communicate complex environmental data and tell about the state or quality of the environment. They allow monitoring environmental trends and tracking progress towards stated objectives and policy goals. These indicators will allow in the context of TIA Methodology:

- Telling whether environmental quality is improving or getting worse
- Assessing whether policies, legislation and other actions are having the desired effect
- Identifying emerging issues
- Informing the development of environmental policies.

The indicators developed by the project have been made taking into account the main territorial trends described in the TIA Methodology (biodiversity, climate change, contaminated sites, marine environments, water, transport or waste) and the data availability. They try to answer the following generic needs:

- Increasing political demands for indicator-based reporting to support the policy-making processes across many levels in the EU and elsewhere.
- Streamline indicator needs across these demands, bring a coherent approach to indicator based reporting, and so facilitate a consistent and stable information basis to support policy-making.
- Provide clear priorities for environmental data collection initiatives that are expensive and involve long times periods between conception and delivery.

In addition to the indicators related to the testing of the Territorial Impact Assessment for European civil protection policy, the following new indicators mostly related to the land use and Natura 2000 Network areas are described:

Urban growth 1990 – 2000; Growth of residential areas 1990 – 2000; Growth of industrial areas 1990 – 2000; Urban growth and population development 1990 – 2000; Productivity of land consumption 2000; Agricultural intensity 2000; Degree of urban dispersion 2000; Land cover replaced by built-up area 1990 and 2000; Usage of land 2000; Loss of natural areas 1990 – 2000; Distribution of the Natura 2000 Network areas inside the NUTS3 (99) regions; Percentage of the protected SPA areas according to the Birds Directive (79/409(EEC) per NUTS3 region; The proportion of fragmentation of the natural and seminatural areas vs. the extent of the Natura 2000 Network areas per NUTS3 (99) region; The proportion of the population working in mining and quarrying industry 2002 vs. the extent of the Natura 2000 Network areas per NUTS2 (99) region; Potential multimodal accessibility vs. the extent of the Natura 2000 Network areas per NUTS3 (99) region; Agricultural Intensity (2000) vs. the extent of Natura 2000 Network area; The change of land use from developed areas to agriculture inside the Natura 2000 network area; The change of land use from forested and natural land to agriculture inside the Natura 2000 network area; The change of land use from forest to agriculture inside the Natura 2000 network area; The change of land use from semi-natural land to agriculture inside the Natura 2000 network area; The change of land use from pastures to arable and permanent crops inside the Natura 2000 network area; The change of land use from wetland to agriculture inside the Natura 2000 network area.

ESPON project 2.4.1

Territorial Trends and Policy Impacts in the Field of EU Environmental Policy

NETWORKING

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Networking

The ESPON project 2.4.1 has reviewed the results of the following ESPON projects: 1.2.1, 1.3.1, 1.3.2, 2.1.1, 2.1.3, 2.1.4, 3.1, 3.2 and 3.3. Chapter B "Presentation of findings concerning existing models and tools related to territorial impact assessment of EU policy" of the ESPON 2.4.1 project final report discusses important findings and experiences from other ESPON projects. The main focus were the relevant results of ESPON policy impact projects in regard to the development of a Territorial Impact Assessment (TIA) for EU environmental policies. The 1st interim report represents a wider study on different ESPON projects, including thematic projects, and their results in the view of EU environment policies.

ESPON co-ordinating cross-thematic projects were reviewed with regard to the development of a TIA for EU environment policies. The ESPON 3.1 project had presented the basic TIA minimum requirements, which have been studied for the development process of TIA. The territorial dimension of the Lisbon/Gothenburg Strategy studied by the ESPON 3.3 project and environmental aspects important for the ESPON 2.4.1 project are considered in several ways and through indicators included in the methodology.

The main objective of the ESPON 3.2 project was to develop future visions of the development of the territories of ESPON space and the project 3.2 provided ESPON with general scenarios. Although none of the given general scenarios was specifically addressing the environment, several of them made direct connections to environmental aspects. An important additional task, which was of great importance for the ESPON 2.4.1 project was the further elaboration of the "Territorial Impact Assessment" tool. The ESPON 3.2 project was expected to analyse the territorial impact approaches developed by the single projects and to propose a more elaborated methodology for future territorial impact assessments of EU policies, which could be considered as draft TIA tool. The team was supposed to use a two-layered approach, with one common methodology for all policies, complemented by a tailor-made methodology for each relevant policy field. The impact assessments are to be understood as ex-ante exercises and are to be applicable for EU-level policy making.

The approach for a Territorial Impact Assessment of European Environmental Policy developed by ESPON 2.4.1 project was presented at the ESPON TIA lead partner meeting in January, 2006 in Brussels.

The co-operation with other ESPON projects was basically concentrated on lead partner meetings as well as in discussions during the ESPON seminars. The ESPON 2.4.1 project received positive feedback for their TIA approach

during the lead partner meeting in January, 2006 and this approach was further developed after the meeting. At the ESPON seminar in Salzburg, the project presented the TIA approach as a main result of the interim report. The feedback that was received was very positive. For the final report, the TIA approach was further developed within the TPG. By testing the TIA approach in different case study areas on different spatial levels, the TPG got also valuable feedback from experts that were not necessarily familiar with ESPON aspects but spatial planning practices in their territory. An example of the TIA application for Civil Protection Policy was presented at the lead partner meeting in April, 2006. This cross-thematic study has shown that the developed TIA methodology produces plausible results and is a good tool for policy making. The positive feedback from other ESPON projects, and especially the constructive feedback from interviewed experts, were helpful and important contributions for the TPG. The strong connection between the work of the TPG and the results of ESPON 3.2 project caused a delay in the project work, since the proposal from the ESPON 3.2 project for the TIA approach was ready only at the end of January, 2006.

The ESPON CU helped the TPG to request Natura 2000 Network related data from DG ENV. However, due to the short term of the project, DG ENV was not able to provide the project with the requested data in time. Some of the data arrived just two days before the deadline so that only some data sets were able to incorporate into the draft final report. However, the TPG has completed new indicators and maps based on Natura 2000 Network data after delivering the draft final report. This new information has been incorporated into the updated version of the final report.

One project partner of TPG has had discussions with experts in European Environment Agency concerning the indicators on environmental structures and trends that were developed or that were planned to develop during the project.

The TPG that was chosen for the ESPON project 2.4.1 has received good results and the work within the TPG has been effective and competent. The TPG has managed to prepare two reports within quite a short term, i.e. in seven and half months. The lack of data has been a major problem for the TPG but despite this it has managed to prepare decent report within given time. Unfortunately, one partner was excluded from the project due to change in personnel. However, the other partners were willing to take over the responsibility of missing tasks and the project results were developed as planned.

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ESPON project 2.4.1

Territorial Trends and Policy Impacts in the Field of EU Environmental Policy

FINAL REPORT

Co-financed by the European Community through the Interreg III ESPON Programme

Territorial Trends and Policy Impacts in the Field of EU Environmental Policy

ESPON 2.4.1

FINAL REPORT

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This report represents the final results of a research project conducted within the framework of the ESPON 2000-2006 programme, partly financed through the INTERREG III ESPON 2006 programme.

The partnership behind the ESPON programme consists of the EU Commission and the Member States of the EU25, plus Norway and Switzerland. Each country and the Commission are represented in the ESPON Monitoring Committee.

This report does not necessarily reflect the opinion of the members of the Monitoring Committee.

Information on the ESPON programme and projects can be found on www.espon.lu

The web site provides the possibility to download and examine the most recent document produced by finalised and ongoing ESPON projects.

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Foreword

This report presents the results of the project "2.4.1 - Territorial Trends and Policy Impacts in the Field of EU Environmental Policy", which was conducted within ESPON 2006 Programme.

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Abstract

The aim of the ESPON 2.4.1 project "Territorial trends in environment and impacts of EU Environment Policy" is to prepare for the improvement of knowledge on environmental issues and trends as well as impacts of EU Environment Policy related to the development of the European territory. The work of the project covers three main tasks: 1) presentation of territorial trends related to environmental issues, 2) proposal for a territorial impact assessment (TIA) and 3) recommendations for future applied research.

The ESPON 2.4.1 project presents territorial trends, situations and structures at European scale in relation to the main environmental issues of relevance for the development of regions and larger territories. The interpretation of CORINE Land Cover data shows interconnections between territorial development and environmental structures. Socio-economic data, information on infrastructure and data of the Natura 2000 network are combined to identify, how their interrelation may affect spatial development.

The project proposes a feasible Territorial Impact Assessment (TIA) of EU Environmental Policy based on test studies related to three major elements of European environmental policy (water management, nature and biodiversity, civil protection). The TIA methodology that is suggested has two levels. At the first level, basic connections and influences between policies, territorial trends and territorial objectives are identified and quantified. At the second level, TIA estimates the territorial effects of EU environmental policies on a certain region, taking into account the regional performance of chosen indicators. The TIA methodology was tested in five case studies on different spatial levels: on European level, in Slovenia on transnational level, in Finland on the national level, in Spain on the regional level and in Germany on a local level. The TIA methodology utilises the indicators that describe the territorial trends related to environmental issues and sets the results into relation to general territorial objectives.

The ESPON 2.4.1 project gives also recommendations and proposals on future research projects linked to environmental trends and EU Environment Policy that can foster the integration of environmental concerns into territorial development strategies at different scales. The recommendations for future strategic projects are based on the outcomes of a comprehensive literature review and review of European Environmental Policy documents. The experiences of the application of the TIA approach and the process of developing indicators for territorial trends related to environmental issues revealed additional data gaps and needs for future research.

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Chapter A – Presentation of the results of the review of literature and EU Environmental Policy undertaken

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1 Literature review of environmentally relevant EU policy documents

1.1 Scoping Document and Summary of Political Messages for an Assessment of the Territorial State and Perspectives of the European Union

The most explicit document in terms of territorial impact of environmental policy is the "Scoping document and summary of political messages for an assessment of the TERRITORIAL STATE AND PERSPECTIVES OF THE EUROPEAN UNION" launched for the Informal Ministerial Meeting on Regional Policy and Territorial Cohesion, 20/21 May 2005 in Luxembourg. This paper can be seen as basis for the follow-up policy document that is currently under preparation and will be endorsed by the Ministers for Spatial Development in 2007 (European Commission 2005a).

However, already the scoping paper argues that certain EU environmental policies are of particular relevance in this context. They often have a very strong territorial impact, caused by expected, but also often unexpected side effects, by setting conditions for territorial developments and policies. The policy elements explicitly mentioned are the Strategic Environmental Assessment (SEA), the Habitats and Birds Directives and the Water Framework Directive (WFD). These elements are covered by the ESPON 2.4.1 project's test cases. Only the Framework Directive on Air Quality has been excluded from a deeper analysis in this project (see section 2 for an explanation).

Moreover, this document contains six so called "Priorities for strengthening the structure of the EU territory". Two of these priorities are closely linked to the scope of the ESPON 2.4.1 project and in particular to the test cases, which have been chosen and which are underlined therewith again as the most relevant from a territorial perspective:

- "Promoting trans-European technological and natural risk management, including integrated development of coastal zones, maritime basins, river basins and mountain areas", covered by civil protection policy.
- "Strengthening the main trans-European ecological structures and cultural resources", covered by habitat.

But also the "Priorities for coherence of EU policies with a territorial impact" (European Commission 2005a) have to be mentioned in context of environmental policy. The scoping document is written from a spatial development perspective, environmental policy and policy makers should be equally interested in the following overall goal: "that EU sectoral and economic polices and territorial development policies in the Member States [should] structurally reinforce each other with the aim of an effective exploitation of Europe's territorial capital."

For that purpose, the benefit of "ensuring active involvement of territorial expertise in an early phase of the development of spatially relevant EU policies (e.g. in expert groups)" is clearly visible in order to avoid unexpected and of course undesired negative impacts of environmental policies on certain territorial development goals, in particular on those that are related to economic aspects. These economic aspects are considered in project 2.4.1 as "territorial efficiency" (see Chapter C, Section 2). The policy goal of active involvement of territorial expertise is related to the analysis tools offered by the ESPON programme: "deploying ESPON and other instruments to deliver territorial analyses for the ex-ante Impact Assessment of territorially relevant EU policies". Here, the direct link to the Territorial Impact Assessment (TIA) becomes clear.

The following Figure 1, which is part of the above-mentioned scoping document, gives an overview how territorial concepts are translated into policies.

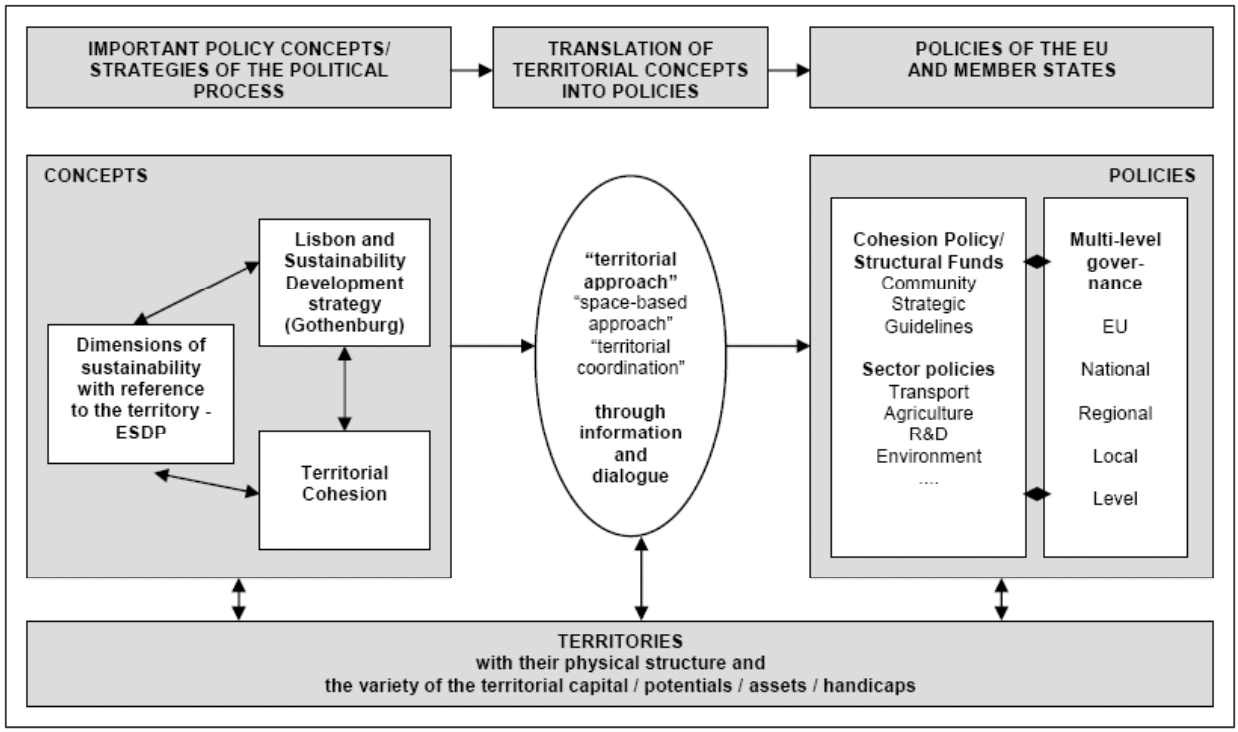

Figure 1 Territorial concepts translated into EU policies (source: European Commission 2005a)

1.2 The 3rd Cohesion Report and Community Strategic Guidelines 2007-2013

The Third Report on Economic and Social Cohesion (3rd Cohesion Report) refers to territorial cohesion in an own subchapter in Part 1 ("Cohesion, competitiveness, employment and growth"). Although the territorial dimension is missing in the title of the report, it argues pursuable that several aspects of the ongoing union's spatial development could lead to a more unbalanced and unsustainable Europe and "affect the overall competitiveness of the EU economy" (p. 28). Thus it becomes clear, why a balanced territorial dimension has been seen as crucial for Europe's future.

Especially for areas constrained by their geographical features, the accessibility and the availability of essential services have to be maintained or developed. However, the need to safeguard the environment has to be taken into account in this context, as well as development strategies for other spatial types. This means: first, the integration of environmental aspects in investment decision-making processes; second, development options have to be identified which both improve the environment and strengthen regional competitiveness (European Commission 2005b). Such

options should be generated from a TIA. This approach has to be seen in line with the **Lisbon Strategy**, which has identified environmental protection as priority, "the more so since it stimulates innovation, and to introduce new technologies, for example, in energy and transport" (European Communities 2000).

The 3rd Cohesion Report (European Commission 2005b) states that environmental problems are acute across the EU, both in areas where there is a high concentration of population, and in areas with pressure on natural resources from agriculture, but also from mining and similar activities. These areas are not evenly distributed across the EU. There is a need in these areas to clean up the environment and to prevent any further damage. It is, however, also important to prevent any further deterioration of the environment in natural or semi-natural areas. According to the 3rd Cohesion Report these aims need to be an integral part of economic development strategy across the EU to ensure the sustainability of development.

1.3 White Paper on European Governance

In this paper the European Commission states: "The territorial impact of EU policies in areas such as transport, energy or environment should be addressed. These policies should form part of a coherent whole as stated in the EU's second cohesion report; there is a need to avoid a logic which is too sector-specific. In the same way, decisions taken at regional and local levels should be coherent with a broader set of principles that would underpin more sustainable and balanced territorial development within the Union" (European Commission 2001, p. 13). "Moreover, the Commission intends to use the enhanced dialogue with Member States and their regions and cities to develop indicators to identify where coherence is needed. It has been built upon existing work, such as the European Spatial Development Perspective adopted in 1999 by Ministers responsible for spatial planning and territorial development. This work of promoting better coherence between territorial development actions at different levels should also feed the review of policies in view of the Sustainable Development Strategy" (European Commission 2001, p.13, 14). Also, the White Paper states that EU policies should be refocused, 'supporting territorial diversity' (European Commission 2001, p.28).

1.4 The Lisbon Strategy

The Lisbon strategy was adopted in 2000, and re-launched by the EU Council in 2005 in order to refocus priorities on growth and employment (European Commission 2006). The main goals of the Lisbon Strategy seek for Europe as one of the world's most dynamic and competitive economies, based on knowledge, sustainable development, employment and social cohesion, while respecting the environment. Similar to the Sustainable Development Strategy, it is based on three pillars: economy, society and environment. Moreover, both strategies share the same goal: improve welfare and living conditions in a sustainable way for present and future generations. In consequence, environmental policies contribute to the envisaged goals of the Lisbon Strategy at least by maintaining a good status of the environment as important factor for economic growth.

In addition, the explicit territorial dimension of the Lisbon Strategy has to be pointed out. It seeks for possibilities to strengthening the territorial capital of Europe's cities and regions by means of:

- Exploiting the endogenous potentials of an area: including natural and cultural values (here, the link to environmental policy becomes clear)
- Promoting an area's integration and connectivity to other areas that are important for its development
- Territorial governance: promoting horizontal and vertical policy coherence.

1.5 The Community Strategic Guidelines

The Community Strategic Guidelines are the principles governing the proposals for the reform of cohesion policy for the period 2007-2013 presented by the European Commission in the 3rd Cohesion Report of February 2004 and in budgetary and legislative form in July 2004. This document pays attention to the territorial aspect of cohesion: "The aim of the new cooperation objective is to promote stronger integration of the territory of the Union in all its dimensions. In doing so, cohesion policy supports the balanced and sustainable development of the territory of the Union" (European Commission 2005p).

The territorial dimension of environmental development and policy has been addressed explicitly in the new Community Strategic Guidelines by chapter 4.1.2 "To strengthen the synergies between environmental protection and growth": "The provision of environmental services such as waste and waste-water treatment infrastructures, management of natural resources, the

decontamination of land to prepare it for new economic activities, and protection against certain environmental risks, should all have high priority in this context". The territorial aspects of these objectives are clearly visible. However, with regard to the three environmental policy elements, which have been chosen for the ESPON 2.4.1 project, attention is mainly paid to civil protection policy. This is underlined by the guideline "undertaking risk prevention measures through improved management of natural resources."

Later on, the Community Strategic Guidelines highlight "the significant needs for investment in infrastructure, particularly in the Convergence regions, particularly in the new Member States, to comply with environmental legislation in the fields of water, waste, air, and nature and species protection." In this context, the territorial dimension of water and biodiversity policies is visible.

Concerning transnational cooperation the guidelines define that "Transnational areas are macro-regions where there is a need to increase economic and social integration and cohesion." The actions envisaged include the creation of European transport corridors (particularly crossborder sections) the prevention of natural hazards, water management at river basin level, integrated maritime cooperation and R&D/innovation networks." This makes clear, that the given territorial dimension of water as well as civil protection policies have been recognised by the strategic guidelines.

1.6 6th Environmental Action Programme

The 6th Environmental Action Programme (6th EAP) has identified four priority areas for urgent actions which have to be tackled for improvements: climate change; nature and biodiversity; environment and health, and quality of life; natural resources and waste. Further, seven thematic strategies are developed for tackling particular complex environmental issues and determining the priorities for the Community: soil protection; protection and conservation of the marine environment; sustainable use of pesticides; air pollution; urban environment; sustainable use and management of resources; waste recycling. These priorities and strategies are core elements of the EU environmental policies that – of course – have different effects on the spatial development (European Communities 2002).

Especially the connection of environmental concerns and sectoral policies is an important task in the ESPON 2.4.1 project. The 6th EAP states that the integration of environmental objectives into the early phases of the different sectoral policy processes is required as well as an ability to assess and make informed decisions over a much longer time horizon. In this context, land

use planning and management decisions are understood as a sectoral policy among others. All in all, the territorial dimension of environmental policy is clearly obvious here.

1.7 The EU Sustainable Development Strategy

The EU Sustainable Development Strategy was adopted by the European Council in Gothenburg, 2001 and object of a comprehensive review in 2005.

The strategy calls for a "more balanced regional development by reducing disparities in economic activity and maintaining the viability of rural and urban communities, as recommended by the European Spatial Development Perspective." (European Commission 2002a, p.12). The European Spatial Development Perspective (ESDP) proclaimed previously even in its subtitle "Towards Balanced and Sustainable Development of the Territory of the EU" this aspect, underlined by goal 3: "more balanced competitiveness of the European territory" and subchapter 1.2 "Spatial Development Disparities" (European Commission 1999).

Early in 2005 the Commission has launched "The 2005 Review of Sustainable Development Strategy". The "Draft Declaration on Guiding Principles for Sustainable Development", which was released in May 2005 as part of the revision process, sets territorial cohesion as one of the aims of sustainable development when stating that "Sustainable Development is a key objective for all European Community policies, set out in the Treaty… It seeks to promote a dynamic economy with a high level of employment and education, of health protection, of social and territorial cohesion and of environmental protection in a peaceful and secure world, respecting cultural diversity." (European Commission 2005n, p. 3). Also two out of ten Policy Guiding Principles in their content correspond to objectives of territorial cohesion, although the territorial aspect is not mentioned explicitly:

- Policy Coherence and Governance: Promote coherence between all European Union policies and coherence between local, regional, national and global actions in order to increase their contribution to sustainable development.
- Policy Integration: Promote integration of economic, social and environmental considerations so that they are coherent and mutually reinforce each other by making full use of instruments for better regulation, such as balanced Impact Assessment and stakeholder consultations (European Commission 2005d, p. 5).

The Strategy for Sustainable Development calls for an Impact Assessment of all EU policy proposals in order to ensure that they include a sustainability impact assessment covering their potential economic, social and environmental consequences. Based on this the goal, the Commission, the EU Parliament and the Council have agreed on an Impact Assessment in 2002 (European Commission 2002b).

1.8 European Spatial Development Perspective (ESDP)

The analysis of territorial or spatial impacts has to be seen on the background of the existing spatial policies. The policy framework of the *European Spatial Development Perspective* (ESDP) has three fundamental goals: *economic and social cohesion, sustainable development and the competitiveness of the EU territory*. These goals are pursued simultaneously with attention given to how they interact, which requires a thorough consideration and coordination of all spatially relevant sectoral policies and various authorities (European Communities 1999).

Especially part 3.4.2 of the ESDP ("Preservation and Development of the Natural Heritage") seems to be quite important for the ESPON 2.4.1 project. Policy option 42 aims at the *"Preparation of integrated spatial development strategies for protected areas, environmentally sensitive areas and areas of high biodiversity such as coastal areas, mountain areas and wetlands balancing protection and development on the basis of territorial and environmental impact assessments and involving the partners concerned."* This passage is a central political rationale for the ESPON 2.4.1 project.

Goals and concepts for the European territorial and spatial development, in particular territorial cohesion and polycentricity helps to implement the more general goals of the European Union like mentioned above.

The term *territorial impact assessment* is used in the ESDP and understood as an assessment tool for evaluating major projects. It is defined as "a tool for assessing the impact of spatial development against spatial policy objectives or prospects for an area" (ESDP Action Programme Progress Reports). The ESDP mentions the Territorial Impact Assessment mainly in the following policy options:

- *Policy option 29:* Introduction of territorial impact assessment as an instrument for spatial assessment of large infrastructure projects (especially in the transport sector).
- *Policy option 52:* Application of environmental and territorial impact assessments for all large-scale water management projects.

1.9 Territorial Cohesion and Territorial Impact Assessment

The ESPON project 3.1 "Integrated Tools for European Spatial Development" describes territorial cohesion to be the most important goal a territorial impact assessment has to refer to: *"Any kind of territorial impact assessment has to refer to criteria derived from chosen spatial development goals*." Polycentric development was understood as a 'spatialised' expression of territorial cohesion. (ESPON project 3.1, 2004, p. 440).

1.10 Commission Guidelines on Impact Assessment

The European Commission has been developing guidelines for assessing the future consequences of policies in different areas (European Commission 2005k). Impact assessment, simply defined, is the process of identifying the future consequences of a current or proposed action (International Association for Impact Assessment, http://www.iaia.org). Well known in the environmental context is *environmental impact assessment (EIA),* which is a procedure that ensures that the environmental implications of decisions are taken into account before the decisions are made. The Commission introduced a new method for Impact Assessment in 2002, integrating and replacing previous single-sector type of assessments.

Further explanations concerning territorial and environmental impact assessment approaches can be found in Chapter C, sections 1 and 2.

2 Identification and review of territorially and spatial planning relevant elements of EU Environmental Policy

The environmental policy areas of the EU differ with respect to their territorial relevance. The following table aims at a closer qualitative statement concerning this territorial relevance. The aim is to identify those areas that potentially shall be in the focus of the ESPON 2.4.1 project. The "territorial relevance" and "explicit spatial planning dimension" can be described by the following criteria:

- Territorial relevance: A territorial relevance of an EU environmental policy exists whenever its implementation has a territorial dimension or in other words the policy is addressed differently with respect to different spatial areas (e.g. certain objectives for protected areas in context of Natura 2000 and others for buffer zones).
- Explicit spatial planning dimension: Such an explicit dimension exists whenever the implementation of an environmental policy might lead to

either a conflict, duplication or to coherence with spatial development goals and/or spatial planning policies (this distinction is rather academic but it shall be mentioned here for analytical reasons) and might influence finally in so doing spatial structures.

Table 1 Overview of environmental themes that are part of the EU environmental policies and their spatial relevance (++: strong; +: moderate; 0: low) (source: own elaboration)

EU environmental theme	Territorial relevance	Explicit spatial planning dimension
Air	+	+
Biotechnology	0	0
Chemicals	0	0
Civil protection and environmental accidents	++	++
Climate change	+	+
Land use	++	++
Nature and biodiversity	++	++
Noise	+	+
Soil	++	++
Waste	++	++
Water	++	++
Environmental economics	+	0
Health	0	0
International issues	0	0
Environment and enlargement	++	Some, but very broad set of policies included which are also parts of other policy areas
Sustainable development	++	Some, but very broad set of policies included which are also parts of other policy areas
Industry	+	Some, but also part of other policy area

For the ESPON 2.4.1 project only those policy areas are of potential interest that at least reaches a moderate score in both categories. These are: Air, Civil protection and environmental accidents, Climate change, Land use, Nature and biodiversity, Noise, Soil, Waste and Water.

This selection is in accordance with the "Scoping document and summary of political messages for an assessment of the Territorial State and Perspectives of the European Union" (European Commission 2005a, p. 12; see also Chapter A of this report). But this paper goes even further as it argues that certain EU environmental policies have indeed a very direct and strong territorial impact, by setting conditions for territorial developments and policies. The policy elements, explicitly mentioned are

- Strategic Environmental Assessment,
- Habitats and Birds Directives,
- Water Framework Directive,
- Framework Directive on Air Quality.

Resulting from this discussion, the following policy areas will be closer looked at: Air, Civil protection and environmental accidents, Nature and biodiversity, and Water.

2.1 Air

In the 6th EAP, environment and health are included as one of the four main target areas of which air pollution is one of the issues highlighted in this area. A main target of the 6th EAP in this respect is to achieve levels of air quality that do not result in unacceptable impacts on, and risks to, human health and the environment. The EU air quality policy acts on different levels to reduce the exposure to air pollution: EC legislation; work at international level to reduce cross-border pollution; co-operation with sectors responsible for air pollution; national, regional authorities and NGOs; research. Under the Strategy the Commission is proposing to start regulating fine airborne particulates, known as PM2.5, which penetrate deep into human lungs. The Commission also proposes to streamline air quality legislation by merging existing legal instruments into a single Ambient Air Quality Directive, a move that will contribute to Better Regulation (European Commission, DG Environment, 2005i).

The EU air quality policy has an area-wide approach and contains a mix of instruments and measures. On the one hand, this applies for projects as sources of air pollutants. On the other hand land use has influence on air-quality as it can interrupt and redirect fresh and cold air streams. This has influence on the concentration of substances that might be regulated (e.g. by the Directive on air pollutant values).

Air quality has some influence on the economic development especially in areas where the economy relies on sectors, which are vulnerable towards a

low air quality, like areas with a high share of agriculture or tourism. In these areas the quality of the products (agriculture) or the attractiveness of the area (tourism) might be reduced due to a low air quality. Further, a high concentration of particular matter (PM10) might affect the transport and logistic industry due to bans for trucks. A low air quality has indirect effects, as it is one factor (of many) that might encourage people to move to areas with better environmental conditions. Thus, air quality policy can be seen as one of the spatially/territorially relevant EU Environmental Policies.

Concerning air quality, the following documents represent the basis for the EU air quality policy: Air quality framework directive (96/62/EC); Directive on air pollutant values, followed in 1999 by a "daughter Directive" (1999/30/EC); Clean Air for Europe (CAFÉ).

2.2 Civil protection and environmental accidents

The overall objectives of this policy element are "to ensure better protection of people, the environment, property and cultural heritage in the event of major natural, technological and radiological disasters, including accidental marine pollution, chemical spills as well as terrorist attacks, occurring inside or outside the EU". In this context, a linkage to the water policy has to be pointed out, since a directive on flood risk management is in preparation (see also Section 2.3).

Especially the management of natural hazards is named in the ESDP explicitly (goal 142 in connection with policy option 46 "Development of strategies at regional and transnational levels for risk management in disaster-prone areas"(European Communities 1999).

In particular, the Solidarity Fund (European Commission 2002), which has been created after the Elbe river flood in 2002, can be seen as an example for environmental policy which is already used integratively in order to cover environmental, social and economic consequences of occurred disasters. However, the solidarity fund works so far only reactive in order to give assistance to the recovery after an occurred disaster. A more proactive approach aiming at improved disaster prevention could be a good example for a better integration of environ-mental aspects into territorial development.

In addition to the so far described overall objectives, some specific tools exist for marine pollution and chemical accidents. Whereas the EU activities in the field of marine pollution are mainly not spatial relevant, the SEVESO II Directive and its spatial relevance should be discussed in more detail.

Council Directive 96/82/EC (SEVESO II) aims at the prevention of major accidents involving dangerous substances, and the limitation of their consequences (European Communities 1996). The provisions contained within the Directive were developed following a fundamental review of the implementation of Council Directive 82/501/EEC (SEVESO I). In addition, Directive 2003/105/EC of the European Parliament amending the SEVESO II Directive has to be considered. This first amendment was to cover risks arising from storage and processing activities in mining, from pyrotechnic and explosive substances and from the storage of ammonium nitrate and ammonium nitrate-based fertilizers.

The requirements for land use planning (Art. 12 SEVESO II Directive) are newly introduced into Community legislation on major-accident hazards; the SEVESO I Directive did not contain such requirements. In general, the requirements of Article 12 of the SEVESO II Directive can be met using whichever method that fits best with the historical development and legislative style that has evolved for land use planning in each Member State. All in all it can be expected that practices within individual Member States would yield broadly similar results in similar situations.

2.3 Water

Concerning water, the following documents represent the basis for the EU water policy:

EU Water Framework Directive: On 23 October 2000, the "Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy" or short the EU WFD was adopted (European Communities 2000a). The WFD aims at an integrated river basin management for Europe. The river basin approach aims at congruence between the ecosystem water (ground water, surface water) and the institutional arrangements created to manage human activities affecting the water system. The WFD offers for the first time integrated instruments and procedures (e.g. river basin management plans including a program of measures) in order to take care for a comprehensive river basin management within the whole EC. These instruments will be binding for all public authorities. In consequence, water management will influence spatial as well as economic development seriously. From an economic point of view Art 9 "Recovery of costs for water services" is probably the most important issue. In accordance to § 1 "*Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic*

analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle."

Forthcoming Directive on Flood Risk Management: Currently a directive on flood risk management is under development (European Commission 2005f; 2005g; 2006a, see also http://europa.eu.int/comm/environment/water/flood_risk/). The activities concerning a flood risk management directive have been introduced by a Communication of the European Commission on "Flood risk management – Flood prevention, protection and mitigation" (European Commission, 2004a), aiming at a flood protection action programme. The forthcoming directive on flood risk management will consist of a *flood mapping* and a *flood management* part.

The development of a Directive on Flood Risk management aims at supplementing the WFD and at an integration of both directives on the level of river basins. To achieve this objective, the Commission does not intend to propose an amendment of the WFD, but to propose a separate Floods Directive whilst ensuring the necessary linkages by legislative measures (within the Floods Directive) as well as informal implementation measures (to be guided by the EU Water Directors, cf. inter alia Council Conclusions) (European Commission, 2005g). In this context, the close linkage of the water policy (Flood risk management directive) to the environmental policy "civil protection" is clearly visible.

Other thematic directives: Urban Waste Water Treatment Directive (91/271/EEC), Nitrates Directive (91/676/EEC), Bathing Water Quality Directive (Council Directive 76/160/EEC concerning the quality of bathing water) and its proposed revision, Drinking Water Directive (98/83/EC).

2.4 Nature and biodiversity

The Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (FFH directive) establishes a European ecological network known as "Natura 2000" (European Communities 1992). The Natura 2000 network is the European ecological network of sites established under the Habitats Directive. Its main purpose is the protection of habitat types and plant and animal species of Community interest in the European Union. It comprises both special areas of conservation (SACs) designated under the 1992 Habitats Directive, and special protection areas (SPAs) classified under the Birds Directive (79/409/EEC; European Commission 2004, p. 4).

The EU Commission has recognised that the management of designated Natura 2000 areas needs to be co-financed: "It is therefore crucial that, as the designation process set out in the Habitats Directive nears its conclusion, attention now turns more towards management of the sites. The implementation of these management plans clearly raises the issue of the availability of the required financial resources for their implementation. Community funding is necessary in order to implement fully the network and provide support for the efficient management of the numerous sites of the network" (European Commission 2004, p. 8).

The Biodiversity Strategy of the Community (European Commission 1998) provides a framework for addressing objectives of sustainable use of biodiversity across the territories that do not constitute "protected areas". The strategy defines a number of relevant territorial concepts including ecological corridors and buffer zones and rural areas that constitute an important factor for combining economic objectives with nature and landscape conservation.

Especially the establishment of the Natura 2000 network with its requirement to create protection areas is of high spatial/territorial relevance and thus important to be considered in the ESPON 2.4.1 project.

Other related policies: On 19 July 2000, the Council of Europe's Committee of Ministers adopted the European Landscape Convention and decided to open it for signature to the 41 Council of Europe's Member States.

2.5 Strategic Environmental Assessment

The so far project-oriented Environmental Impact Assessment (EIA, EU directive 85/337/EEC in connection with EU directive 97/11/EC) was enlarged on a strategic level through the EU directive 2001/42/EC "Assessment of the effects of certain plans and programs on the environment", which came into force on 27th of June 2001 (European Commission 2001). The directive mainly contains procedural requirements. The EC argued primarily, "that "Environmental assessment is an important tool for integrating environmental considerations into the preparation and adoption of certain plans and programmes, which are likely to have significant effects on the environment in the Member States, because it ensures that such effects of implementing plans and programmes are taken into account during their preparation and before their adoption." (Point 4 of the substantiation of the directive). This argumentation is based on the main lessons learned from practical experiences with the present environmental

assessment on the project level. The main problems in dealing with environmental issues on the project level refer to the impossibility of assessing alternatives and interactions between the effects of several projects. After the fundamental decision about a specific land use or an infrastructure investment has been made on the programme or plan level, only minor changes on the project could be taken into consideration as a result of an EIA.

The key task of the SEA is in accordance with Art. 3 EU directive 2001/42/EC the assessment of the "significant effects on the environment, including issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors" (Annex 1, letter f). The results of this assessment, summarised in the environmental report, have to be taken into account in decision-making about specific plans or programs (Art. 2 b and c EU directive 2001/42/EC).

The SEA directive has been implemented in the national law in the meantime. In consequence it will seriously influence planning procedures in spatial planning as well as all spatially relevant sectoral planning divisions. Even the programmes of measures and landscape plans have to be assessed.

2.6 Prioritised compilation of relevant elements of the EU Environmental Policy

Looking at these policies, specific differences in the spatial dimension the respective policy claims can be observed:

- Site: Some territorially relevant EU policies relate to certain installations that exist on certain sites. Thus, the territorial aim of the policy is site-specific (e.g. SEVESO II Directive).
- Network: Other EU policies relate to a spatial network. Here, the territorial aim is network-specific (e.g. NATURA 2000).
- Area-wide: A third group relates to the whole EU territory, meaning that in any place within the EU territory, the policy shall be applied. This territorial aim can be characterised as being area-wide (e.g. WFD, Air Quality Directive).
- Cross-sectoral: Further policies unfold territorial effects but cannot be characterised as typically spatially specific. They moreover aim at a good implementation of EU Environmental Policies ("support to policy";

Tamborra, 2005) by ensuring a proper identification and assessment of effects on the environment and thus are cross-sectoral (e.g. SEA, EIA).

The ESPON 2.4.1 project selected one policy from each of the spatial dimensions for the assessment of territorial impacts. Based on the review of the elements of environmental policy the following are chosen as test cases. The following list of elements of EU Environmental Policy will be considered for the three test cases:

- Site = Civil Protection: This policy contains the whole disaster circle. In particular disaster prevention is from highly relevance for territorial development (see final report of the ESPON 1.3.1 project). In addition, instruments like the solidarity fund can be understood as a possibility for the integration of environmental aspects in territorial development. The ecologic, social and economic impact of environmental policy could be assessed by this example properly. In addition, the SEVESO II directive contains with Art 12 a spatial and environmental component.
- Network = Habitat/Biodiversity: These elements will be examined together. Habitat can be seen as an example for environmental policy that concentrates on certain areas (coherent net of protected areas, NATURA 2000). Since the reporting process is mainly completed, the influence of the protection of certain areas on territorial development can de examined. In addition, the starting management process allows analysing the economic aspects of the directive, in particular the financing of the continuing fostering of the areas. The strategy is in the first instance command and control oriented. Habitat is complemented by the more programmatic biodiversity strategy.
- Area-wide = Water management: The WFD directive possesses a comprehensive spatial approach. It makes use of a broad mix of instruments and measures. Although at a present stage the monitoring process is in the focus of the responsible authorities, the coming programmes of measures and management plans are will be seriously influence territorial development. In addition the directive owns an economic aspect (Art. 9).

  As mentioned above, also Air Quality Policy is an area-wide approach. However, in this category, it is believed/assumed that the territorial impacts of the EU Water Policy are much stronger. Therefore, Water Policy has been selected in this field.
- Cross-sectoral = Environmental Impact Assessment and Strategic Environmental Assessment: These EU policies are taken into account as a part of the development of a TIA methodology.

Chapter B – Presentation of findings concerning existing models and tools related to territorial impact assessment of EU policy

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This chapter presents findings and advice concerning existing models and tools related to territorial impact assessment of EU policy, covering efforts undertaken by the European Communities and ESPON projects. These served as a common basis for the development of the procedural assessment steps of the TIA of EU Environmental Policies (see Chapter C). This chapter takes into account findings and experiences from three different areas of impact assessments:

1. EU approach (Commission Guidelines on Impact Assessment and procedural steps and experiences from the EIA and the SEA Directives),
2. ESPON approach (findings and experiences from ESPON policy impact projects and Co-ordinating cross-thematic projects) and
3. further existing Impact Assessment Approaches and Projects.

1 EU approach: Impact Assessment Guidelines and Directives

In this section, EU approaches of impact assessments are reviewed. In the first part, the internal Commission Guidelines on Impact assessment are presented whereas the second part put emphasis to the elements of the EU Environmental Impact Assessment and the Strategic Environmental Assessment Directives, which set a legal framework for the Member States.

1.1 Commission Guidelines on Impact Assessment

The European Commission has taken several concrete actions to improve the way it designs policy, of which one is *impact assessment*. For the Impact Assessment of its policies the Commission introduced a new method in 2002, integrating and replacing previous single-sector types of assessments (European Commission 2002b).

The Commission's internal Guidelines on Impact Assessment have been updated on 15 June 2005 (European Commission 2005k). This thoroughly revised document provides a useful step-by-step guidance to carry out the

impact assessments of major legislative and policy-defining initiatives set out in the Commission's annual Work Programme.

In this document, the Commission answers the question what is to be understood under an Impact Assessment as follows: "Impact Assessment is a set of logical steps which structure the preparation of policy proposals. It involves building on and developing the practices that already accompany the process of policy development by deepening the analysis and formalising the results in an autonomous report. Responsibility for developing the Impact Assessment lies with the service in charge of developing the proposal" (European Commission 2005k, p. 4).

The Commission's approach to Impact Assessment involves the following key steps:

1. Analysing the issue/problem, what causes it, who it affects, and if the EU level is the appropriate level to deal with it (in line with the principle of subsidiarity);
2. Defining some key objectives to tackle the problem; and ensuring that these are consistent with other EU policies and strategies, such as the Sustainable Development and Lisbon Strategies;
3. Looking at possible policy options to meet the objectives, making sure to always consider the option of taking no action at all at EU level, and examining alternative approaches to regulatory actions;
4. Assessing the possible impacts of short-listed policy options, intended and unintended, across the social, economic and environmental dimensions; the analysis should also consider impacts that fall outside the EU;
5. In the light of the impact analysis, the options should then be compared to see if it is possible to rank them and identify a 'preferred' option.
6. The new Guidelines also, for the first time, set out a procedure for completing an Impact Assessment Report in those cases where a decision is taken, possibly as a result of the impact assessment, not to proceed with the proposal.
7. Throughout the process, there should be close contacts between Commission services to ensure that all relevant factors are taken into consideration. The requirement to consult with stakeholders also ensures that a full picture be developed of potential impacts.

A *territorial* impact assessment as envisaged in the ESPON programme has to be carefully distinguished from a general policy impact assessment as described above. A territorial impact assessment focuses on territorial effects of a policy and in a way is of a more general nature because it is

related to "territory" and thus comprises several elements of the spatial structure such as infrastructure, settlement areas etc. Within the ESPON 2.4.1 project the TIA approach developed focuses on the effects of *environmental* policies. However, the basics are nevertheless the same and the methodology developed takes into account the elements mentioned above, including certain specifications (territorial, environmental).

1.1.1 EIA and SEA Directives

Certain assessment steps of the TIA for EU environmental policy have to be seen in relation to the frameworks of the EIA Directive (85/337/EEC) and the SEA Directive (2001/42/EC). Especially in comparison to the SEA Directive, some overlapping may be assumed. The similarities and differences of an SEA and a TIA as well as the added value of a TIA are discussed in Chapter F, Section 2.4.

The table below shows the equivalent parts as mentioned in the SEA and EIA Directives. The discussion in Chapter F shows that not all of these 11 steps make sense in a TIA. The applicability of these steps is shown and adapted for different levels (ESPON three level approach), as presented in Chapter C in the application of the TIA for the test cases in the case study work.

Table 2 Possible assessment steps of a TIA for EU environmental policies. (source: own elaboration)

Elements of assessment procedures under EU legislation or EU activities	SEA Directive equivalent	EIA Directive equivalent
1. Description of the intervention and identification of significant effects	Art. 5, p. 1	Annex III (1)
2. Consultation of authorities	Art. 6, p. 3	-
3. Description of significant effects	Art. 5, p. 1	Annex III (3)
4. Evaluation of significant effects	Art. 5, p. 1	Annex III (4)
5. Consultation of the public	Art. 6, p. 4	-
6. Assessment of significant effects	Art. 3	Annex III (4)
7. Integration of considerations into the programme or policy	Arts. 8, 9	-
8. Identification of reasonable alternatives	Art. 5, p. 1	Annex III (2)
9. Measures envisaged to reduce or eliminate contradictory or negative effects	Art. 7, p. 2	Annex III (5)
10. A non-technical summary of the information provided under the above headings	Annex II	Annex III (6)
11. Monitor the significant effects of the implementation	Art. 10, p. 1	-

The examples of the EIA and the SEA application in EU Member States shows despite of the common framework a large variety exists. This relates among others to the relationship between both assessments. Risse (2005) gives some examples that are a result of a questionnaire on the application of strategic environmental assessment in the Member States of the European Union.

In some countries both assessments are complementary or at least they do not overlap:

- In Finland as in other countries/jurisdictions the plan/programme that is subject to SEA may include projects which go under EIA regulations. In the subsequent EIAs the information gathered during SEA is taken into consideration and thus the same studies are not required twice.
- In the Netherlands, there is a 'cascade' of environmental assessments. One makes use of another and focuses on the issues at hand.
- In Germany, the potential for overlap between SEA and EIA has been recognised and therefore a procedure has been established that fulfils the requirements of the EIA Directive and as well of the SEA Directive.

- EIA and SEA are not always complementary in practice. In some countries an overlapping exists: In Sweden, certain Detailed Development Plans will require both an EIA according to the EIA Directive and a SEA according to the 2001/42/EC Directive. The two assessments are similar but not complementary.

