

Territorial Trends and Policy Impacts in the
Field of EU Environmental Policy - ESPON
2.4.1

INTERIM REPORT



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Edited by

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

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List of Abbreviations

6 th EAP	6 th Environmental Action Programme
CAFE	Clean Air For Europe
CAP	Common Agricultural Policy
CDM	Clean Development Mechanism
CLC	Corine Land Cover
ECCP	European Climate Change Programme
EIA	Environmental Impact Assessment
EPI	Environmental Policy Integration
ESDP	European Spatial Development Strategy
ESPON	European Spatial Planning Observation Network
EU	European Union
FFH	Flora, Fauna, Habitat (Directive)
GMES	Global Monitoring for Environment and Security
GMO	Genetically Modified Organism
ICZM	Integrated Coastal Zone Management
INSPIRE	Infrastructure for Spatial InfoRmation in Europe
ISA	Integrated Sustainability Assessment
IUCN	International Union for the Conservation of Nature and Natural Resources
JI	Joint Implementation
NUTS	Nomenclature of Territorial Units for Statistics
RDP	Rural Development Policy
RDR	Rural Development Regulation
SEA	Strategic Environmental Assessment
TEN	Trans-European Networks
TIA	Territorial Impact Assessment
TIM	Territorial Impact Model
TPG	Transnational Project Group
WFD	Water Framework Directive

Summary

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 ESPON 2.4.1 project is envisaged to present 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. It should give proposals on feasible Territorial Impact Assessment (TIA) of EU Environmental Policy based on test studies related to at least three major elements of European environmental policy. The ESPON project 2.4.1 should also give 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.

This interim report presents a literature review as well as scientific achievements in relation to the territorial dimension of environmental development and policy (chapter A). The interim report gives an overview of elements of EU Environment Policy and their spatial and territorial context. Based on terms of reference the relevant elements of EU Environmental Policy are prioritised and compiled (chapter B). The main outcome of the interim report is the presentation of the TIA methodology of EU Environmental Policy. The application of proposed TIA methodology is presented by three selected EU Environment Policies: Civil Protection and Environmental Accidents, Nature and Biodiversity and Water (chapter C). The interim report presents also the relevant European wide indicators and datasets related to EU Environmental Policies affecting the EU Territory as well as the key maps envisaged related to the territorial situation and trends within environmental sector (chapters D and E). The interim report also shortly discusses on the first ideas concerning recommendations and proposals for future applied research integrating the environmental dimension in territorial analysis (chapter F). Finally the first interim report presents the four case study areas to be investigated within the ESPON 2.4.1 project (chapter G).

Review on EU Environmental Policies

The goals for European spatial development are based on the over-all European aims of sustainable development and social and economic cohesion. This requires a balanced and sustainable spatial development between economic, social and environmental objectives. At the same time the territory of the European Union covers a large cultural variety, local and regional identities that must be retained. In this context the European spatial development perspective (ESDP) proposes to

"examine periodically and systematically the spatial effects of [European Community] policies" including EU Environment Policy.

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 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 the Strategic Environmental Assessment, the Habitats and Birds Directives, the Water Framework Directive and the Framework Directive on Air Quality. These elements are covered by the ESPON 2.4.1 project test cases. Only the Framework Directive on Air Quality has been excluded from a deeper analysis in this project.