Similar to the large variety of application and implementation of the SEA Directive also the EIA Directive's application shows this fact. The report "On the Application and Effectiveness of the EIA Directive" in EU Member States (European Commission 2003) *"has revealed several shortcomings and weaknesses. In the Commission's view in some Member States there are examples of very good practice, e.g. in relation to encouraging public participation or providing for clear quality control procedures. In others (and sometime in the very same Member States that have elements of good practice), there are still weaknesses. These findings need to be carefully assessed alongside other factors in order for the Commission to decide whether the EIA Directive should be further amended at this stage. It appears that the main problem lies with the application and implementation of the Directive and not, for the most part, with the transposition of the legal requirements of the Directive."* (European Commission 2003, p. 6).

These differences and shortcomings of the implementation of a Directive or at least an assessment framework shall also be kept in mind for the future application of any territorial impact analysis. It is always a question of the right balance between the obligatory framework as given by an EU directive and the necessary freedom of the Member State to integrate it into the national legal system and adapt it to specific institutional settings and finally the authority that is in charge of a certain assessment.

2 ESPON approach: Findings/experiences from ESPON projects

One of the main aims of the ESPON programme is to identify and regionalise spatial structures and territorial impacts of policies. The latter is addressed by the ESPON policy impact projects (so-called strand-2 projects). In parallel, the development of a common TIA methodology was part of the co-ordinating cross-thematic projects (so-called strand-3 projects). Relevant strand-2 and strand-3 projects will be reviewed in this section.

2.1 Review of ESPON policy impact projects

This section reviews relevant results of ESPON policy impact projects in regard to the development of a TIA for environmental policies.

2.1.1 ESPON 2.1.1 project

The objective of the ESPON 2.1.1 project was to assess the territorial impacts of EU Transport and TEN policies (ESPON project 2.1.1. 2005). The major question is how far the TEN provide the right answers for a territorial development as described in the ESDP. The measures proposed in the White Paper "European Transport Policy for 2010: Time to Decide" should provide the framework for the investigation. In the ESPON 2.1.1 project the evaluation of the territorial impacts of EU transport and telecommunication policies was mainly conducted via scenario analysis. The project presents an example of TIA on the case of EU transport policy, using innovative tools for analysis.

Impact on transportation flows

For the analysis of "overloaded transport corridors", the TEN-STAC study results were used in the project for classification and mapping of transport corridors and for a brief empirical analysis of the long distance transportation flows at the regional level. A basis of the transportation flow analysis is the road transport mode as a main polluter.

The indicator used for the regional analysis of transport flow network data is the **density of kilometres travelled within the road network at the NUTS 3 level**. The distribution of transport flow volumes interacts strongly with the spatial structure of Europe. Spatial interactions that generate traffic concentrate on urbanised regions and on networks between major centres. The cross rural areas that are the carrier of transportation infrastructure.

In areas and corridors of high traffic density, the conditions for a modal shift to environmentally friendly modes of transport such as railways and waterways should be further improved. This aim does not only address the natural heritage, where overloaded transport corridors cause spatial fragmentation and environmental pressure, but also built-up areas and the people who live there.

Policy interactions

Transport policy addresses two fundamental concerns of the EU: the improvement of the European competitiveness and the cohesion between the Member States. Since **the way in which transport itself interacts with other policy sectors is poorly understood**, the danger is that

horizontal interactions may result in single sectoral policies running counter to one another.

The project identifies the main policy interaction **within transport policy itself**. On the one hand, infrastructure investments aim at reducing transport costs, while on the other hand pricing mechanisms for transport networks should make users aware of the real resource costs of transport, when they differ from private costs. The conflict results from a failure to implement policy in its totality. Realizing single and distinct measures runs the risk of making the situation worse.

A similar conflict is identified between **transport and environmental policy**. Reducing transport costs increases mobility, which is a pre-requisite for a single market in goods and services. But on the other hand the increase in transport negates the objective of environmental sustainability. In order to secure the latter, the user must face the true social cost of transport, including environmental externalities.

As a second source of political conflict there is a **vertical interaction, taking place between EU and national transport policy**. Since large parts of the transport policy are fully reserved to the Member States, there is a balance between national and EU objectives, with weights differing between the countries. Vertical as well as horizontal conflicts may appear whenever either of the different interests dominates the others.

In most countries there is less interest in pricing mechanisms for efficiency reasons. Charging is seen more as a means towards raising revenues necessary for future infrastructure investments, or in the context of prevention of environmental damage. **Countries differ significantly in their environmental priorities**, depending also on their location. More peripheral countries which are less affected by congestion seem to place more emphasis on global environmental issues, as do some of the smaller Member States - issues which they can typically only affect marginally, but where they have some need to influence the decisions of their bigger neighbours.

Spatial equity versus environmental sustainability

From the scenario results and the analysis of policy interactions the project suggest three fundamental political goals between which trade-offs may appear:

1. economic efficiency
2. spatial equity,
3. and, environmental sustainability.

Among the possible trade-offs the project dealt in detail also with the trade-off between "spatial equity" and "environmental sustainability". There is a wide consensus, that pricing instruments are the most attractive way to deal with the problem of environmental externalities. Since all transport modes damage the environment, the aim should not be only to shift the transport in favour of the less damaging modes, but to reduce the overall amount of transport. This actually means an increase in transportation costs.

The conflict with the goal of balanced spatial development appears, because this cost increase is the most unfavourable for lagging regions, rural regions and peripheral regions, those who are in general less affluent than the centres. Consequently, all indicators in the results of the models show that Social Marginal Cost Pricing (SMCP) for all modes aggravates spatial disparities.

The main political conclusion is that pricing scenarios should not be abandoned in favour of spatial equality objectives. Instead, a policy worsening regional income disparities should be accompanied by transfers in favour of those regions suffering from losses. Such an instrument mix of pricing and compensation is the right way both to protect the environment in an efficient way, and to avoid undesired spatial imbalances.

2.1.2 ESPON 2.1.3 project

The overall aim of ESPON 2.1.3 project "The territorial Impact of Common Agricultural Policy (CAP) and Rural Development Policy" was deepening the understanding of territorial impacts of the EU's Common Agricultural Policy and Rural Development Policy (CAP/RDP) through the provision of a standardised database and an analysis of territorial trends covering the EU-15 and neighbouring and accession states (ESPON project 2.1.3. 2005).

So far, the design and implementation of the CAP have been little touched by the territorial concepts of balanced competitiveness, economic and social cohesion, and polycentricity set out in the ESDP and in the Third Cohesion Report, although the policy has begun to address the goal of environmental sustainability.

Findings

The key finding of the ESPON Project 2.1.3 is that the CAP of the EU has worked against the ESDP objective of balanced territorial development, and has not supported the ESDP objectives of economic and social cohesion.

Pillar 1 (comprised of market support, mostly non-budgetary and direct payments) support mostly goes to the wealthiest regions of EU15. The level

of total Pillar 1 support was found to be generally higher in more accessible regions, and lower in more peripheral regions at all spatial scales (local, meso and EU-level). Multiple regression analysis shows that total Pillar 1 support is strongly associated with a region's average farm business size and land cover indicators. This conflict with cohesion objectives is not surprising, since Pillar 1 has never been a cohesion measure. However, the Rural Development Regulation (RDR) is a cohesion measure, and, while the evidence on Pillar 2 (agri-environmental and other "rural development" expenditures) is more mixed, expenditure under the RDR does not appear to support cohesion objectives either. The "rural development" Pillar 2 may in some cases be more consistent with cohesion within countries, but runs counter to EU-wide cohesion in the way it is currently structured.

Territorial impacts of agri-environmental programmes

Agri-environmental programmes were found to contribute to prudent management of and protection of nature and cultural heritage through encouraging a reduction in inputs of inorganic fertilisers, conservation of habitats, and preservation of the cultural landscape. Agri-environment schemes are particularly suited to the encouragement of appropriate land management.

A number of studies have pointed to evidence of environmental improvements generated by the programmes including reduction in soil erosion and pollution, limiting pressure from input use, conservation of habitats and maintaining cultural landscapes. But evidence of positive impacts on biodiversity is more limited. The effectiveness of the programme has in some cases been compromised by either poor targeting or implementation together with production linked support policies associated with environmental problems.

Environmental outcomes related to agricultural practices are not limited to the agri-environment regulation but are also addressed through the Birds and Habitats Directive, Water Framework and Nitrates Directives and associated regulations. Integration of environmental objectives requires that mechanisms within the CAP should be identified to support attainment of the goals of these directives.

Indicators

There is no direct impact indicator developed by the project for the Agri – Environmental issue. The diversity of the European agricultural landscape as well as the diversity of cultural values and the differing structures of farming systems makes it very difficult to identify a common set of indicators to assess the effectiveness of the measures.

2.1.3 ESPON 2.1.4 project

ESPON 2.1.4 project "Territorial trends of energy services and networks and territorial impact of EU energy policy" has provided the background for a more informed discussion of policy impact in Europe. The aim of the study was to identify and measure, whenever possible, the links between energy policy and local development in the European Union regions (ESPON project 2.1.4. 2005).

EU energy policy

In recent years, the following general areas of debate have been of particular importance for shaping a common EU energy policy:

- the internal-market for energy (electricity and gas),
- the environmental policy,
- the European Energy Charter.

One of the findings of the project is that the EU energy policy is now relying on renewables development and energy efficiency. Both can have an important impact at local level by increasing the use of endogenous energy resources. Biofuels for transport, biomass, wind and small hydropower for electricity production are among the main drivers of such a policy for years to come.

Based on the final report of project 2.1.4 the object of energy efficiency activities is to ensure rational use of energy resources and reduce adverse environmental effects of energy use. The development of renewable energy sources (wind, solar, biomass, hydro) is one of the most important challenges and objectives of EU Energy Policy based either on environmental concerns, but also on security of supply and reduction of energy dependence.

Indicators

In the view of air quality the ESPON project 2.1.4 can provide useful information and indicators, i.e. the studies on Kyoto Protocol targets for greenhouse gas emissions and ceilings for acidification gases and development of renewable energy source along with the directive on "the promotion of production of electricity from renewable energy sources" (Directive 2001/77/EC). The environment related indicators about greenhouse gas emissions and acidification gas emissions could help to monitor the existing air quality targets in Europe.

Greenhouse gas emissions indicator shows a positive evolution on the reduction of amounts of CO2 equivalent released to the atmosphere between

1990 and 2001. Emissions have declined substantially in all of the New Member States and candidate countries (except Cyprus and Malta) mainly due to the introduction of market economies and the consequent restructuring or closure of heavily polluting and energy-intensive industries. In EU15 only Germany, Luxembourg, Sweden and the United Kingdom reduced the values in the same period.

Regarding the emissions of acidifying substances in the EU15 they have decreased by 41% between 1990 and 2001, and by 58% in the 10 new Member States. In EU15 the biggest reductions have been in Germany and the United Kingdom, in the New Member States they were in Czech Republic and Latvia.

2.1.4 Summary of TIA approaches in ESPON policy impact projects

Although Chapter 9.3.2 of the ESPON 3.1 project draws a rather sceptic conclusion of the application and the approaches of the TPGs concerning the Territorial Impact Analysis in the policy impact projects (ESPON project 3.1, 2004, pp. 427ff.), there are interesting attempts which partly have been considered as a basis for the development of procedural steps for a TIA for EU Environmental Policies. The following table gives an overview of the different approaches used in previous ESPON policy impact projects. It shows the large variety of approaches used.

Table 3 Overview of the characteristics of policy Impact Assessment approaches in ESPON policy impact projects. (source: ESPON project 3.1,2004, p. 435f.)

TIA Minimum requirements	2.1.1 Transport &TEN *(FR)*	2.1.2 R&D *(FR)*	2.1.3 CAP & RD *(FR)*	2.1.4 Energy (TIR)	2.2.1 SF *(TIR)*	2.2.2 PreAc. *(TIR)*	2.2.3 SF urban areas *(FR)*
Reference to causing policy interventions	no reference to interventions (highly aggregated)	financial actions (RTD Frame, ERDF, ESF)	CAP expenditures	investments, energy infrastructure & energy relations (in 5 'blocks')	EU-funding incl. national co-financing	Phare and pre-accession aid measures	ERDF, ESF, CI Urban (30 interventions)
Hypothesis on cause-effect-relations	several existing complex models	speculations only	- 'direct' regional income - income multiplier	5 types of energy territorial impacts	economic disparities	Economic and social performance	Positive impacts on urban areas
Regional scale (min. NUTS 2)	NUTS 3	NUTS 2 (NUTS 1 for some)	NUTS 2/3 (estimations)	NUTS 2	NUTS 2/3	NUTS 3 (NUTS 2 for some)	NUTS 3/5 for observation NUTS 2/3/5 for analysis
Reference to past & future interventions	reference to past (1981-2001) hypothesis about future impacts (2001-2021)	primarily backwards	only ex-post analysis	review 'way forward'	Meta-evaluation of previous SF interventions	Analysis of past interventions, ex-post analysis	1994-1999 2000-2006
Interventions/ effects registered	accessibility regional welfare	input and context variables	subsidies farm income	energy - investment - production, - consumption, - service in 5 'domains'	SF at regional level, regional development trends and changing disparities	Economic and social performance	structure of interventions
Quantitative/ qualitative appraisal	Quantitative Scenario analysis	mainly quantitative	mainly quantitative	mainly quantitative	mainly quantitative	Quantitative and qualitative analysis; test of working hypothesis	mainly quantitative
Concepts/ goals referred to	Cohesion, polycentricity efficiency v. equity	balanced development polycentric development competitiveness	cohesion environmental protection, polycentricity	Three ESDP guidelines	territorial cohesion, polycentric development; balanced development,	Balanced spatial competition and equity of economic and social cohesion	missing
Technique of analysis	simulation models classification of regions case studies	aggregate statistical analysis case studies	aggregate statistical analysis case studies	Input-Output model; aggregate statistical analysis case studies	comparing maps of regional distribution case studies	Cluster analysis, gini-coefficient, regression analysis	aggregate statistical analysis of 25 urban areas case studies
Applied understanding of 'territorial'	regional disparities	'Islands of R&D' (regions)	regional disparities	regional disparities	cross-sectoral approach to space	regional disparities	declining industrial urban areas
Territorial reference of outcome	several typologies of regions	typology of regions	typologies of regions	typologies of regions	typologies of regions	Typologies of all regions	typologies of regions

The assessment of TIA approaches of the first ESPON phase has shown some difficulties concerning a quick progress to apply and further develop a common TIA (ESPON project 3.1, 2004, p. 434):

- the present orientation of EU policy programmes is still far away from actually taking into account spatial development goals and concepts;
- hence, as a direct consequence of that orientation, there is a dramatic lack of territorial differentiation of policy implementation data;

- finally, the elaboration of spatial development goals and concepts in the wake of the ESDP has hardly achieved operational results appropriate for assessment, so far.

The ESPON 2.4.1 project addressed these constraints by a careful selection of territorially relevant environmental policies (see Interim Report, Chapter B). In this context, territorial relevance is defined as a situation where a certain policy (e.g. an EU Directive) leads to results that differ territorially within the EU area (e.g. protection areas versus non-protected areas). Further, the project developed an approach that will help to assess the achievement of spatial goals in a quantitative way (see Chapter C).

2.2 Review of ESPON co-ordinating cross-thematic projects

This section reviews relevant results of ESPON co-ordinating cross-thematic projects in regard to the development of a TIA for environmental policies. In ESPON project 3.1 these are mainly the well-known basic "TIA minimum requirements".

2.2.1 ESPON 3.1 project

The ESPON 3.1 project "Integrated Tools for European Spatial Development" was the first of the cross-thematic projects and had a difficult task of coordinating other projects as well as developing tools for territorial analysis (ESPON project 3.1. 2004). The main goals of the project were:

- Preparation of common ground for other projects and the integration of the results of other projects
- Supporting co-ordination on a technical and scientific level of ESPON 2006 Programme and the projects under measure 1 and 2, including data collection, development of a GIS facility and map-making, thematic coordination preparing for the cross thematic exploitation of integrated results based on all projects prepared under the programme.
- Offering scientific support for the achievement of the objective of the ESPON 2006 Programme.

TIA

One of the important tasks was also to contribute to the methodological development of territorial impact assessment, as proposed initially in the ESDP. It describes territorial cohesion to be the most important goal a territorial impact assessment has to refer to: *"Any kind of territorial impact assessment has to refer to criteria derived from chosen spatial development goals. The only two key concepts with genuine territorial dimension are*

'territorial cohesion' and 'polycentric development'. Actually territorial cohesion and polycentric development are often associated in documents relating to territorial development. Most of the time polycentrism is justified by the dual need to improve global competitiveness of the European continent and to correct imbalances and disparities generated by the centre-periphery scheme. Polycentrism is seen as a way to concretise 'higher' policy aims, and notably to remove obstacles to cohesion such as growing territorial disparities. In this perspective, polycentric development appears as a 'spatialised' expression of territorial cohesion. In other terms, polycentrism is viewed as the operational concept – or development / spatial model - corresponding, in terms of spatial planning, to the 'abstract' concept of territorial cohesion, as the way chosen to concretise it" (ESPON project 3.1, 2004, p. 440).

This is summarised in a ten-point list of "TIA minimum requirements", structured in three phases:

- Scoping (Reference to policy interventions; Hypothesis on cause-effect-relations; Regional scale of observation; Reference to past and future),
- Analysing (Interventions and effects measured; Quantitative/qualitative appraisal; Technique of analysis),
- Assessing (Goals referred to: polycentric spatial development/territorial cohesion; Applied meaning of 'spatial/territorial'; Territorial coverage of outcome).

These minimum requirements were taken into account for the development of the ESPON 2.4.1 TIA approach (see Chapter C).

2.2.2 ESPON 3.2 project

One of the most important on-going ESPON projects is the project 3.2, "Spatial Scenarios and Orientations in Relation to the ESDP and Cohesion". Currently the Third Interim Report of the project is available for review of its results (ESPON project 3.2. 2006).

Scenarios

The main objective of the ESPON 3.2 project is to develop future visions of the development of the territories making up the ESPON space, i.e. EU27+2. These future visions will take different forms from basic quantitative trends scenarios to qualitative normative, roll-back scenarios. The aim is to provide policy makers with the necessary tools to understand the potential

evolutionary paths that European regions might take and the possible consequences of different spatial policy choices.

Although none of the current scenarios is specifically addressing environment as an issue, several of them make direct connections to environmental aspects, like for instance transport scenarios, rural development scenarios or climate change scenarios.

Tools

Parallel to the elaboration of these scenarios, work also progresses on the tools the team proposes to use in conjunction with the scenario building exercise. These include the MASST macro-economic regional development model, the KTEN transport meta-modeller, measurements of elements of territorial cohesion (ECTI) and the long-term database structure.

TIA

An additional task, which is important for the ESPON 2.4.1 project is also further elaboration of "Territorial Impact Assessment" tool. The ESPON 3.2 project is expected to analyse the territorial impact approaches developed by the single projects and to propose a more elaborated methodology for future territorial impact assessments of EU policies, which could be considered as draft TIA tool. The team is supposed to use a two-layered approach, with one common methodology for all policies, complemented by a tailor-made methodology for each relevant policy field. The impact assessments are to be understood as ex-ante exercises and are to be applicable for EU-level policy making. The final aim is to come up with something similar to the *Commission Guidelines on Impact Assessment* (SEC(2005)791) and the *Handbook on environmental assessment on Regional Development Plans and EU Structural Funds programmes* which should allow policy makers working on different EU-level policies to follow simple guidelines for evaluating their territorial impacts.

At the ESPON Seminar in Manchester (7-8 November 2005) ESPON project 3.2 ("Spatial scenarios and orientations in relation to the ESDP and EU Cohesion Policy") presented a Working Document for the Workshop "Territorial Impact Assessment (TIA) methodology". The Working Document finally concludes that the goal of assessing policy impacts is to develop a tool for ex-ante evaluation of policies. Such an ex-ante evaluation can only be very approximate and depends on a series of hypotheses concerning cause ad effect relationships. Further it requires in-depth knowledge about the complexity and diversity of regional contexts in which a given policy is applied. One of the main results of the workshops for the future work of the ESPON 3.2 project was the agreement to identify and define so-called logical

cause and effect models for a series of policies, taking into account the work done by ESPON Priority-2 projects.

This sets the frame for the ESPON 2.4.1 project in order to guarantee compliance between both projects (ESPON projects 2.4.1 and 3.2): Cause-effect chains should ideally link elements of EU environmental policies with those territorial trends which have been identified by the ESPON 3.2 project and which can be measured by indicators. Thus, a qualitative but logical connection between policies and their effects exists – at the same time changes in territorial trends can be measured quantitatively.

2.2.3 ESPON 3.3 project

The main scope of the ESPON 3.3 project "Territorial Dimension of the Lisbon/Gothenburg Strategy" is to develop a number of basic analytical elements that can introduce territorial cohesion to the Lisbon/Gothenburg strategy and indicate ways of integrating the Lisbon/Gothenburg strategy in Structural Funds interventions in support of a balanced territorial development of the enlarged EU. The project is still on-going and the following review is based on the Third Interim Report (ESPON project 3.3. 2005).

In order to add the territorial dimension to the Lisbon/Gothenburg strategy, the ESPON 3.3 project proposes the approach based on the assessment of the competitiveness (Lisbon Strategy) and sustainability (Gothenburg strategy) modifying and integrating the list of most suitable indicators into a reviewed version of the Porter Diamond. The project studies economic competitiveness as a system, as well as that of territory and the environment, to calculate the carrying capacity of the economic/territorial/environmental systems at national (spatial systems) and regional scale (large areas) to be "competitive in sustainability". In the ESPON 3.3 project, this concept is to be distinguished from that of "sustainable competitiveness", which is commonly intended only in economic terms. Thus, a project attempts to come to a comprehensive methodology that would be able to reveal the capacity of different territories for generating competitiveness on a basis of sustainable development.

Environmental aspects important for the ESPON 2.4.1 project are considered in the project in several ways and through indicators included in the methodology. On the one hand the quality of the environment contributes to the performance of regions in the "Global-Local Interaction" as well as "Quality" determinants, on the other hand environmental aspects contribute

also to the "territorial" typologies used in the project to add the territorial dimension to the four determinants.

3 Review of existing scientific impact assessment approaches and projects

This section gives an overview of selected approaches of impact assessments, being a part of research projects as well as being applied in practice.

In recent years the EU funded several initiatives and projects in the areas of Impact Assessment and sustainable development, many of them focusing on the effects of EU environmental policies (mainly climate change policies and research policies). In the following, impact assessment approaches in the context of the I.Q. Tools-, the $(IMP)^3$- and the SENSOR project are presented.

Finally, two examples of a spatial impact assessment of the environmental policies in the Netherlands and in Slovenia are presented.

3.1 Environmental Impact Assessment models

Impact assessment approaches in general follow similar steps. First, the system of concern (e.g. an ecosystem or a spatial/territorial system) has to be modelled and the main relationships between the system's elements have to be described. Second, possible impacts have to be defined (e.g. a policy or a project) that have the potential to change the elements of the system. Third, these changes can be defined as impacts of the policy and they are finally assessed.

When comparing different Impact Assessment approaches it becomes obvious that especially the modelling of the system shows large varieties, depending on the objectives and complexity of the assessment. The I.Q. Tools, which is a web-based software to support the process of the EU Impact Assessment procedure contains an inventory of models and indicators that can be used for undertaking Impact Assessment. This inventory holds a section on environmental impact assessment models.

These models intend to measure and to evaluate the environmental impact of economic activities or policy measures. An established approach within these models is the so-called impact pathway analysis. This is a bottom-up approach for estimating external costs starting from a particular process and its emissions, and moving through their interactions with the environment to

a physical measure of impact (the main component being health; I.Q. Tools, 2006).

Although the impact pathway analysis is used as a part of environmental impact assessment models in order to estimate environmental impacts, it can in principle be an approach for territorial impact assessment. In this case, it will be started from a particular policy (EU Water policy) and its elements (Water Framework Directive with its requirements) and moved through their interactions with the territory to a physical measure of impact (impact on spatial structure assessed against certain territorial objectives). This in principle can be done qualitatively as well as quantitatively.

3.2 (IMP)³ project

Concerning the (IMP)³ project (IMProving the IMPlementation of Environmental IMPact Assessment), the following aspects should be highlighted: As a result of the five-year-report, the Commission aimed at a deeper evaluation of problematic aspects of the EIA Directive and launched a project within the 6th Framework Programme (European Commission 2001b) The project (IMP)³ is based on the results of this report and has been focused therefore on the three main weak points the report outlined:

- a better incorporation of human health aspects into EIA;
- a better integration and more consistency of risk assessments, regarding various sources of risks (natural hazards, accidents, sabotage); and
- a survey of project types subject to EIA.

Whereas the first item seems to be less important in terms of territorial relevance, the second and third points are clearly important in this context. The recommendations, the IMP³ project launched, were structured along the SWOT-analysis.

Concerning risk assessment the following policy options were presented, designed to operate mainly along the three major axes of guidance, supporting measures, and regulatory or legislative measures:

- Policy option 0: Zero option: 'Do nothing'
- Policy option 1: Guidance 'light'
- Policy option 2: Preparation of a new technical guidance package plus pro-active dissemination activities
- Policy option 3: Set of supporting measures

- Policy option 4: Launching of a risk assessment initiative with a broader perspective
- Policy option 5: Minor amendment to the EIA Directive plus new technical guidance package plus support for implementation
- Policy option 6: Major amendment to the EIA Directive plus new technical guidance package plus support for implementation

With the exception of option zero, all policy options would have a clear territorial impact, since they are aiming at a better integration of risks, caused by natural and technological hazards in the EIA. This would lead to more prevention in terms of a reduced vulnerability and partly also a decrease in hazard potential respectively probability of occurrence or magnitude of a potentially harmful event. At the same time, some project designs would have to be changed or even the whole project would be prohibited.

Also the SEA can be seen as a suitable procedural framework, risk assessment can be structures along, as argued by Greiving (2004).

In the context of projects subject to the EIA, the Commission's Five Year Report (European Commission 2001) emphasised that EIA is one of the sectors of Community environmental law where Member States have the worst implementation record. This is related to a system to cover all project types with likely significant effects on the environment. The policy options, carried out by the IMP³ projects are again structured along the SWOT-analysis. In particular the recommended amendments to the EIA directive would have a serious territorial impact. There is enough flexibility for the Member States to meet their national/regional circumstances, while at the same time safeguard a robust mechanism for a consistent coverage of those project types. For instance policy option 5 aims at abolishing Annex II entirely with consequential changes to Annex I leading to a simplified list of projects with indicative or guidance thresholds and criteria, where EIA must be considered. Additionally, inclusion or mandatory thresholds and criteria, where EIA is required combined with necessary supportive measures. Such an amendment to the existing directive would have a relevant territorial impact, in particular in terms of territorial cohesion while the existing differences in the implementation of the EIA directive leads to an unbalanced development.

3.3 SENSOR project

SENSOR (Sustainability Impact Assessment: Tools for Environmental, Social and Economic Effects of Multifunctional Land Use in European Regions; is an Integrated Project within the 6th Framework Research Programme of the European Commission, which develops science based ex-ante Sustainability Impact Assessment Tools (SIAT) to support decision making on policies related to multifunctional land use in European regions. SENSOR directly responds to the European sustainability objectives as applied to land use and regional development (SENSOR project 2006).

Making use of macro-econometric and sectoral land use models and impact indicators, European policy scenario analyses will forecast future land use changes, assess their multifunctional interrelations and economic, social and environmental impacts.

To assess multifunctional land use effects at regional level, impact indicators will be verified on the basis of sustainability thresholds and targets derived from expert consultations and regional stakeholders, thus complementing the data-driven scenario analyses. Validation of assessment results will be conducted in case study areas of sensitive regions such as mountains, coastal zones, islands and post-industrialised areas across Europe. From the onset of the SIAT design, user requirements are explicitly taken into account.

Although the SENSOR project still is in progress, it is very interesting because it focuses on the effects on future land use and thus has a specific spatial orientation. Further, some of the envisaged elements of the approach seem to be promising also for the development of a territorial impact assessment, such as the orientation at certain targets, the inclusion of expert consultations and regional stakeholders, taking into account user requirements and finally the validation of the assessment results in case studies.

3.3.1 EU environment and nature politics and its impact on spatial development in the Netherlands

The study "EU politics and its impact on spatial development in the Netherlands" (Ruimtelijk Planbureau 2004) was made by the Netherlands Institute for Spatial Planning (Ruimtelijk Planbureau). The study surveys a selected number of spatially relevant EU policy fields and their potential impacts in the Netherlands, among them the policy fields "Environment and Nature" and "Water".

The survey points out that EU policies lead to direct and indirect effects which cannot in every case be measured quantitatively. A scientifically valid cause-effect relationship was not made by the authors as it was not feasible within the context of the brief survey and which requires more in-depth research. For this reason, the link between policy (cause) and spatial development (effect), as well as statements about future developments, are based entirely on opinions found within the relevant literature and on the authors' discussions with experts (Ruimtelijk Planbureau 2004, 12-13).

Environment and nature are considered to be the most spatially relevant policy areas (Ruimtelijk Planbureau 2004, 85). The purpose of the chapter on environment and nature is to explore how much effect European nature and environmental policies have on spatial developments in the Netherlands.

The survey identifies the following environmental and nature policy areas to have spatially relevant effects (Ruimtelijk Planbureau 2004, 87-96):

- **Nature:** Birds Directive, Habitat Directive, Natura 2000 Network;
- **Environment:**
    - external integration' policies such as the EIA and the SEA Directives that ensure that, where relevant, environmental policies are incorporated into other sectors,
    - climate and energy (implementation of the Kyoto protocol),
    - local environmental quality: air pollution (CEFE programme, Air Quality Framework Directive, Integrated Pollution Prevention and Control Directive), safety (Seveso II Directive) and noise pollution (Directive 2002/49/EC).

Among the five main conclusions that are drawn in the survey, the following two are relevant for the Impacts of EU environmental policy in general (Ruimtelijk Planbureau 2004, 97):

- The direct consequences of European nature policy (Habitats and Birds Directives) are obvious and considerable (affecting 750,000 ha); the spatial effects of European environmental policy are much narrower in scope, although not yet fully in the picture.
- The need to incorporate European environmental and nature conservation regulations into spatial and land use plans makes great demands on the plan preparation process, including the identification of all possible problem areas, because these regulations are found mainly in sectoral legislation (not planning law).

Due to the importance of water management in the Netherlands, **EU water policy** is covered by an extra chapter "Water", reflecting mainly on water

quality policies like the Bathing Water Quality Directive, the Nitrates Directive and the Water Framework Directive (Ruimtelijk Planbureau 2004, 102ff.). The survey concludes for the Netherlands *"that there are relatively few discernable direct impacts of EU water policy on spatial developments so far. Part of this, of course, is because the full spatial impact of the [WFD] will only become apparent in the future once measures are taken to comply with its provisions. EU water policy is therefore a prime example of the indirect spatial workings of EU sectoral policy: its direct manifestations remain unseen, while its indirect effects reverberate in the kinds of alliances forged at the international level and the measures taken domestically to comply with EU regulations"* (Ruimtelijk Planbureau 2004, 113).

The study made by the Ruimtelijk Planbureau identifies similar policy areas to be spatially relevant as made by ESPON project 2.4.1. Further, it recognises the need to identify cause-effect relations in further research and suggests ESPON activities in these areas which are now being covered by ESPON project 2.4.1: "The impact of EU environmental policy (which includes nature) on spatial developments has great potential for further in-depth research. Curiously, there is no ESPON study underway that examines the territorial effects of environmental policy in the Member States" (Ruimtelijk Planbureau 2004, 97).

3.4 Territorial impacts of sector policies – Anticipation of changes in urban and rural areas in Slovenia

Due to the ongoing transition, the Slovenian policy documents have almost all been renewed over the last decade. There are very few policies which have been in place long enough to be assessed ex-post and even fewer with a reasonably consistent measurement of their effects. Ex-ante and integrated form as of assessments therefore seem to be the most relevant approaches. Recently, the research project "Territorial impacts of sector policies – anticipation of changes in urban and rural areas", carried out by the Urban Planning Institute of the Republic of Slovenia attempted to develop a knowledge support tool for policy development, focused on the assessment of the impacts of policy measures on spatial development (Urbanistični inštitut RS 2005, 5).

The project developed a knowledge base, accessible on the internet, with several functionalities to support policy assessment. The reference frame for assessment is described by a set of planning policy objectives as set forth by the Spatial Development Strategy of Slovenia (SDSS; 38 objectives, grouped in 12 thematic areas, covering the main aspects of sustainable development).

The central part of the knowledge base consists of expert assessments of the relations between policy measures and a set of objectives of sustainable territorial development. The assessment process contains two steps:

1. Identification of the relation (relevance) of an instrument to a certain objective (this basically corresponds to a traditional interaction matrix).
2. Production of a quasi-quantitative and qualitative evaluation for each of the identified correlations. The level of impact is assessed on a scale from -5 (strong impact, leading against the objective) to +5 (strong impact, leading towards the objective).

The most important part of the evaluation is the comment, providing a short argumentation for the given score together with reference. All inputs are stored in the data base and after several rounds of evaluations are made, the joint (average) score is calculated (Urbanistični inštitut RS, 2005, 6).

The approach enables an integrated evaluation of measures of different sectoral policies and identification of their antagonistic or synergetic impacts. It also allows the use of different reference frames and corresponding sets of sustainability objectives and targets, Further, it allows a flexible approach to assessment, combining mid-term and ex-ante approaches and exploration of all types of knowledge (Urbanistični inštitut RS 2005, 6).

The methodology has some interesting elements that are considered in the ESPON 2.4.1 project's approach like the orientation at spatial goals, identification of relevance and evaluation on a scale from -5 to +5. It acknowledges that cause-effect relations often cannot be directly measured by indicators but need to be identified by expert knowledge and discussion among experts. However, a step in-between policy elements and their impact on spatial goals is missing. Therefore, the expert's evaluation seems to be a little bit like a "black box". For this purpose, the 2.4.1 project's approach proposed so called "story lines", measured by indicators.

4 Conclusion

The review of existing impact assessment approaches provided the ESPON 2.4.1 project can be seen as a solid foundation and valuable inspiration for the development of a Territorial Impact Assessment methodology for EU Environmental Policies. However, the methodological challenges and obstacles in the application and implementation of the EIA and SEA Directives as well as with other Impact Assessment approaches show that establishing any kind of assessment methodology and process that has to be

applicable for each member state and spatial level is not easy and takes time.

This applies especially for a Territorial Impact Assessment that until now only plays a role in the ESDP where several areas of its application are mentioned as well as in the ESPON 2006 programme where this has been the task of the policy impact projects. This of course does not mean that TIA automatically will be accepted. Therefore, the question shall be asked, which character a TIA shall have and what the perspectives are for a realisation. The following table shows different characters of a TIA and their chances for a political realisation.

Table 4 Perspectives of a TIA in political respect (source: own table)

Character of TIA	Areas of application	Advantages/ disadvantages	Chances of political realisation
Non-binding, informal, internal administrative character	EU policies, made by the EU itself	-	Large because already now guidelines for policy impact analysis exist; important for the justification of policies
	National, regional policies	Real territorial effects might not be taken into account properly, large differences in the approaches	Some chances because of justification of own policies (examples: *Raumverträglichkeitsprüfung* [Germany], Netherlands, Slovenia)
Binding (e.g. "EU Directive on the assessment of the territorial effects of certain programmes and policies")	All programmes and policies which are likely to have significant territorial effects	Comparability, same obligation in all member states; need to adapt territorial goals (in contrast to the SEA where the protection goods remain the same)	Low because Member States might not agree on assessment steps, involved actors and protection goals/territorial objectives, fear of over regulation by the EU

Thus, it can be summarised that the development of the TIA is based on an already existing tradition of policy impact analysis. Concerning the chances for its realisation, the following aspects have to be taken into consideration:

- harmonisation of tools (to avoid overlapping),
- careful consideration what is really necessary (to avoid over-regulation),
- clear definition which assessment tool shall be used for which purpose,
- clear definition of policy objectives that serve as basis for the assessment.

Chapter C – Territorial Impact Assessment of EU Environmental Policy – The spatial effects of policies for civil protection, water, and habitat and biodiversity

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1 Introduction

This chapter is dedicated to the methodological approach that has been developed to assess the territorial impacts of EU environmental policy and its application in selected case studies.

In the first part, the rationale and the basic structure (PIM and TIM levels) of the TIA methodology are presented and described. This TIA approach is embedded in the context of EU environmental policies (as described in Chapter A.1) and inspired by the findings of the literature research of existing impact assessment approaches (Chapter B) as well as the general methodological framework suggested in the ESPON project 3.2 (ESPON project 3.2, 2005, pp. 9ff.).

In the second part, the results of a territorial impact assessment of EU Environmental Policies that has been carried out in five case studies are presented (the extensive case study reports including the detailed application of the TIA methodology can be found in Annex 1). Four of the case studies (EU, Slovenia, Finland, Emsland) use the developed TIA methodology that is characterised by an ex-ante approach. The fifth case study (Andalusia) uses an ex-post approach to identify territorial impacts. The comparison of the different characteristics (ex-ante vs. ex-post), the TIA application at different spatial scales (three level approach: EU, transnational/national, regional/local) as well as the coverage of three test cases (Civil Protection Policy, Nature and Biodiversity Policy, Water Policy, as identified in Chapter A.2.6) produces a solid basis for formulating recommendations on needs for further data development and ideas of territorial indicators (Chapter E) as well as proposals for future applied research themes (Chapter F).

2 Territorial Impact Assessment methodology

The TIA methodology that is suggested has – similar to the general methodological framework suggested in the ESPON project 3.2 "Spatial Scenarios and Orientations in relation to the ESDP and EU Cohesion Policy" framework (ESPON project 3.2, 2005, pp. 9ff.) – two levels:

At the **first level** (or general/European/abstract level), basic connections and influences between policies (e.g. regional or environmental policies), territorial trends (e.g. socio-cultural, economic, transport, etc.) and territorial objectives (in the first instance territorial cohesion) are identified and quantified. This approach follows the three phases of scoping, analysis and finally assessment as suggested in the minimum requirements of a Territorial Impact Analysis. This first level has been described by the ESPON project 3.2 as Potential Impact (PIM): "General assessment of the impact of EU policies on the overall European territory. This assessment refers to an abstract territory, and the impact may be seen as a general 'potential impact'" (ESPON project 3.2, 2005, p. 11). This assessment is done against the goal of territorial cohesion. Territorial cohesion has been divided into three main elements (ESPON Project 3.2, 2005, p. 17):

- **Territorial quality** (e.g.: the quality of the living and working environment; comparable living standards across territories; similar access to services of general interest and to knowledge);
- **Territorial efficiency** (e.g.: resource efficiency with respect to energy, land and natural resources; competitiveness and attractiveness of the local territory; internal and external accessibility);
- **Territorial identity** (e.g.: presence of "social capital"; capability of developing shared visions of the future; local know-how and specificities, productive "vocations" and competitive advantage of each territory).

It shall be mentioned that these elements of territorial cohesion have been developed during the work of ESPON project 3.2 and only valuated by the ESPON monitoring committee but not by any official European document. The setting of goals and objectives is a normative question that has to be answered by politicians and not by scientists. This aspect is discussed in more detail in Chapter F (Proposals for Future Applied Research Themes).

At the **second level** an estimation of the territorial effects of EU environmental policies on a certain region, taking into account the regional performance of chosen indicators, will be carried out. This is called TIM: "Territorial impact model for assessing the impact on single regions" by the ESPON project 3.2.

Following this framework, a more detailed and applicable methodology has been developed and will be explained in the following.

2.1 PIM – the Potential Impact of a Policy

The potential impact of a policy recognises the elements of policy that might have territorial effects. These elements can be subdivided if the overall policy has several implementation options that regions can choose.

The key policy elements can be classified according to the implementation phase as follows:

- **Category A:** Existing operational policy instruments. For these policy elements an ex-post assessment based on observed trends after the implementation can be applied.
- **Category B:** Elements in implementation process. For these elements the regulation at EU level is ready but the implementation process is going on at regional level. For these elements an ex-ante assessment based on expert judgement on potential effects of territorial trends has to be applied.
- **Category C:** Policy elements under regulation development in the EU level. For these elements it would be the best to develop the general EU Impact Assessment methodology by providing TIA tools to the Impact Assessment framework. Therefore, Category C elements will be excluded from the first application in this project.

The policy elements can be further divided into three classes according to the policy impact mechanism:

- **Regulatory elements:** These are policy elements consisting of specific rules included in national laws (EU ordinances and directives). For these elements indicators based on the phase of policy element implementation on a certain region can be used.
- **Funding mechanisms:** These are mechanisms that support the policy development (structural funds, special funding programmes like LIFE, Solidarity Fund etc.). For these elements, the use of indicators based on the money allocated to a certain region combined with the expected results can be considered.
- **Others:** These should be described in more detail if they are seen relevant for a certain cause-effect chain.

The approach to identify the potential impact of a policy (PIM) that will be described in the following can be characterised as an empirical-

phenomenological systems analysis on the basis of combined expert knowledge and, where information is heterogeneous and/or sparsely available, intuition (WBGU 1994, p. 186). The primary objective of this approach is the identification of the most important effects that are induced by a policy.

As a first stage or scoping phase, the impact of the several policy elements on certain trends will be identified. Here, two kinds of development trends have to be distinguished:

- **General territorial trends** as defined by the ESPON project 3.2. These trends have clear, pre-defined positive or negative effects on the three territorial objectives of territorial cohesion (Territorial quality, Territorial efficiency, Territorial identity). The effects of environmental policy elements on the general territorial trends have to be defined separately for each policy element in the scoping phase. These are often side effects of a focused policy element. However, the selection criteria of these trends are not clear and the trends have not yet been subject to any official EU document. The missing of e.g. environmental trends (see below) shows that the defined trends may not cover all relevant territorial trends.
- In consequence, the project decided to add some more **specific environmental trends** related to each of the three chosen environmental policy sectors (the three "test cases"). Environmental policy elements have a strong link to these specific environmental trends but the link from the trend to the three territorial objectives of territorial cohesion is often weaker (Territorial quality, Territorial efficiency, Territorial identity).

The results of the scoping phase are presented as diagrams of cause-effect chains. By these hypotheses, the question should be answered, what is changed by the intervention(s). This phase of evaluation refers to an abstract territory, and the impact chains can be seen as general political impact chains. The ideas behind and the description of the elements of the cause effect chains are explained further below. This way of identifying and presenting elements and effects of a policy was inspired by the "Systems Analysis of Global Change" that was developed by the German Advisory Council on Global Change (WBGU 1994, p. 188).

The long chains from policy elements through trends to territorial objectives will be applied for the analysis of effects related to any of the policy elements. Both general territorial trend and specific trends should be considered. For Category A policy elements historical development trends have to be considered while the identification of cause-effect chains related

to Category B and C should be based on experts' judgements of potential trends.

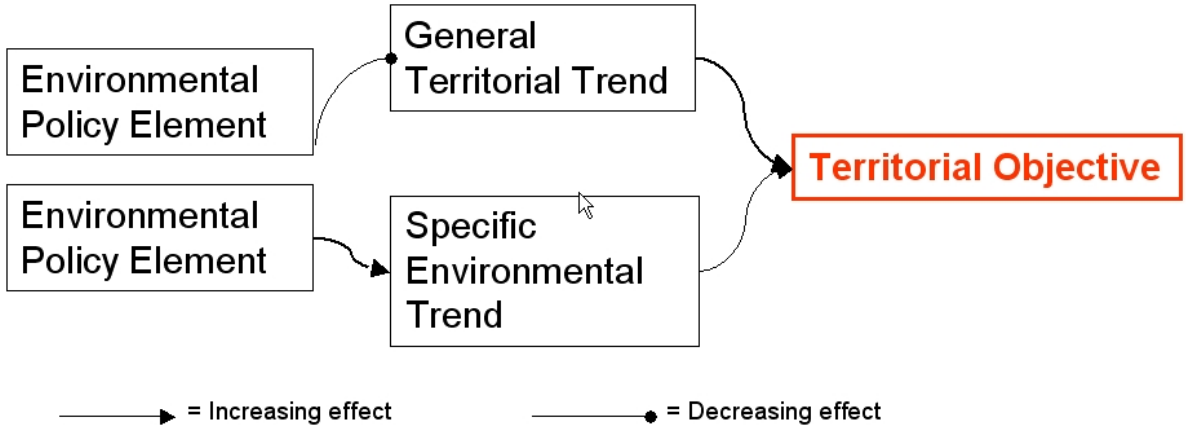


Figure 2 General example for cause-effect chains in the TIA for environmental policy (source: own figure)

The assessment of the effects linked with the cause-effect chains is based on experts' meanings of those who are involved in the project.

Both links from policy elements to trends and from trends to territorial objectives can have the values -2, -1, +1 or +2. The value of the general impact PIM will be calculated by multiplying these link values and possible values for the PIM can thus be -4, -2, -1, +1, +2 or +4.

The long cause-effect chains can be classified into four groups:

- **Plus-Plus:** A policy element has an increasing effect (moderate = +1, strong = +2) on a trend that has a positive impact (+1 or +2) on a territorial objective. The overall effect is positive (+).
- **Plus-Minus:** A policy element has an increasing effect on a trend that has a negative impact on a territorial objective. The overall effect is negative (-).
- **Minus-Plus:** A policy element has a decreasing effect on a trend that has a positive impact on a territorial objective. The overall effect is negative (-).
- **Minus-Minus:** A policy element has a decreasing effect on a trend that has a negative impact on a territorial objective. The overall effect is positive (+).

The observed long cause-effect chains are classified into two groups according to their overall effects:

- **Cause-effect chains with overall positive effect** on the studied territorial objective: Plus-plus and minus-minus chains.
- **Cause-effect chains with overall negative effect** on the studied territorial objective: Plus-minus and minus-plus chains.

For example, there can be three cause-effect chains with an overall positive effect and two chains with a negative effect on the territorial objective "Territorial Quality".

In the next phase, these recognised cause-effect chains are described using a story line: a short text that describes the potential territorial effect of a policy instrument (see case study section where the story lines are described in detail). The story lines aim at the identification of useful indicators for each cause-effect chain. Indicators can be based on the sensitivity (or vulnerability) of the territory to certain changes or the potential of the territory to benefit from the changes (Category B and C policy elements) or a measure of actual implementation (money spent to implement the policy) or even measured changes in the general or specific trends for Category A policy elements.

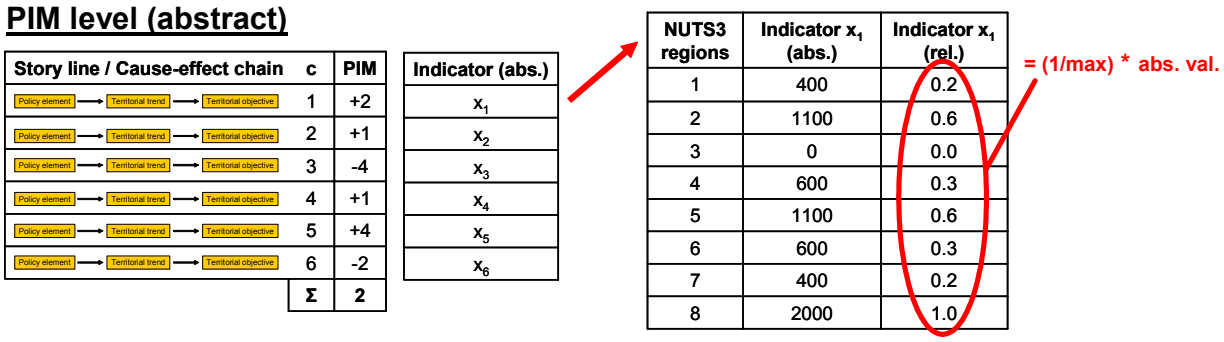


Figure 3 PIM level – Potential impact of a policy (source: own figure)

In the figure above, the table on the left shows the story lines linking environmental policy elements with territorial objectives, having a potential impact (PIM) between -4 and +4. The sum of the potential impact of each story line gives an idea of the potential territorial impact of EU Environmental Policy. These story lines can be described by indicators (x_1 to x_6). The table on the right shows by the example of indicator X_1 how the absolute values are transformed into a relative scale, based on the maximum and minimum indicator values that occur. This relative scale is important for the TIM phase (see below).

2.2 TIM – Territorial Impact Model for assessing the impact on single regions

In this phase, the final judgement based on policy elements and observed or expected trends on each region should be made. Does an environmental policy element have a positive or negative impact on the three predefined territorial objectives in a specific region based on the indicators developed in the PIM phase?

The recognised indicators representing cause-effect chains as identified in the PIM phase will be calculated for all NUTS3 regions in the ESPON territory (see application in Section 3.1) and the values are reclassified into a scale from 0 to 1 ($S_{r,c}$ in the TEQUILA model, see ESPON project 3.2, 2005 and Camagni, 2006) in the application of the TIA in the case studies, the cause-effect chains are weighted (Θ_c in the TEQUILA model). For the whole ESPON territory, such a weighting step cannot be made and thus all cause-effect chains have the same value (therefore Θ_c is faded in Figure 4 below).

The policy intensity of a policy element is set 0 in case this policy is not relevant at all in a region (e.g. coastal zone policies are not relevant for Austrian regions). This is called the policy intensity (PI) parameter in the TEQUILA model. However, due to the given difficulties in application, this parameter will be kept in the model but applied only if absolutely necessary. When using an existing ESPON typology (such as urban-rural), every spatial type has to be classified according to its given policy intensity related to every cause-effect chain since this might be different for different cause-effect chains.

The sums of cause-effect chains show the degree of territorial impact (TIM) of Policy area A on Territorial Objective x in Region r. The end product consists of three maps showing the overall impact of the studied environmental policy on regions for the three territorial objectives (efficiency, quality, identity; see Figure 4 below).

TIM level (NUTS3): $TIM_{x,r} = \Sigma_c \Theta_c PIM_c S_{r,c} PI_{r,c}$

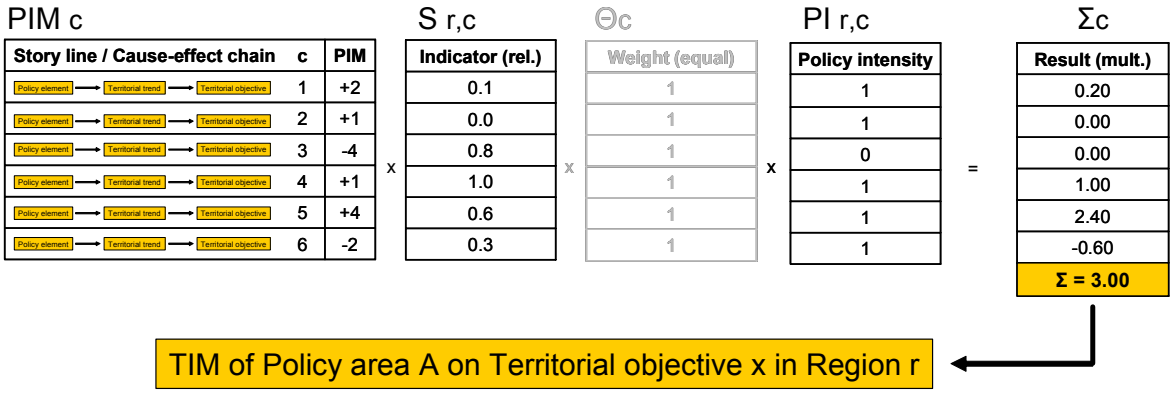


Figure 4 TIM level – Territorial Impact Model for Assessing the Impact on Single Regions (source: own figure)

The TIM values are calculated as follows: $TIM_{x,r} = \Sigma_c \Theta_c PIM_c S_{r,c} PI_{r,c}$, where:

$TIM_{x,r}$ = territorial impact on NUTS3 region r for territorial objective x (territorial quality, territorial efficiency, territorial identity),

r = NUTS3 region,

c = cause-effect chain from political element through trend to territorial objective,

Θ_c = weight of the c chain (only in the case study application; therefore faded here),

PIM_c = potential impact of policy for chain c from PIM diagram (overall negative or positive effect nominated as –4, – 2, -1, +1, +2, +4),

$S_{r,c}$ = value of the selected indicator for chain c in region r scaled to 0-1,

$PI_{r,c}$ = policy intensity for chain c in region r (0 or 1; 0 if the chain c from policy instrument to territorial objective is not relevant in region r).

A final aggregation of the results related to the three elements of territorial cohesion into one overall impact might be useful. This will be discussed in view of the real results, gathered from the assessment of the impact of EU environmental policies on each NUTS3 region.

2.3 TIM – Requirements for application in case studies

In addition to the European-wide application of the TIA, it is also applied in the case studies (see Sections 3.2-3.5). For this case-study application, some amendments of the methodology are necessary in view of the given differences in the physical characteristics as well as implementation of the EU policies in the several European regions:

- The transformation of absolute indicator values to a relative scale **requires reference points**. At the European level, these reference points are determined by the minimum and maximum values in all regions. For national level case studies it is suggested to take European-wide indicator values as reference points whereas for regional level case studies national level indicator values are suggested.
- A **weighting** of the different territorial trends should be made for the regional application in order to adjust the approach to regional circumstances, possibly applying the Delphi method by representatives of the region (Helmer, 1966).
- The recognised cause-effect chain **might not be valid for all European regions**, for example policy mechanisms targeted to coastal areas are not interesting for Austrian regions. Thus the whole cause effect chain could be left out if it is not applicable in a region. This selection shall also be done by representatives of the region.

The TIA approach for the application in the case studies thus shows some differences as can be seen in the following Figure 5.

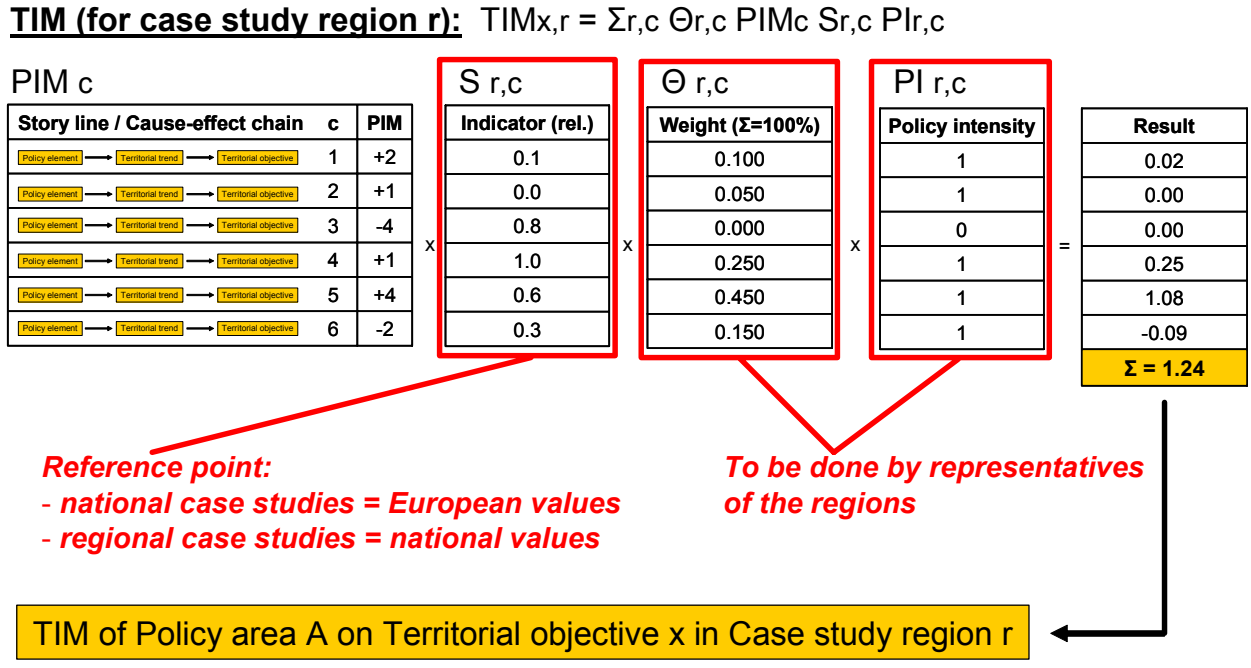


Figure 5 TIM application in case study (source: own figure)

2.4 Fulfilment of TIA minimum requirements in the developed TIA approach of EU Environmental Policies

The TIA minimum requirements (see Chapter B) have been taken into account in the approach developed in the ESPON 2.4.1 project as shown in the following Table 5.

Table 5 Characteristics of Territorial Impact Assessment approach of ESPON 2.4.1 project. (source: own elaboration)

TIA minimum requirements	Characteristics of Territorial Impact Assessment approach of ESPON 2.4.1 project
Reference to causing policy interventions	– EU Directives (Seveso II, WFD, FFH, Birds) – financial actions (Solidarity Fund) – strategies (Biodiversity Strategy)
Hypothesis on cause-effect relations	– identification and description of 'cause-effect-chains' in storylines
Regional scale (min. NUTS 2)	– NUTS 3
Reference to past & future interventions	– ex-ante analysis
Interventions/effects registered	– effects of policy elements on territorial trends; effects of territorial trends on territorial objectives
Quantitative/qualitative appraisal	– semi-quantitative approach
Concepts/goals referred to	– goals of territorial cohesion (territorial quality, territorial efficiency, territorial identity)
Technique of analysis	– empirical-phenomenological systems analysis on the basis of combined expert knowledge
Applied understanding of 'territorial'	– regional differentiation of environmental policy impacts on the territory
Territorial reference of outcome	– typologies of regions

The table above shows that most of the minimum requirements are taken into account or are fulfilled, respectively.

3 Territorial Impact Assessment of EU Environmental Policies in selected case studies

This section describes the main findings of each case study application. The selection of case studies aimed at a broad coverage of aspects in order to estimate the applicability of the TIA under different circumstances:

- *Coverage of different perspectives:* ex-ante (EU case study, Slovenia, Finland, Emsland) and ex-post (Andalusia),
- *Coverage of different spatial scales:* EU level (EU case study), transnational/national (Slovenia, Finland), regional/local (Emsland, Andalusia),
- *Coverage of test cases:* Civil Protection (EU case study, Finland, Emsland), Nature and Biodiversity (EU case study, Slovenia, Emsland, Andalusia), Water (EU case study, Slovenia, Emsland, Andalusia).

In so doing it can be proven both, the applicability of the methodology on different spatial levels (Finland, Germany) as well as the plausibility of the cause-effect chains (Spain, Slovenia) by means of an ex-post assessment of the observable impact of environmental policies on territorial objectives. The extensive case study reports are added as Annex 1 to this report.

3.1 Ex-ante assessment of EU Environmental Policies at EU level

On the highest, i.e. European level, all policy elements are relevant for the TIA. Therefore Policy Intensity (PI) is set "1" for all policy elements in this TIA. The impact on the territorial development might vary from policy element to policy element; therefore the PIM and the related storylines have values from overall negative to positive (values from -4 to +4). Other than in the national or regional TIA applications an additional weighing is not necessary. Unfortunately there is still reason to exclude some cause-effect chains from the assessment, due the lack of data. Either the database for a suitable indicator is too weak or there exists no suitable indicator at all.

Civil protection policy

The TIA for the impacts of European civil protection policy on the territorial development comprises 15 cause-effect chains (see figure 6). Different from the policy elements "Water Protection" and "Nature and Biodiversity" all cause-effect chains result in a positive PIM. Four indicators were identified that are suitable for nine of the cause-effect chains. These indicators are:

- Existence of internal and external emergency plans

- Percentage of inspected SEVESO II establishments in relation to overall amount
- Information to the public issued
- Money from the EU Solidarity Fund after a disaster event.

Other indicators, like the effect of article 12 of the SEVESO II directive on land-use or the impact on costs of energy production are difficult to quantify at European level.

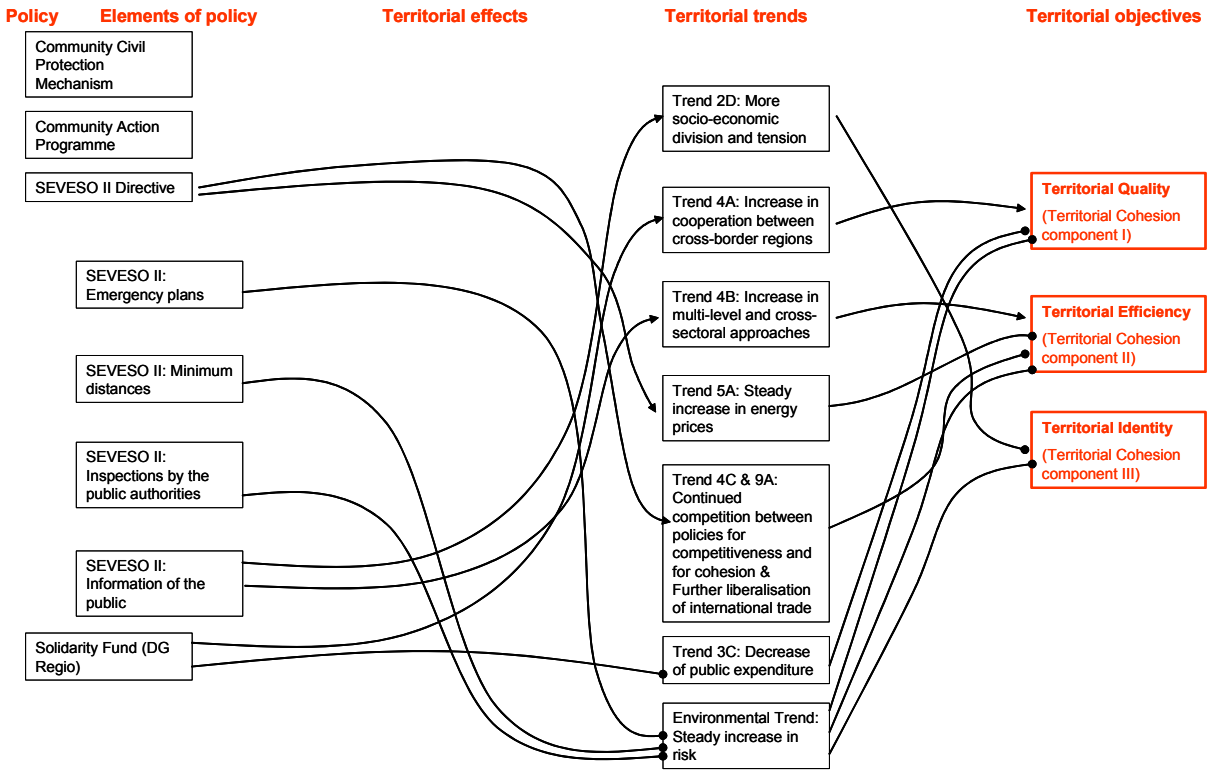


Figure 6 Cause-effect chains of EU civil protection policy. Arrows show positive, circles negative links (source: own figure).

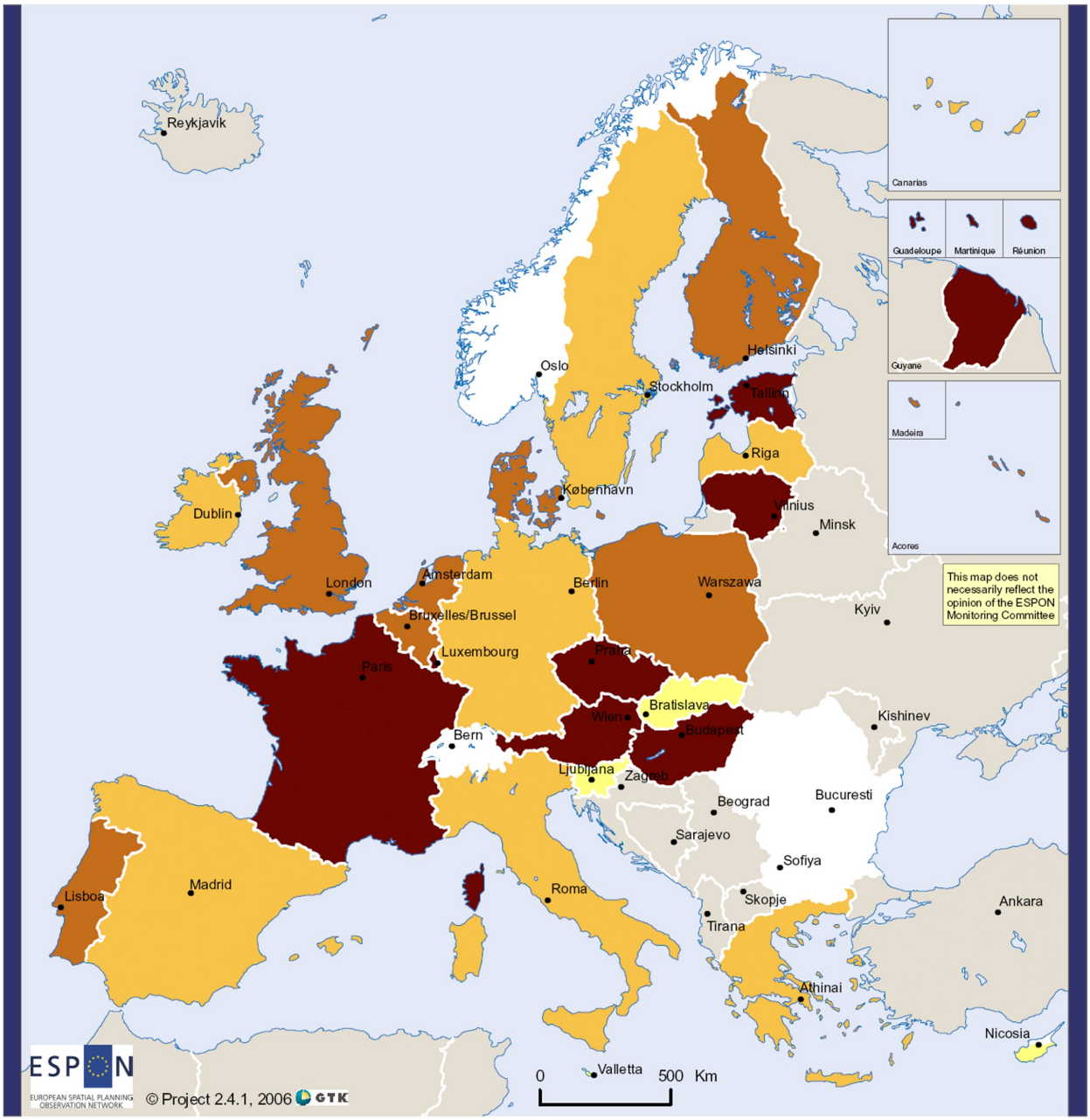
According to the TIA results, the Czech Republic, Luxembourg, Hungary, Lithuania and Austria can expect the most positive influence of European civil protection policy on the development of territorial quality, while on the other end of the scale Slovenia, Slovakia, Malta and Cyprus have only a very small positive impact.

The results for the development of territorial quality in Austria and the Czech Republic were positively influenced by the money the countries received from the EU solidarity fund in the years 2002 to 2004. Germany, Spain, France, Italy, Malta and Portugal received funding as well, but the amount per capita was considerably smaller.

For the territorial efficiency Slovenia, Slovakia, Malta and Cyprus get the least advantage from civil protection policy, while the territorial development of Lithuania gains the most benefit.

Most favorable conditions for a positive development of the territorial identity are given in France, Belgium, Poland, Lithuania and Finland, while in Slovenia, Slovakia, Malta and Cyprus hardly any positive impact is expected based on the TIA results.

Slovenia, Slovakia and Malta got low TIA results, because none of these countries had inspected its SEVESO II facilities nor developed emergency plans (in 2002). The situation of Cyprus is slightly better, because the inspection of SEVESO II facilities is completed. On the other hand, Luxembourg, Hungary and Lithuania have inspected all facilities and implemented internal and external emergency plans as well.



TIM for the territorial quality of the civil protection policies on NUTS0 level

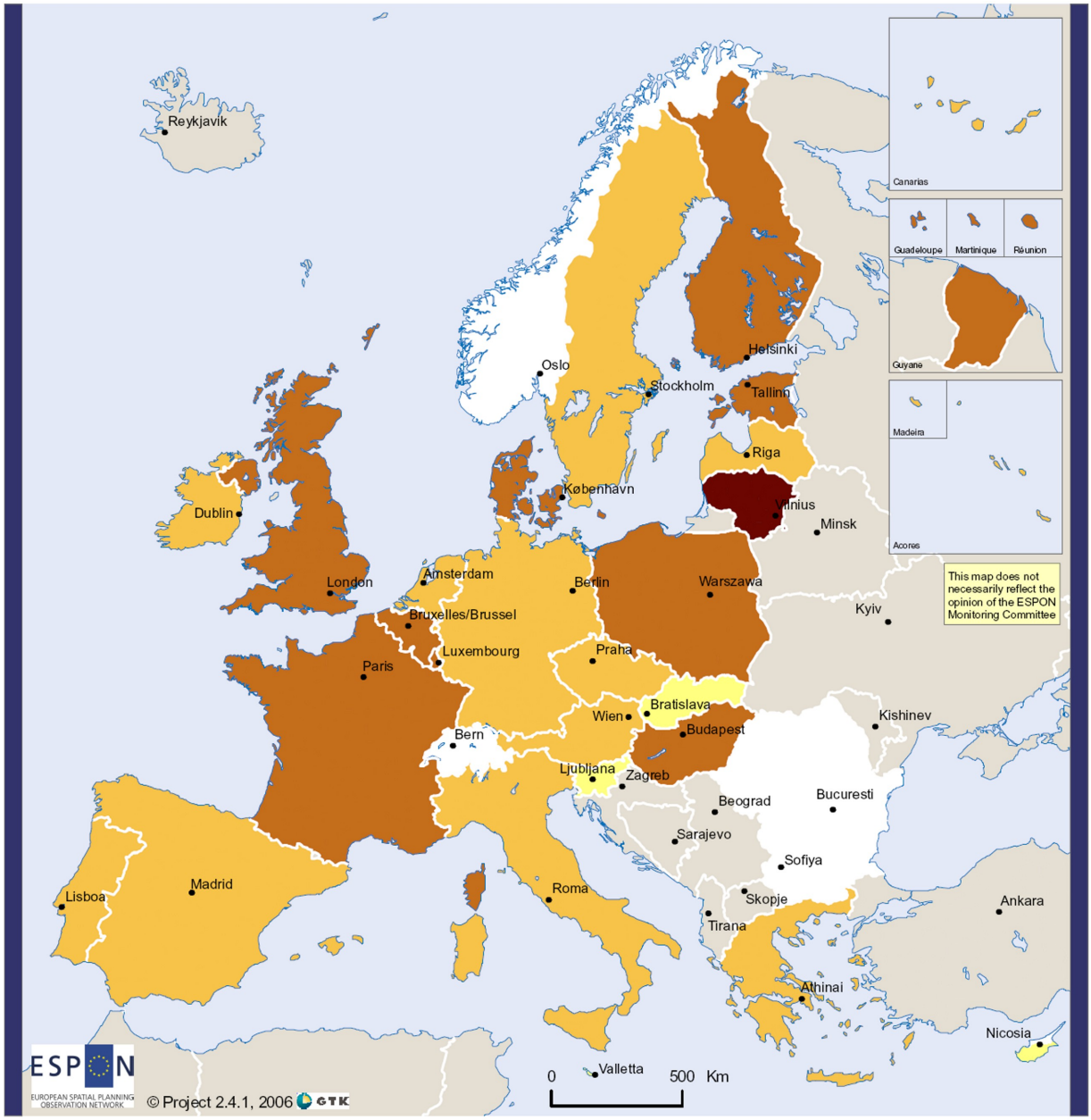
- 0.0 - 2.0
- 2.1 - 4.0
- 4.1 - 5.0
- 5.1 - 6.0
- Non espon space
- No data

Origin of the data: Report on the application in the Member States of Directive 96/82/EC (SEVESO II Directive)
European Union Solidarity Fund Annual report 2004

Source: ESPON Data Base

The application data of the SEVESO II Directive does not exist from Norway, Switzerland, Romania and Bulgaria.

Map 1 TIM values of EU civil protection policy for Territorial Quality on the European level



TIM for the territorial efficiency of the civil protection policies on NUTS0 level

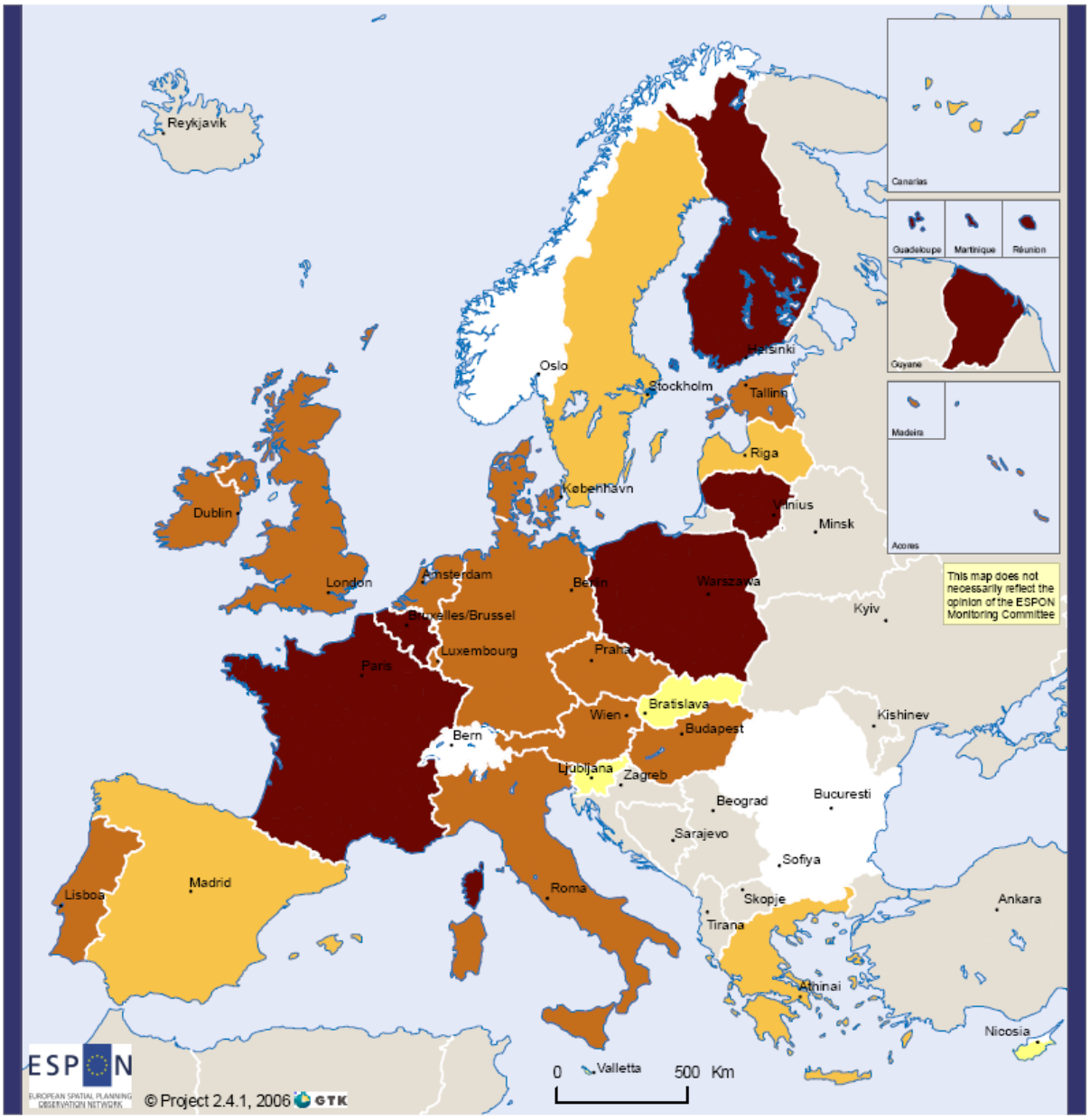
Origin of the data: Report on the application in the Member States of Directive 96/82/EC (SEVESO II Directive)

Source: ESPON Data Base

- 0.0 - 2.0
- 2.1 - 5.0
- 5.1 - 6.0
- 6.1 - 7.0
- Non espon space
- No data

The application data of the SEVESO II Directive does not exist from Norway, Switzerland, Romania and Bulgaria.

Map 2 TIM values of EU civil protection policy for Territorial Efficiency on the European level



Map 3 TIM values of EU civil protection policy for Territorial Identity on the European level

Water Policy

Many of the indicators representatives for the cause-effect chains of European water policy (see figure 7) are related to future outcomes (e.g. costs for drinking water in 2015 or improvement of drinking water in 2015). Without scenarios or similar procedures there are no data for these indicators. Often the implementation of the WFD is in such an early stage that sensible conclusions cannot be drawn. Some data would be available theoretically but the effort of data processing is too big for a project of this size.

Data are available for nutrients in freshwater and the use of freshwater resources from 1992 until 2002 and 1993 until 2002 respectively. These data would cover only six out of 21 cause-effect chains.

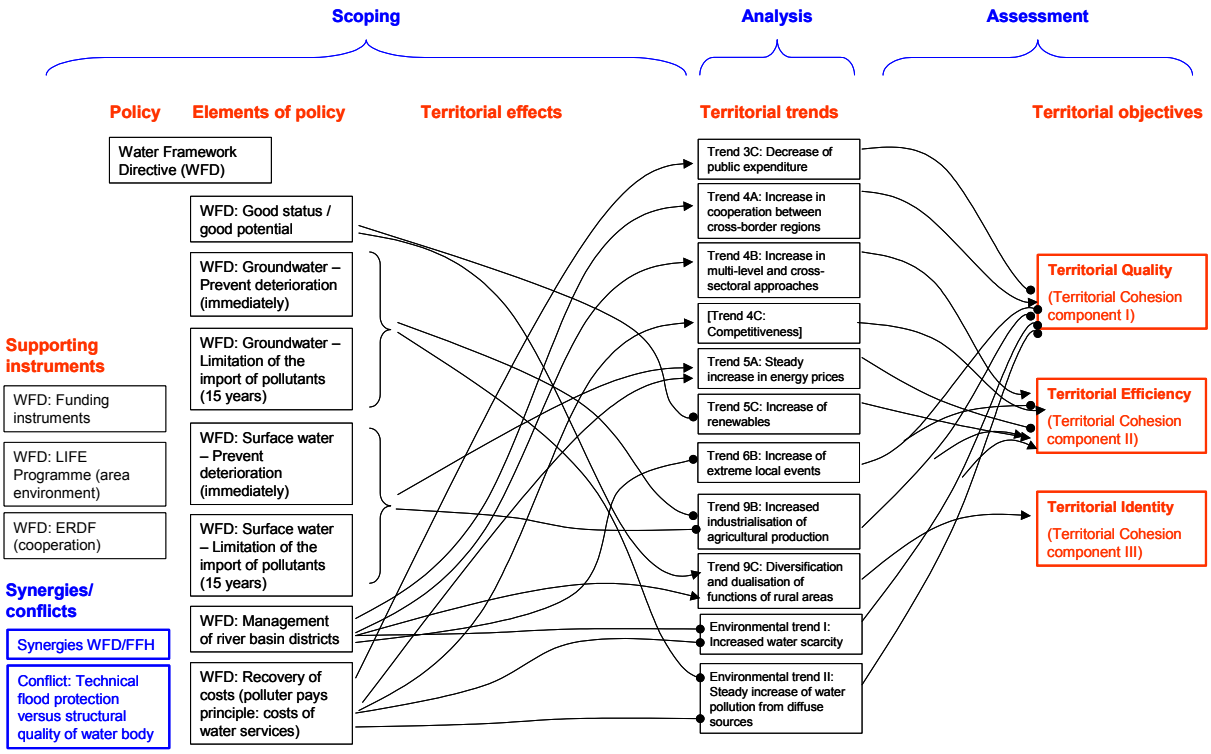


Figure 7 Cause-effect chains of the Water Framework Directive. Arrows show positive, circles negative links. (source: own figure)

Nature and Biodiversity Policy

EU nature and biodiversity policy is related with several negative side effects for the territorial quality as well as territorial efficiency. In civil protection and water policies, the positive effects such as security for the people or improved drinking water quality may influence in a positive way directly

social and economic trends (as part of the territorial development). The advantages of preserving habitats and biodiversity might become obvious in the long run, while restrictions in a certain area or region can take effect rather immediately. However, some effects such as an increasing (or preserved) resilience towards extreme events, when protected areas serve as buffer zones or compensate impacts, elevate territorial quality and efficiency directly.

In figure 8, the negative impacts on territorial efficiency countervail the clearly positive effects on the territorial quality. The overall result from the cause-effect chains (PIM value) does not show a clear tendency for the impact on the territory. The element of territorial identity is not very well represented in figure 8, only one cause-effect chain brightens the effect on territorial cohesion.

Some of the presented storylines were discussed controversially. It was argued that for some regions an increasing area reserved for the Natura 2000 network may have positive impacts on the regional activity rate and hence on territorial quality and efficiency. This can be true especially for regions, where the development strongly depends on tourism.

12 of 14 cause-effect chains and the related indicators depend on data on protected areas under FFH directive (92/43/EEC) and birds directive (79/409/EEC) (see figure 8). A number of indicators combine information on the Natura 2000 network and other data describing territorial development. Due to limited data availability only six indicators covering nine cause-effect chains and the related storylines were developed. The list below gives a short overview; a detailed description of the indicators is in chapters D 3.16 – 3.20:

- Distribution of the total Natura 2000 network areas inside the NUTS3 (99) region
- The proportion of people working in mining and quarrying industry vs. the extent of the Natura 2000 network area per NUTS2 (99) region
- The existence of the natural hazards vs. the extent of the Natura 2000 network areas per NUTS3 (99) region
- The potential multimodal accessibility vs. the extent of the Natura 2000 network areas per NUTS3 (99) region
- The proportion of the fragmentation of the natural and semi-natural areas vs. the extent of the Natura 2000 network areas per NUTS3 (99) region
- Agricultural Intensity (2000) vs. the extent of the Natura 2000 network areas per NUTS3 (99) region

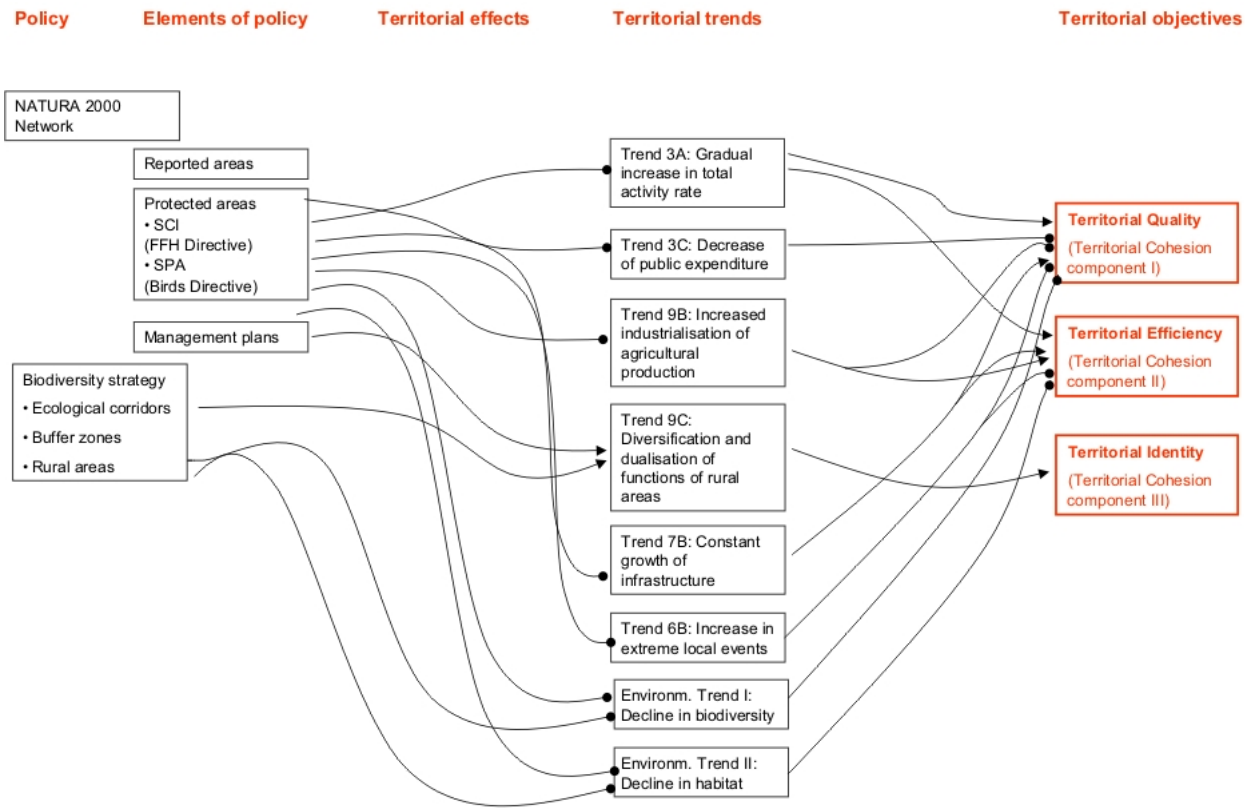


Figure 8 Diagram of cause-effect chains of EU Nature and Biodiversity policy. Arrows show positive, circles negative links. (source: own figure)

Based on the developed indicators the TIM values of EU nature and biodiversity policy for the territorial quality and the territorial efficiency were calculated. Figure 9 illustrates the procedure how the indicators related to the different storylines are combined and calculated to get the TIM values.

The approach resembles the cost-utility analysis that weighs the total expected costs against the total expected benefits of one or more actions. In other words, a cost-utility analysis measures the degree of achievement of objectives. In the ESPON 2.4.1 context, not the expected benefits but the degree of achievement of the potential impact (PIM value) in a certain region is measured. This degree has a factor between 0 (not achieved at all) and 1 (fully achieved). Other than for example the indicators for civil protection policy, most indicators for nature and biodiversity result from the combination of two different kinds of input data. Depending on the storyline and the nature of the indicator two different ways were applied to calculate the combined indicators.

For example the indicator “The share of people working in mining and quarrying industry vs. extent of Natura 2000 network areas” (see figure 9) is based on multiplication. In case of a very low percentage of Natura 2000 network area, there is no conflict to expect between Natura 2000 network and mining activities. At the same time in an area with very low mining and quarring activity a high percentage of Natura 2000 network area has no negative impact on the activity rate (and hence territorial quality or efficiency) according to the storyline.

Whereas in storyline 3 (see figure 9) lower agricultural intensification may have a positive effect on territorial quality. This effect can be supported and strengthened by a higher percentage of Natura 2000 network area. Therefore the two elements of the indicator are aggregated by addition.

The addition or multiplication results in an indicator value between 0 and 1. This is multiplied with the PIM value (“Indicator value x PIM value).

The division into three classes per dimension of the indicator was used for illustration purposes. The actual calculation of the indicators was done with continuous unclassified values.

Only one storyline describes the effect of EU nature and biodiversity policy to territorial identity. There exist no suitable data for this storyline and there are no maps presenting TIM values for the territorial identity.

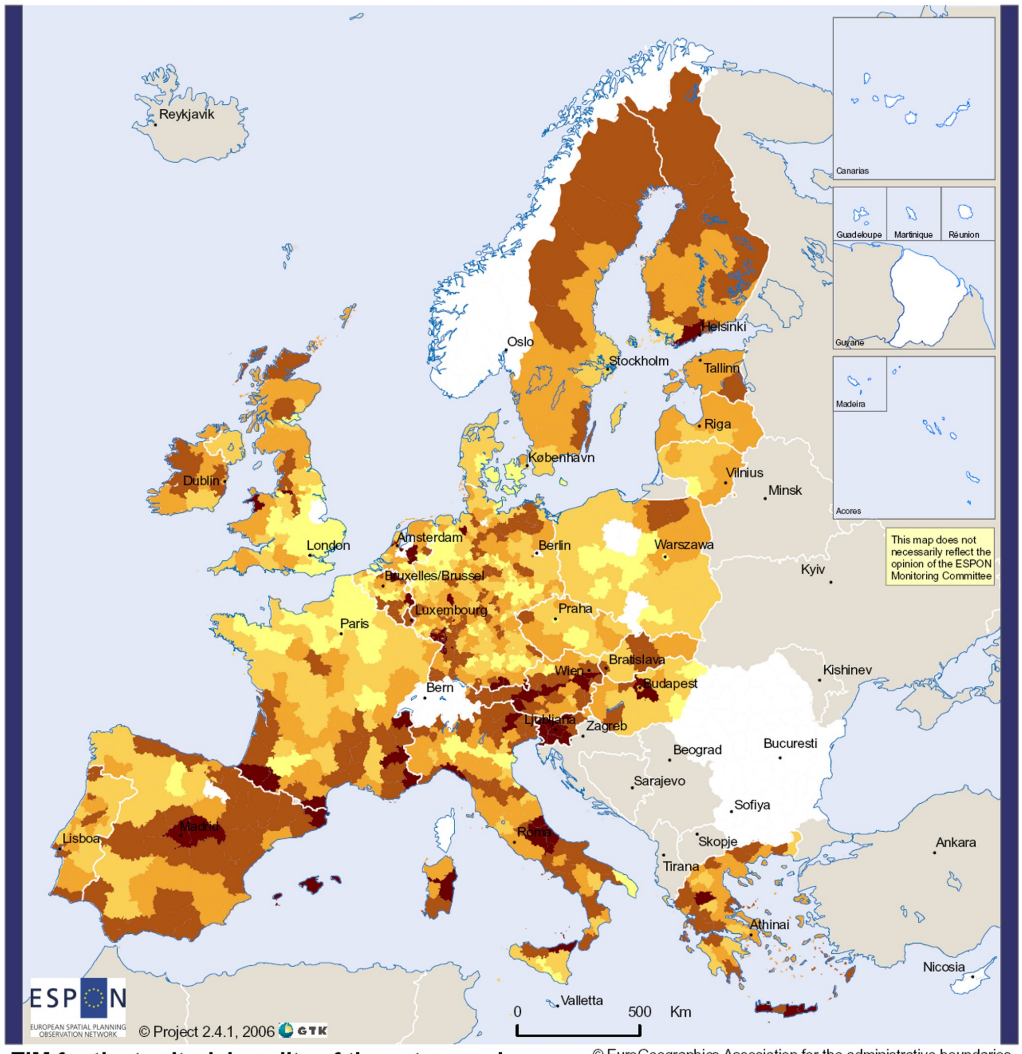
Figure 9 Flowchart describing the calculation of TIM values of EU nature and biodiversity policy for the territorial objectives.

TIM values for Territorial Quality are calculated by combining five indicators. The indicators related to storylines can be found in Annex 1A where ex-ante assessment of EU environmental policies on European level is presented.

According to the TIA results, most of Slovenia and parts of Greece, Italy, Spain, France, Austria, Hungary, Germany, Belgium, the Netherlands, the United Kingdom and Finland have the most positive influence of EU nature and biodiversity policy on territorial quality. On the other hand, in the western and southern parts of Great Britain, in northern France and in parts of Poland, Spain, Italy, Hungary, Denmark and Germany the influence of EU nature and biodiversity is very low. The positive effect of the policy for the territorial quality in capital region is detected in Madrid, Helsinki and Ljubljana while in London, Warszawa, Prague, Budapest and Paris the effect is very low.

TIM values for Territorial Efficiency are calculated by combining four indicators. The indicators related to storylines can be found in Annex 1A where ex-ante assessment of EU environmental policies on European level is presented.

In contrast to territorial quality, the influence of EU nature and biodiversity policy on territorial efficiency is negative in Europe. Most negative influence is found in northern Sweden, Finland, in northern and central parts of the United Kingdom, in many parts of Spain, Portugal, Slovakia and Hungary as well as in parts of Estonia, Austria, the Check Republic, Greece, southern France, Poland and Germany. The negative effect is not very strong in many single parts of Europe, i.e. southern Great Britain, Lithuania, France, Poland, southern Sweden.