EU Environmental Policy Areas of Potential Interest

EU Environmental Policy covers a large variety of policy areas. In some of these areas, the environmental strategies have an explicit spatial dimension and therefore are in the range of the ESPON Programme research agenda. The ESPON 2.4.1 project gives an overview of EU Environmental Policy and produces a prioritised compilation of elements of EU Environmental Policy, which are spatially/territorially relevant in the ESPON context. The EU Environmental Policy areas, as presented by the DG Environment are: Air, Biotechnology, Chemicals, Civil Protection and Environmental Accidents, Climate Change, Environmental Economics, Environment and Enlargement, Health, Industry, International Issues, Land Use, Nature and Biodiversity, Noise, Soil, Sustainable Development, Waste, and Water. For the ESPON project 2.4.1 only those policy areas are of potential interest that at least reach a moderate territorial relevance and explicit spatial planning dimension. There exist specific differences in the spatial dimensions the respective policy claims can be observed, i.e. site, network, area-wide and cross-sectoral. The ESPON project 2.4.1 has selected one policy from each of the spatial dimensions for the assessment of territorial impacts. Civil Protection and Environmental Accidents Policy represents the site-specific spatial dimension, Nature and Biodiversity the network dimension, Water Policy the area-wide dimension and for the cross-sectoral dimension Strategic Environment Assessment Directive is studied.

Territorial Impact Assessment (TIA) Approach

The methodology for the territorial impact assessment of EU Environmental Policies is designed in a way that ESDP policy options can be operationalised. The methodology developed in the ESPON project 2.4.1 has concentrated on the impact on territorial cohesion in its three dimensions as identified by the ESPON project 3.2. These policy options can be seen as an assessment basis for the application of the territorial impact assessment method. The methodology takes into account the following principles: **three-level-approach** as the appropriate typology group for the analysis of environmental policies, TIA **minimum requirements** as shown by ESPON 3.1 project, and **further development** of a TIA methodology.

The TIA methodology that is suggested by the ESPON 2.4.1 project has – similar to the methodological framework suggested in the ESPON project 3.2 framework – two levels:

1. On the first (or general or European or abstract) level basic connections and influences between policies (e.g. environmental policies), territorial trends (e.g. socio-cultural, economic, transport etc.) and territorial objectives (in the first instance territorial cohesion that has been divided into three elements, territorial quality, efficiency and identity, by the ESPON 3.2 project) are identified and quantified. This approach follows the three phases of scoping, analysis and finally assessment. This first level has been described by project 3.2 as “potential impact (PIM)”. This assessment is done against the goal of territorial cohesion.
2. On the second (NUTS3 level) 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 “Territorial impact model for assessing the impact on single regions (TIM)” by the ESPON 3.2 project.

The first step of PIM is to recognize the elements of policy that might have regional aspects. These can be subdivided if the overall environmental policy has several implementation options that regions can choose.

These key policy elements are classified according to their implementation phase. Category A includes existing policy instruments, category B the policy elements that are in implementation phase and finally category C those policy elements that are under regulation development in the EU level. The policy elements can be further divided into three classes according to the policy impact mechanism. **Regulatory elements** are the policy elements consisting of specific rules included in national laws (EU ordinances and directives). **Funding mechanisms** are the mechanisms that support the policy development (structural funds, special funding programmes like LIFE, solidarity fund etc.). **Others** should be described more in detail if relevant for a certain cause effect chain.

As a first stage or scoping phase, the impacts of the several environmental policy elements on certain trends are identified. Here, two kinds of development trends have to be distinguished: **General territorial trends** as defined by the ESPON project 3.2 (Territorial quality, Territorial efficiency, Territorial identity) and **specific environmental trends** related to each of the three chosen environmental policy sectors (the three “test cases”). The policy elements can have increasing or decreasing effect on a trend that can, in turn, have a positive or negative impact on a territorial objective. This assessment can be described through cause-effect chains for three main policy elements: Civil Protection and Environmental Accidents, Nature and Biodiversity, and Water. The application of TIA approach will be studied more detailed within the case study areas.

Indicators and Maps

The relevant European wide indicators and datasets related to EU Environmental Policies affecting the EU Territory have been studied. A set of criteria has been established to select the main indicators and datasets useful to define the new relevant indicators. There should be data available for the development of the indicators. The spatial coverage should be good, i.e ESPON space and there should also be possibility to combine spatial and statistical information. Three examples of possible indicators are presented: increase of protected sites due to Natura 2000, impact of afforestation on soil erosion and desertification and urban growth. Based on that Natura 2000 and Corine Land Cover data sets are suggested as key map elements for the ESPON 2.4.1 project.