TIM for the territorial quality of the nature and biodiversity policies on the NUTS3 (99) level

- 0.0 - 1.5
- 1.6 - 3.0
- 3.1 - 4.5
- 4.6 - 6.0
- 6.1 - 9.0
- Non espon space
- No data

Origin of the data: DG ENV NATURA2000 Network
Employment by economic activity ESPON project 3.1
Corine Land Cover 2000
Corine Land Cover 1990
Accessibility data ESPON project 1.2.1
Fragmentation data ESPON project 1.3.1
Natural hazard data ESPON project 1.3.1

Source: ESPON Data Base

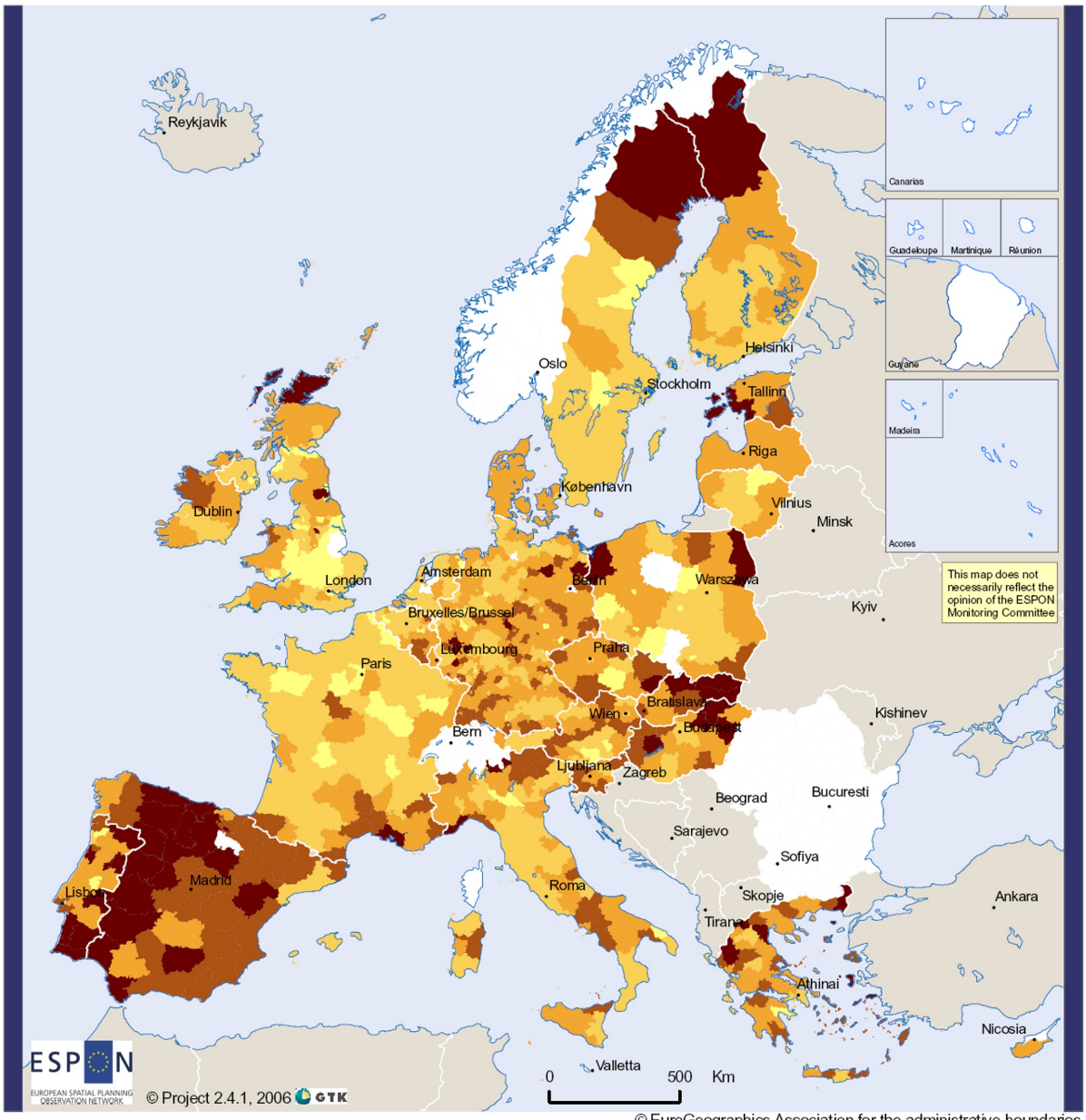
The data of employment is formulated from NUTS2 (99) level statistics to NUTS3 level. The statistical data of employment from the years 2001 and 2002 is not available from the remote areas of France, Corsica, Malta and seven single regions in Germany, Spain, Netherlands, Poland and United Kingdom (DE6, ES23, NL23, NL31, PL021, PL022 and UKF3).

The Natura2000 Network data does not exist from Norway, Switzerland, Romania and Bulgaria. The processed NATURA2000 data set on NUTS3 (99) does not cover three regions in Poland (PL0C1, PL0C2 and PL0C3) and two regions in Germany (DE301 and DE302).

The accessibility data does not exist from the remote areas of France, Portugal and Spain.

The Corine Land Cover 2000 data used for the intensification indicator is not available from Norway, Switzerland and the remote areas of France and Portugal. The Corine Land Cover data 1990 used for the fragmentation indicator is not available from Cyprus, Norway and the remote areas of France, Portugal an Spain.

Map 4 TIM values of EU nature and biodiversity policy for Territorial Quality on the European level



TIM for the territorial efficiency of the nature and biodiversity policies on the NUTS3 (99) level

- -8.0 - -6.0
- -5.9 - -4.0
- -3.9 - -2.5
- -2.4 - -1.0
- -0.9 - 0.0
- Non espon space
- No data

Origin of the data: DG ENV NATURA2000 Network
Employment by economic activity ESPON project 3.1
Corine Land Cover 2000
Accessibility data ESPON project 1.2.1
Natural hazard data ESPON project 1.3.1

Source: ESPON Data Base

The data of employment is formulated from NUTS2 (99) level statistics to NUTS3 level. The statistical data of employment from the years 2001 and 2002 is not available from the remote areas of France, Corsica, Malta and seven single regions in Germany, Spain, Netherlands, Poland and United Kingdom (DE6, ES23, NL23, NL31, PL021, PL022 and UKF3).

The Natura2000 Network data does not exist from Norway, Switzerland, Romania and Bulgaria. The processed NATURA2000 data set on NUTS3 (99) does not cover three regions in Poland (PL0C1, PL0C2 and PL0C3) and two regions in Germany (DE301 and DE302).

Map 5 TIM values of EU nature and biodiversity policy for Territorial Efficiency on the European level

3.2 Ex-ante assessment of EU Environmental Policies at transnational/national level: Slovenia case study

The case study consists of three main parts. The first one is the overview of the High Speed Railway (HSR) planning process of transnational character between Italy and Slovenia, discussing the diverse aspects relevant in the planning process with the emphasis on the role of EU Environment Policy. It is as an ex-post assessment of EU Environment Policy on the case of a single territorially very relevant transport plan.

The second part tries to assess the impacts of EU Environment Policy on the territorial objectives through the impacts on a particular plan for the construction of HSR link between Trieste and Ljubljana, constituting an element of EU transport policy. In doing so it uses the outcomes of the ex-post assessment from the first part and utilizes the elements of the ex-ante assessment from the TIA methodology developed in this ESPON project.

The third part is an ex-ante assessment of Habitat and Biodiversity Policy on the transnational level of the case study area, consisting of Slovenia and Friuli Venezia Giulia Autonomous Region in Italy. It is an application of the TIA approach developed in this ESPON project.

The first part enables an in-depth understanding of the mechanisms defining the planning process in the transnational context and learns a few lessons especially regarding the role of SEA. In this respect it points to two main weak points regarding assessments of projects/plans of transnational character that apply to SEA:

- At what planning stage should the impacts be assessed? Planning stages may differ significantly from one Member State to another.
- How to harmonize assessment procedures when the planning procedures are so diverse?

The second part is an attempt to cross the impacts of two territorially most relevant EU policies in the case study area (transport and environment policies) with regard to territorial objectives. The potential impacts of the HSR project on territorial objectives were assessed first, followed by the assessment of the impact of the elements of EU Environment Policy on the HSR project obtained from the ex-post assessment from the first part of the case study. On this basis it was also possible to assess how do these policy elements affect the three elements of territorial cohesion, namely territorial quality, territorial efficiency and territorial identity.

The overall potential impacts of the HSR project on territorial objectives were assessed *modestly positive with regard to territorial quality*, *very*

positive with regard to territorial efficiency and diverse and consequently *neutral with regard to territorial identity*.

Assessment of the impact of the elements of EU Environment Policy on the HSR project was made separately for the two most relevant elements in the particular case that is Strategic Environmental Assessment (SEA) and Habitat and Biodiversity Policy.

SEA was identified as the main instrument that influenced the rethinking of the project on both sides of the border. In this way it has two important effects in terms of territorial objectives:

- It stimulates the possible optimisation of plans with regard to territorial objectives;
- Non-harmonized application of SEA in both Member States involved slows down the planning process and decreases the potential competitive position of the project against other transport infrastructure projects in the area.

Taking this into account SEA affects the potential impacts of HSR on territorial trends so that the overall impacts change as a consequence. Better plans could on the one hand cause the potential impacts of HSR on territorial trends to be *stronger in a positive direction and weaker in a negative direction*. On the other hand lower chances for the project to be realised in the case of positive overall impact of HSR on territorial objectives mean that *no impacts would mean a relative loss* with regard to the particular element of territorial cohesion.

Habitat and Biodiversity Policy was assessed to have by far the strongest impact among the territorially relevant elements of EU Environment Policy for the HSR project. Much of the case study area is protected within the Natura 2000 areas: 34 % of the territory in Slovenia and 26% of the territory in Friuli Venezia Giulia. It impacts the territorial objectives through the HSR project in the following important ways:

- Searching for alternative routes further slows down the planning process;
- Mitigation measures make the project more expensive and decrease the potential competitive position of the project against other transport infrastructure projects in the area.

Both expected effects work in the direction of decreasing the chances of the project to be realised and thus increase the chances of no impacts, meaning *a relative loss in the case of a positive overall impact* on a particular element of territorial cohesion.

The third part of the case study focuses on the territorial impacts of a single territorially most relevant element of EU Environment Policy in the case study area, which is Habitat and Biodiversity Policy. TIA for the Habitat and Biodiversity Policy on the EU level from the Chapter C of the Interim Report served as a point of reference in this assessment that deals with transnational/national level. The methodology of the PIM phase has been partly updated with new trends and according story lines, which correspond to specificities of the case study area.

The results so far can only refer to PIM phase, but still a few notes can be made. While the *impacts of EU Habitat and Biodiversity Policy on the territorial identity and territorial quality are mostly on the positive side, there are many negative impacts in terms of territorial efficiency*. Despite the abstract character of the final result we can put it in relation to the EU level assessment and note that the impacts on territorial quality are assessed more positively in this case study compared to EU level. Consequently also the overall impact is assessed rather positive, while on the EU level the impact was assessed as more or less neutral.

The results of both assessments (second and third part) seem quite well aligned and plausible. Most negative impacts can be expected in terms of territorial efficiency, where any benefits of environment policies might only show in the very long run. In terms of territorial quality the impacts seem to be on the positive side in the case study area. An important part of the impacts in this respect can be attributed to the importance of cross-border cooperation due to the transnational character of the case study. Impacts on the territorial identity are also decisively on the positive side although not very strong, which is reasonable.

From the methodologically point of view a few things can be noted regarding the TIA approach used:

- PIM phase relies strongly on expert opinion; further improvements of the methodology may go in the direction of excluding biased opinion as much as possible;
- There is a general problem with needed and available indicators as well as data in the TIM phase; assessment against indicators may seem useful but only when appropriate data is available;
- In the second part of the study an attempt was made of crossing the impacts of several EU policies ("impact on the impact") and the TIA approach developed in this project proven to be quite useful in this respect. Perhaps a more systematic approach for crossing impacts could assert TIA as a useful tool for bridging various sectoral plans and policies.

- Ex-post and ex-ante assessment methods can be seen as complementary especially when crossing the impacts of several policies.

3.3 Ex-ante assessment of EU Civil Protection Policy at national level: Finland case study

Most of the cause – effect relationships recognized in the PIM phase are related to the steady increase in risks related to natural and technological hazards. The most important policy elements reported in the PIM phase are requirements from the Seveso II Directive (96/82/EC). According to the ESPON project 1.3.1 The Spatial Effects and Management of Natural and Technological Hazards, Finland can be classified as low natural hazard region in Europe. Technological hazards are most common in south-western (nuclear power plants, oil industry) and south-eastern (oil industry, nuclear power plants and chemical plants) parts of the country. In Finland, 123 sites belong to the upper tier establishments of the Seveso II directive and 120 sites to the lower tier.

Fifteen story lines were described in the PIM phase for the Civil Protection Policy (ESPON project 2.4.1 2006, p.82f). The following four indicators were available and linked to nine story lines described for the Civil Protection Policy:

Indicator A: Existence of emergency plans. This indicator was available from the Commission's report on the application in the Member States of Directive 96/82/EC on the control of major-accident hazards involving dangerous substances for the period 2000-2002. Indicator A was recognized as the best available indicator for the following three story lines:

Story line 3: *The territorial quality* of living and working environment may suffer from a steady increase in risks related to natural and technological hazards, but the Seveso II emergency plans (Art. 11) aims at avoiding major accident hazards and helps to reduce risk related to technological hazards. This story line is assigned with PIM value +4.

Story line 4 describes similar chain from emergency plans to *the territorial efficiency* (i.e. competitiveness and accessibility) with PIM value +4. Story line 5 links the emergency plans to *the territorial identity* (i.e. social networks), and the PIM value is +2.

According to the Commission's report on the implementation of Seveso II Directive (European Commission 2004b), the highest percentage of existing emergency plans is 100% and the lowest value 0%. Thus if all the emergency plans are ready, the indicator A gets value 1 and if none of the

plans are ready, the indicator gets value 0. In Finland, the inspection is lead by the Safety Technology Authority TUKES. In Finland, all the Internal emergency plans were ready by end of 2002. Data on the External emergency plans is missing from the Commission's report (European Commission 2004b), but according to Senior Safety Engineer Anne-Mari Lähde from TUKES, at least 50% of the External emergency plans were ready for the period 2000-2002. Thus at least 75% of all the plans are ready and indicator A gets value 0.75 for Finnish case study.

Indicator B: Percentage of inspected establishments in relation to the overall amount. Indicator B was recognized as the best available indicator for three story lines:

Story line 9: *The territorial quality* of living and working environment may suffer from a steady increase in risks related to natural and technological hazards, but the inspections by the public authorities (Art. 18) aim at avoiding major accident hazards and helps to reduce risk related to technological hazards. The PIM value is +2.

Story line 10 links the inspections to the *territorial efficiency* with the PIM value +2. Story line 11 links the inspections to the *territorial identity* with PIM value +1.

According to the Commission's report (European Commission 2004b), the highest percentage of inspected establishments is 100% and the lowest value 0%. Thus if all the sites have been inspected, the indicator B gets value 1 and if 0% of the sites have been inspected, the indicator gets value 0. In Finland, all the establishments had been inspected, and indicator B gets value 1 for Finnish case study.

Indicator C: Information to the public issued. Percentage (%) of all Seveso II establishments. Indicator C was recognized as the best available indicator for two story lines:

Story line 12: *The territorial identity* may be negatively influenced by more socio-economic division, but the information of the public can be seen in line with risk governance principles. PIM value is +1.

Story line 13: *The territorial efficiency* may benefit from an increase in multi-level and cross-sectoral approaches which may be stimulated by the information to the public. PIM value is +1.

According to the Commission's report (European Commission 2004b), the highest percentage of information issued to the public is 100% and the lowest value is 0%. Thus if information is issued for all the sites, the indicator C gets value 1 and if no information is given to the public, the

indicator gets value 0. In Finland, information is given to the public from all Seveso II sites, and indicator C gets value 1 for Finnish case study.

Indicator D: Financial aid spent per year by the solidarity fund in relation to the population of a member state. This indicator was linked to one story line:

Story line 15: The *territorial quality* may suffer from a decrease in public expenditures, but aid spent by the solidarity fund may counterbalance this effect. PIM value is +2.

According to EU Solidarity Fund Reports 2002-2004 (European Commission 2004c; 2005q) the highest amount of aid granted per population was 134 m€/8121149 = 16.5 €/person for Austria in 2002. Finland did not even apply for aid from the solidarity fund. Thus Finland gets value 0 for this indicator.

TIM for Territorial Quality ($TIM_{TQ,Finland}$) is calculated as follows:

$$\mathbf{TIM_{TQ,Finland} = \Sigma\, \Theta_c \times PIM_c \times S_{Finland,c} \times PI_{Finland,c}}$$

In which:

C is the number of a story line related to the Territorial Quality (3 or 9 or 15)

Θ_c is the weight of the story line, for Finland no weighing was applied

PIM_c is the general impact for the story line (+4 for story line 3, +2 for story line 9 and +2 for story line 15)

$S_{Finland,c}$ is the value of indicator for story line c (0.75 for indicator A, 1 for indicator B, 0 for indicator D; indicator C does not have story line to measure Territorial Quality)

$PI_{Finland,c}$ is the policy intensity of story line c for Finland: always relevant (1.0)

Thus $TIM_{TQ,Finland}$ = +4 x 0.75 + +2 x 1 + +2 x 0= +5 which is a relatively high value for the available indicators. Thus the key elements of the EU civil protection policy have been well implemented in Finland and this should have a positive effect on the Territorial Quality.

In the similar way, the Territorial Efficiency is linked to story line 4 (PIM +4, indicator A = 0.5), story line 10 (PIM +2, indicator B=1) and story line 13 (PIM +1, indicator C=1), and the $TIM_{TE,Finland}$ = +4 x 0.5 + +2 x 1 + +1 x 1 = +5.

The Territorial Identity is linked to story line 5 (PIM +2, indicator A=0.5), story line 11 (PIM +1, indicator B=1) and story line 12 (PIM +1, indicator C=1). $TIM_{TI,\ Finland}$ = +2 x 0.5 + +1 x 1 + +1 x 1 = 3. Both Territorial

Efficiency and Territorial Identity are positively affected by implementation of the Civil Protection Policy.

Three experts evaluated the recognized story lines and indicators: Senior Safety Engineer Anne-Mari Lähde from Safety Technology Authority TUKES, Researcher Kaisa Schmidt-Thomé from Centre for Urban and Regional Studies of the Helsinki University of Technology (former ECP in Finland) and Environment Counsellor Harri Pitkäranta from the Ministry of the Environment (member of ESPON MC). The proposed indicators describe mostly the state of the implementation of the Seveso II directive. According to Mr Pitkäranta, positive effects can be expected in longer time perspective. Ms Lähde mentioned that the number of accidents related to the Seveso II type installations kept in the same level during 1999-2003, but the number of accidents during 2004-2005 has been statistically lower than the long-time expected variation. However, the number of accidents is relatively small and it was not considered as a reliable indicator.

The interviewed experts pointed out that there is a need for one important indicator: Effect of Art 12 (Seveso II directive) on land use planning practice. Guidance of land use planning related to Seveso II directive was given by Christou and Porter (1999). In Finland, the safety authorities have to be consulted if land use planning is developed or changed in the surroundings of existing Seveso II establishments. The safety measures are well taken into account in the planning practices, but it is hard to measure the effect of improven planning system on territorial objectives.

3.4 Ex-ante assessment of EU Environmental Policies at the regional level: Emsland, Germany case study

Introduction

The validity of the key territorial trends has to be verified. These European trends are valid in general but might be wrong in certain regions such as the Emsland. However, as already pointed out in the Interim Report it can be stated that all those trends are true that have been chosen as a basis for cause-effect chains related to the three test cases. This first step is relevant for all three test cases. In the following, the next steps will be described separately for the test cases, since the relevance and the weighting of the different cause-effect chains. This weighting puts emphasis on the regional circumstances of each cause-effect chain that may be different for each case study area, (see Chapter C, Interim Report). In context of the PIM only the general degree of impact of a policy element on territorial trends and from

trends to objectives was measured (+1, +2, -1, -2), but not its relevance for a certain region.

Moreover, for some story lines, other (best available) indicators were used, that seem to be able to indicate the regional impact of a certain policy element.

Background information can be found in part II of the Annex 1 where the calculation for TIM related to each story line for the three different case studies is described and presented in tables. The final taking into account of the story lines is indicated by using colour shadings:

- The red colour indicates those chains that were estimated by the county administration as not relevant for the Emsland.
- The light green colour shows chains that are principally relevant, but cannot be measured yet.
- The rest of the story lines, marked in deep green, served as basis for the calculation of the TIM.

Test case Civil Protection Policy

15 cause effect chains had been identified, described by means of story lines and suitable indicators had been developed (see part II of the Annex 1). Only three cause-effect chains were excluded by the responsible civil protection unit in the Emsland county. In these cases, the PI factor – as described in Chapter C – was set "0". All of these three chains are related to more general effects that cannot be judged from a regional perspective, as the contact persons argued. The other twelve chains were weighted from the regional perspective of the Emsland and used for the TIA, since all chains were measurable by means of suitable indicators.

However, the weighting is obviously done from the perspective of a public administration that is not very aware of risk perception, since the chains 12 and 13 that are related to public participation and risk awareness were estimated as less important than, e. g. the inspection of establishments. Moreover, the result of the TIM is clearly influenced by national circumstances: the policy element "appropriate distances" (Art. 12 SEVESOO II directive, covered by the chains 6 - 8) is not relevant due to the legislation that had already existed in Germany before the SEVESO II directive came into force. This might be totally different in other member states without such a restrictive national legislation.

The overall TIM that results from these twelve chains is remarkably high: + 48 (by a maximum possible value of + 53). However, this positive result can be seen in line with the interview that took place with county

representatives, since no negative effects of civil protection policy on territorial development were pointed out in this context. In consequence it is not surprising that all cause-effect chains that were considered for the TIA have a positive result. Thus the lowest possible value would be 0. The overall result consists of + 17 for territorial quality (based on 4 chains), + 18 (territorial efficiency, again 4 chains) and finally + 11 for territorial identity, also 4 chains).

Test case Water Policy

21 cause effect chains had been identified, described by means of story lines and suitable indicators had been developed (see part II of the annex 1). From these 21 chains, the regional water administration identified 17 as relevant for the Emsland (PI factor– as described in Chapter C – was set "0"), whereas others, related to water scarcity, are obviously not relevant for a rural area in Germany. However, it is questionable that also the story line was identified as not relevant by the water authority that is related to the participation of all relevant stakeholders by setting up management plans. The water administrations weighted the 17 relevant cause effect chains due to their particular relevance for the Emsland.

From these 17 weighted chains unfortunately only nine could have been used for the TIA, because the eight others were excluded since they are presently not measurable at all because the proposed indicators aim at measuring a future status that cannot be foreseen at present time. Here, scenario techniques might be helpful for future TIA applications.

The reference value that was chosen for the calculation of the TIM is not the national one, as suggested in the Interim Report, but the value for the catchment area of the Ems since the Water Framework Directive aims at management plans for river basins, not for member states.

When looking at the overall TIM that is + 9.8 it becomes obvious that the impact of the WFD on the territorial development in the Emsland county seems to be quite positive (the highest possible value would be +14, the lowest – 10). Nevertheless, all three cause effect chains that are related to territorial efficiency indicate a quite negative impact on this dimension of territorial cohesion (- 7.6, resulting from three cause-effect chains). Water policy is obviously related with several negative side effects for the territorial efficiency. This is in particular valid for the agricultural sector that is the dominant land use in rural areas like the Emsland, but also still an important employer.

At the same time really strongly positive impacts can be expected on the quality of the territory (+ 11.4, four chains) respectively the identity (+ 6,

two chains). The envisaged positive effects on given environmental trends are more important than the negative side effects. But here, a period of time has to be passed, because most of the negative side effects will be realised before the expected positive effects of the WFD start to appear. This first, preliminary result should be proven by an ex-post assessment when the management plans are in force. Nevertheless, this first result calls for a stronger consideration of the economic effects of the WFD (e. g. by means of supporting funds) in order to avoid the negative effects that are indicated by this TIA. Moreover, there is only one sector that will be negatively affected by the WFD: the agricultural sector. At the same time, the different potential positive effects related to territorial efficiency and quality are only from minor relearn for these actors: Here, it becomes obvious that costs and benefits that are linked with the WFD are unequally distributed not only in time and space, but also between the different actors.

This is particularly important in view of the fact that the full spatial impact of the WFD will only become apparent in the future when the management plans will come into force and measures are taken to comply with its provisions. This is clearly indicated by the several chains that are principally relevant for the Emsland, but cannot be measured yet. Here, some additional negative economic effects that are related to water prices and energy costs might happen in future (chains 6 and 7) although other might contradict this trend (chains 9 and 19). At the same time, the positive effects on territorial quality will be most likely strengthened as indicated by chains 8, 18, 20, 21.

Test case Nature and Biodiversity Policy

In general, it was assumed that the EU nature and biodiversity policy is related with several negative side effects for the territorial quality as well as territorial efficiency. The advantages of preserving habitats and biodiversity might become obvious in the long run, while restrictions in a certain area or region can take effect rather immediately.

This assumption is surprisingly not in line with the outcome of the TIA application in the Emsland. From 15 cause effects chains only eight were estimated as relevant for the Emsland; two of them were excluded, since their cannot be measured yet (see part II of the annex 1). This is partly hard to understand, since in particular those chains were judged as not relevant that are related with the potential decreasing effect of protected areas for the risks to natural hazards. At the same time is the major part of all protected areas located in the flood hazard zone of the Ems river.

At least two factors have to be mentioned in order to explain the positive impact of nature policy that was measured by in the end six cause effect

chains (+ 36), while the highest possible value would be just + 48. The positive result is much more impressive when looking at the lowest possible result that is - 16: First, a considerable amount of money has been spent by the commission for the implementation of the NATURA 2000 network (see the quite successful LIFE project "River Dynamics of the Ems River being Close to Nature" that is described in the annex 1). This resulted in a positive impact on territorial quality (+12). Second, in the real planning practice, the assumed negative impact on infrastructure and settlement development has not been shown to be true. In consequence, the expected negative impact on territorial efficiency did not happen. Of course, such negative impacts might happen in future in context of coming projects also in the Emsland. However, there is one problematic contradiction that has to be pointed out: On the one hand, till now the NATURA 2000 network has not been hindered the settlement and infrastructure development. On the other hand, a strong reducing impact of this network on further urban growth and declining biodiversity is expected. This might be generally the truth, but has still to be proven in this area.

However, all in all the result underlines the impression, that the most important problem in context of the implementation of the NATURA 2000 network is the lack of communication of the objectives and possible impacts from the early beginning. In consequence, the whole discussion on regional and local level is still heavily influenced by a climate of fundamental distrust in the intention of the EC and the national governments although at least in this case study area up to now no significant negative effects on territorial objectives have happened.

Lessons learned

The TIM as quantitative output of the TIA application as well as the different results for each of three elements of territorial cohesion are completely in line with the qualitative interviews that took place at the beginning of the work on the case study and that are part of the annex 1. This congruence can be seen as a solid proof for the plausibility of the TIA methodology. In addition, the findings were presented on a final meeting that took place in Meppen on the 22 May 2006. The outcome of the TIA application was proven by all county representatives that were involved in the project as fitting with their view on the EU environmental policy and its effects in the Emsland county.

Several cause-effect chains were measured by means of very detailed information that is available for such a small area (e. g. exact amount of establishments in context of SEVESO II, impact of NATURA 2000 on each relevant project that was carried out in recent years).

In consequence, the TIA application in the Emsland can be seen as a quite successful plausibility test for the methodology in general, but a region is not the right level for the TIA as policy instrument. Thus, the TIA approach, to be applied primarily at the European level, should be seen as an added value to the already existing and still necessary participation of the different stakeholder groups in the legislation process. Here, the practitioners ask for an earlier and more comprehensive involvement from the early beginning of the legislation process, e. g. by means of simulation games with those actors on the regional and local level that are later responsible for the implementation of the EU legislation into daily planning practice.

3.5 Ex-post assessment of EU Nature and Biodiversity Policy at the regional level: Andalusia, Spain case study

This regional case study is based on the Natural Park Los Alcornocales in Andalusia (Spain) where the cause effect chain shows the importance of the policy elements like the FFH or SPA Directives that establishes management plans and the adoption of the compensatory measures in all the projects to be realise in order to guarantee the global coherence of the Natura 2000 sites.

In this way, the real impact of environmental policy (by the example of the nature policy) on a specific, territorially relevant project can be proven. This methodological concept can be understood as a complementation to the ex-ante orientation of the other case studies in order to compare the impacts that were assessed at a general level (PIM) with those that have taken place already in real planning settings (monitoring).

The actual case-effect relationship addresses the construction of a modern highway has been built across the Natural Park Los Alcornocales, included in the Natura 2000 Network. The highway connects two of the most prosperous economical areas of Andalusia between Jerez de la Frontera/Bay of Cádiz and Algeciras / Campo de Gibraltar, it cross the Natural Park in 38,5 Km, that could be understood as a high fragmentation due the high ecological values of this protected area, but since the European, National and Regional legislation and policies obligate to adopt as many compensatory and correction measures as needed to guarantee the coherence of the Natural Park with a plausible result. (See the extended assessment of this case study in the Annex 1)

The different actions taken for the construction of this new infrastructure have developed a high number of green corridors and buffer zones to

maintain the fauna in its own lifestyle context separated from the highway infrastructure, reducing or eliminating the view and noise impacts.

The different elements of the European Nature and Biodiversity Policy have not affected to all the territorial trends and storylines (see description in the Annex 1) mentioned in the TIA methodology as it was expected when the case study was proposed:

- **Trend 3A**: Since the Natural Park was established in 1990 there has been a gradual increase in total activity rate, the protection of the Park has helped for the development of the local employment and the creation of new enterprises and cooperatives.
- **Trend 3C**: The evolution of public investments in the Natural Park has increased year by year, the principal contributor is the Ministry of the Environment of Andalusia with a basic investment of 6,5 Mio EUR in 2004 (research project and specific actions not included)
- **Trend 9B**: The economy of the Natural Park was based principally on the exploitation of forest resources, which actually has increased their production following sustainable procedures of exploitation.
- **Trend 9C**: The diversification of activities is focused on the conservation of the natural resources as investment for the future. It permits the dualisation of functions of the rural areas in the Natural Park. All functions are linked as an obligation with the conservation of the environment.
- **Trend 7B**: The development of the infrastructures inside the Natural Park has been the principal impact during last years, the construction of the highway is an example. The development of infrastructures has not to have a negative impact, It is true that the development of an area is connected with the development of artificial infrastructures but these artificial infrastructures can also be projected taking into account the sustainability for the future and the environmental context where are developed.
- **Trend 6B**: There has been no increase of extreme local events in the Natural Park's municipalities. Local governments and people have adopted the Natural Park as a symbol and in general it has been seen as the main attraction of the area, it increases the local economy and also the principal aims to defend the Natural Park's environment.

The **territorial quality** depends on the area of the Natural Park, principally the territorial quality is better in the neighbouring areas of the new highway. In the northern and southern areas of the Natural Park the territorial quality is lower, especially in the northern part where the infrastructure network development is extremely poor due to the accessibility and the low

population density. In some cases the poor infrastructure development does not help for the accessibility to general interest services. Although during the last years the public investments to develop new "green" infrastructure has increased following the management plan of the Natural Park.

The territorial efficiency is the result of the local competitiveness and attractiveness of the local territory, the sustainable exploitation of the natural resources (cork oak) and the conservation of these resources with good practises. The accessibility through the new highway has transformed the mobility of people and promoted a better transportation for the manufactured goods.

The increase of the territorial quality and efficiency have created a common territorial identity, the social initiatives and the participation of local people through the Management Body of the Natural Park has helped to justified the new control board for local products and the trademark "Parque Natural Los Alcornocales" concentrating the traditional activities and products to be manufactured and exported. The Natural Park has also become into a green tourist attraction promoting its ecological values. All the social participation contributes everyday in a common vocation for the future.

The results of the application of the TIA Methodology following the cause effect chains and impact matrix have helped to understand that the different impacts of environmental policy elements on territorial trends can be classified as a strong positive impact and the impact of territorial trend on territorial objective not always can be observed as a significant impact. However, the ex-post assessment of the impact of nature policy on a specific project can be seen as a plausibility test for the cause-effect chains that are a central part of the ex-ante TIA approach of project 2.4.1.

The methodology adopted to develop this ex-post assessment has been mixed using the main guidelines of the TIA Methodology and the Core Set of Indicators developed by the Natural Park and the Regional Development Institute of Andalusia. The availability of general indicators based on Natura 2000 singular areas is possible only from the Management Body of the Natural Park, and for general comparisons the Ministry of the Environment of Andalusia has a complete database with long period of data available.

4 Findings and recommendations

4.1 Findings from the TIA case study applications

Comparing the ex-ante and ex-post evaluation approach

The different ex-ante and ex-post case studies fit well to each other. In this context, the ex-post assessments can be seen as a kind of plausibility test for the cause-effect chains that are central part of the ex-ante TIA approach. The very detailed and carefully proven impact of an environmental policy on territorial objectives in practice can be seen as the most important benefit that the ex-ante approaches contribute to the common work. Theoretically, small mistakes can sum up to an overall result that is most likely to be wrong. Results have to be interpreted very carefully and shall take into account possible mistakes. The plausibility of the results in the case studies however allows to say that such mistakes do not seem to add up too much.

Comparing the TIA application at different spatial levels

The TIA approach seems to be applicable primarily at the European and national level of policy making, but not very useful for regional actors, in charge of the implementation of policies into practical decision-making. There are mainly two reasons for this: First the rather theoretical and abstract approach that is hard to be linked to practical decision-making and second the existing discrepancy between the level and actors where policies are made (EU/transnational) and where they are implemented (regional/local context). In any case, it should be seen as an added value to the already existing and still necessary participation of the different stakeholder groups in the legislation process (e. g. the committee of the regions). Here, simulation games with local and regional actors could be seen as an added value.

Comparing the application of the three test cases

The spatial relevance of all three test cases was proven. Civil protection policy is obviously quite positive assessed on all spatial levels. Water policy is clearly related with positive effects for territorial quality and identity whereas the negative impact on efficiency calls for a stronger consideration of the economic effects of the WFD (e. g. by means of supporting funds to be spent in particular for those actors and regions that are primarily negatively affected). This is particular important in view of the fact that the full spatial impact of the WFD will only become apparent in the future when the management plans will come into force and measures are taken to comply with its provisions. This in general asks the question if an ex-ante approach (based on indicators to measure certain developments) is suitable

for effects which only occur in the (far) future. Nature has to be seen as the most controversial policy element, causing strong negative effects, in particular to territorial efficiency, but this depends obviously on the sensitivity of the affected territory. The negative impact of nature policy on efficiency was proven by the case studies Slovenia and Andalusia, but the Emsland study came to another result. At the same time, the intended positive impact on the environment (i.e. the preservation of habitats and species) was proven by both ex-post case studies. This ambivalent character of nature policy – effective, but related with strong negative side-effects – calls for more attention to be paid to counterbalanced measures for those areas that are obviously negatively affected from this policy due to their spatial characteristics.

4.2 Recommendations for a successful application of the TIA approach

For a successful application of the TIA approach some training (e. g. a one-day workshop) is needed for those who are responsible for the TIA application, since it seems presently partly difficult to understand for practitioners. Moreover, the description of story lines and methodology has to be done in a language that is close to practitioners. Language is understood in both, literally because the story lines have to be translated to the local language of the practitioners as well as figuratively because the chosen words should be as less abstract and complex as possible. These aspects have to be taken into account for any TIA project planning.

The success of the TIA application depends very much on the availability of appropriate indicators. In the test cases some data gaps became obvious. However, the results are plausible but the fact of missing data has to be considered carefully. However, this problem is only partly related to data availability, but to a certain extent caused by the ex-ante perspective of the TIA. In particular related to the water policy that is partly (implementation of WFD) still under development, the impacts cannot be measured by indicators. This problem is also relevant for other policy elements like the forthcoming flood risk management directive. Here, scenario techniques might be helpful and should be subject of further research to be undertaken by ESPON II.

The Spanish as well as the Slovenian case study indicated that a combined ex-ante and ex-pot approach helps to understand better what are the real cause-effects between policies, trends and territorial objectives. This aspect should be considered for future research.

The weighting factor was applied only in the Emsland case. Here, the weighting was successfully used by the contact persons as possibility to adjust the TIA to the regional circumstances and was perceived therefore as a useful tool. However, at the same already the PIM phase relies strongly on expert opinions that should be avoided in favour of measurable indicators, as argued by the Slovenian case study. This is to a certain extent, a contradiction that might be solvable in view of the fact that the TIA is estimated as most suitable for the European level where a weighting of the different cause-effects should be dispensable.

Chapter D - Indicators on environmental structures and trends on the European territory

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1 Introduction

The indicator development on main environmental trends and structures as well as in the economic sectors is one of the main final products developed for the ESPON project 2.4.1 and is the final step to assess and evaluate the impacts in the field of EU Environmental Policies.

Environmental indicators simplify, quantify and communicate complex environmental data and in doing so tell us about the state or quality of the environment. They allow us to monitor environmental trends and track progress towards stated objectives and policy goals. These indicators will allow us in the context of the developed TIA Methodology:

- To trace whether environmental quality is improving or getting worse
- To assess whether policies, laws and other actions are having the desired effect (ex-post)
- To assess which territorial impacts policies, laws and other action may have in future (ex-ante)
- To identify emerging issues
- To inform the development of environmental policies.

The indicators developed by the project and presented in this chapter has been done taking into account the main territorial trends described in the TIA Methodology (biodiversity, climate change, contaminated sites, marine environments, water, transport or waste), the data availability and trying to answer the following generic needs:

- Increasing political demands for indicator-based reporting to support the policy making processes across many levels in the EU and elsewhere.
- Streamline indicator needs across these demands, bring a coherent approach to indicator based reporting and so facilitate a consistent and stable information basis to support policy making.
- Provide clear priorities for environmental data collection initiatives that are expensive and involve long-lead times between conception and delivery.

2 Methodology and criteria of indicator selection

As already explained in the Interim Report, the methodological procedure adopted to compile all the information and interact with the existing knowledge in the consortium was the following:

a. Documentation

b. Description of the state-of-the-art of selected Environmental Policies affecting the EU Territory

c. Review and compilation of existing datasets and indicators in EEA, OECD, EUROSTAT, ESPON. (see Annexes 2, 3, 4 and 5 of ESPON 2.4.1 project's Interim Report)

d. Definition of criteria to be used for the selection of new indicators.

Criteria	Foreseen Goals
Available data for the development of the indicator	Ability to develop the indicator in a further step, an EU pilot site.
Good spatial coverage	Ability to cover a large area, if possible covering ESPON space (EU25 + Bulgaria, Romania, Norway and Switzerland)
Possibility to combine spatial and statistical information	Analysis of environmental policies on spatial development

e. **Consultation** of the consortium on the selection of indicators from this list and discussion on the criteria to be chosen for the selection of the integrated indicators. External experts from EEA or DG ENV will also be approached. (see Annex 1 of ESPON 2.4.1 project's Interim Report)

f. **Evaluation and Definition of relevant indicators** showing the impact of EU Environmental Policies in the ESPON Space (EU 25 + Bulgaria, Romania, Norway & Switzerland), through the elaboration of Indicator Fact Sheets.

During this second phase of the project new indicators have been incorporated to the preliminary proposal.

The methodological Indicator Fact Sheets are updated with the consortium feedback and **final approval** from the consortium on the indicators to be used to develop the EU pilot site within the project.

As a **next step** in the project, the indicators will be calculated and presented as results of the EU pilot site in the project, at NUTS3 level.

3 New indicators proposal

The indicators developed are based on the expertise and the data availability of the ESPON 2.4.1 partners and according to the questions formulated in the following figure.

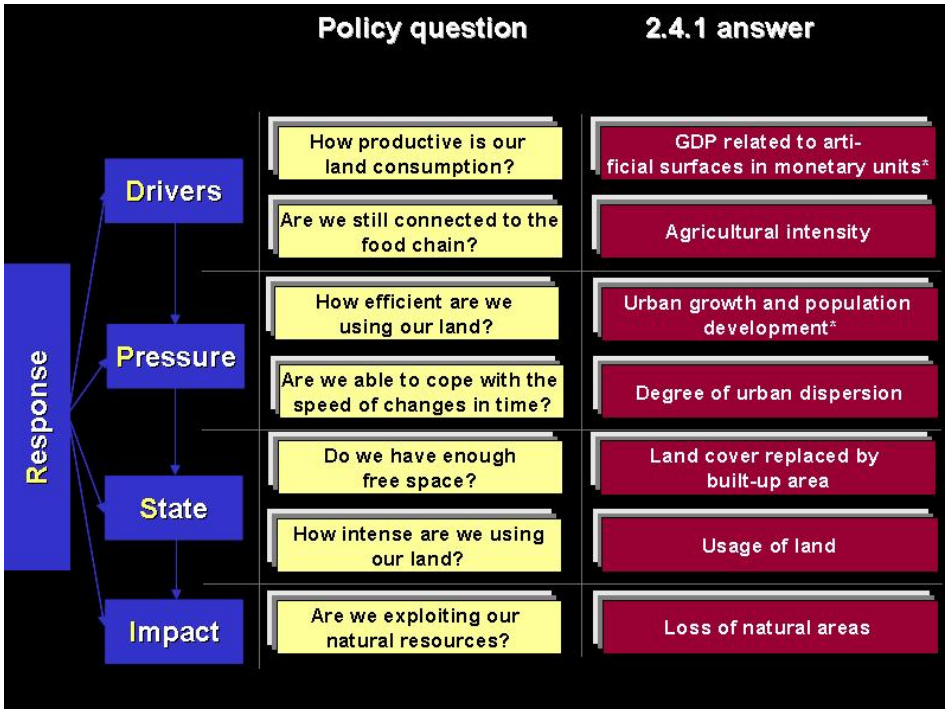


Figure 10 Proposal of ESPON project 2.4.1 partners for indicator development

The following 15 indicator maps are presented:

Map #6: Urban growth 1990 – 2000

Map #7: Growth of residential areas 1990 – 2000

Map #8: Growth of industrial areas 1990 – 2000

Map #9: Urban growth and population development 1990 – 2000

Map #10: Productivity of Land Consumption 2000

Map #11: Agricultural Intensity 2000

Map #12: Degree of Urban Dispersion 2000

Map #13: Land Cover Replaced by Built-up Area 1990 to 2000

Map #14: Usage of Land 2000

Map #15: Loss of Natural Areas 1990 – 2000

Map #16: Percentage of natural and semi-natural areas lost due to urban and transport development (1990-2000)

Map #17: Annual change of natural and semi-natural areas together with change in GDP

Map #18: Percentage of new forest on areas of medium to high risk of desertification

Map #19: The percentage of Natura 2000 network areas per NUTS3 (99) region

Map #20: The proportion of fragmentation of the natural and semi-natural areas vs. the extent of the Natura 2000 network areas per NUTS3 (99) region

Map #21: The proportion of the population working in mining and quarrying industry vs. the extent of the Natura 2000 network areas per NUTS2 (99) region

Map #22: The existence of the natural hazards vs. the extent of the Natura 2000 network areas per NUTS3 (99) region

Map #23: The potential multimodal accessibility vs. the extent of the Natura 2000 network areas per NUTS3 (99) region

Map #24: The change of land use from developed areas to agriculture inside the Natura 2000 Network area

Map #25: The change of land use from forested and natural land to agriculture inside the Natura 2000 Network area

Map #26: The change of land use from forest to agriculture inside the Natura 2000 Network area

Map #27: The change of land use from semi-natural land to agriculture inside the Natura 2000 Network area

Map #28: The change of land use from pastures to arable and permanent crop inside the Natura 2000 Network area

Map #29: The change of land use from wetland to agriculture inside the Natura 2000 Network area

Map #30: Agricultural Intensity (2000) vs. the extent of the Natura 2000 network areas per NUTS3 (99) region

Further information about these indicators including metadata and development methodology is available in Annexes 2 and 3.

3.1 Urban growth 1990 – 2000

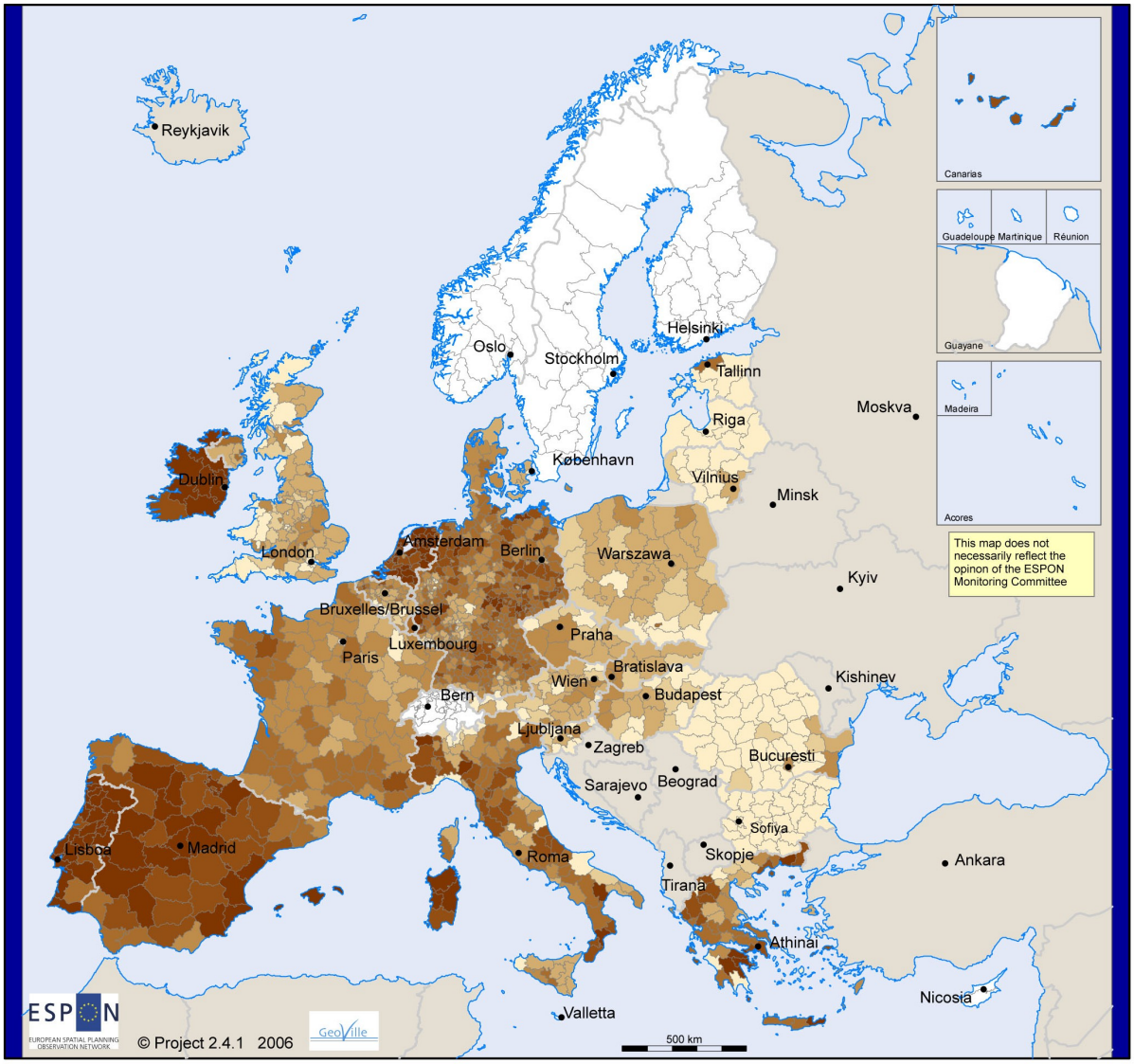
Indicator interpretation

As seen at the national level, the spatial pattern of relative urban growth during the period 1990 to 2000 in Europe follows largely a gradient from East to West. Very low (mainly < 1%) in the Baltic States and Bulgaria and Romania, it increases to moderate values in the new Eastern states and Austria. Germany, Belgium, Luxemburg, Italy and France as the group following to the West show heterogeneous increases in an overall upper medium range, with Germany "leading". As an exception of the East-West gradient, Greece belongs to this group, and the UK has a comparatively moderate increase, similar as the new Eastern EU states. Maxima and relatively homogeneous areas of very large urban growth are found in Spain, Portugal, and Ireland, as well as the Netherlands.

Conclusions

Overall, the countries can be grouped into four classes of relative urban growth, ranging from below 0,5 % in dominant parts of the easternmost countries to over 20% in the westernmost states. The pattern of growth is homogeneously low in the easternmost- and homogeneously high in the westernmost states, and very heterogeneous in the states with overall intermediate increases. This pattern clearly reflects the large economic trends and discrepancies during the last decade of the 20th century, with the easternmost states showing the smallest dynamics, and Spain, Portugal, Ireland, and the Netherlands being the most dynamic regions, but with only a narrow margin to the central and southern European states.

Urban growth 1990 - 2000



Relative growth in %

- to below 0.5 %
- 0.5 to below 1 %
- 1 to below 2.5 %
- 2.5 to below 5 %
- 5 to below 10 %
- 10 to below 20 %
- 20 % and more
- Non ESPON space
- No data

Origin of data: CORINE changes 1990-2000: European Environment Agency
Regional level: NUTS 3

Source: ESPON Data Base

CORINE changes 1990-2000 do not exist for Cyprus, Finland, Malta, Norway, Sweden, Switzerland and the remote areas of France and Portugal.

Map 6 Urban growth 1990-2000

3.2 Growth of residential areas 1990 – 2000

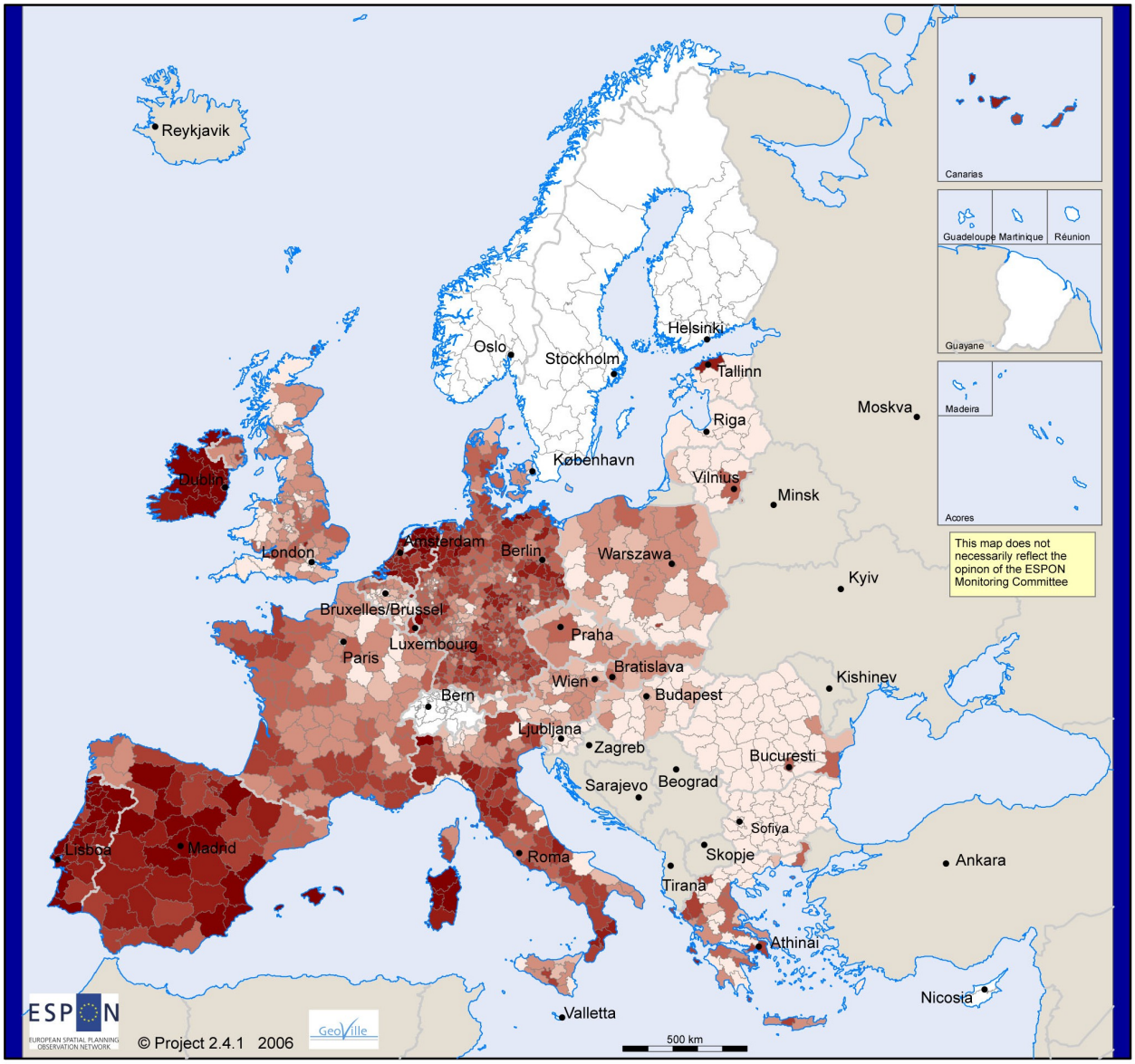
Indicator interpretation

The spatial pattern is similar to that of total urban growth (Map 6), though it shows somewhat larger regional discrepancies within many countries. From a national perspective, residential area growth follows largely a gradient from West to East. Very low (mainly < 0.5%) in the Baltic States and Bulgaria and Romania, it increases to moderate values in the new Eastern states and Austria. Belgium, Luxemburg, Italy and France as the group following to the West show heterogeneous increases in an overall upper medium range, with outstanding high increases in Germany. As an exception of the East-West gradient, Greece belongs to this group, and the UK has a comparatively moderate increase, with an obvious gradient from East to West. Maxima and relatively homogeneous areas of very large residential growth are found in Spain, Portugal, and Ireland, as well as the Netherlands.

Conclusions

Overall, the countries can be grouped into four classes of relative urban growth, ranging from below 0,5 % in dominant parts of the easternmost countries to over 20% in the westernmost states. The pattern of growth is homogeneously low in the easternmost- and homogeneously high in the westernmost states, and very heterogeneous in the states with overall intermediate increases. This pattern clearly reflects the large economic trends and discrepancies during the last decade of the 20th century, with the easternmost states showing the smallest dynamics, and Spain, Portugal, Ireland, and the Netherlands being the most dynamic regions, but with only a narrow margin to the central and southern European states.

Growth of residential areas 1990 - 2000



Relative growth in %

- to below 0.5 %
- 0.5 to below 1 %
- 1 to below 2.5 %
- 2.5 to below 5 %
- 5 to below 10 %
- 10 to below 20 %
- 20 % and more
- Non ESPON space
- No data

Origin of data: CORINE changes 1990-2000: European Environment Agency
Regional level: NUTS 3

Source: ESPON Data Base

CORINE changes 1990-2000 do not exist for Cyprus, Finland, Malta, Norway, Sweden, Switzerland and the remote areas of France and Portugal.

Map 7 Growth of residential areas 1990 – 2000

3.3 Growth of industrial areas 1990 – 2000

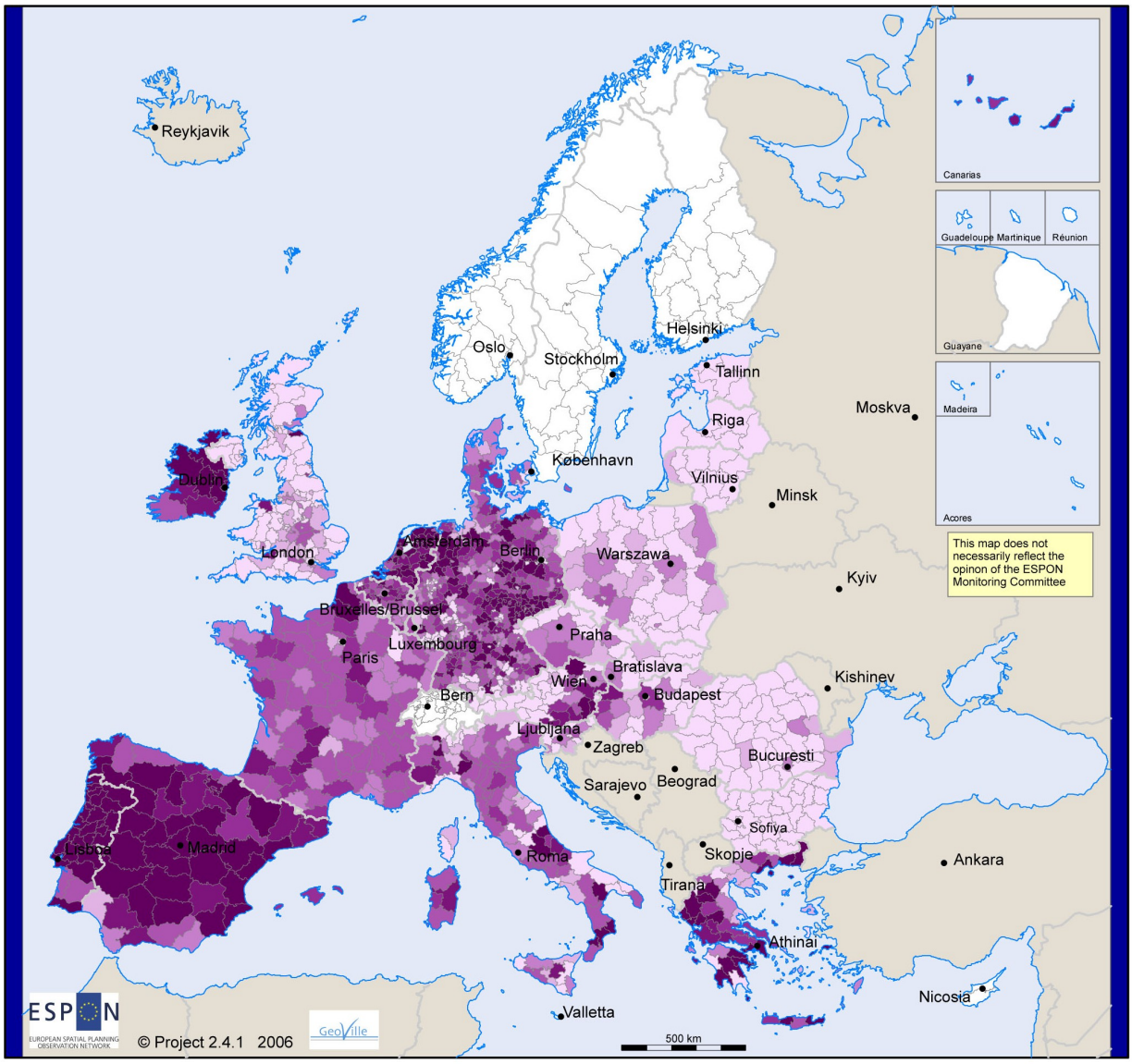
Indicator interpretation

The big picture of the increase of industrial, commercial and transport areas is similar to that of total urban growth: Low in the eastern EU countries, and high(er) in the West and the South. More than with total urban growth or residential growth, there are distinct regions of higher growth within several countries: Industrial area growth concentrates in Poland, the Czech Rep., Slovakia, Hungary, Slovenia, Austria, and the UK in a few, partly larger areas including the capital regions. The opposite is true for Italy and Greece with an overall large growth, where only some "islands" of low growth can be found in peripheral areas.

Conclusions

Overall, the countries can be grouped into three classes of relative growth of industrial and transport areas, ranging from below 2,5 % in almost the total territories of the Baltic states, Bulgaria and Romania, to over 40% found especially in the Westernmost states (Spain, Portugal and Ireland), Germany, the Netherlands and in a few parts of Italy and Greece. The UK shows an outstanding low growth as compared to the other western industrial nations. As also shown by maps 5 and 6, this indicator reflects the substantial discrepancies between the spatial manifestations of economic activity especially between the eastern and western EU. The beginning strong economic growth of the new Eastern EU countries manifests itself in regional concentrations within these countries.

Growth of industrial areas 1990 - 2000



Relative growth in %

- to below 2.5 %
- 2.5 to below 5 %
- 5 to below 10 %
- 10 to below 20 %
- 20 to below 30 %
- 30 to below 40 %
- 40 % and more
- Non ESPON space
- No data

Origin of data: CORINE changes 1990-2000: European Environment Agency
Regional level: NUTS 3

Source: ESPON Data Base

CORINE changes 1990-2000 do not exist for Cyprus, Finland, Malta, Norway, Sweden, Switzerland and the remote areas of France and Portugal.

Map 8 Growth of industrial areas 1990 – 2000

3.4 Urban growth and population development 1990 – 2000

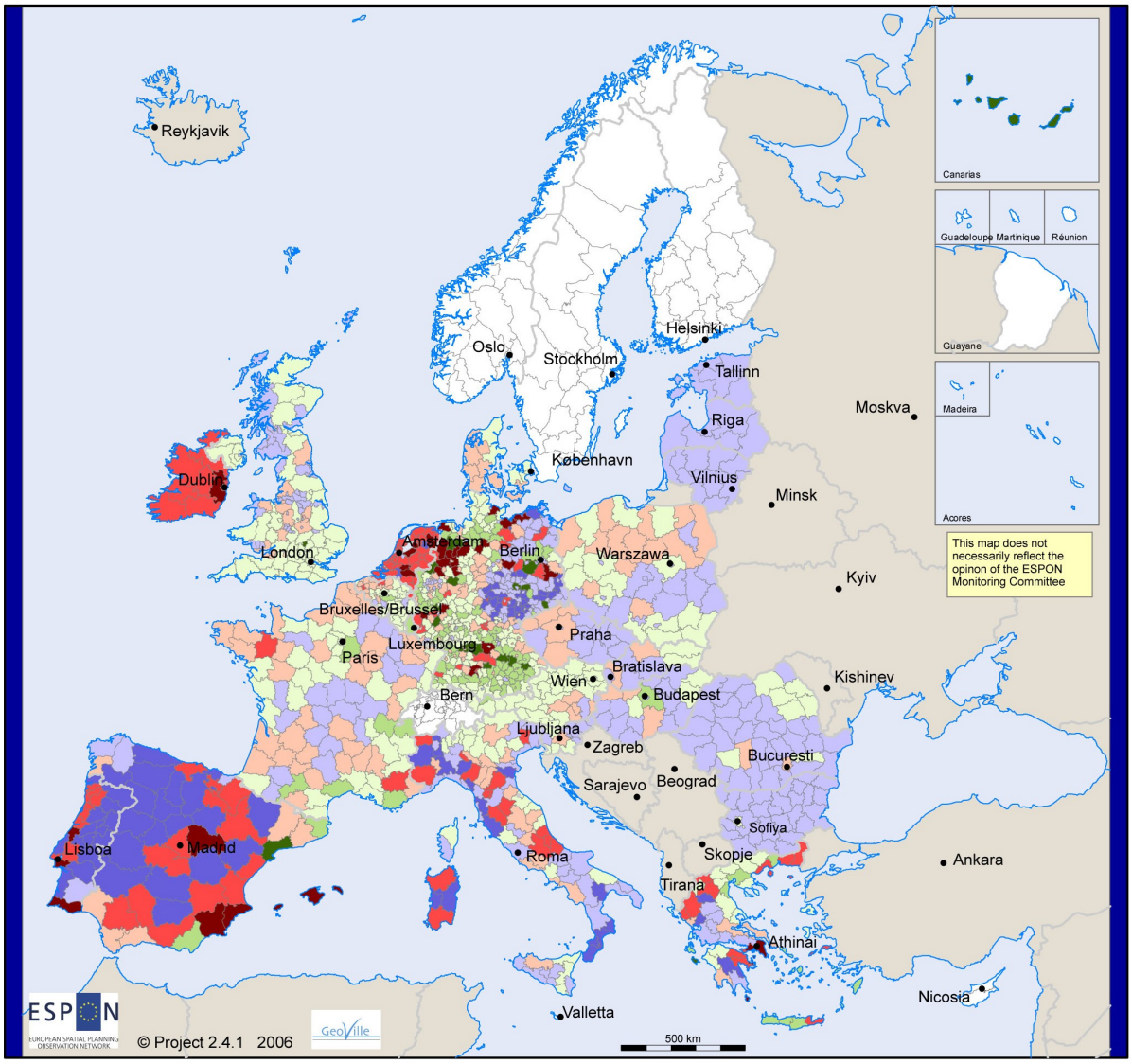
Indicator interpretation

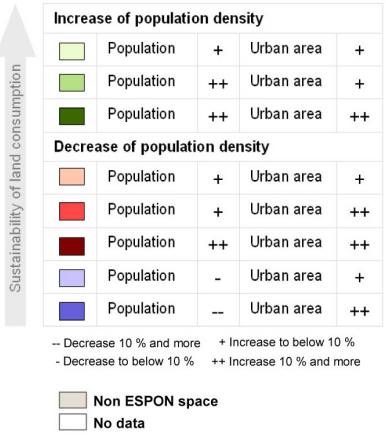
As seen in blue tones, almost all European countries experienced a decrease of population at least in some parts of their territories, with the Baltic States and Bulgaria loosing population all over. Population loss is especially heavy in parts of Portugal and Spain, Southern and North-Eastern Italy and especially Eastern Germany. Pronounced gains of population (> 10%, through immigration) can only be observed in Western Germany. Only a few regions of some other countries (mainly France and Spain) show more than 10% increase of population. When put in relation to urban growth, the total picture is very inhomogeneous. A large group of countries is composed of regions of three types: Small to moderate urban growth combined with small to moderate population increase or decrease: The Eastern European States plus Austria, and the UK, France, and Belgium. The Southern States, as well as Ireland, the Netherlands and Germany are more heterogeneous and contain also regions with low to moderate population growth combined with large increases of urban areas.

Conclusion

If the combination of low population increase or decrease and large increases of urban areas can be taken as an indication of unsustainable land consumption, then Spain, Portugal, Ireland and the Netherlands can be taken as "leaders" in that respect, together with some parts of Germany, Italy, and Greece. Dispersed to extensive population loss can be observed all over Europe and concentrates especially in the easternmost states, Eastern Germany, Spain, Portugal, and in parts of France, Italy, and Greece. Outstanding and extensive population increases can only be seen in Western Germany. The other regions and countries show rather moderate developments.

Urban growth and population development 1990 - 2000

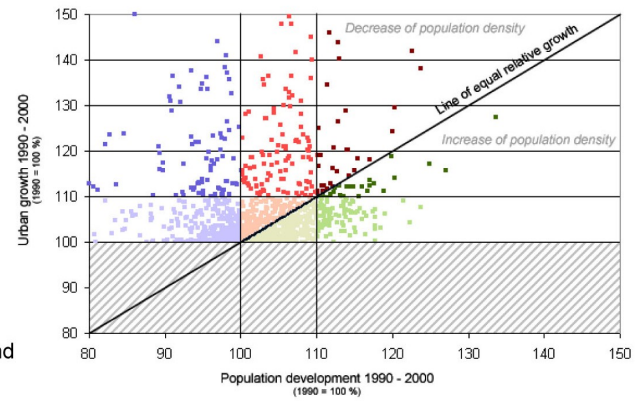




CORINE changes 1990-2000 do not exist for Cyprus, Finland, Malta, Norway, Sweden, Switzerland and the remote areas of France and Portugal.

Origin of data: CORINE changes 1990-2000: European Environment Agency
Statistical data: ESPON Data Base, Eurostat
Regional level: NUTS 3

Source: ESPON Data Base



Map 9 Urban growth and population development 1990 – 2000

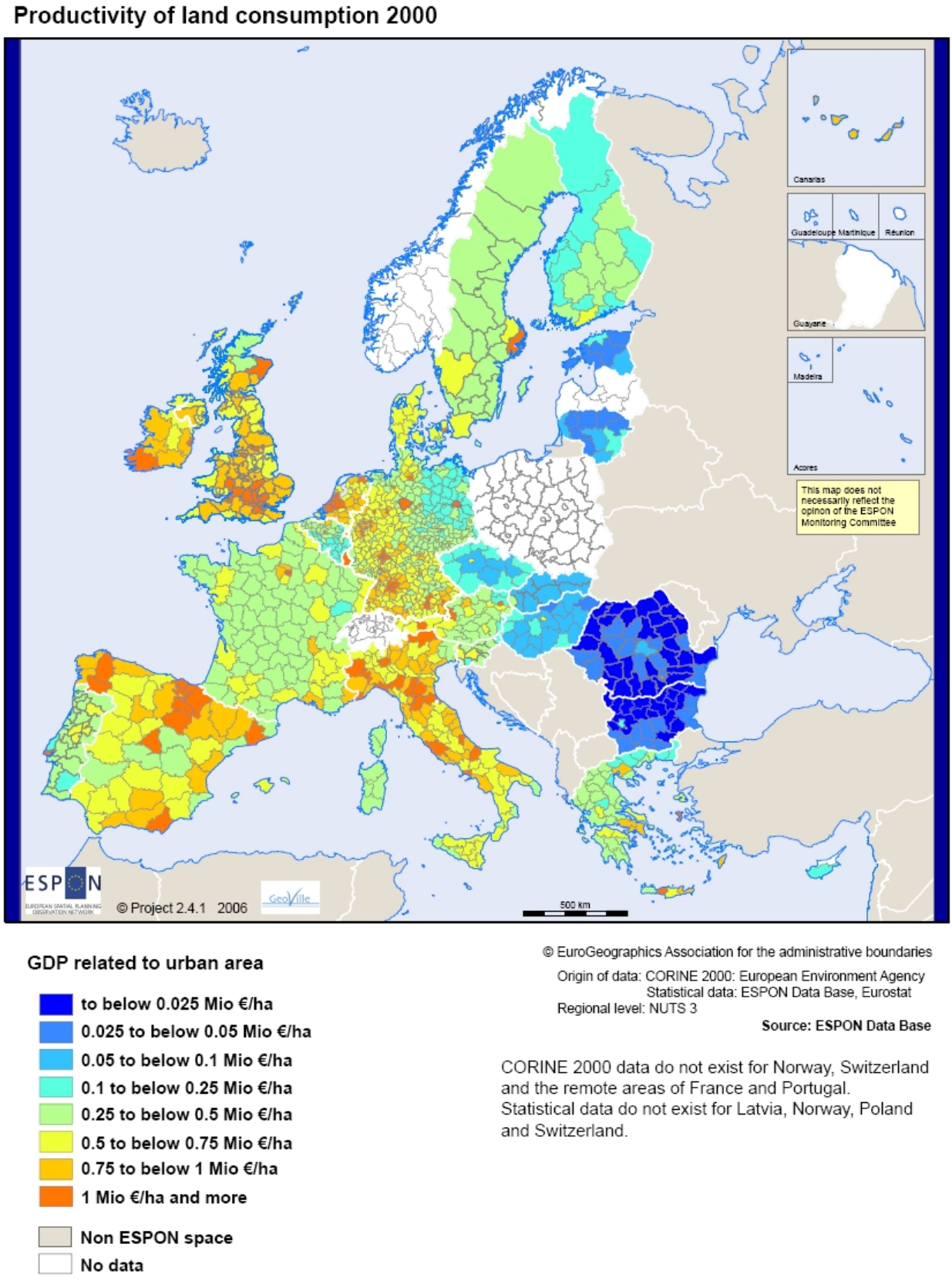
3.5 Productivity of land consumption 2000

Indicator interpretation

While the EU15 countries can be seen in the upper half of the productivity classes, the newer EU states (as far as contained in the map) and especially the future member states Bulgaria and Romania range at the lower end of productivity with the exception of Slovenia. Of the newer countries, after Slovenia the Czech Rep. shows the highest productivity values. Within the EU 15, a couple of countries ranks rather homogeneously in the middle of the classes, in particular Sweden, Finland, France, Portugal, Greece, Belgium, Austria, as well as Eastern Germany. The countries with the highest productivity are Spain, Italy, Germany, the Netherlands, The UK and Ireland.

Conclusion

A total of four groups of productivity classes can be seen at the national level: Bulgaria and Romania rather homogeneously at the lower end with 0,025 Mio€/ha and less, the new EU countries (except Slovenia) with somewhat higher productivity of land consumption, but still in the lower half, and a partition of the EU15 countries in those with homogeneous upper medium ranks and others with a large part of NUTS 3 regions at the high end of productivity (1 Mio €/ha and more).



Map 10 Productivity of land consumption 2000

3.6 Agricultural intensity 2000

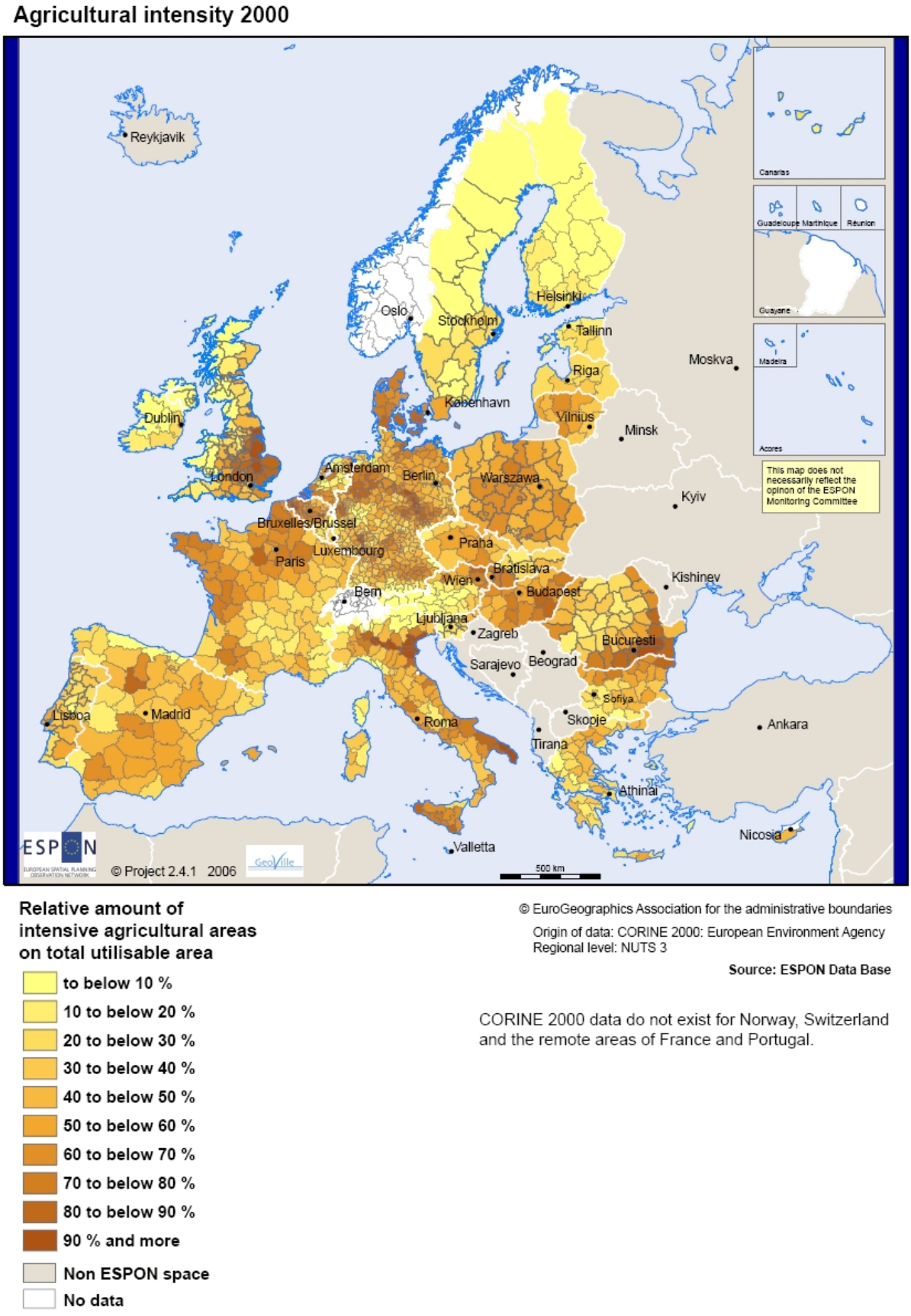
Indicator interpretation

The indicator reflects largely the topographic, climatic and edaphic potential of the European NUTS3 regions for intense agriculture. There are outstanding intensely used regions (values of 80 to over 90%), such a Eastern UK, the Po valley or the fertile marsh regions in northernmost Germany. Areas of the other extreme (below 10 to 30 %) are found in the Alps, northern Europe, Ireland, the Carpathian, etc., which are mostly related to prohibiting topographic, edaphic and climatic conditions. The remaining areas have intermediate shares of intense agricultural land, showing a regionalised pattern, and are clearly related to the large natural units of the EU.

Conclusions

With shares of below 10% to over 90% per cent of the total vegetated area, the big picture of agricultural intensity clearly reflects the spatial distribution of the major natural units of the EU. In spite of the EU economy being mainly based on industrial and commercial activities and services, a substantial part of the territory is (still) devoted to intense agriculture.

Interpretations and conclusions on a finer scale, which would incorporate human land use decisions cannot be made on the basis of this mono-temporal indicator alone.



Map 11 Agricultural intensity 2000

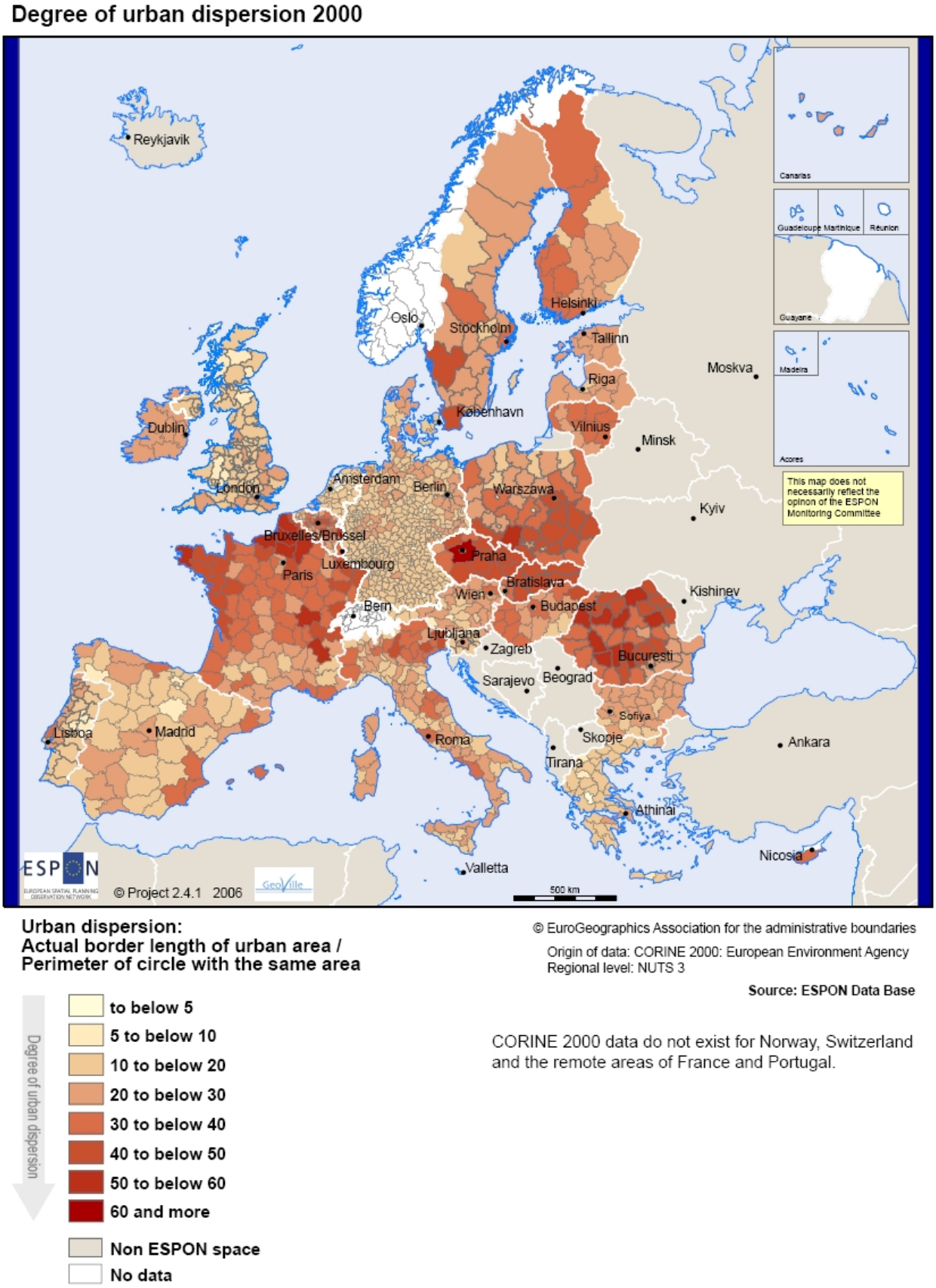
3.7 Degree of urban dispersion 2000

Indicator interpretation

Map 11 shows outstanding differences of the degree of urban dispersion at the national and greater regional level. Especially the Czech Republic, Slovakia, Southern Poland, Romania, and Northern France show high urban dispersion values (30 to 40 and above). Germany, The Netherlands, Denmark, Greece, the UK, and most of Portugal and Spain have relatively low to very low dispersion values. Italy, Sweden, Northern Poland are examples for intermediate, though very heterogeneous values. There may be a negative correlation between urban dispersion and urban growth (the higher urban growth, the lower the dispersion) when looking at the extremes, but this cannot be visually confirmed for NUTS3 regions with intermediate urban dispersion values. Here a statistical co-analysis of these indicators would be of interest to establish those correlations.

Conclusion

The mono-temporal map of urban dispersion shows major differences at the national and greater regional level, where partly, especially concerning the extremes, a negative correlation with urban growth may be inferred. Statistical analysis however is necessary to confirm this observation. Recent urban sprawl that may have led to an increase of urban dispersion cannot be separated from basic structural urban characteristics on this mono-temporal map.



Map 12 Degree of urban dispersion 2000

3.8 Land cover replaced by built-up area 1990 to 2000

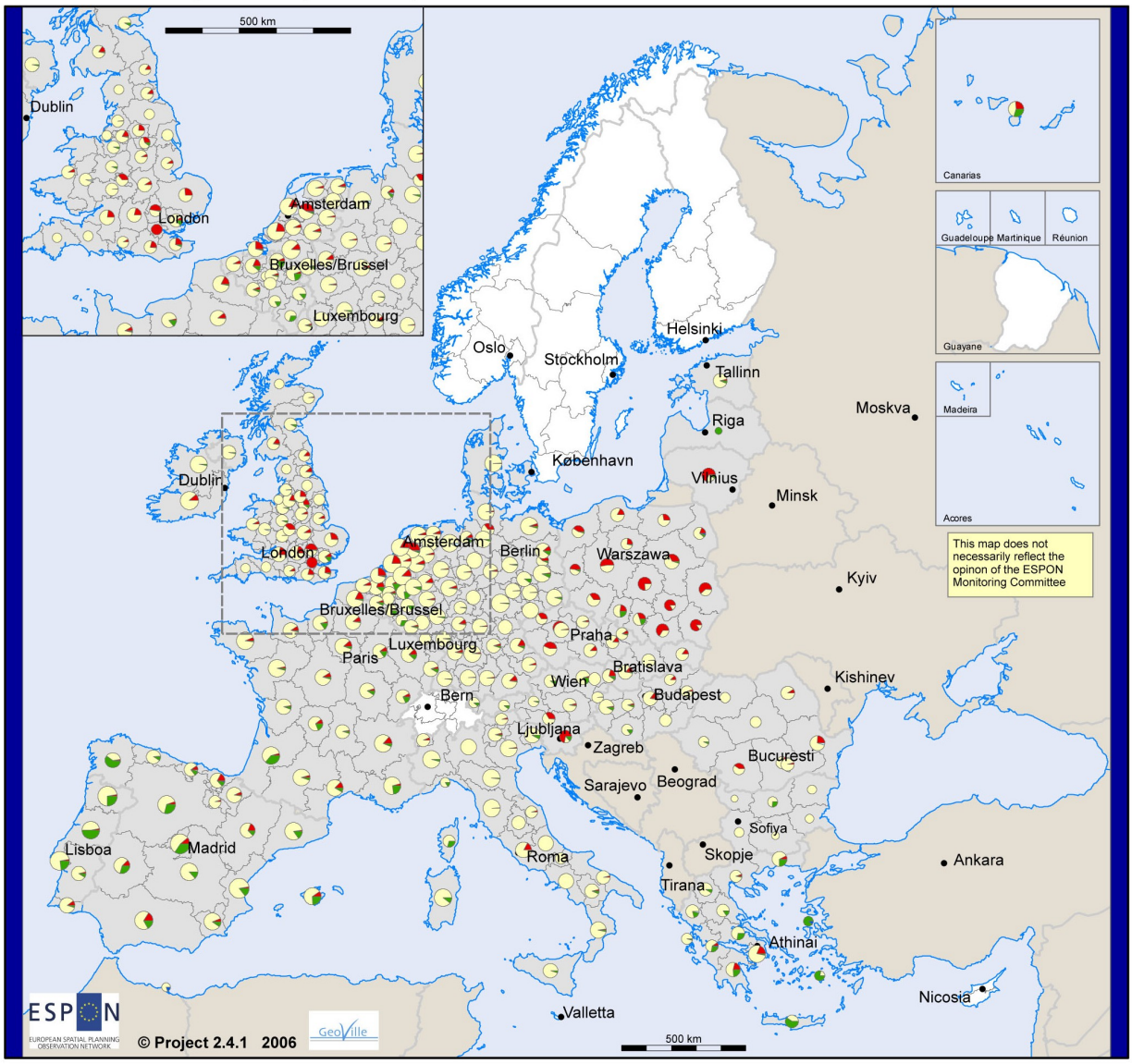
Indicator interpretation

The indicator reflects largely the topographic, climatic and edaphic potential of the European NUTS3 regions for intense agriculture. There are outstanding intensely used regions (values of 80 to over 90%), such a Eastern UK, the Po valley or the fertile marsh regions in northernmost Germany. Areas of the other extreme (below 10 to 30 %) are found in the Alps, northern Europe, Ireland, the Carpathian, etc., which are mostly related to prohibiting topographic, edaphic and climatic conditions. The remaining areas have intermediate shares of intense agricultural land, showing a regionalised pattern, and are clearly related to the large natural units of the EU.

Conclusions

Agricultural areas have the largest overall share of the land cover classes that have been replaced by urban areas. Forests and semi-natural areas as well as mines, dump and construction sites and artificial non-agricultural vegetated areas are further significant land cover classes diminished, and tend to concentrate in certain regions: Forest and semi-natural areas contribute significantly in the South (except mainland Italy), and the two artificial surface groups in Poland, the UK, The Netherlands, Belgium, the Czech Republic and Slovenia. Besides Land Cover Replaced by Built-up Area 1990 to 2000, map 13 also shows the absolute size of the increases of urban areas. These are outstandingly low in the Baltic States, Bulgaria and Romania, very high in Spain, Portugal, The Netherlands, Belgium, Ireland and Germany and moderate to relatively high in the remaining states (compare to map 6).

Land cover replaced by built-up areas 1990 - 2000



Type and absolute amount of land cover replaced by built-up areas

100 km²
10 km²
1 km²

- **Artificial surfaces**
- **Agricultural areas**
- **Forests & semi-natural areas**
- **Wetlands**
- **Water bodies**

- **Non ESPON space**
- **No data**

Origin of data: CORINE changes 1990-2000: European Environment Agency
Regional level: NUTS 2

Source: ESPON Data Base

CORINE changes 1990-2000 do not exist for Cyprus, Finland, Malta, Norway, Sweden, Switzerland and the remote areas of France and Portugal.

The conversion of water bodies and wetlands to built-up area in the ESPON space between 1990 and 2000 is generally low (<5% of total area replaced by built-up area). Higher rates were observed in the following NUTS-2 regions:
- ES64 (Ciudad Autónoma de Melilla): 19 %
- GR41 (Voreio Aigaio): 10 %
- UK22 (East Wales), DE50 (Bremen), DE94 (Weser-Ems): 6 %

Map 13 Land cover replaced by built-up area 1990 to 2000

3.9 Usage of land 2000

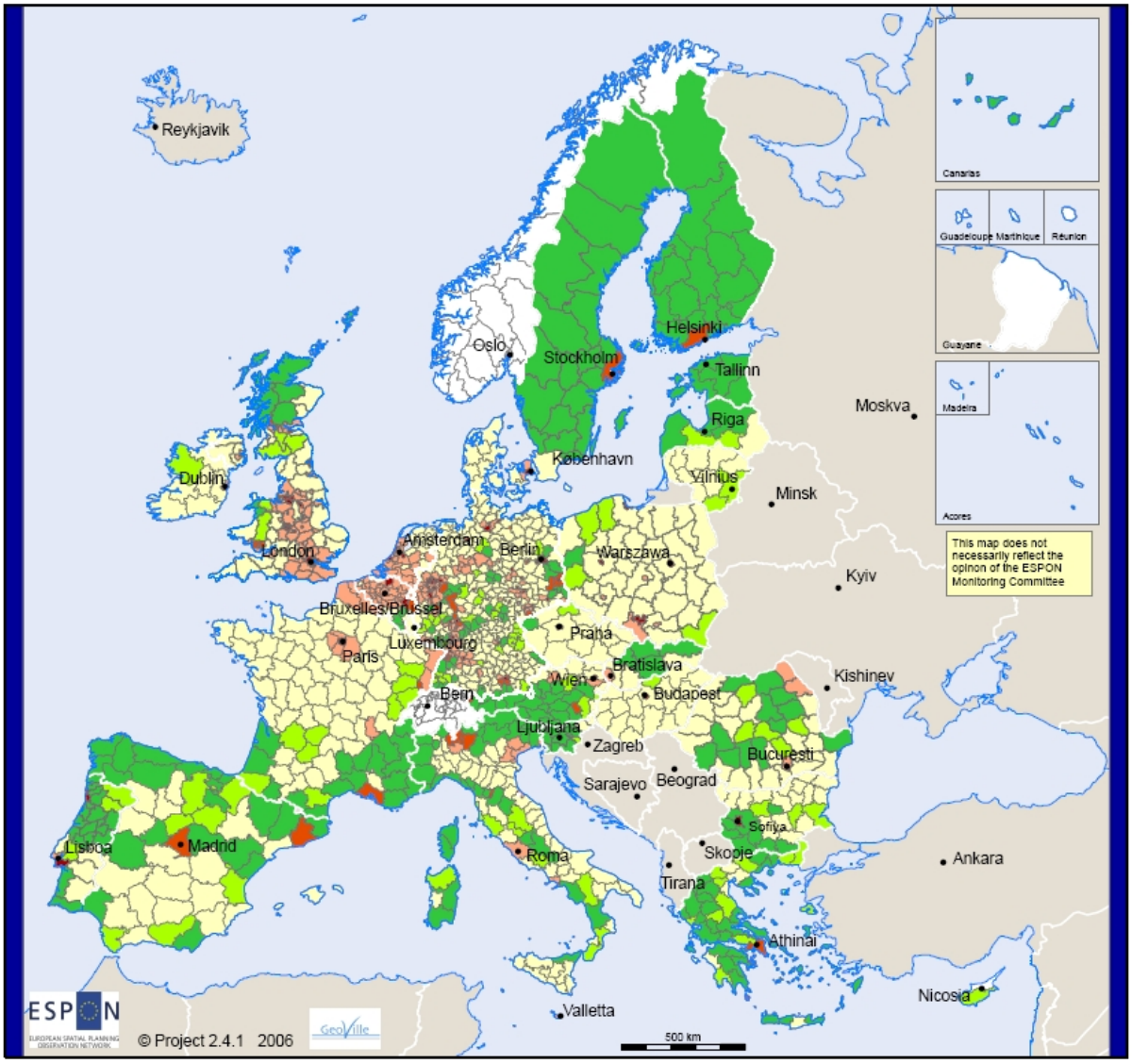
Indicator interpretation

In their spatial distribution the six land cover composition classes agglomerate in three major groups: Class 5, regions mainly shaped by agriculture, dominates most countries. The second largest group is made up by class 4 and 6 (the "green" classes), which tend to cluster in neighbouring regions. They are mainly found in Northern and Southern Europe as well as regions with rugged terrain (Alps, Carpathians, etc.), where the agricultural intensity, but also the share of urban areas is low. Regions with 10% or more artificial areas also tend to build spatial clusters. The predominant type among those is class 1, i.e. the co-dominance of artificial and agricultural surfaces. This type covers large parts of Belgium, The Netherlands, Southern and central UK and is also frequently found – more dispersed – in Germany. The remaining regions with artificial areas of 10% and more are mostly single large urban agglomerations (the capitals of many countries), such as Stockholm, Helsinki, Madrid, Rome, or Athens.

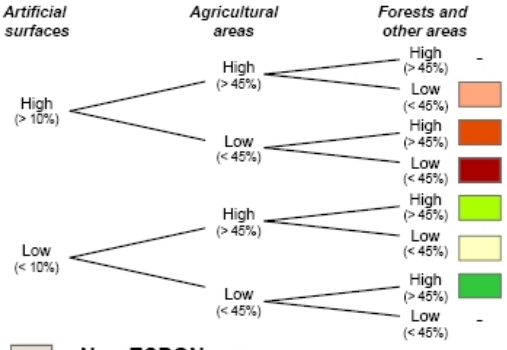
Conclusions

Even though the EU area in general is highly urbanised, the number of NUTS3 regions with a share of artificial areas of 10% and more appears moderate. This highly urbanised type dominates Belgium and The Netherlands, covers a large contiguous area in Southern and central UK and several larger regions in Germany. In all other countries it is restricted to major single urban agglomerations, often only the capital cities. Altogether, the map conveys the image of an EU territory that is predominantly shaped by Agriculture, forests and semi-natural areas, with a few large and several smaller regions of urban agglomerations.

Usage of land 2000



Land use composition of NUTS-3 units



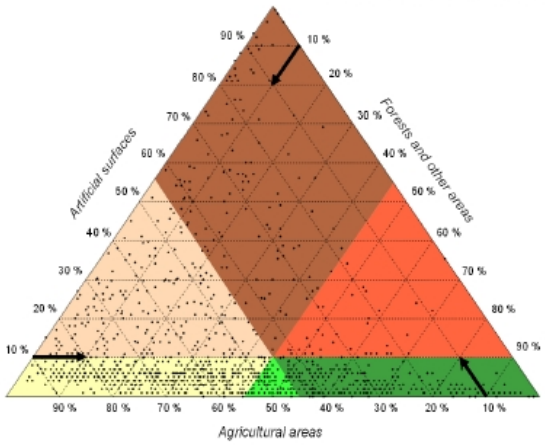
Non ESPON space

No data

CORINE 2000 data do not exist for Norway, Switzerland and the remote areas of France and Portugal.

Origin of data: CORINE 2000: European Environment Agency
Regional level: NUTS 3

Source: ESPON Data Base



Map 14 Usage of land 2000

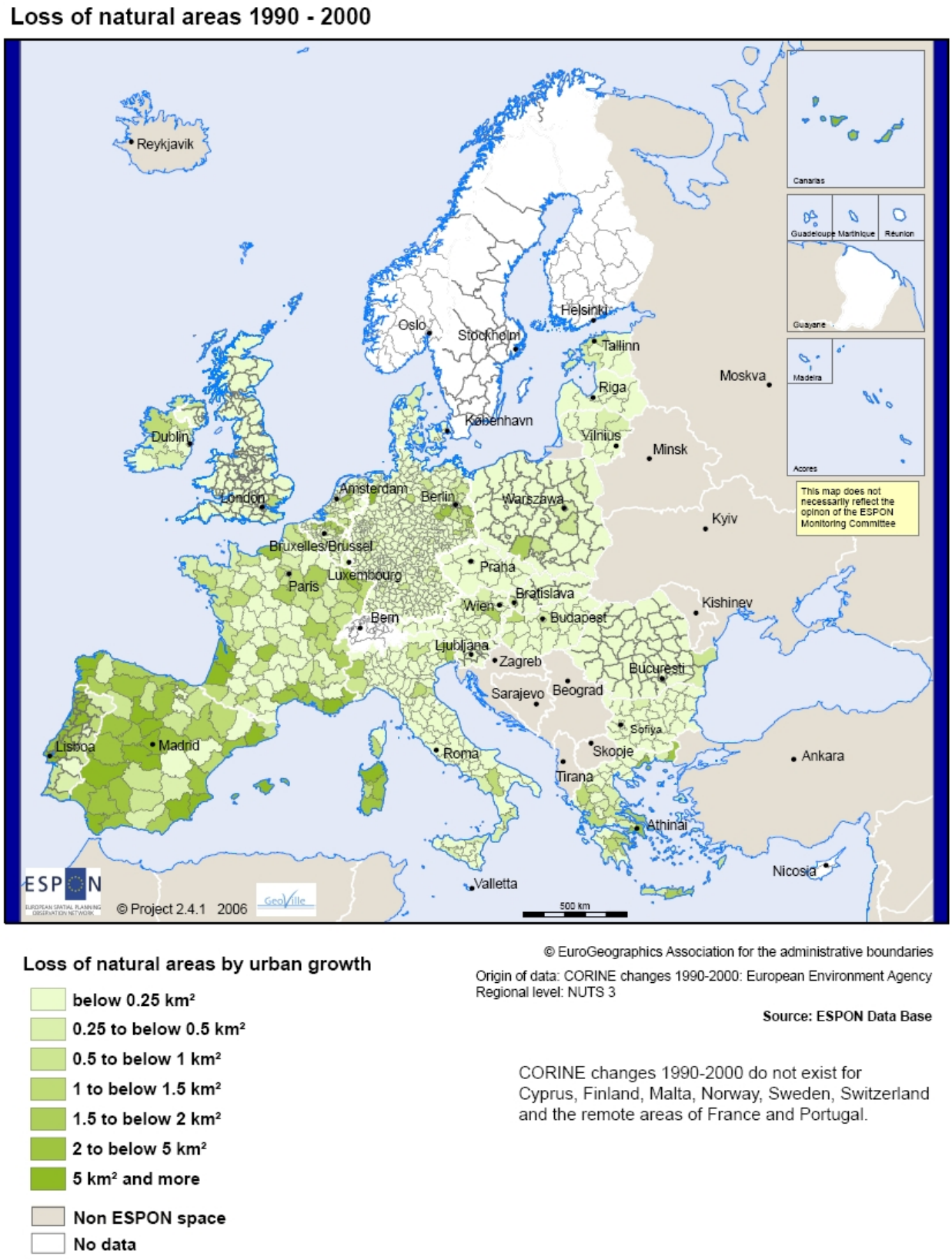
3.10 Loss of natural areas 1990 – 2000

Indicator interpretation

As already reflected in map 13, significant amounts of "natural" areas (> 1 to 1.5 km²) are lost to urban growth especially in Portugal, Spain, France, Sardinia, and Greece – though these are countries/regions with relatively large NUTS3 units. Belgium, The Netherlands and Germany (especially Eastern Germany) also have lost substantial amounts of "natural areas", especially when considering the small size of NUTS3 regions there. More isolated NUTS3 regions with higher losses are found in mainland Italy, Austria, and Poland. The other Eastern EU states, Romania, Bulgaria and also the UK and Denmark, on the other hand, have experienced predominantly small losses of "natural" areas (< 0.25km²).

Conclusions

The absolute loss of "natural areas" due to urban growth ranges from 0.25 km² and less in the prevailing parts of the Eastern EU states, Bulgaria, Romania, and the UK to more than 5 km² in parts of Spain, Portugal, France, the Benelux States, Germany and Sardinia. Nevertheless, expressed in total figures (km²), the "natural" area lost to urban growth may appear not much. However, when summarized over whole countries, substantial losses result in some cases, e.g. 258.9 km² in Spain, 145,7 km² in Portugal, 102.8 km² in France, 43,9 km² in Germany, 20,8 km² in Belgium, 11.9 km² in the Netherlands and 11.0 km² in Sardinia. In addition, as can be seen on map 12, "natural" areas constitute in most countries (except for parts of the Southern European countries) only a small minority of the total area taken up for urban growth.



Map 15 Loss of natural areas 1990 – 2000

3.11 Percentage of natural and semi-natural areas lost due to urban and transport development (1990-2000)

Indicator interpretation

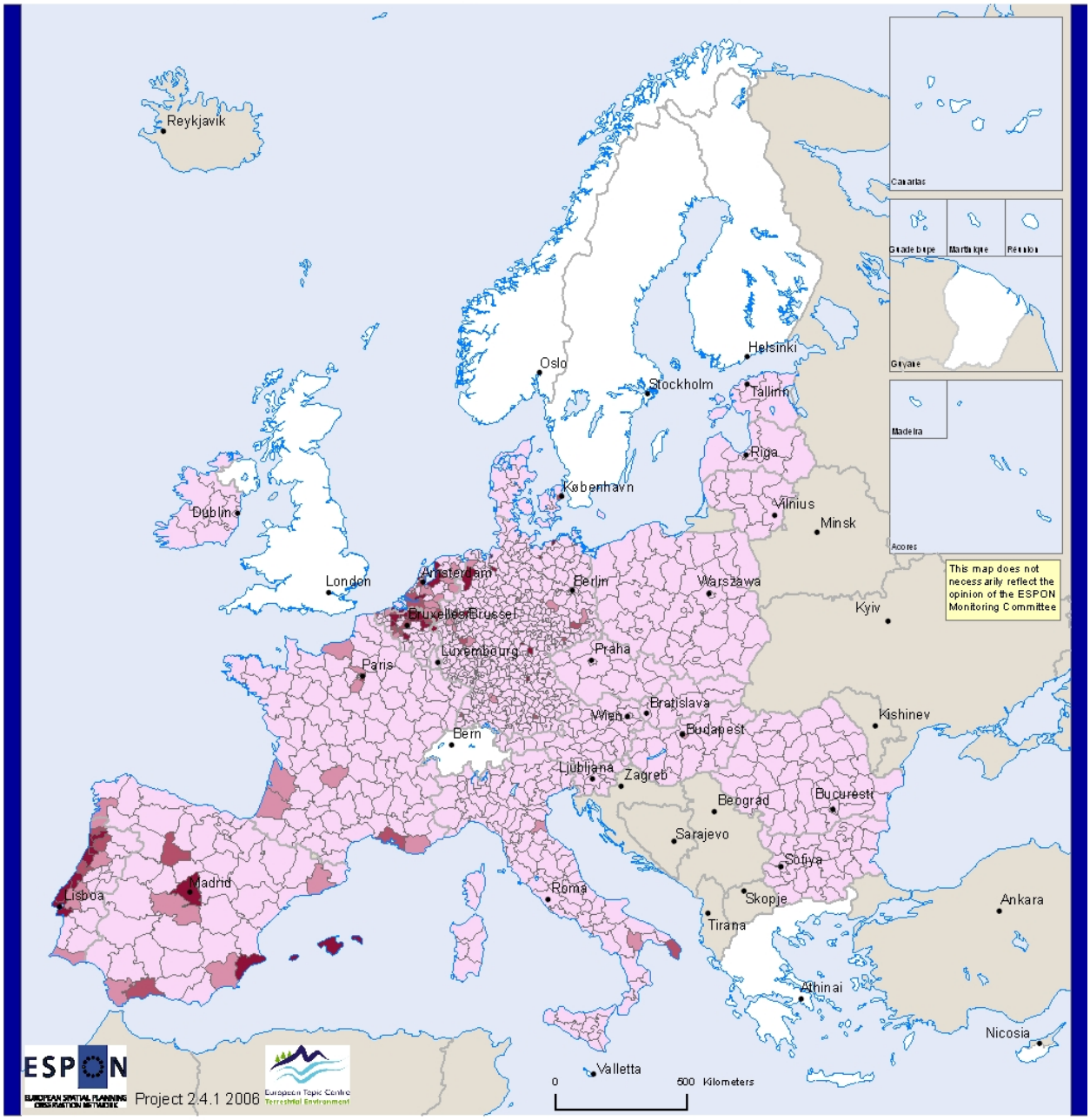
"The overall threat and changes in biodiversity at all scales (genes, species, ecosystems and habitats) are expected to remain high in the EU to 2010 and beyond. The pressure comes from many interconnected sources, principally land use change, pollution and the introduction of alien species. The area available for natural and semi-natural habitats and indigenous species is foreseen to decrease (e.g. the ongoing relentless spread of urban development and transport infrastructure) and the threats are foreseen to continue to increase. But ongoing and some new recoveries are also foreseen for several habitats and species. The robust and generalist species as well as the invasive species are foreseen to continue to be favoured and spread, while rare, endemic and specialist species will continue to decline." (Source: Changes and loss of biodiversity - Environment in EU at the turn of the century, EEA, 1999)

Analysing this map, it is observed that the main decrease of the natural and semi-natural areas is concentrated in the Iberian peninsula, especially in the north area of Portugal, the region of Madrid, due to the great urban growth of the periphery of the city and in the Balearic Islands, where the urban pressure of the second residences has affected the natural patrimony of the islands in an important way.
The pressure of the tourism activities on the nature reserves and semi-natural it is also noticeable in specific areas of the French and Spanish Mediterranean coast.
On the other hand, in the area of the Benelux, and due to the reduced extension of the existing nature reserves, the artificialization in % has also been important.

Conclusions

Although the reduction of the surface of the natural and semi-natural areas has been significant in some regions, the destruction of these spaces due to the construction of urban zones and infrastructures has not been in % as important as one might have expected. The reason is that most of the new constructions, infrastructures of transport or new urban areas, are produced in former agricultural areas, which are those that have suffered a greater impact of this artificialization.

Percentage of natural and semi-natural areas lost due to urban and transport development (CORINE 1990 - 2000)



Natural and semi-natural areas lost due to urbanisation

- < 0,25 %
- 0,25 - 0,5 %
- 0,5 - 1 %
- > 1 %
- No data
- Non ESPON space

Origin of the data: Corine Land Cover 1990 and 2000.

Source: European Environment Agency

The Land Cover Flows are based in the availability of Corine Land Cover 1990 and 2000 in each country:

ES, PT, FR, IT, SI, BE, NL, DE, DK, PL, CZ, SK, AT, HU, EE, LV, LT, GR, UK, IE, BG, RO.

Map 16 Percentage of natural and semi-natural areas lost due to urban and transport development (1990-2000)

3.12 Annual change of natural and semi-natural areas together with change in GDP

Indicator interpretation

Europe is the third most densely populated area of the world's major regions and arguably its land is the most intensely used. In recent decades the rise of the service economy and the need for food security, together with vastly improved standards of living, changes in societal norms and values, increased personal mobility and increasing demands for housing, have led to widespread conflicts over the use of land. Major ongoing pressures include urban sprawl and the expansion of transport infrastructure to accommodate rising levels of traffic. These have resulted in the sealing of soil surfaces, the fragmentation of habitats and the loss or disturbance of natural areas.

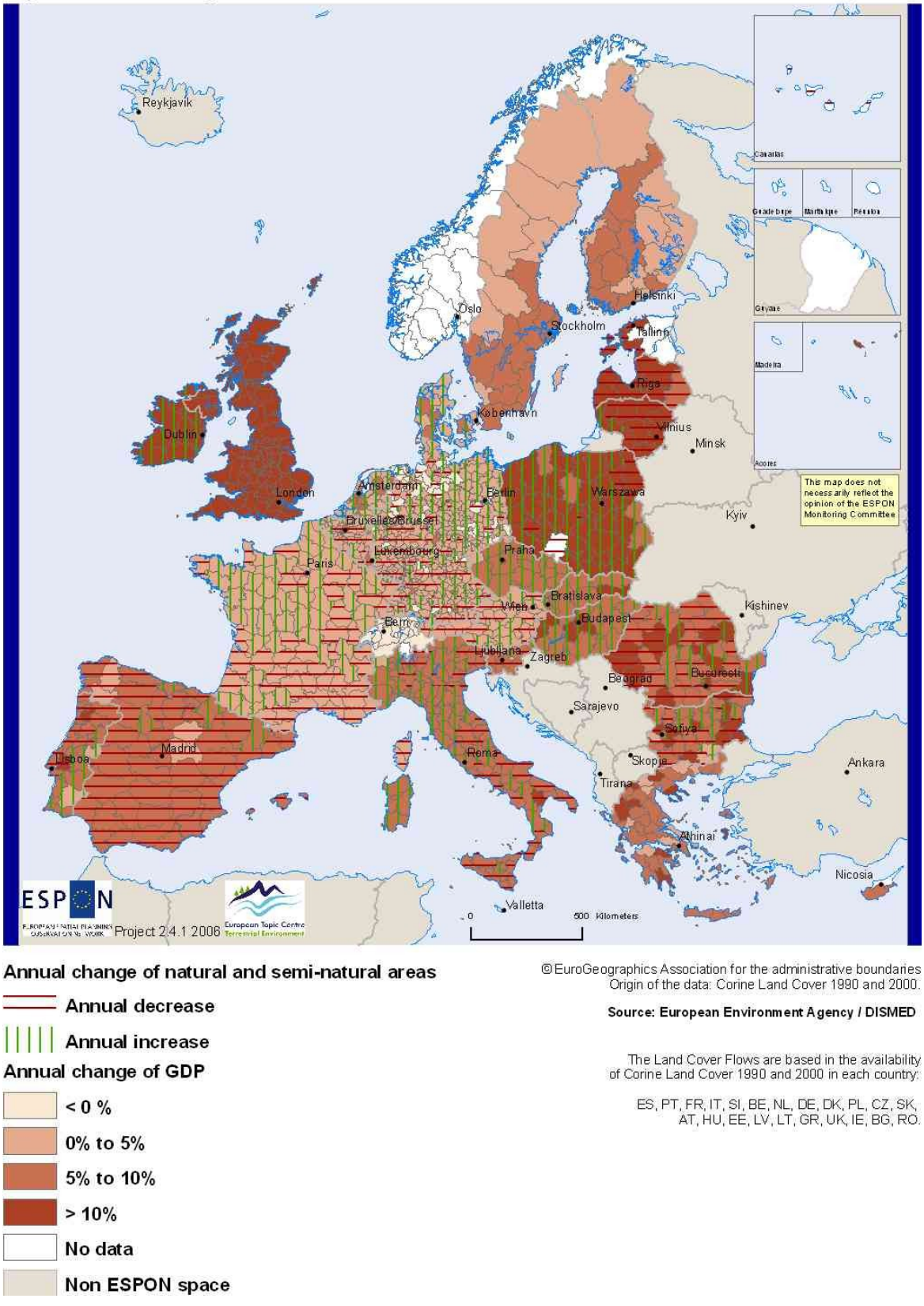
This indicator wants to show the effects of GDP evolution in the natural and semi-natural areas in the EU regions. The objective is try to establish links between the economic development of each region and the quantity of natural and semi-natural area existing

The surface of natural and semi-natural areas decreases especially in the Mediterranean countries. Spain, south of Italy and France is where the natural areas have decreased more its total surface. On the other hand, in the central and part of the eastern EU regions, the annual average change of natural and semi-natural areas has increase more significantly due to, in part, agriculture land abandonment.

Analyzing the evolution of GDP at regional level (NUTS3) in the EU states the first idea to be taken into account is the irregular spatial distribution. The new Member States as well as the main receivers of he European cohesion funds (Spain, Portugal, Greece and Ireland), the countries that more have increased are their GDP (all more than one 5%).
Although in the case of Spain it could be interpreted that the economic growth has entailed one wasted of natural areas, in other countries as Ireland the phenomenon is inverse.

Conclusions

Taking into account the data available is difficult to establish direct links between the GDP growth and the loss of natural and semi-natural areas. Moreover when the major land consumption by artificialization is done mainly on the agriculture areas. For this reason we cannot establish direct links between the GDP increase or decrease and the creation or destruction of natural and semi-natural areas.



Map 17 Annual change of natural and semi-natural areas together with change in GDP

3.13 Percentage of new forest on areas of medium to high risk of desertification

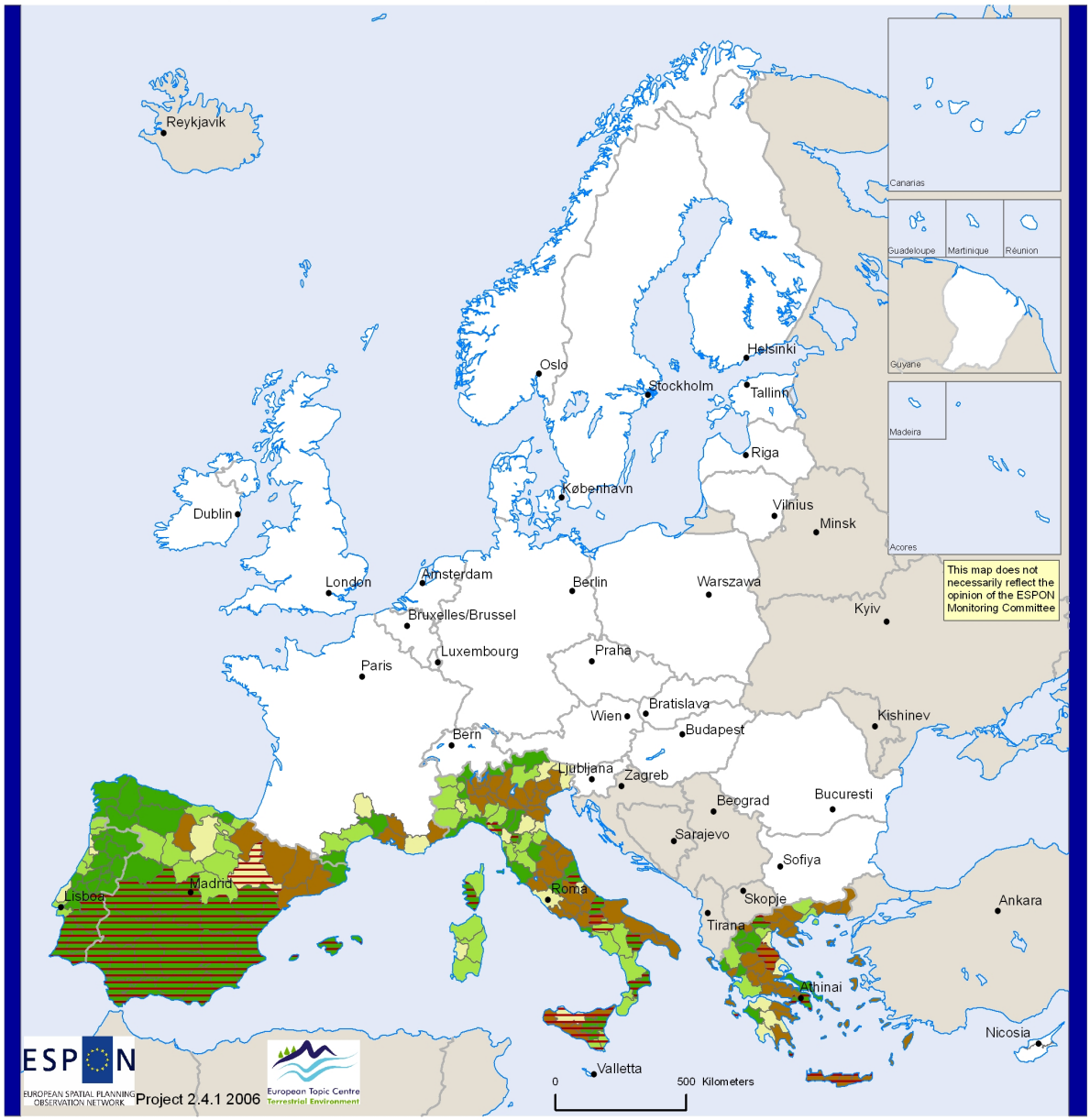
Indicator interpretation

EU does not have a comprehensive common forestry policy since it relays on the principle of subsidiarity. However, there is an increasingly complex array of EU legislation and policy initiatives. Many of these policies are oriented to promote soil protection against erosion and, in the most extreme cases desertification, as it is recognised as one of the main threats to soil in the Thematic Strategy for Soil Protection. Consequently it is difficult to have European wide georeferenced statistics on afforestation. However, earth observation can provide a hint on the degree and where it is happening. The map shows that in 10 years period (19990-2000) most of the new forests in Spain and Portugal have been growing in areas of mid to high risk of desertification, whereas on the eastern Mediterranean countries afforestation shows other patterns, not always related to the risk of desertification. These regional differences are also related to absolute values of afforestation, Spain and Portugal are the countries where the process has been more intensive.

Conclusions

Afforestation can have different purposes, one of them soil protection against erosion. Because lack of harmonised European databases, earth observation is a useful tool that allows detecting where the process has been more intensive in the 90's. Most of the new forest areas in Spain and Portugal have been allocated in areas with mid to high risk of desertification, whereas in the eastern Mediterranean countries the afforestation process has been less extensive and not always linked to desertification prone areas.

Percentage of new forest on areas of medium to high risk of desertification (CORINE 1990 - 2000)



Percent of new forest on desertification prone areas

- < 25%
- 25% - 50%
- 50% - 75%
- 75% - 100%
- Areas of higher risk of desertification
- No data
- Non ESPON space

Origin of the data: Corine Land Cover 1990 and 2000.

Source: European Environment Agency / DISMED

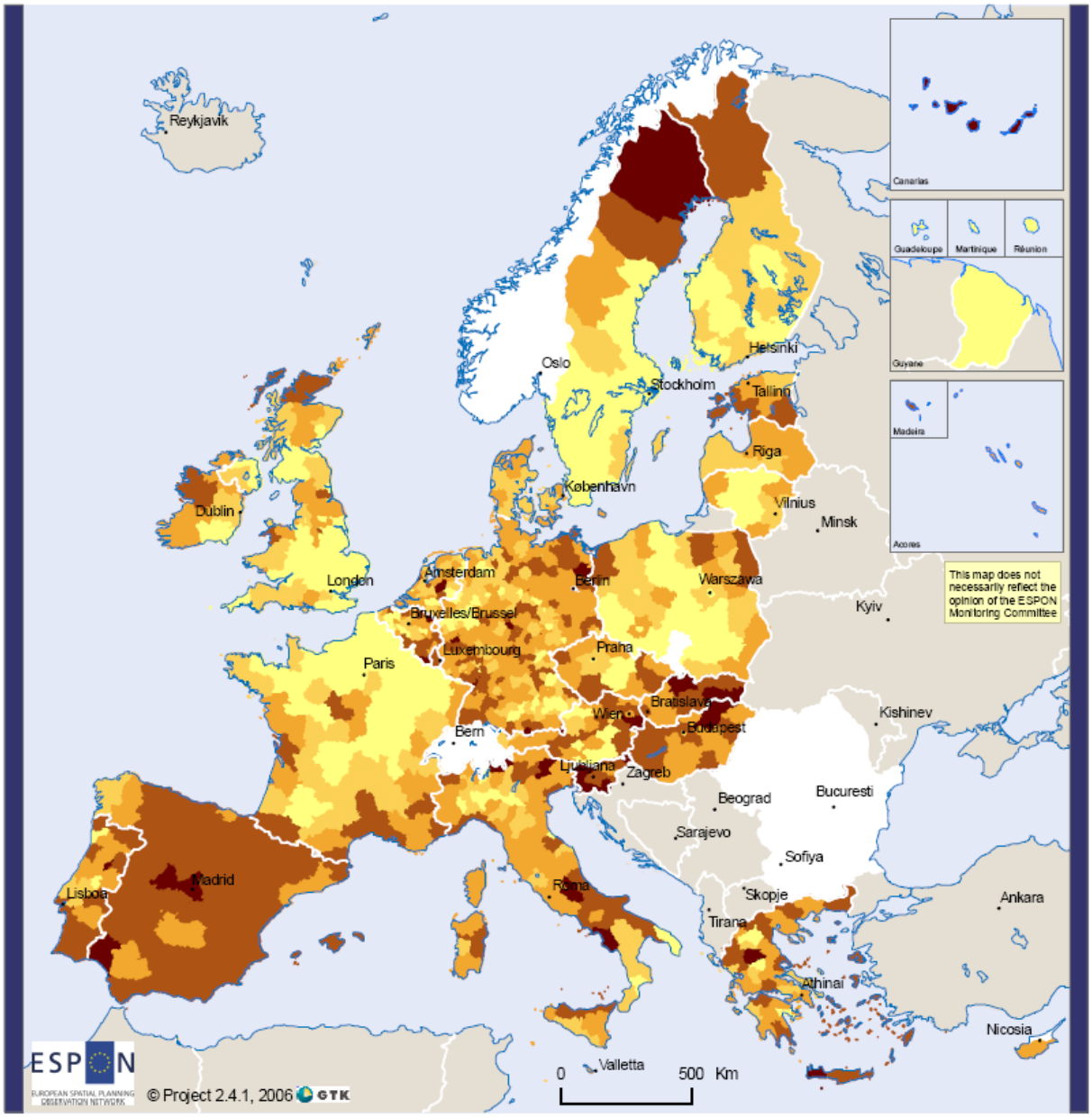
The Land Cover Flows are based in the availability of Corine Land Cover 1990 and 2000 in each country:

ES, PT, FR, IT, SI, BE, NL, DE, DK, PL, CZ, SK, AT, HU, EE, LV, LT, GR, UK, IE, BG, RO.

Map 18 Percentage of new forest on areas of medium to high risk of desertification

3.14 Natura 2000 network area

Map 19 shows, how the reported Natura 2000 network areas are distributed in Europe. While some countries such as Spain, Slovakia, Slovenia and Hungary but as well Luxembourg and Estonia have a high percentage of Natura 2000 network area (>10%), other countries (France, Poland, Sweden, Finland and UK) have mainly in peripheral areas a high protection level. Large parts of the Canaries and Madeira belong to the Natura 2000 network, but the percentage of protected areas in the French overseas areas and the Acores is low. All over Europe mountain areas and lower mountain ranges can be identified because of a higher percentage of protected area. In many countries with an overall low percentage of Natura 2000 network area the boarder regions have a higher protection level than the central parts of the countries. The percentage of Natura 2000 network area is roughly reciprocal to the level of fragmentation (see respective map in Annex 2). The Alps, large parts of Spain and the northern parts of UK, Sweden and Finland have a low level of fragmentation but a high level of protection (the interpretation of the Alps area is limited, because of the lack of Natura 2000 data for Switzerland). On the other hand, the coastal area along the North Sea and the English Channel, central Poland and parts of southern Germany have a high level of fragmentation, but a low percentage of Natura 2000 network area.



Map 19 Percentage of Natura 2000 Network areas inside NUTS3 (99) region

3.15 The proportion of fragmentation of the natural and semi-natural areas in Europe vs. the extent of the Natura 2000 Network areas per NUTS3 (99) region

Indicator interpretation

Landscape indicators, such as fragmentation, are gaining more and more political and scientific attention, as they help to understand the complexity of the European landscape. The indicator of fragmentation of the natural areas can be used to depict the environmental 'sensitive' areas. For example, the survival of threatened species requires populations, which are large enough to maintain genetic diversity. If the habitats of these species are reduced or fragmented by human activities, it may lead to the isolation of individuals and groups from main population (Steenmans & Pinborg 2000).

According to global forest fragmentation research (Wade et al. 2003) Europe had the most human-caused fragmentation and South America the least, relative to the other continents. This definition covers all the European forest types, except for boreal forests. However, in the boreal forests in northern Europe, forest cover is high and not declining, but intensive forestry has turned natural forests into managed production areas with even-aged stands of single tree species. Therefore such forests will also lose ecologically specialized species of animals and plants (Hanski 2005).

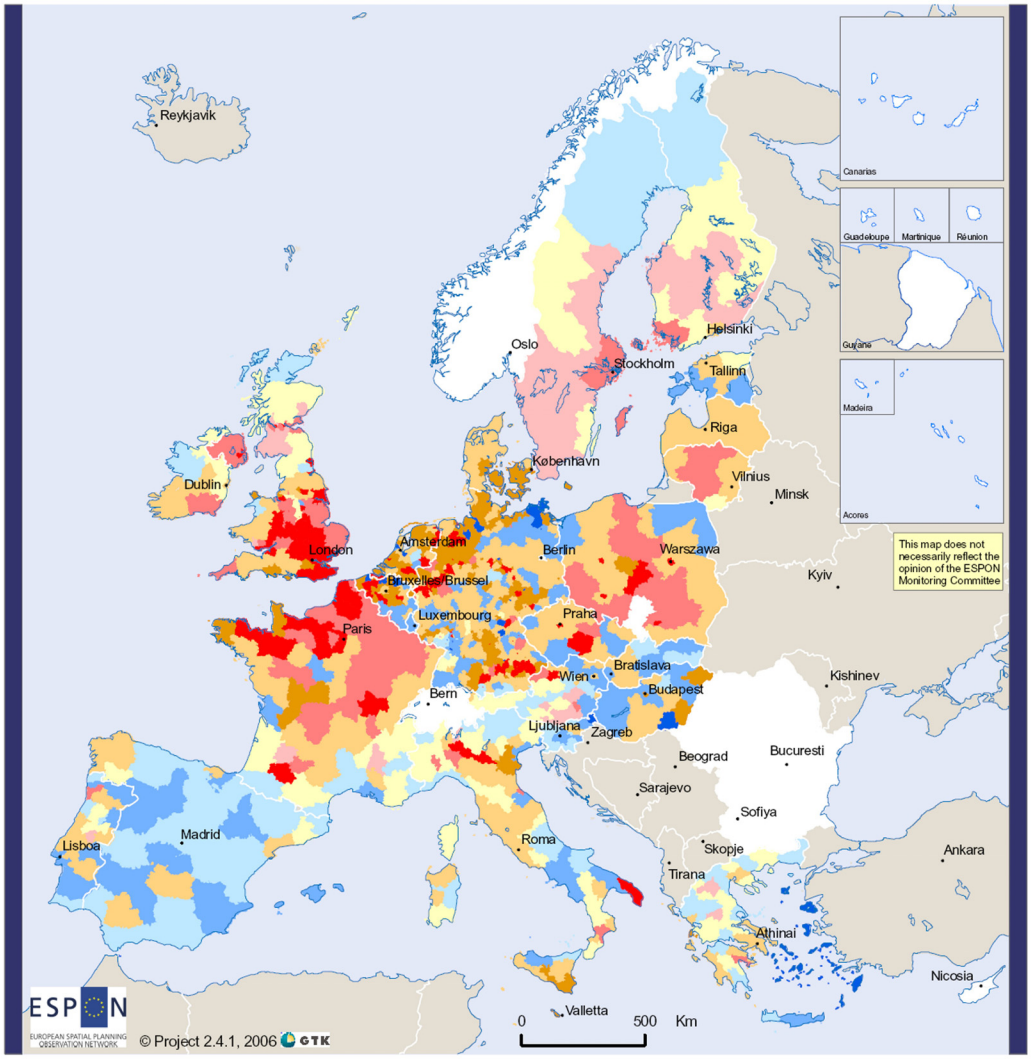
It is helpful to evaluate fragmentation by taking into account the amount of forests. However, for a given amount of forest, there can be more or less human-caused fragmentation depending on the biogeographical regions and natural types. Mapping relative human-caused fragmentation may be more useful for policy makers than maps just showing the natural areas. Regions with a high proportion of forest are not necessarily less fragmented. In Europe, for example, where temperate forests have largely been removed, the natural fragmentation maps can identified small patches with less or even no fragmentation.

The indicator of fragmentation is based on CLC 1990 data and it shows the proportion of fragmented natural areas to all natural areas in NUTS3 regions. The biogeographical regions like alpine and boreal regions can be easily distinguish by lower fragmentation rate. The most fragmented areas are found along coastal areas of North Sea (northern France, Belgium, Netherlands and northern Germany), in southern England and South and East Romania. These are the European regions with remarkably small sized natural areas remaining.

Infra Eco network Europe (IENE), established in 1996, is a European network of authorities and experts involved in the phenomena of habitat fragmentation caused by the construction and use of linear transport infrastructure, especially motorways, railways and canals (waterways). The organisation has 23 European countries as members and its aim is to stimulate the mutual co-operation and promotion of the exchange of knowledge between the sectors of environment and transport infrastructure, both, on a national as on an international level.

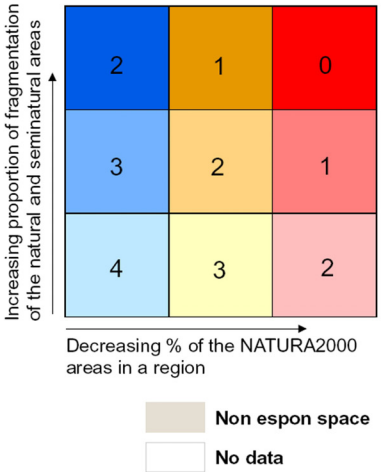
The indicator on the degree of fragmentation of natural and semi-natural areas in Europe vs. the extent of the Natura 2000 Network areas per NUTS3 region was produced for TIA calculations. The indicator combines the fragmentation information with the extent of Natura 2000 network. Areas with high degree of fragmentation and small extent of Natura 2000 network are found in France, Italy, Belgium, the Netherlands, the Czech Republic, Poland, Germany and the United Kingdom.

Areas with low degree of fragmentation and high extent of Natura 2000 network areas located in Spain, Portugal, Italy, Greece, France, Austria, Slovakia, Slovenia, Germany, the Netherlands, Ireland, the United Kingdom, Finland and Sweden.



The proportion of fragmentation of the natural and seminatural areas vs. the extent of the NATURA2000 Network areas per NUTS3 (99) region

Origin of the data: DG ENV NATURA2000 Network
Corine Land Cover 1990
Fragmentation data ESPON project 1.3.1
Source: ESPON Data Base



Story line: Man has always changed natural areas into agricultural, industrial and housing use. This contributes to a declining biodiversity and hence affects the territorial quality. The biodiversity and hence affects the territorial quality. The biodiversity strategy should slow down this process, preserving biodiversity and territorial quality as well.

PIM value: +4

The Corine Land Cover data 1990 is not available from Cyprus, Norway and the remote areas of France, Portugal an Spain.

The Natura2000 Network data does not exist from Norway, Switzerland, Romania and Bulgaria. The processed NATURA 2000 data set on NUTS3 (99) does not cover three regions in Poland (PL0C1, PL0C2 and PL0C3) and two regions in Germany (DE301 and DE302).

Map 20 The degree of fragmentation of natural and semi-natural areas in Europe vs. the extent of the Natura 2000 Network areas per NUTS3 (99) region

3.16 The proportion of people working in mining and quarrying industry vs. the extent of Natura 2000 network areas per NUTS3 (99) region

This indicator points on a possibly negative influence of large areas reserved for the Natura 2000 network on the activity rate of a region and, hence, on the territorial cohesion. Mining and quarrying industry provides employment and economic growth in regions which have difficulties attracting other forms of investment. In other words the mining industry offers economic activity in many peripheral areas (European Commission, 2006c). Similar applies to the forest industry as well. However, data about employment in forestry are less accessible, since in most cases they are collected together with agricultural data.

The non-energy extractive industry in Europe (i.e. excluding minerals used for fuel) is usually divided into three sub-sectors: metallic minerals, industrial minerals and construction minerals. The direct employment in these sectors in EU is estimated to be 230 000 people (European Commission, 2006c).

The construction minerals sub-sector is by far the largest both in terms of tonnage and sale revenue. The widespread distribution of sand and gravel, and hard rock resources, and the relatively low price of product, means that transport costs significantly influence the distance to markets. In the construction mining industry 2003 the direct employment were estimated to be 169 000 in EU25 (European Commission, 2006c).

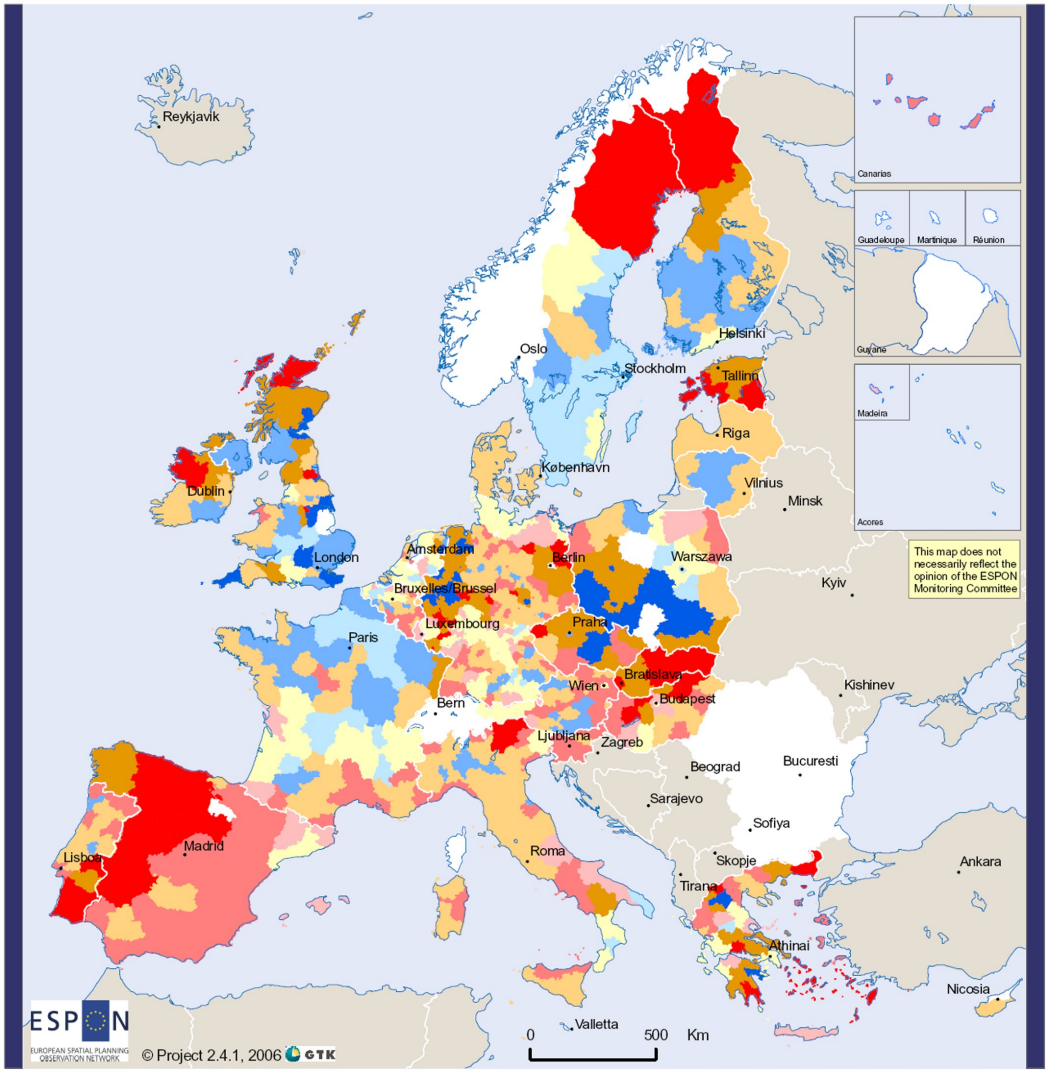
The industrial minerals sub-sector provides a wide range of non-metal minerals. The sub-sector is mainly composed of small and medium-sized enterprises. However, it also includes the world's leading international production companies of some industrial minerals (e.g. in talc). In the industrial mineral industry 2003 the direct employment were estimated to be 40 000 in EU25 (European Commission, 2006c).

EU metal mining accounts for only 3% of world production. The metal mining sub-sector is located in many of the EU15 countries, and particular in some of the more Northern and Southern countries, such as Sweden, Finland, Greece, Spain and Portugal (European Commission, 2004d).

The Directorate-General for Enterprise and Industry together with the working group has produced twenty Sustainable Development Indicators (SDI) to describe non-energy extractive industry in EU. One of the member state level indicators describes sensitivity by number of Natura 2000 sites in which a company operates extraction activities (or which are adjacent to extraction sites). Unfortunately, the data is based on voluntary initiative and the participation of companies is far from complete. E.g. it is estimated

that the construction mineral companies that provided data for the survey represent only 15% of the total EU25 workforce in this sub-sector. This initiative was launched in 2000 and because of the early stage it is hoped that with time, many more companies will participate in the exercise.

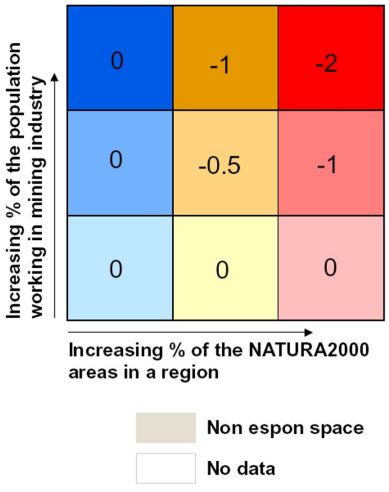
Based on the results shown on map 21 the extensive Natura 2000 network might cause negative impact on employment in mining and quarrying sector in western Spain, Slovakia, Hungary, parts of Italy and Greece and to lower extent in parts of Germany, the Czech republic, Poland, Estonia, Finland and Sweden.



The proportion of the population working in mining and quarrying industry 2002 vs. the extent of the NATURA2000 Network areas per NUTS3 (99) region

Origin of the data: DG ENV NATURA2000 Network
Employment by economic activity ESPON project 3.1

Source: ESPON Data Base



Story line: The territorial quality and efficiency gets benefit from the gradual increase in total activity rate, but reserving the land for protected areas may have negative impact on the activity rate.

PIM value: -2

The data of employment is formulated from NUTS2 (99) level statistics. The statistical data of employment from the years 2001 and 2002 is not available from the remote areas of France, Corsica, Malta and seven single regions in Germany, Spain, Netherlands, Poland and United Kingdom (DE6, ES23, NL23, NL31, PL021, PL022 and UKF3).

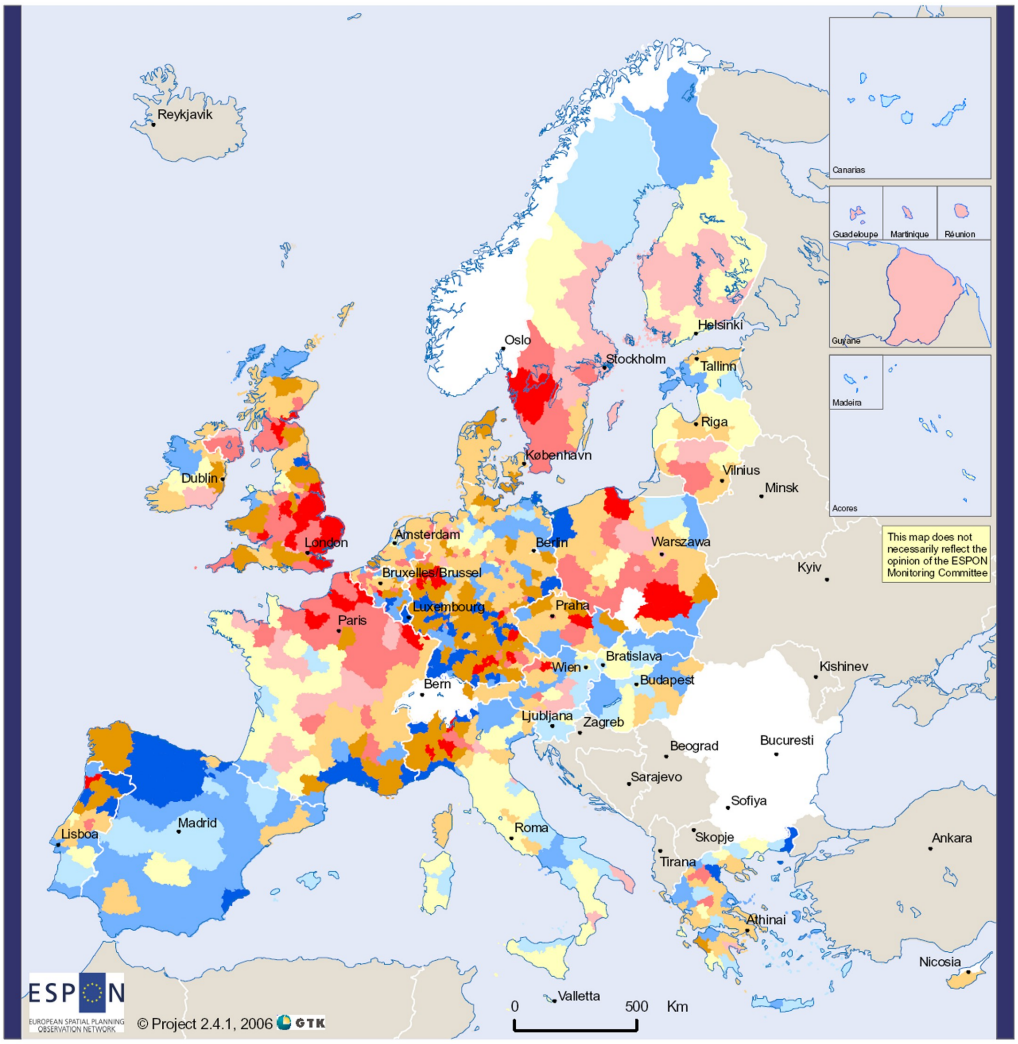
The Natura2000 Network data does not exist from Norway, Switzerland, Romania and Bulgaria. The processed NATURA 2000 data set on NUTS3 (99) does not cover three regions in Poland (PL0C1, PL0C2 and PL0C3) and two regions in Germany (DE301 and DE302).

Map 21 The degree of population working in mining and quarrying industry vs. the extent of the Natura 2000 network areas per NUTS3 (99) region

3.17 The existence of the natural hazards vs. the extent of Natura 2000 network areas per NUTS3 (99) region

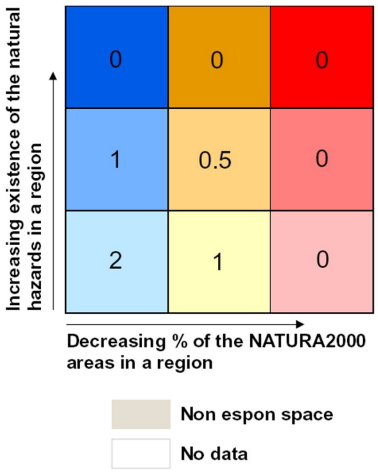
This indicator intersects the results of the ESPON project 1.3.1 and the Natura 2000 network area as shown in chapter 3.15.

The designation of areas for the Natura 2000 network might enhance the resilience of a region towards natural hazards. For example Natura 2000 network areas might serve as buffer zones in case of floods, storm surges or landslides. On the other hand, in case of forest fire hazard Natura 2000 network areas area going to be forest fire prone areas rather than buffer zones to protect human settlements. Therefore, areas e.g. in northern Spain and Portugal do not benefit as much as the following map may indicate. Flood and land slide hazard prone areas in central Europe may get benefit from the intensive Natura 2000 network.



The existence of the natural hazards vs. the extent of the NATURA2000 Network areas per NUTS3 (99) region

Origin of the data: DG ENV NATURA2000 Network
Natural hazard data ESPON project 1.3.1
Source: ESPON Data Base



Story line: The territorial quality and efficiency can suffer from increasing number of extreme local climate events. Large protection areas can reduce the negative effects of extreme natural (climate) events.

PIM value: +2

The aggregation of the hazard data is based on seven hazard indicators describing floods, storms, storm surges, extreme temperatures, forest fires, land slides and droughts. These values are weighted based on expert opinions (Delphi method questionary).

The Natura2000 Network data does not exist from Norway, Switzerland, Romania and Bulgaria.The processed NATURA 2000 data set on NUTS3 (99) does not cover three regions in Poland (PL0C1, PL0C2 and PL0C3) and two regions in Germany (DE301 and DE302).

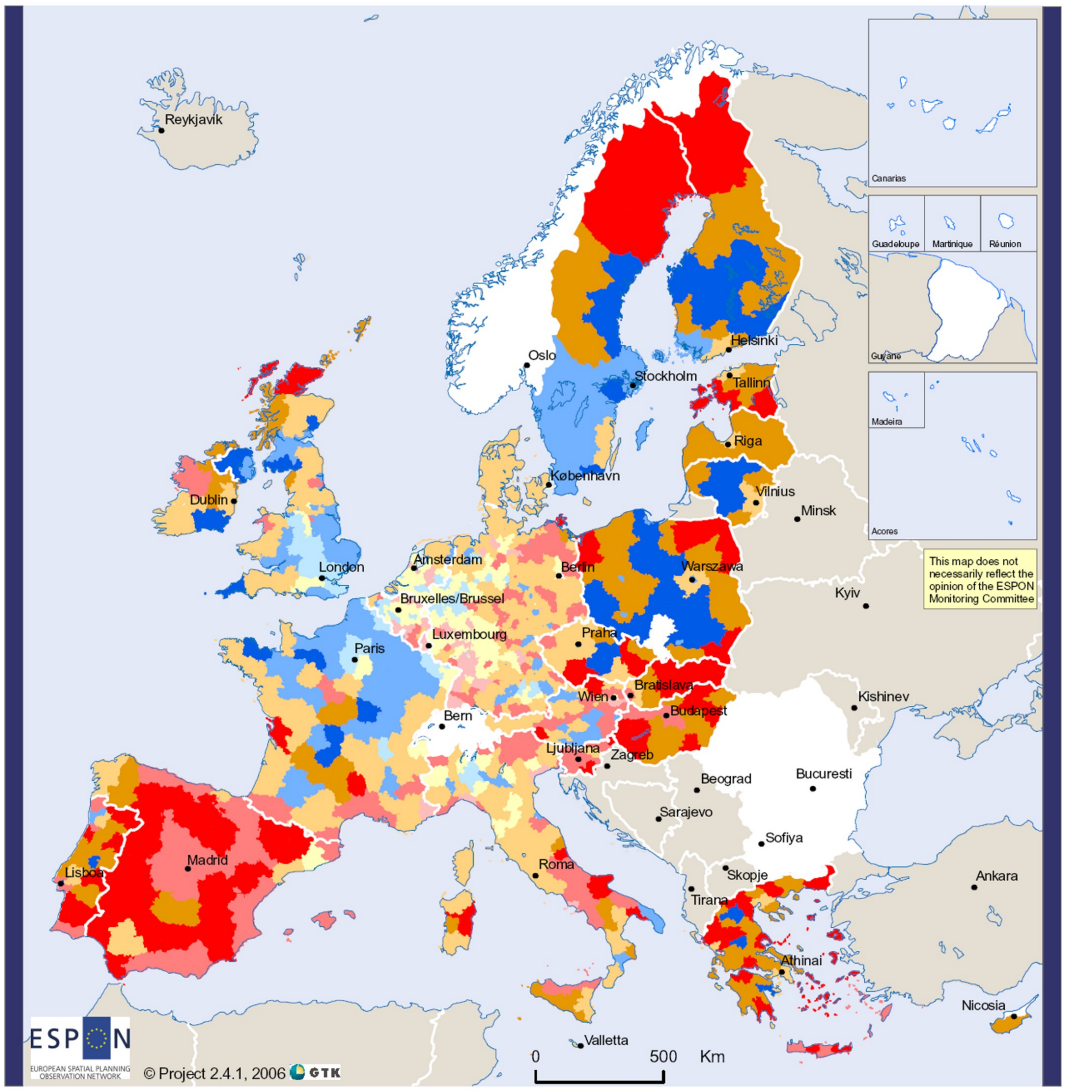
Map 22 The existence of the natural hazards vs. the extent of the Natura 2000 network areas per NUTS3 (99) region.

3.18 The potential multimodal accessibility vs. the extent of Natura 2000 network areas per NUTS3 (99) region

This indicator intersects accessibility data presented by ESPON project 1.2.1 and the Natura 2000 network areas as shown in chapter 3.1.5.

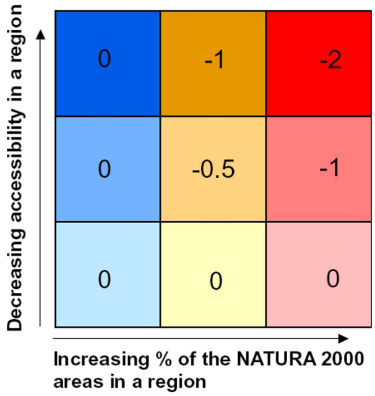
While good accessibility may enhance the territorial efficiency and quality of a region, large areas designated for the Natura 2000 network can limit future possibilities for increasing accessibility. Especially areas with low accessibility and high percentage of Natura 2000 network area may face problems, whereas areas with good accessibility and high percentage of Natura 2000 network area obviously found solutions that comply with the goals of nature protection and territorial cohesion at the same time.

Remarkable is Spain and Slovakia with an all over high percentage of Natura 2000 network area, but a limited potential multimodal accessibility. Similar regions occur also in Hungary, Austria, Estonia, Poland, Slovenia, the Czeck Republic, Portugal, Italy, Greece and the northern parts of Finland, Sweden and the United Kingdom.



The potential multimodal accessibility vs. the extent of the NATURA2000 areas per NUTS3 (99) region

Origin of the data: DG ENV NATURA2000 Network
Accessibility data ESPON project 1.2.1
Source: ESPON Data Base



Story line: The territorial quality and efficiency may benefit from the constant growth of infrastructure, but the new protected areas can limit the development of infrastructure such as building of new transport networks.

PIM value: -2

The accessibility data does not exist from the remote areas of France, Portugal and Spain. The Natura2000 data does not exist from Norway, Switzerland, Romania and Bulgaria. The processed NATURA2000 data set on NUTS3 (99) does not cover three regions in Poland (PL0C1, PL0C2 and PL0C3) and two regions in Germany (DE301 and DE302).

Map 23 The potential multimodal accessibility vs. the extent of Natura 2000 network area per NUTS3 (99) region

3.19 The change of land use to agriculture inside the Natura 2000 network areas

Agriculture in Europe is not only expanding, it is also intensifying[1]. High-input farming practices – such as deep drainage, large-scale irrigation, heavy pesticide use and multiple cropping – are leading to the degradation of agricultural and semi-natural habitats, causing declines in biodiversity across huge areas.

The EU's common agricultural policy (CAP) and associated national agricultural policies initially aimed to increase productivity and provide more food at a lower cost for EU countries, while also achieving a fair standard of living for farmers. However, the negative consequences of the intensification of farming were recognised by the 1980s, and in 1985 the CAP experienced changes, with the introduction of agro-environmental support to farmers. In 1998, the Agenda 2000 reform introduced elements of environmental cross-compliance and the opportunity for farmers to obtain support (under the rural development regulation) for activities other than farming itself. The 'mid-term' review in 2003 placed environmental concerns at the heart of the CAP. Consequently, from 2005 farmers will receive a single farm payment based on their historic level of CAP support, provided they undertake to comply with a suite of EU directives (including the birds and habitats directives) and keep their land in 'good agricultural and environmental condition'. Although a wide suite of measures can be funded under the rural development heading, it is anticipated that this change in the CAP will release funds to encourage more farmers to join agri-environment schemes (Kristensen, 2003).

Since the end of the Second World War, the development of agriculture in the EU has been driven by the pursuit of ever-higher levels of productivity and efficiency. This has led to the adoption of new farming methods, which have changed the face of the countryside to an unprecedented degree.

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[1] Intensive agriculture/farming: Farming characterised by high input use that strives for maximum production, often at the expense of environmental considerations. (EEA Glossary)

Sustainable agriculture: The desired relationship between agriculture and environment can be captured by the term 'sustainable agriculture'. The 5th environmental action programme refers to sustainable development as 'development, which meets the needs of the present without compromising the ability of future generations to meet their own needs'. Sustainable agriculture entails the management of natural resources in a way, which ensures that the benefits are also available in the future. A broader understanding of sustainability extends to the protection of landscapes, habitats, and biodiversity, and to overall objectives such as the quality of drinking water and air. (EEA Glossary)

Nowadays, farmland, including arable land and permanent grassland, is one of the dominant land uses in Europe, covering more than 45 % (180 million ha) of the EU-25. Agricultural land-use in the more productive lowland areas of the EU-15 has intensified considerably during recent decades; the mechanisation of agriculture has facilitated the elimination of many landscape features such as hedgerows, the drainage of wetlands and the ploughing of semi-natural grasslands. Species richness and habitat diversity have declined due to increased pesticide and fertiliser use and the simplification of crop rotations.

Improvements in agricultural productivity often result in pressure on natural resources. For example, the increase in the area of irrigated farmland in southern Europe during 1990–2000 has put additional pressure on water resources.

Farm abandonment is a medium-term consequence of the marginalisation of agriculture due to low agricultural profitability, often linked to physical or climatic handicaps and wider socio-economic trends. Although the available data can hide significant intra-regional differences, it appears that marginalisation is occurring in Ireland, the south of Portugal, Northern Ireland, large parts of Italy, and in parts of Spain and France. A loss of biodiversity and heritage landscapes is almost always associated with farm abandonment. In between the intensively-managed agricultural land and the abandoned farmland are areas which generally contain more of a patchwork of seminatural and natural habitats and varied farmland. These areas are subject to a greater range of intensities of management, host a higher diversity of species and have a high nature value (HNV). Whereas traditional, low-intensity, farming methods helped to create a rich tapestry of cultivated fields, fallows, hedgerows, wood pastures, permanent pastures and orchards, which supported a wealth of wildlife, intensification has given rise to a much more uniform landscape.

Many of these important habitats have been lost or have suffered reduction, degradation or fragmentation, threatening the very wildlife that has become dependent on them. Moreover, approximately 50 % of the species occurring in Europe have been estimated as depending on agricultural habitats (Kristensen, 2003). Nevertheless, the loss of biodiversity in these habitats during the past few decades has been high. Agricultural practices and organisation are still quite diverse at the European level, ranging from large and specialised commercial holdings to part-time farming using mainly traditional practices. The most favourable conditions for farmland species diversity are considered to occur under extensive and/or traditional agricultural management. The major pressures on biodiversity on agricultural land result from changes in the type and intensity of farming

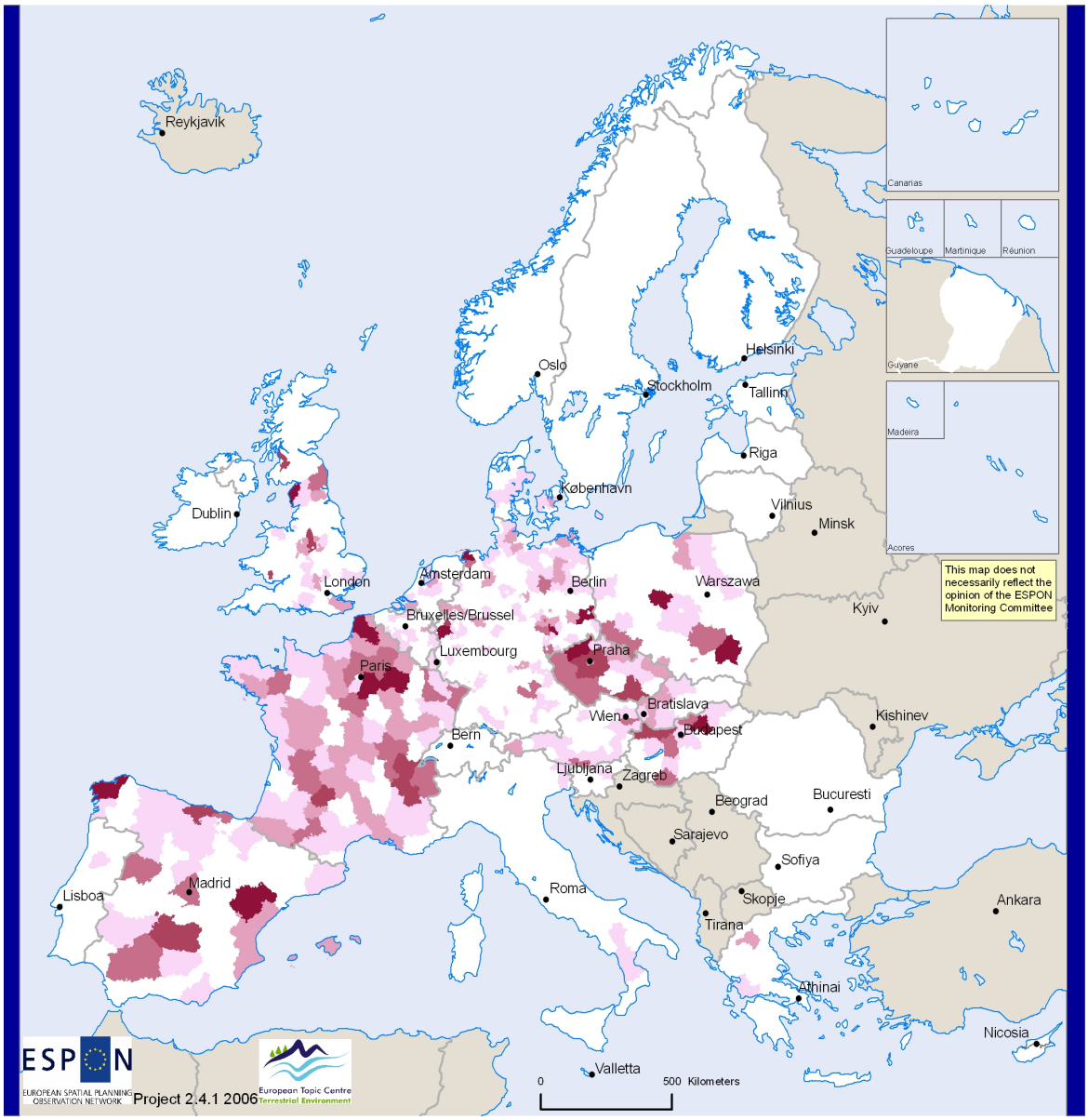
that generate changes in agricultural landscapes. Such changes can result either from intensification or abandonment, both of which can be detrimental to biodiversity.

Data

In the following, six maps are presented indicating the change of land use to agricultural land use inside the Natura 2000 Network areas. Values for this indicator are based on the Land Cover Flows from Corine Land Cover 1990 and 2000 as part of a Land Cover Statistical databases and the Natura 2000 network, showing the results of this analysis in hectares by NUTS3. The maps present the change of developed areas, forested and natural land, forest, semi-natural land and wetland to agriculture, and pastures to arable and permanent crops. The principal lack of information is related to Switzerland, Norway, Sweden and Finland, and also to the outermost regions.

Intensification is defined as the process of moving from low-input to high-input farm type. It can be characterised by expenditures per hectare, fertiliser per hectare, water consumption or livestock stocking densities (EEA, 2005). There is not a single relationship between land cover changes and intensification/extensification because of the high variability in farm types and agricultural practices in Europe. Hence, the approach presented in this indicator is not suitable and should be further developed taking into account other elements. It would be worthwhile to analyse the results in terms of % of Natura 2000 area and not only in absolute values. So far, the maps show the conversion from other land use to agricultural use. However, the change of agricultural land use to other forms of land use inside Natura 2000 network areas is not taken into account, i.e. all values of conversion are positive. Hence, the maps do not show the net-change in agricultural are inside Natura 2000 network areas. Interesting and valuable information could also be achieved by linking to the database “Important bird areas classified as threatened by agricultural intensification” to see to what extent agricultural changes are occurring in areas already identified as threatened.

Intensification of agricultural land use and NATURA2000 network area



Conversion from developed areas to agriculture by NUTS3 inside the Natura 2000 network areas

- < 50 Ha
- 50 - 100 Ha
- 100 - 200 Ha
- 200 - 300 Ha
- > 300 Ha
- No data
- Non ESPON space

Origin of the data: Natura 2000 database

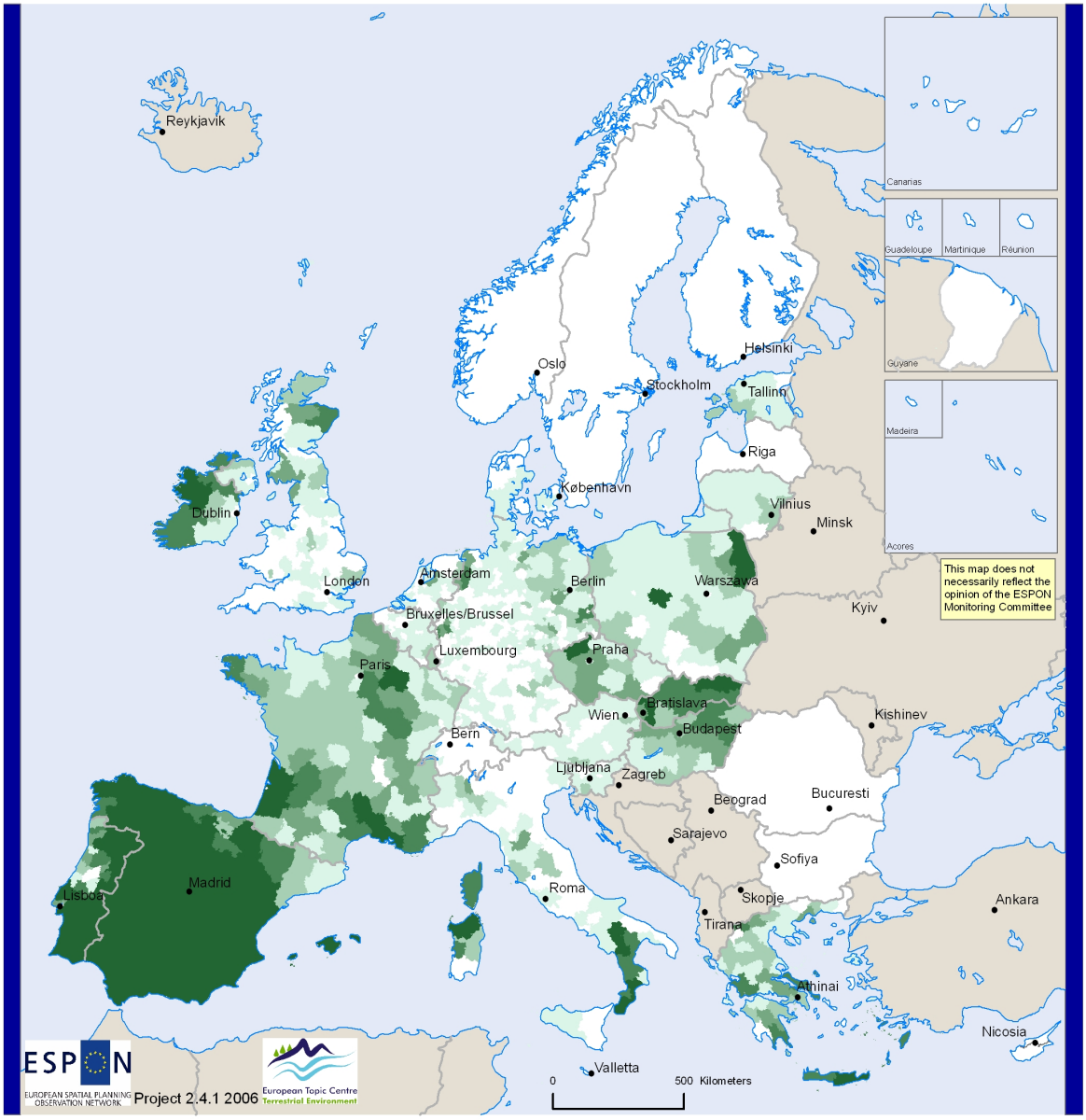
Source: DG Environment

The Land Cover Flows are based in the availability of Corine Land Cover 1990 and 2000 in each country:

ES, PT, FR, IT, SI, BE, NL, DE, DK, PL, CZ, SK, AT, HU, EE, LV, LT, GR, UK, IE, BG, RO.

Map 24 The change of land use from developed areas to agriculture inside the Natura 2000 Network area.

Intensification of agricultural land use and NATURA2000 network area



Conversion from forested and natural land to agriculture by NUTS3 inside the Natura 2000 network areas

- < 100 Ha
- 100 - 250 Ha
- 250 - 500 Ha
- 500 - 1000 Ha
- > 1000 Ha
- No data
- Non ESPON space

Origin of the data: Natura 2000 database

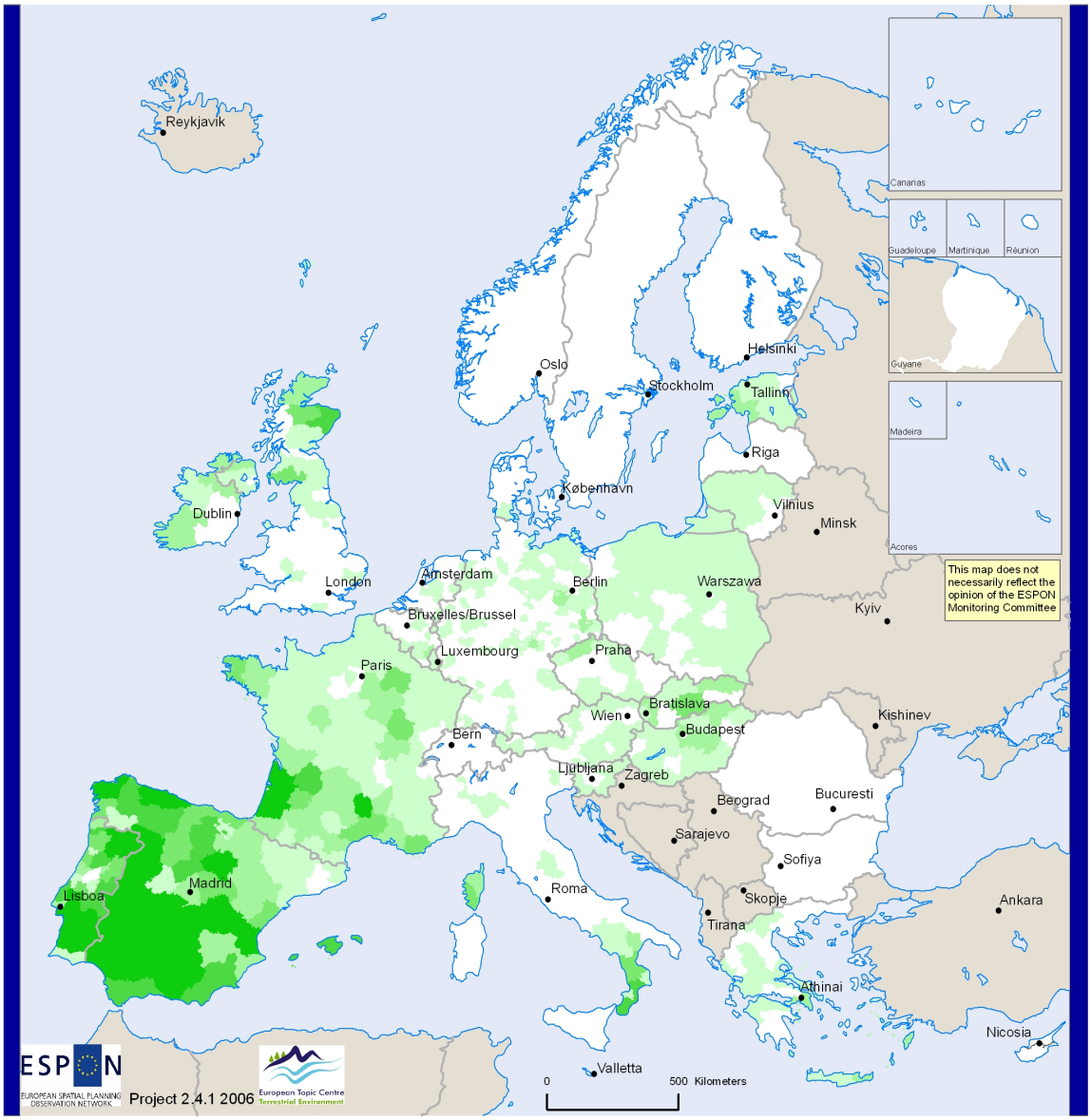
Source: DG Environment

The Land Cover Flows are based in the availability of Corine Land Cover 1990 and 2000 in each country:

ES, PT, FR, IT, SI, BE, NL, DE, DK, PL, CZ, SK, AT, HU, EE, LV, LT, GR, UK, IE, BG, RO.

Map 25 The change of land use from forested and natural land to agriculture inside the Natura 2000 Network area.

Intensification of agricultural land use and NATURA2000 network area



Conversion from forest to agriculture by NUTS3 inside the Natura 2000 network areas

- < 100 Ha
- 100 - 250 Ha
- 250 - 500 Ha
- 500 - 1000 Ha
- > 1000 Ha
- No data
- Non ESPON space

Origin of the data: Natura 2000 database

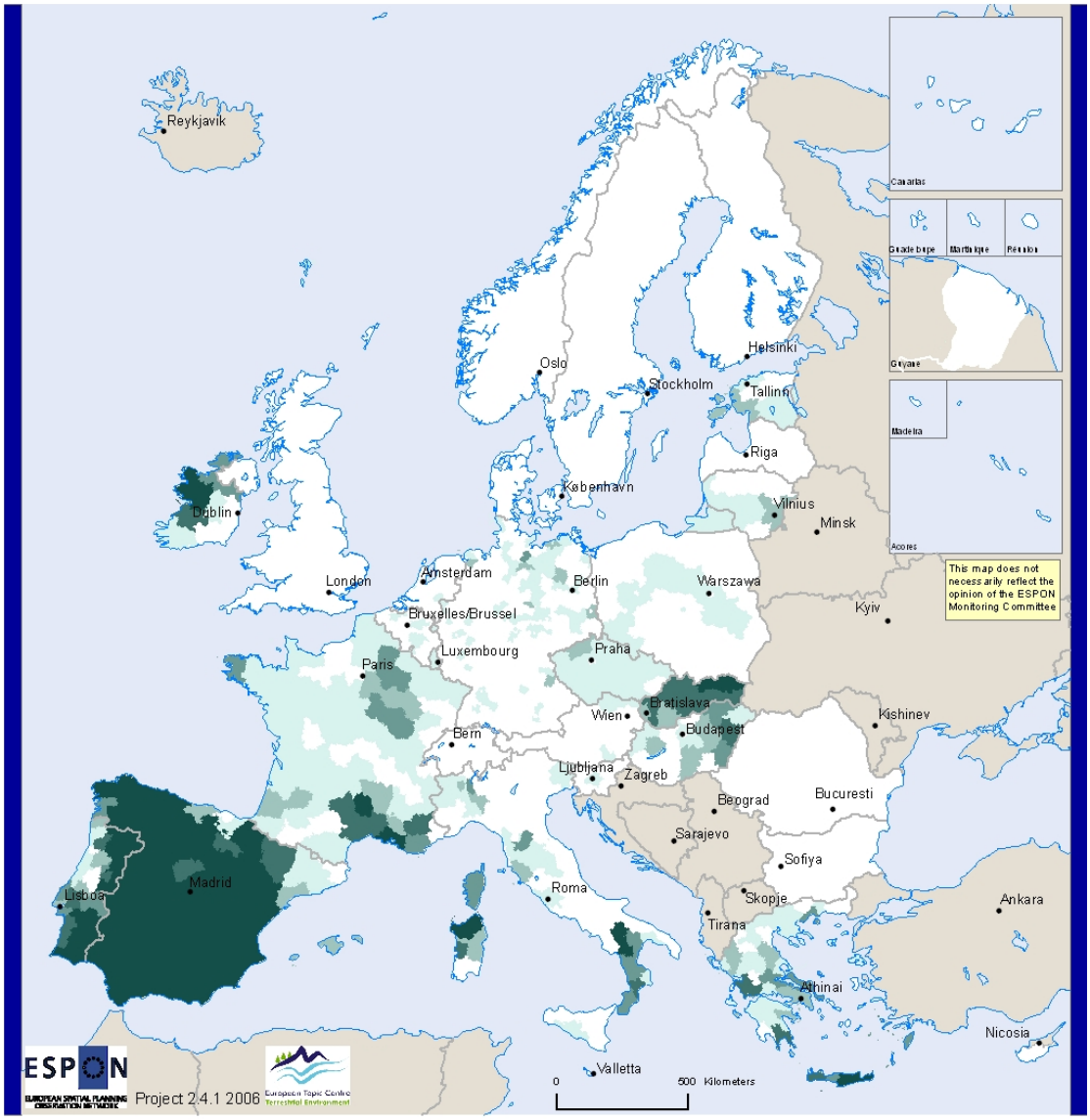
Source: DG Environment

The Land Cover Flows are based in the availability of Corine Land Cover 1990 and 2000 in each country:

ES, PT, FR, IT, SI, BE, NL, DE, DK, PL, CZ, SK, AT, HU, EE, LV, LT, GR, UK, IE, BG, RO.

Map 26 The change of land use from forest to agriculture inside the Natura 2000 Network area.

Intensification of agricultural land use and
NATURA2000 network area



Conversion from semi-natural land to agriculture by NUTS3 inside Natura 2000 network areas

- < 100 Ha
- 100 - 250 Ha
- 250 - 500 Ha
- 500 - 1000 Ha
- > 1000 Ha
- No data
- Non ESPON space

Origin of the data: Natura 2000 database

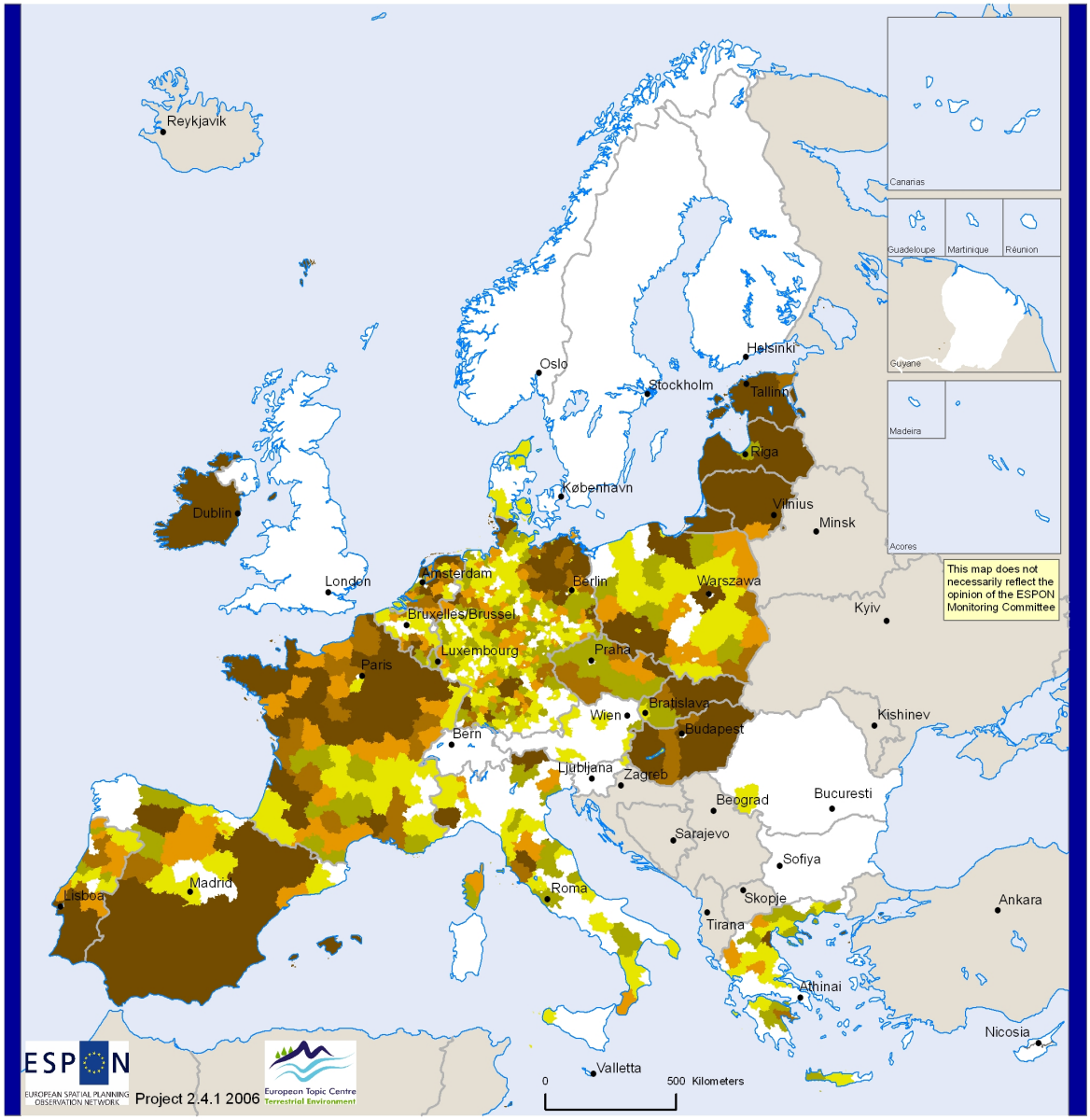
Source: DG Environment

The Land Cover Flows are based in the availability of Corine Land Cover 1990 and 2000 in each country:

ES, PT, FR, IT, SI, BE, NL, DE, DK, PL, CZ, SK, AT, HU, EE, LV, LT, GR, UK, IE, BG, RO.

Map 27 The change of land use from semi-natural land to agriculture inside the Natura 2000 Network area.

Intensification of agricultural land use and NATURA2000 network area



Conversion from pastures to arable and permanent crops by NUTS3 inside Natura 2000 network areas

© EuroGeographics Association for the administrative boundaries
Origin of the data: Natura 2000 database

Source: DG Environment

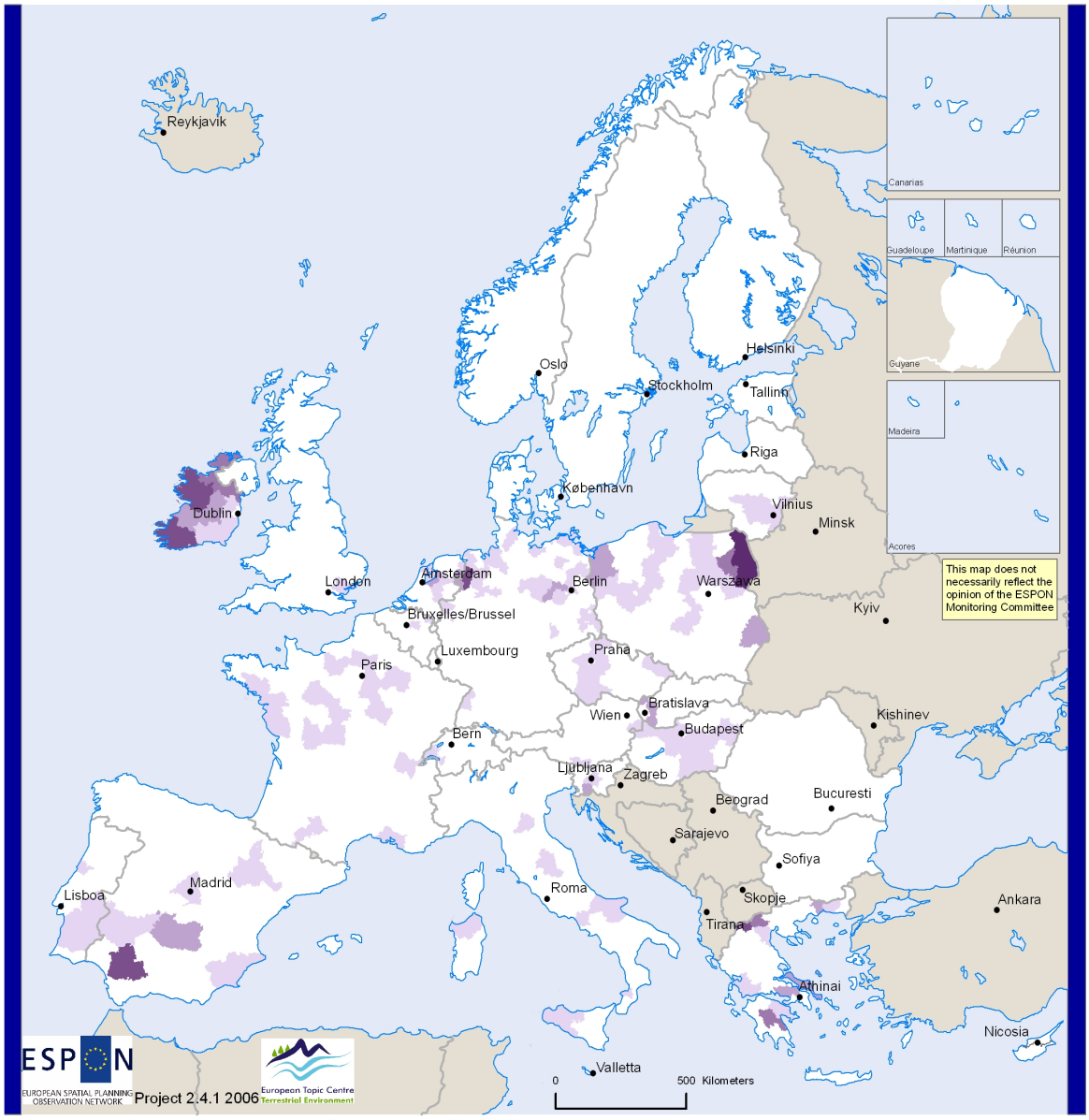
- < 100 Ha
- 100 - 250 Ha
- 250 - 500 Ha
- 500 - 1000 Ha
- > 1000 Ha
- No data
- Non ESPON space

The Land Cover Flows are based in the availability of Corine Land Cover 1990 and 2000 in each country:

ES, PT, FR, IT, SI, BE, NL, DE, DK, PL, CZ, SK, AT, HU, EE, LV, LT, GR, UK, IE, BG, RO.

Map 28 The change of land use from pastures to arable and permanent crop inside the Natura 2000 Network area.

Intensification of agricultural land use and NATURA2000 network area



Conversion from wetland to agriculture by NUTS3 inside the Natura 2000 network areas

- < 100 Ha
- 100 - 250 Ha
- 250 - 500 Ha
- 500 - 1000 Ha
- > 1000 Ha
- No data
- Non ESPON space

Origin of the data: Natura 2000 database

Source: DG Environment

The Land Cover Flows are based in the availability of Corine Land Cover 1990 and 2000 in each country:

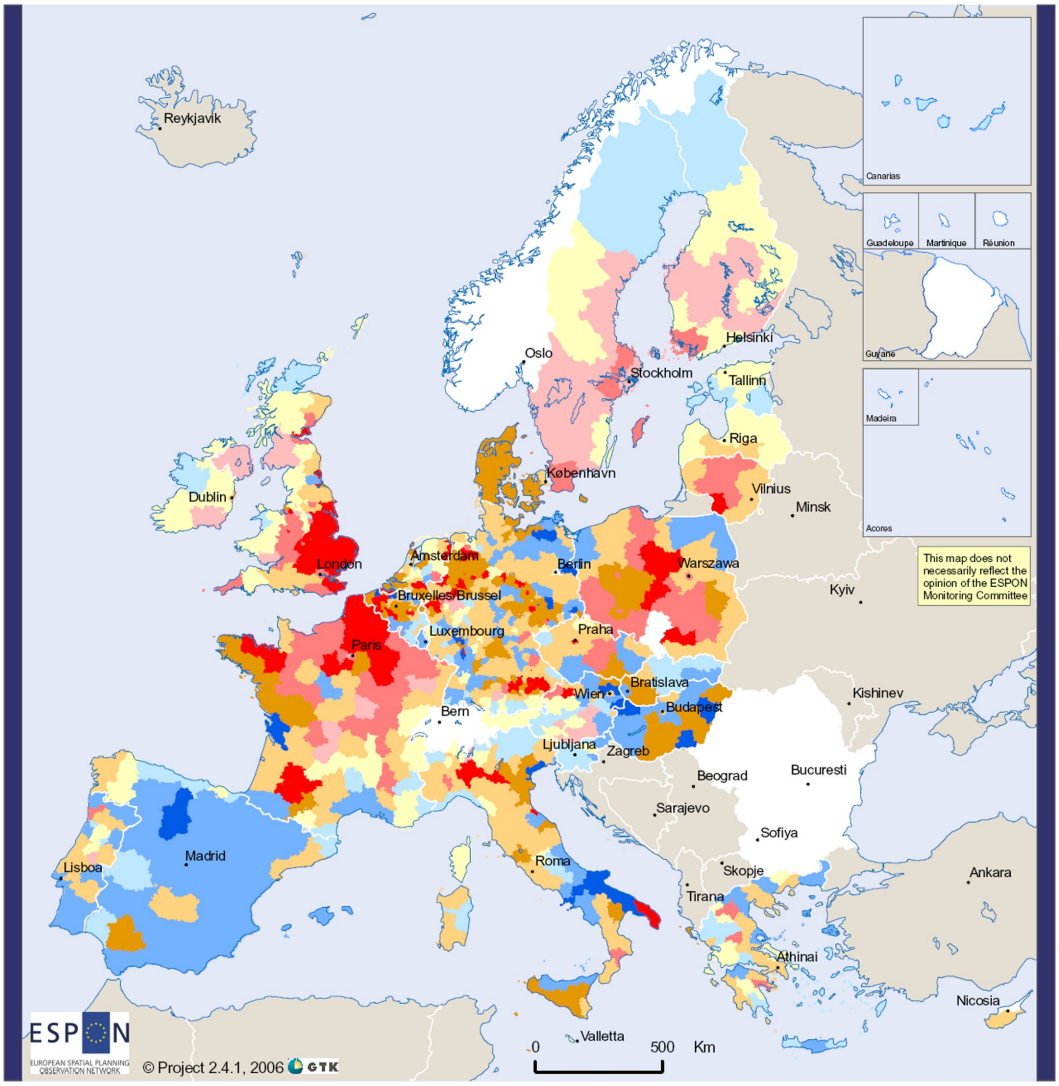
ES, PT, FR, IT, SI, BE, NL, DE, DK, PL, CZ, SK, AT, HU, EE, LV, LT, GR, UK, IE, BG, RO.

Map 29 The change of land use from wetland to agriculture inside the Natura 2000 Network area.

3.20 The degree of intensification of agricultural land use vs the extent of the Natra 2000 Network areas

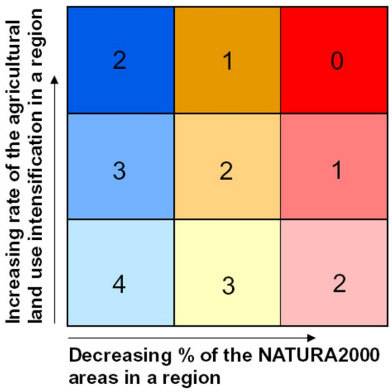
The indicator on the degree of intensification of agricultural land use vs. the extent of the Natura 2000 Netwrok areas per NUTS3 was produced for TIA calculations. This indicator intersects the Corine Land Cover 2000 data on agricultural land use (chapter 3.6; map 11) and the Natura 2000 network areas per NUTS3 region as shown in chapter 3.15.

The quality of living and working environment may suffer from increased industrialisation of agriculture production. However, protection areas of birds can slow down the industrialisation of agriculture production and thus improve the territorial quality. Areas where intensification of agriculture is strong and coverage of Natura 2000 network is small are located in France, Lithuania, Poland, western parts of the United Kingdom and smaller parts of Italy, Germany, Belgium, the Netherlands, Greece, Finland and Sweden. Protection of areas for Natura 2000 network can slow down the negative trend of agricultural intensification in some areas of Italy, Spain, Austria, Hungary, Germany, Belgium and France



The degree of the intensification of agricultural land use vs. the extent of the NATURA2000 Network areas per NUTS3 (99) region

Origin of the data: DG ENV NATURA2000 Network
Corine Land Cover 2000
Source: ESPON Data Base



Story line: The territorial quality of living and working environment may suffer from the increased intensification of agricultural production, while protection of areas for birds can slow down the intensification rate and thus improve the territorial quality.

PIM value: +4

The Corine Land Cover 2000 data is not available from Norway, Switzerland and the remote areas of France and Portugal.

The Natura2000 Network data does not exist from Norway, Switzerland, Romania and Bulgaria. The processed NATURA 2000 dataset on NUTS3 (99) does not cover three regions in Poland (PL0C1, PL0C2 and PL0C3) and two regions in Germany (DE301 and DE302).

Map 30 The degree of intensification of agricultural land use vs. the extent of the Natura 2000 Network areas per NUTS3 (99) region

Chapter E - Data needs and indicators to be developed in the future

Authors: Aleix Canalis, Alejandro Iglesias (UAB), Hilkka Kallio (GTK), Stefan Greiving (PRC), Stefan Kleeschulte (GeoVille).

1 Introduction

Each of the environmental policy areas are directing and implying the use of different kinds of data.

Good policy relies on quality information. The increasing complexity and interconnections of issues that affect the quality of life today is recognized by the policymakers and influences the way new policies are being prepared today. The Sixth Environmental Action Programme for instance emphasizes the need to base environmental policy-making on sound knowledge and participation, principles that will influence the Union's environmental policy-making for the next decade.[2]

In that sense, the development of new territorial indicators or the updating of the existing ones are closely related with data availability.

2 Databases available and data gaps

In the following table practical information (availability, access conditions, temporal and geographical coverage…) about the databases used to develop the indicators done is listed.

Table 6 Available databases

Data source	Corine database 1990	Corine database 2000	Natura 2000 database	Desertification Information System for the Mediterreanean (DISMED)	Map of Soil Erosion Risk in Europe (PESERA project)
Status	Historical	Under development	Finished in 2004	Done	Done
Responsible authority	European Commission – DG-Environment Nuclear	EEA	DG ENV is the owner of the database. Management under ETC	EEA	JRC

[2] INSPIRE Environmental Thematic Coordination Group, 2002, Environmental thematic user needs - Position Paper, Version 2, EEA

	Safety and Civil Protection		NPB (European Topic Centre on Nature Protection and Biodiversity)		
Start date	1986	1999	Staring network in 1992 when Council of Ministers adopt the Habitat Directive.		
End date	1995	On going	At the end of 2004 the Commission will review Natura 2000 contributions from Member States.		
Probability of availability	100 % (Archive)	Once finished 100%	Once finished, ETC TE will have 100% access		
Data availability	Total	Partial	Partial today in ETC-TE	Total	Total
Geographic coverage	EU 15 (with the exception of Sweden) and some accession countries (Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia)	15 Member States of the European Union and Liechtenstein, as well as in the 10 Phare accession countries	EU countries (EU 15 plus several accession countries)	Algeria Egypt France Greece Italy Libya Morocco Portugal Spain Tunisia Turkey	
Spatial resolution	100 m X 100 m	100 m X 100 m	Depending on Member States		
Temporal coverage	1990 +/- 5	2000 +/- 1 year	Depending on Member States		
Quality	Accuracy ≥	Accuracy ≥	Depending		

	85 %	85 %	on the Member States		
Access conditions	unclear data dissemination policy	agreed dissemination policy from the start	Agreed dissemination policy from the start		

Environmental problems occur in concrete spaces and times. First of all, the databases referred above are all integrated in a GIS, making the necessary corrections to have consistent layers and comparable data.

The GIS system allows also the integration of statistics (population, land use, tourism, transport, etc) and a spatial readability of these statistics, to have them compared with the land use changes.

3 Future indicators proposal

3.1 TIA indicators proposal

Following the application of the TIA methodology in the three policy areas studied in the ESPON 2.4.1:

- Civil protection policy
- Water policy
- Habitat and biodiversity

Taking into account the Best needed indicator (BNI) proposed in the Chapter C of the interim report to follow-up the territorial trends produced by the application of each policy, find below some ideas for a new territorial indicators to be developed in further steps.

Table 7 Ideas for a new territorial indicators

Policy	TIA Indicator proposal
Civil protection policy; Best indicators proposal	Impact of SEVESO requirements on energy production costs
	Trend of production of energy consumptive/ chemical/dangerous goods (e. g. aluminium, chemicals)
	Performance of emergency plan according to triennial tests
	Effect of Art. 12 on land-use planning practice (extension of distances)

	Effect of Art. 18 on attention paid to Seveso II requirements
	Changes in community's perception of risks related to major accident hazards
	Existing cooperation in context of projects under the regime of Seveso II
	Recovery actions, cross-border coordinated
	Financial aid, spent per year by the solidarity fund in relation to the population of a NUTS3 area
Water policy; Best indicators proposal	Success of transnational cooperation in a sub river-basin
	Development of water prices during the last years on NUTS3 level
	Full participation of all stakeholder groups in the setting-up process of a management plan
	Opposition to the polluter plays principle in a NUTS3 region
	Nutrients in freshwater (EEA CSI 020)
	Development of water prices after implementation of management plans on NUTS3 level
	Impact of management plans on production of hydroelectricity on NUTS3 level
	Share of measures, aiming at flood hazard reduction, being part of the programme of measures relevant for a certain NUTS3 region.
	Present achievement of good status/potential of water bodies in a certain NUTS3 region (available from status reports which have been reported to the commission)
	Achievement of good status/potential in 2015 as targeted by the WFD
	Use of freshwater resources (EEA CSI 018)
	Consumer costs for drinking water/waste water in a NUTS3 region in 2015 in comparison to present costs
	Improvement of the groundwater status till 2015 in comparison to the present status in a certain NUTS3 region
	Average costs on NUTS0 level

	Change of employment rate after implementation of protection areas
Nature and biodiversity policy; Best indicators proposal	Amount of additional public funds granted to the region for the establishment of new protection areas/size of the region.
	Change of employment rate after implementation of protection areas
	Size of agricultural land located in protected areas
	Implementation of management plans of NATURA 2000 directive and biodiversity

Some of the indicators proposed by the TIA methodology have been already developed by some EU institution such as the indicators:

- Nutrients in freshwater (EEA CSI 020) (http://themes.eea.europa.eu/IMS/ISpecs/ISpecification20041007131957/IAssessment1116497150363/view_content)
- Use of freshwater resources (EEA CSI 018) (http://themes.eea.europa.eu/IMS/ISpecs/ISpecification20041007131848/IAssessment1116497549252/view_content)

On the other hand, other indicators proposed are very difficult to define due to the lack of data or their conceptual complexity.

3.2 The requirement of data for Habitat and Biodiversity Policy area - Natura 2000 data and it's availability

For each Natura 2000 site, national authorities have submitted a standard data form for descriptive data. It contains an extensive data set describing the site and its ecology. The European Topic Centre for Nature Conservation (ETC/NC), based in Paris, is responsible for validating these data and creating an EU wide descriptive database. (European Commission 2005).

The elaboration of a GIS on Natura 2000 network is an ongoing project, which has not been yet completed. The Commission foresees to facilitate public access to available information via Internet in the mid term, after the achievement of the ongoing works and once the hosting database infrastructure will be in place. (European Commission 2005)

At the moment a coherent dataset including the entire Natura 2000 data is not public available. The ESPON project 2.4.1. had a data request to the DG Environment for certain calculations to be used in TIA applications. However, data was received just after the official deadline of project. Some

calculations were made afterwards but datasets give possibilities for further calculations as well.

3.3 Other indicators proposed

Following their own criteria, the data sets existing nowadays and the core-set of indicators available in different international organizations, the ESPON 2.4.1 partners consider also interesting for the study of Territorial trends and the impacts in the field of EU Environmental Policy the lists of indicators located in annex 4.

4 Future data needs and problems to be solve and to improve the indicator development

In the near future we expect a strong increase in demand and importance of statistical information associated with geographical data at all levels.

Existing gaps are a major obstacle for an immediate broader use of geo-data in statistics. Some of these gaps are :

a) lack of awareness of existing geo-data;

b) lack of co-ordination with National Mapping Agencies and other official mapping bodies;

c) lack of efficient and user-friendly data-interchange and communication procedures;

d) redundancy in data acquisition and data storage;

e) insufficient update of data;

f) lack of guidelines for meta-information;

g) price highly variable;

h) problem of copyrights.

Chapter F – Primary research objectives and proposals for future applied research themes

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1 Introduction

This final chapter summarises the policy debate and scientific development in relation to territorial effects of EU Environmental Policies. The chapter defines and targets the scope of the future research and is mainly based on the results of the scientific and policy review that the study has implemented.

The chapter starts with the identification of primary research objectives, followed by a section where it is discussed how the results of the ESPON 2.4.1 project are embedded in the ESPON programme and how future applied research can contribute to widening and deepening of knowledge gained in this project. The final section of this chapter draws conclusions not only concerning research objectives and proposals for future applied research themes, but also covering the project as a whole.

It is in fact more a requirement than a recommendation for future applied territorial research to integrate the environmental dimension in territorial analysis, when following strictly several key European documents from the European Community Treaty to the latest "Draft Declaration on Guiding Principles for Sustainable Development" (EU Commission 2005n). Two out of ten Policy Guiding Principles in this last document address coherence among policies in the EU as a key issue for sustainable development.

It is suggested that findings on environmental elements have to be crossed with more socio-economic factors of the development of regions and larger territories. This approach is in line with Article 6 of the European Community Treaty: "Environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities (...) in particular with a view to promoting sustainable development."

On the other hand, the integration of the environmental dimension in the sectoral policies does not guarantee that the actual decision-making would in the end really contribute to the goals of sustainable development. Firstly, for the implementation of the sectoral policies the spatial context is important in

terms of existing qualities and secondly, the synergies among sectors should be established afore implementation measures.

The most explicit document in terms of territorial impact of EU policies is the "Scoping document and summary of political messages for an assessment of the territorial state and perspectives of the European Union" launched for the Informal Ministerial Meeting on Regional Policy and Territorial Cohesion, 20/21 May 2005 in Luxembourg (European Commission 2005a). This document served as basis for the forthcoming policy document "Territorial State and Perspectives of the EU" that is presently under preparation. It will be endorsed by the Ministers on Spatial Development, most likely during the coming German Presidency. Chapter C will put emphasis to "The Impact of EU Policies on Territorial Development". In this context, already the scoping document stressed the relevance of environmental policies such as "Trans-European risk management (priority 5.1) or "Strengthening the Main Trans-European Ecological Structures" (priority 6.1). Thereby, the relevance of the thematic scope of the 2.4.1 project becomes obvious.

2 Primary research objectives

The following section outlines the key questions that the future research should aim at answering for integrating the environmental dimension into territorial analysis. The structure of the section follows the main strands of the project, including research objectives coming from literature research, recommendations based on the TIA approach developed in the project and proposals resulting from analysis of territorial trends, situations and structures in relation to environmental issues. Following is a comparison of TIA and SEA approach to impact assessment and argumentation on which could serve better for the integration of the environmental dimension into territorial analysis and development. The resulting research objectives are highlighted in the boxes below each of the subchapters dealing with specific issues in question.

2.1 Proposals resulting from literature research

Extended literature research served as the first source of proposals for primary research objectives. Aside from the main EU policy documents and scientific literature some of the conclusions are based also on the lessons learned from the case studies that did not find direct output in the TIA performed. First, the policy concept of "environmental policy integration" is considered, developed by the EEA for better integrating environmental

dimension also into territorial analysis and development. Later on, the role of the strategic projects is examined as potentially one of the most important tools contributing to policy coherence. In this context the role of transnational plans and initiatives is stressed as well.

2.1.1 Environmental Policy Integration

The EEA report "Environmental policy integration in Europe" further develops the concept of "environmental policy integration" (EPI). The EPI concept aims at "a continual process to ensure environmental issues are taken into account in all policy-making, generally demanding changes in political, organisational and procedural activities, so that environmental issues are taken on board as early as possible and continuing during implementation." (European Environment Agency 2005, p. 11). Environmental Policy Integration as strategy is underlined by the following sources:

- Article 6 of the European Community Treaty: "Environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities"
- EEA report "Environmental policy integration in Europe" promotes the EPI concept

This approach should be adapted on all three spatial levels. In particular spatial planning at various levels can be seen as an important instrument to deliver EPI (European Environment Agency 2005, p. 25) by means of bringing together policy and decision-makers from different sectors. Due to the fact that EU has limited competence to intervene in spatial planning directly the EU has used alternative means to promote its planning objectives. EU funding, specifically the Structural Funds and in some aspects the Rural Development Fund have been used to promote integrated spatial development plans. In this way, the EU has also supported innovative sustainable development projects, for example, under the URBAN community initiative (European Environment Agency 2005, p. 40). It is recommended using in this context in future the IA approach in order to identify possible contradictions between environmental objectives and other spatially relevant interests, in particular those which are designated in regional or urban land-use plans.

Research objective 1: Identification of factors that negatively influence the implementation of the SEA Directive both in material as well as in procedural respect due to specific national and/or regional/local institutional settings.

Relevant spatial level: EU level

2.1.2 Strategic projects and transnational cooperation

As suggested by the already mentioned "Scoping document and summary of political messages for an assessment of the TERRITORIAL STATE AND PERSPECTIVES OF THE EUROPEAN UNION" (European Commission 2005a), more attention will be paid in future to strategic projects in context of the future EU Cohesion Policy strand of European Territorial Cooperation (ETC). Strategic projects should cover multiple (sub) projects and investments and aim at improving (trans-)European territorial governance i.e. by developing common approaches, networks and integrated development strategies.

This given perspective should be used in particular by environmental policy, because such strategic, integrative projects seem to be a real chance to introduce environmental issues in spatial development as requested by the EEA approach. This is clearly visible by the examples, provided in this scoping document, e. g. "the integrated development of coastal zones, combining joint management of maritime risks, including coastal defences; protection and development of areas of high natural value (e.g. wetlands); development of short sea shipping links; investing in sustainable energy systems, including natural gas and wind power; sustainable development of the economic potential of the coast, including recreation and tourism; action to optimise the environmental quality and economic potential of coastal areas."

Strategic projects should on the one hand implement the objectives set by "Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013" (EU Commission 2005b), calling for actions, based on shared development strategies of the territories concerned (national, regional, local) and on the networking of the key stakeholders. On the other hand they could be an efficient tool also for the implementation of policy guiding principles set by "Draft Declaration on Guiding Principles for Sustainable Development" (EU Commission 2005n), that call for "coherence between all European Union policies and coherence between local, regional, national and global actions in order to increase their contribution to sustainable development."

Strategic projects may be in the near future one of the very few tools applying the spatial planning approach on the EU and transnational level. Through their crosscutting role, bridging the gaps between different sectors and between policy and decision-makers on different levels, they can also be seen as an instrument delivering EPI on the EU and transnational level.

Although few other instruments that could contribute to better coherence between different policies are available at transnational level (legislative competences are in the hands of the EU or the member states, for instance),

it is exactly at this level where policy coherence and "integration of economic, social and environmental considerations so that they are coherent and mutually reinforce each other" (EU Commission 2005a) is the natural way to develop policies. Whenever countries or regions find common interest to collaborate on a specific theme, a lot of coordination is required to reach to the desired common goals. In order to agree on common instruments many differences between institutional systems and administrative cultures have to be overcome. So, coherent action is a prerequisite for any kind of successful result in this context. One of the issues to be investigated in the future is therefore to what extent transnational initiatives by itself represent a tool that EU could exploit to achieve better coherence between policies.

In this context, it may be interesting to examine existing transnational initiatives and check to what extent they have been successful or why they failed. In the framework of EU policy-making it would be most welcome to investigate also what was the role of the EU in this context. Some first evidence suggests that these initiatives are more successful, when they are also backed by some EU instruments, supporting their implementation. In other cases EU can even present an obstacle for implementation of transnational initiatives. Such is the case with the Alpine Convention Transport Protocol, where demands set by the EU undermine the commitments of the Contracting Parties, despite the fact that its aims are well in line with the White Paper "European transport policy for 2010: time to decide". (European Commission 2001a)

Research objective 2: Formalize the necessary elements of strategic projects, in order to effectively implement the coherent approach set by EU policy documents.

Relevant spatial level: EU level

Research objective 3: Investigate the factors for success or failure of transnational initiatives in the implementation of the coherent approach.

Relevant spatial level: EU level

2.2 Recommendations for further applied research on the TIA approach

Considering the application of the TIA approach in the different case studies, some lessons were learned. As it is recommended to use the TIA for real policy-making, the authority responsible for setting up a programme or policy has to carry out the TIA, but with scientific support for the methodological, respectively analytical part. However, there are some potentials, but also problems related to the TIA approach that can be summarised as follows.

Potentials

Flexibility: Can be applied (a) for different test cases, i.e. environmental policies, (b) at different spatial levels (EU, national, regional) and (c) it can be adapted to changing assessment goals (in contrast to the SEA where the protection goods remain the same).

Unbiased character: Allows an integration of environmental aspects by considering positive as well as negative effects of territorial development on the environment and vice versa.

Problems

Time and effort: Carrying out a TIA requires a thorough and tailor-made preparation (description of story lines, if necessary a translation for local actors, selection and weighting of relevant story lines etc.).

Influence of experts' based estimations: The extent of positive or negative impacts of policies on territorial trends as well as of trends to territorial objectives is based mainly just on the opinion of the experts that were involved in the 2.4.1 project. Here, more information is needed that is based on empirical data of the real relevance of the identified cause-effect relationships.

Completeness: How can it be guaranteed that the selected storylines really represent the effects of a policy? Are there maybe elements of a policy that have been overlooked by those who carry out the TIA? Do other unknown or unidentified effects of an element of the policy exist that might have important effects, too?

Lack of data related to the chosen indicator: In most of the case study application, large data gaps existed. The question is how to deal with such data gaps? Can they be neglected? What does this mean for the overall result? Is it still valid if the result is only based on a few indicators? On the opposite, the identified data gaps might lead to further research in order to close these gaps since the importance of these data will become clear by

carrying out a TIA. The success of the TIA application depends very much on the availability of appropriate indicators. In the test cases some data gaps became obvious. However, the results are plausible but the fact of missing data has to be considered carefully. However, this problem is only partly related to data availability, but to a certain extent caused by the ex-ante perspective of the TIA. Here, scenario techniques might be helpful and should be subject of further research to be undertaken by ESPON II.

Comparability: In the case studies the TIA methodology was adapted to the circumstances of the case study area and/or the test case. Although such a tailor-made application seemed to be necessary, the comparability of the results on the other hand was not completely possible. Future research should focus on the development of a common TIA framework for the territorial effects of different EU policies in order to harmonise the TIA application in different territorial or policy related settings.

Research objective 4: Further empirical analysis of identified cause-effect chains in order to minimise estimations that are based just on experts' options.

Relevant spatial level: primarily regional level

Research objective 5: Testing of scenario techniques for the TIA in order to get data for the territorial impact of policies that are not implemented so far.

Relevant spatial level: EU and transnational/national level

Research objective 6: Development of a common TIA framework for the territorial effects of European policies.

Relevant spatial level: Transnational/national and regional/local level

2.3 Proposals resulting from mapping environmental trends

According to UNEP environmental degradation trends are increasing at an alarming rate in Europe as well as on all over continents. The areas under main concern are degradation of land (e.g. land take, soil erosion, soil contamination) forest degradation and loss, marine and coastal zones, atmosphere, fresh water resources, habitat fragmentation and the loss of biodiversity.

The EEA Core Set of Indicators (CSI) and other indicators from Eurostat or UNEP already address these thematic issues.

A weak point for most of the indicator sets is the integration of data sources from other organisations than the "home" organisation, i.e. EEA indicators are based mostly on EEA data and Eurostat indicators mostly on Eurostat data.

Further research needs to address:

- How to ensure better access to existing information (largely addressed by INSPIRE) and the **lack of coherence** between different information sources
- How to better **integrate** data and information from different sources and to analyse **interactions** between objects
- The **location** and **distribution** of natural assets to improve the knowledge base and the starting point for spatial analysis, modelling and future assessments
- The environmental impact of actions in different locations than where they originate (e.g. the influence of upstream agricultural practises on downstream water quality)
- The identification of and disaggretation of data to environmentally meaningful analytical units, e.g. ecotones
- Multi-scale analyses which allows to exchange and compare data and information at different levels of scale and administrative levels.

Finally, the analysis, mapping and reporting of environmental trends should move away from (illustrative) themes (e.g. biodiversity, forests) to context-free topics allowing a multi-criteria analysis.

Research objective 7: Multi-scale and multi-criteria analysis of environmental degradation trends from the point of view of the territorial objectives.

Relevant spatial level: EU and transnational/national level

Research objective 8: Integration of environmental data and spatial analysis of interaction between objects of various environmental themes (e.g. soil and land degradation, fresh water resources, marine and coastal zones) in different regions.

Relevant spatial level: primarily regional level

2.4 TIA and SEA – What fits better to stronger integrate the environmental dimension into future integrated territorial analysis and development?

Project 2.4.1 is asked for future applied research themes in order to integrate the environmental dimension stronger into future territorial analysis. This calls for a discussion of the perspectives of the TIA as well as the EIA and possible synergies as well as conflicts in-between. Both instruments are principally able to link territory and environment; the TIA from the territorial perspective and SEA as well as EIA from the environmental side. In the following, similarities and differences of the TIA and the environmental assessments will be discussed.

Piggyback character

Both assessments have to be seen as dependent parts of other procedures such as plan approval procedures (SEA), project approval (EIA) respectively legislative procedures (TIA). In consequence they can be defined as reactive instruments, to be used only piggyback in case of a causing event (e.g. a policy, programme/plan or project).

Assessment goals

As already mentioned in Chapter F of the interim report, the SEA can be seen as a kind of ex-ante assessment of plan and programme proposals and therefore be understood as an important element of an Environmental Policy Integration as proposed by the EEA in context of spatially relevant decision-making. The SEA could be understood as (spatial) planning optimisation tool by integrating the environmental issues in the procedures as early as possible. In so doing the decision-making process would be improved and a wider acceptance of the final decisions guaranteed.

The EC argued primarily "*that "Environmental assessment is an important tool for integrating environmental considerations into the preparation and adoption of certain plans and programmes which are likely to have significant effects on the environment in the Member States, because it ensures that such effects of implementing plans and programmes are taken into account during their preparation and before their adoption.*" (Point 4 of the substantiation of the directive, European Communities 2001). This argumentation is based on the main lessons learned from practical experiences with the Environmental Impact Assessment. The main problems in dealing with environmental issues on the project level refer to the impossibility of assessing alternatives and interactions between the effects of several projects. After the fundamental decision about a specific land use or an infrastructure investment has been made on the programme or plan

level, only minor changes on the project could be taken into consideration as a result of an EIA. Here, the more operational character of the SEA becomes visible while a strategic perspective, crucial for an ex-ante assessment of policies, is missing. In consequence, it will be excluded from the further considerations.

However, the ESPON 2.4.1 interim report stated in Chapter C that "a territorial impact assessment focuses on territorial effects of a policy and in a way is of a more specific nature." Within the ESPON 2.4.1 project a further focussing of the aim of a TIA has to be done because it has to deal with the effects of *environmental policies*." (ESPON project 2.4.1. 2005)

In both instruments, an identification, description and assessment of certain effects is embedded. This indicates methodological similarities. However, it should be asked against which background these effects have to be assessed. In case of the SEA this question can easily be answered when looking at Annex I of the Directive.

In accordance with Art. 3 EU Directive 2001/42/EC an assessment of the *"significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors"* has to be carried out. This also defines what can be understood as an environmental impact, thus pointing at the general topic of the SEA Directive. This very broad understanding of the environment might be seen as a reason for the given territorial relevance of the SEA. Nevertheless the SEA has to be understood as a tool aiming at avoiding *negative* effects on the protection of goods cited above. This is a difference to the TIA which is of an unbiased and, because of the spatial context, of a comprehensive nature. This leads to the following observations and raises important questions concerning the TIA:

- A TIA considers *positive* as well as *negative* effects.
- The effects *on what* should be assessed? What does "territorial" mean? What are the territorial objectives?

In Priority 2 of the ESPON 2006 programme, it is mentioned that a TIA shall "show the influence of sector policies on spatial development at the relevant EU scale". Schindegger & Tatzberger (ESPON project 3.1. 2005) suggest that the topic of a TIA is the impact of sectoral policies on spatial structures. However, it is not clearly defined what is meant either by "spatial development" or by "spatial structures".

Within the ESPON programme, project 3.1 has proposed that the assessment has to be done against the goal of territorial cohesion. Territorial cohesion has been divided into three main elements by the ESPON project 3.2 (ESPON project 3.2. 2005, p. 17):

- Territorial quality (ex.: the quality of the living and working environment; comparable living standards across territories; similar access to services of general interest and to knowledge)
- Territorial efficiency (ex.: resource efficiency with respect to energy, land and natural resources; competitiveness and attractiveness of the local territory; internal and external accessibility)
- Territorial identity (ex.: presence of "social capital"; capability of developing shared visions of the future; local know-how and specificities, productive "vocations" and competitive advantage of each territory)

However, although this proposal seems to be in line with existing policy documents such as the Third Cohesion Report, there is a lack of goals that are officially affirmed (e.g. by the Commission or the Council) as relevant for a TIA. Since this is obviously a normative task, a political decision is needed in order to create a common fundament for every TIA, carried out by those experts who are asked for such an analysis, similar to Annex I of the SEA Directive. In this context the forthcoming policy document "Territorial State and Perspectives of the EU" has to be mentioned that is going to be approved during the German Presidency. It is divided into three main parts: defining the scope, assessing the state and developing perspectives. The preparatory scoping document as agreed on the Informal Ministerial Meeting on Regional Policy and Territorial Cohesion, 20/21 May 2005 in Luxembourg, focused in Chapter B.3 already on given impacts, but missed an analytical basis for these assumptions (European Commission 2005a). However, the importance of the SEA was mentioned in this context. What is needed for the assessment of the state is a clear scope for the assessment. While territorial cohesion is mentioned as overall objective, some more operational goals are needed that can serve as the needed normative basis for the TIA. However, in view of the existing table of contents of this document, the relevance of the TIA becomes clear, since Chapter C.5 of the Document will focus on "The Impact of EU Policies on Territorial Development". This calls for certain "territorial efficiency, quality and identity objectives" (ESPON project 3.2. 2005).

Involvement of the public

In this context, the need of formalised, comparable procedures has to be discussed. Whereas an involvement of the public is an obligatory part of any

SEA, no similar obligations exist for a TIA. What are the possible reasons for this? However, opposite to the SEA, the TIA is up to now an informal tool to be recommended only within the ESDP (which is not binding) as well as in ESPON programme that is an observatory network and where some first TIA approaches have been developed. Results gathered from this network might be relevant for future European Spatial Development Policies, but are clearly without any importance for concrete decisions about future land-use as it is the fact in case of the SEA. Therefore, the involvement of external actors seems to be dispensable.

Standards for the significance of effects

An important problem that has been identified by creating a TIA for environmental policies is related to the measurement of the significance of the policy impacts. Again, there is a lack of standards for the assessment of such effects. Annex II of the SEA directive offers such standards by mentioning aspects such as "the probability, duration, frequency and reversibility of the effects; the cumulative nature of the effects; the risks to human health or the environment (e.g. due to accidents); the magnitude and spatial extent of the effects; the value and vulnerability of the area." In order to guarantee similar standards in the application, such criteria as listed in Annex II of the SEA would be quite helpful for the TIA as well.

However, nevertheless some general methodological guidelines from EU level to steer proper implementation of SEA in order to develop comparable procedures would be useful. An example of such a guideline could address the transparency of the planning procedures or phases (analytical part, evaluation, making alternatives, assessment of the alternatives, final proposal) that have to be repeatable.

Alternatives

In context of the SEA, it is obliged to search for suitable alternatives in cases significant effects of a plan or programme on the environment are unavoidable. A similar effect in terms of searching for alternatives to envisaged policies might be the outcome of a TIA, but this is not explicitly mentioned. Here, a certain advice as a part of possible guidelines would be helpful.

Added value of a TIA instrument

As it becomes more and more obvious, the SEA has certainly some advantages in comparison to the so far existing TIA that is not very well formalised and cannot be seen therefore as obligatory for every actor involved in territorial relevant decision-making. This calls for one important

research question: What could be the added value for an additional instrument like the TIA in comparison to the existing SEA? Is such an instrument aiming at an integration of the environmental dimension into territorial analysis really needed?

The broad definition of the environment according to Annex I of the SEA directive automatically leads to a territorial relevance of the SEA. However, the environment is still in the focus of the assessment and not the territory, for what negative effects shall be avoided. This distinction might be seen as academic, but it is in fact not, because the SEA is often seen as a burdensome obligation, able to create hindrances for policies, programmes or plans, decision-makers are looking for a frictionless implementation. This is more a psychological than a factual argument, but could nevertheless be important. The TIA is more open, considering positive as well as negative effects, but also obliged to take environmental aspects into account. However, as a prerequisite, the goals, for what background the policy impacts have to be assessed, have to refer properly to the environment respectively the environmental dimension of territorial development. For that purpose, the criteria, laid down in Annex I of the SEA directive might serve as guidelines in order to refer properly to the environment in context of a TIA.

Flexibility

The unbiased character of the TIA allows the weighting-up of positive and negative effects on the environment as well as other aspects that are territorially relevant such as competitiveness. In the context of the TIA the environmental dimension is to be understood as an embedded part of a comprehensive assessment. The SEA has to be seen as a one-dimensional assessment of effects on the environmental that results have to be considered afterwards by confronting them with other concerns in the decision-making process. This might be seen, however, as a guarantee that environmental concerns cannot be ignored or put aside, but leads at the same time certainly to a confrontation between the environment and other concerns of territorial relevance.

Planning related decision-making is seriously influenced by legal and institutional settings they are embedded in. These settings are different not only from member state to member state by also within one member state. Moreover, decisions as final outcome of planning processes can be characterised as determined to a certain extent by fundamental political attitudes but also from actual preferences. In consequence, a similar outcome of a SEA might be considered differently from case to case in weighting-up processes.

Aiming at a better integration of the environmental dimension into territorial development calls for an integrating tool that allows the consideration of given political preferences, but makes them at the same time visible for everybody (weighting of the different cause-effect chains). Such an integrating tool is the SEA certainly not, but could be found by using the TIA.

The integration of environment into territorial analysis may contribute also to a better integration onto territorial development, since the results of the analysis provide information about the given relevance of the different environmental elements and intertwinements with other aspects of territorial relevance and vice versa.

Influence on policy making

The SEA (as well as EIA) is relevant for those plans or programmes that may have significant effect on the environment, but not for policies itself. Thus, environmental policy integration, the EEA called for, seems to be impossible by means of the SEA that is related only with the implementation of policies through plans or programmes, but not able to influence policy making. As concluded from the case studies, often the (environmental) policies itself are the real problem because of the missing attention they have paid to side effects and regional diversity in Europe. The Impact Assessment of the Commission missed a certain territorial dimension as already stated in the interim report (ESPON project 2.4.1 2006, p. 65). This calls for a tool that is able to integrate environmental concerns, but also possible adverse effects on other territorial relevant objectives that might be contradicted by these policies.

All in all, it becomes clear that the existing Impact Assessments alone seem to be insufficient for an optimal integration of the environmental dimension into territorial analysis as well development - in particular on the level of policy-making. Here is a clear added value of the TIA visible. Nevertheless, the more implementation oriented SEA and EIA are still relevant in order to take care for a proper attention that has to be given to the environment in daily decision-making on regional and local level. These levels would also benefit from a TIA regarding environmental policies. A TIA aims at an ex-ante assessment of policies. In that way, adverse side-effects of environmental policies on other territorial objectives as described in the different case studies become visible and suitable countermeasures could be integrated from the early beginning into the design of such policies. Moreover, the TIA makes visible, that areas are affected differently from the same policies.

Therefore, environmental legislation should be adapted more carefully to the existing spatial structures such as Functional Urban Areas (FUA) and urban-rural typologies. Presently, EU environmental legislation disregards for instance completely the given conflicts between the several spatial relevant functions in particular in urban areas, which have been resulted from reporting protected areas in the context of Natura 2000 network.

In several member states, just an implementation of EU directives without any additional regulations regarding financial or organisational questions is requested in order to avoid additional bureaucracy. However, such an implementation strategy may lead to more time-pressure and resistance in particular for regional and local level as concluded from a study, carried out by the German Urban Institute (Rottmann 2005, p. 3). Therefore, research is needed on what are the really necessary and useful implementation measures and should be avoided in order to be practicable.

Moreover, most of the legislative instruments of environmental policies are effectively in the hands of the Member States. It is acknowledged in this context that the Member States have different legislative systems and different "administrative culture and practices" (European Environment Agency 2005). Lacking is an overview of existing practices regarding the territorial analysis, which could lead to comparison and possibly to commonly recognised "guidelines" on territorial analysis. Such an overview could help in planning the common large scale projects and monitor their impacts. This would also support "the learning process between countries".

It is interesting also to acknowledge the role of Impact Assessments in the transnational context, which can be, as we have noted earlier, the level where the need for policy coherence is most pressing. The SEA directive addresses the trans-boundary consultations in case when the implementation of a plan or a programme being prepared in relation to territory of one Member State is likely to have significant effects on the environment in another Member State. But in effect the SEA directive avoids the problem of differences in "administrative culture and practices" (European Environment Agency 2005) by stating that Member States define the consultation process and the timing between themselves. There is obviously the need for some guidance on the use of the directive from the side of the EU in this respect. On the other hand it may be interesting to investigate to what extent TIA can be used on the transnational level. One of the case studies in this project (Slovenia) makes such an attempt.

Research objective 9: Clear definition of goals for what background the policy impacts have to be assessed by means of a TIA and criteria for the relevance of impacts.

Relevant spatial level: EU level

Research objective 10: Development of differentiated implementation strategies for EU policies according to existing spatial structures, both on EU as well as member state level.

Relevant spatial level: EU level, transnational/national level

3 Embedding the findings into the ESPON context

This project is somehow double headed, with the development of TIA approach on the one hand and mapping of environmental trends on the other hand. Both parts needed close relation with some other ESPON projects already during the development of the methodological parts. Especially the TIA methodology was developed in close relation with the ESPON project 3.2, using several of its results and hopefully feeding it back with own results. Nevertheless, final findings from mapping environmental trends reveal some interesting results that immediately open the "why" aspect. To understand the causal relationships it is necessary to look beyond this ESPON project and compare the results with the results of other ESPON projects. Future territorial research can in this respect develop territorial typologies and indicators, which could on the one hand widen the knowledge through integration of different aspects of territory, and on the other hand deepen the knowledge through extended data sets and more detailed analyses.

3.1 Possible typologies

When assessing the results of mapping environmental trends in this project, for instance "Urban growth and population development 1990 – 2000", it would be of great interest to compare the results with other ESPON results or any kind of geographical socio-economic data in order to get a clue why such development has happened. Unfortunately, there is very little data available for time-spans and it is even more difficult to find matching years and adequate geographic coverage. For this reason, also ESPON typologies very rarely display territorial development but rather territorial state in a fixed year.

One of the possible directions for future territorial research could therefore be to develop typologies that would be able to display the dynamics of territorial development. As there's a common problem with available data in ESPON in general, and an even more serious problem with data for time-series, it is very important to develop territorial typologies that would be able to say as much as possible with as little data as possible. The good side is that this would also help readability of final results. The previously mentioned "Urban growth and population development 1990 – 2000" is an attempt to develop such a typology within this project.

Territorial typologies can also display the relation between the dynamics of the territory and its state in a chosen moment. These kinds of typologies can shed some light on causal relationships in the territory. A typical simple matrix combining dynamics and state includes types like "high growth/high state", "low growth/high state", "high growth/low state" and "low growth/low state". A combination of, for example, "Urban growth and population development 1990 – 2000" as a typology displaying dynamics, and "Population per Urban area in 2000" as a typology displaying a fixed state, could be an example of such a typology.

Even more demanding task is to develop typologies related to territorial impacts of policies. An attempt of such a typology was made in the TIA case studies. The main challenge here is to present the results in an understandable manner.

Both of these types of typologies could, besides environment related issues, certainly include findings from other ESPON projects as well, related either to territorial trends or territorial impacts of polices. The most obvious examples of possible combined typologies would incorporate typologies of urban areas, demographic trends, urban-rural relations or potential accessibility.

Research objective 11: Develop territorial typologies that would be able to display the dynamics of territorial development, and typologies combining dynamic and static aspect of territorial development. Readability of final outcomes should remain an important objective as well.

Relevant spatial level: EU level

3.2 Territorial indicators

Through the process of selecting the relevant indicators the question of availability of indicators was at least as much if not more important than the relevance itself. As it turned out Corine Land Cover data sets were by far the most extensively used despite their non-perfect reliability and despite the fact that they don't cover the whole of ESPON space. The main reasons for this are two:

- It is more or less the only data set that is able to display the dynamics of territorial development, due to the fact that CLC data sets for two years are mostly available by now (CLC 1990 and CLC 2000);
- The data itself is more exact than NUTS 3 level needed for ESPON maps, so it is possible to aggregate data in NUTS 3 regions and also combine different data from CLC data sets.

We can therefore make two basic observations about what kind of territorial indicators future research should develop. First, reliable time series are desperately needed. It would be most useful to have any kind of comparable territorial data for two or more different years, in order to be able to display some dynamics in the territory and monitor the impacts of policies.

And second, the data needs to be as accurate as possible, so that data can be aggregated on larger scales, NUTS 3 for example. Raster squares of 100x100 m as in CLC are one solution to this problem, but others exist as well.

It is therefore important for future territorial research to continue regular monitoring of the European territory with the help of core territorial indicators on the one hand, but on the other hand also to extend the use of these indicators to smaller geographical scales.

It is expected that in the near future demand and importance of statistical information associated with geographical data at all scales will increase strongly. Existing data gaps are a major obstacle for a broader use of geo-data in statistics.

The work done in the chapter D developing the territorial indicators has highlighted the uncertainty of our knowledge in many areas of the environment and the impact of EU territorial policies on it. The issues for which no core indicators could be identified require further conceptual development. For example, more research is required into the question of biodiversity, in order to improve the test assumptions and the ecosystem monitoring, without keep in mind the problems of copyright detected.

All indicators need to be reviewed continually to improve definition, usage and interpretation.

Several of the core indicators identified in this report require further development before they can be fully implemented. Further development may relate to data collection techniques or other methodology or interpretation issues.

Some concrete proposals for future territorial indicators can be found in Section 3 of Chapter D and in Annex 4.

Research objective 12: Extend the existing ESPON database with data for regular time series, for instance each 5 or 10 years. Efforts should also be made to ensure regular time series from other sources. This would allow displaying the dynamics of territorial development.

Relevant spatial level: EU level

Research objective 13: Stimulate the Member States to implement research based on ESPON indicators also on smaller geographical scales, e.g. on NUTS 5 level.

Relevant spatial level: EU level, national level, regional/local level

3.3 Access points

Although diverse sources of information were used in the project, the main ones were related to the documents or data issued by the European Commission. This is on the one hand the consequence of the fact that the project is deeply embedded in a certain EU policy context and on the other hand the consequence of the need for EU level data. ESPON programme and DG Environment have proven to be important sources of both qualitative as well as statistical information.

For case studies a number of national sources were crucial as well in terms of data, but even more as a methodological reference point.

A detailed list of access point is added in the references.

4 Conclusions and recommendations

General conclusions

The project tried to answer the questions, how does EU environmental policy affect territorial development and what are the territorial impacts of EU environment policy? Are they positive or negative?

The case study work has shown that it is not possible to simply talk about positive or negative effects of EU environmental policies. The reason is that policies have different effects in different areas – not only in regard to Europe as a whole but also within a region or even a community. A certain policy (e.g. water policy) may have positive effects on territorial quality and territorial identity and at the same time negative effects on territorial efficiency. Of course, the positive effects may be much larger than the negative effects and thus lead to an overall positive effect.

However, it has to be acknowledged that positive and negative effects are not equally distributed over time and people. As e.g. the water policy has shown, the negative effects occur immediately after implementation of the management plans whereas the positive effects only become visible after a longer time period (sometimes many years). Further, those people who have an advantage of a certain policy are – as a rule – not the same as those who have disadvantages (e.g. water policy leads to advantages for the tourism sector but to disadvantages of the agricultural sector).

These negative side effects of EU environmental policies should be stronger taken into account for future policy making, e.g. by flexible and tailor-made funding transitional periods and/or those actors who will have a burden due to the policy.

Such kind of integrated policy would help not only to absorb negative territorial effects but also to enhance the acceptance of environmental policies in general, as the contacted stakeholders in the Emsland case study confirmed.

Two dimensions have to be distinguished: (1) scientific dimension: methodology of assessing territorial impacts against certain objectives, (2) political dimension: normative decisions of defining/setting goals of territorial development. This means that TIA results may differ over time, depending on changing objectives.

TIA methodology

In planning practice as well as in spatial planning theory, exist very few examples of Territorial Impact Assessments. Besides ESPON projects, which in most cases broke new ground in the field, examples of assessments of policy impacts on spatial development were only found in Netherlands (Ruimtelijk Planbureau 2004) and Slovenia (UPIRS 2005). No standard methodology has been established so far neither in ESPON nor elsewhere, so the methodology developed by project 2.4.1 broke new ground in this respect.

The results of the TIA application in the case studies in combination with qualitative interviews have shown that the TIA approach produces plausible results. The results from TIA-analysis made for EU nature and biodiversity policy at EU-level seem to be potentially important in terms of designing future policies. It has become obvious that the territorial effects of nature policy differ seriously between the different regions. This calls for a more regionalised approach of EU policies in general and may serve in detail for a justification of exceptions from the envisaged environmental goals in economically negatively affected regions.

However, it became obvious that it is difficult to assess possible future effects with indicators because obviously there are no data available unless a policy or a plan is implemented. In this context, the TIA approach should be complemented by other methods like scenarios or simulation games. Especially simulation games with participation of stakeholders that are aware of implementation practice have the potential to show the complexity and possible hindrances of the implementation. An example of such an approach is the simulation game of the SEA Directive implementation in context with regional planning in North Rhine Westphalia in 1998 (UVP-Gesellschaft 1999).

Still, we are far away from a common TIA methodology for all policies. A common TIA framework should be developed the future and its application in planning practice should be systematically tested in order to guarantee comparable results.

EU environmental policies

Although (negative) territorial effects often are already obvious from the beginning of a new policy initiative, they are often not communicated well enough to regional and local stakeholders and the public – not only at the EU level but also at the national level. This often leads to disapproval of policies, often enhanced by public opinion and media campaigns. An early

information policy including the presentation of complementary and compensation measures like funding possibilities to absorb negative effects would help to avoid many typical implementation problems.

The setting up of requirements for the implementation of Directives shall take into account the difficulties of administrative and political practice. E.g. deadlines for taking into account objections against river basin management plans shall be adapted to time spans that are realistic for political decision-making, i.e. enough time shall be given for the communication and persuasion process. In this case, stakeholders shall have more flexibility in the implementation process. On the other hand it is important to set common standards (e.g. quality standards, standards how to measure and assess water quality) in order to guarantee that policies are implemented similarly, especially in neighbouring areas.

One positive side-effect of EU environmental policies is that stakeholders are forced to think about alternatives in those cases where an environmental policy restricts development projects (e.g. infrastructure projects). In some cases, this has lead to leave the beaten track and to find innovative solutions, which at the same time also have a better economic effect.

ESPON perspective

The project adds to the ESPON programme a few valuable new aspects. First, it contributed to the development of TIA methodology in general and specifically assessed the territorial impacts of EU environment policy. Different case studies offered a valuable input in this respect, testing the application of the methodology in diverse territorial contexts. Downsides of the TIA methodology have also come to the fore; wide sets of indicators are needed (depending on the test case) in order to reach minimum reliability of results.

Second, the project mapped some environmental trends. For this, it developed a number of new territorial indicators and a few territorial typologies. Some of these perhaps have the potential to become part of the core set of indicators. The results of each map are interpreted as well and through comparison with other ESPON results some causal relationships can perhaps be revealed.

Of course a lot more research is needed to get a reliable picture about territorial effects of environment policies but also to monitor some main environmental trends.

Outlook

As discussed earlier in this chapter, TIA can be a valuable tool for supporting policy-making in the field of environmental policies as well. Still, it needs to be decided where and when should such TIA be applied.

Considering positive and negative aspects of TIA discussed in section 2.2 of this chapter, we can say that due to its flexibility and unbiased character TIA obviously has the potential to become a useful tool for ex-ante assessment of policies. One of the more realistic but ambitious outlooks is the integration of TIA approach into the EU policy impact assessment guidelines. In this way the unnecessary duplication of impact assessments would also be avoided.

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