Recommendations and Proposals for Future Applied Research

It is more a requirement than a recommendation for future applied territorial research to integrate the environmental dimension in territorial analysis. 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 results of the qualitative and quantitative analysis and especially the application of the TIA in the three case studies will enable the ESPON 2.4.1 project to formulate policy recommendations which at the same time have to be reflected against the objectives in existing policy documents.

At EU-level 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. The Environmental Policy Integration (EPI) suggested by European Environment Agency (EEA) 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." This approach is suggested to be adapted on all three spatial levels. It is also recommended to use in future the Impact Assessment 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. As a kind of ex ante assessment of policy proposals, the Strategic Environment Assessment (SEA) can be understood as an important element of an EPI in context of spatially relevant decision-making.

At trans-national level there are only a few from the instruments that could contribute to a better coherence between different policies available directly, but it is exactly at this level where policy coherence is the natural way to develop policies aiming at "integration of economic, social and environmental considerations so that they are coherent and mutually reinforce each other". One of the issues to be investigated in the future is therefore to what extent trans-national initiatives by itself represent a tool that EU could exploit in order to achieve better coherence between policies.

Most of the legislative instruments of environmental policies are effectively dealt within the Member States, i.e. at national level. It is acknowledged in this context that the Member States have different legislative systems and also different administrative culture and practices. 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.

The 3rd Cohesion Report contains a special chapter about the given perception of Community policies at the regional level. In general, the positive contribution of integrating environmental considerations into regional development policy was acknowledged, as was, in particular, the requirement for stricter norms. Furthermore, the cohesion report points out, that in nearly all cases, the close relationship between environmental and cohesion policy was emphasised as well as the positive synergy between the two policies. In view of these observations, research is needed in order to find appropriate ways to communicate the objectives, existing funding options and mutual benefits for regional and local stakeholders from the early beginning of a legislative procedure.

Chapter A – Literature Review

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1 Review of 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 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 the Strategic Environmental Assessment (SEA), the Habitats and Birds Directives and the Water Framework Directive (WFD) (European Commission 2005a). 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 chapter B 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" (EC 2005) have to be mentioned in context of environmental policy. This 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 policies 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 in the development of spatially relevant EU policies (e.g. in expert groups)” is clearly visible in order to avoid unwished negative impacts of environmental policies on territorial development. This policy goal 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:

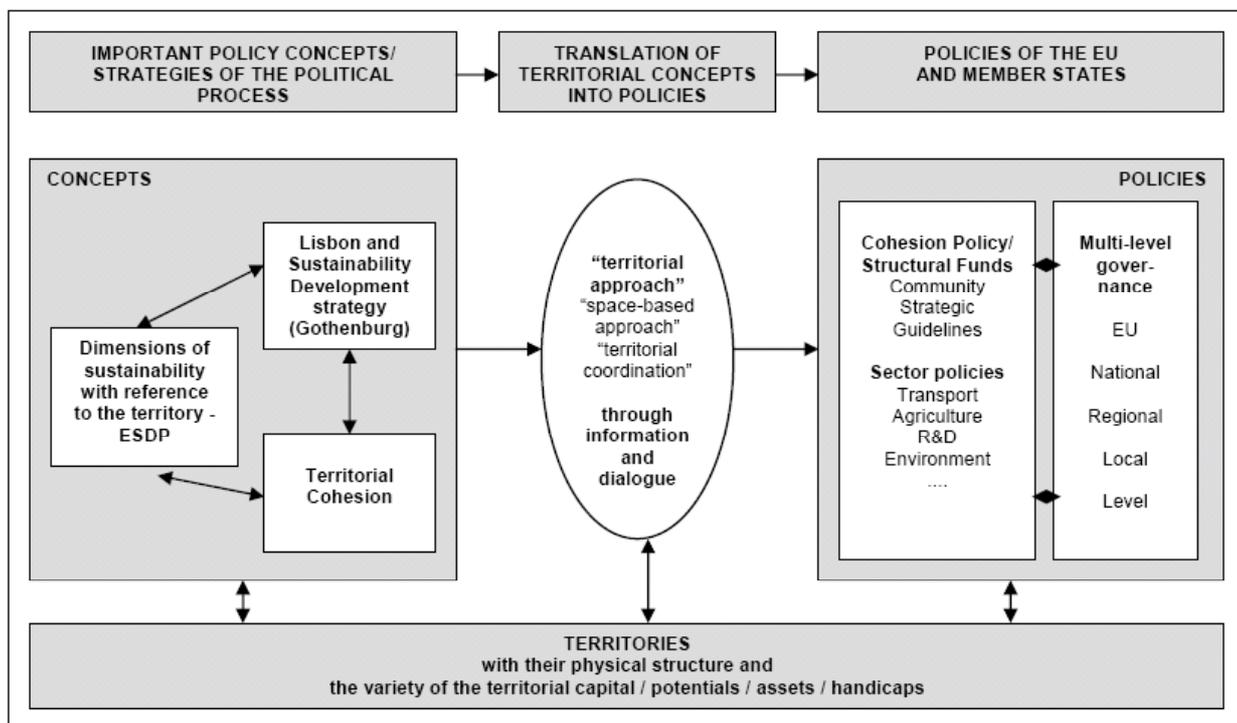


Figure 1 Territorial concepts translated into EU policies (source: European Commission 2005a)

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 persuasively that several aspects of the ongoing union's spatial development could lead to a more unbalanced and not-sustainable Europe and "affect the overall competitiveness of the EU economy" (p. 28). For that reason it becomes clear, why a balanced territorial dimension has been seen as crucial for Europe's future.

In particular the following aspects have to be taken into account:

- The high concentration of economic activity in the Pentagon area;
- The persistence of economic imbalances between metropolitan areas and the rest of the countries;
- At regional level a number of territorial disparities, such as urban sprawl on the one hand and a tendency to falling population and a decline in the availability of basis services in peripheral rural areas and certain, disadvantaged parts of cities on the other hand.
- Areas constrained by their geographical features (islands, ultra peripheral regions, mountainous regions). Especially this aspect can be seen as rationale for the ESPON 2.4.1 project.

In particular 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 2005a). 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 Union 2005b, p. 36).

The 3rd Cohesion Report (European Union 2005b) states that environmental problems are particularly 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.

The 3rd Cohesion Report addresses in the context of part 3 "Impact of Community policies: competitiveness, employment and cohesion" environmental protection for sustainable growth (pp. 120ff) and refers mainly to the 6th Environmental Action Programme.

1.3 The Lisbon Strategy

The strategy was adopted in 2000, and re-launched by the EU Council in 2005 in order to refocus priorities on growth and employment. 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 3 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.

1.4 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." Moreover, the commission clearly proclaims that "the concept of territorial cohesion extends beyond the notion of economic and social cohesion, its objective being to help achieve a more balanced development, to build sustainable communities in urban and rural areas and to seek greater consistency with other sectoral policies which have a spatial impact. This also involves improving territorial integration and encouraging cooperation between and within regions." In particular this document has to be understood as an appeal for cooperation on all spatial scales, since a multi-disciplinary or integrated approach is needed for improving territorial cohesion.

It is quite remarkable that the commission obviously agrees on one of the main results of the ESPON programme, that there is a lack of the territorial dimension of the several sector policies. The new Community Strategic Guidelines for 2007-2013 pay attention to the territorial dimension of cohesion, since "one of the determining features of cohesion policy - by contrast with sectoral policies - is its capacity to adapt to the particular needs and characteristics of specific geographical challenges and opportunities." (European Commission 2005a)

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.

Moreover, the guidelines argue, that the presently existing attractive conditions for businesses and their highly-skilled staff have to be secured by promoting land use planning which reduces urban sprawl, and by rehabilitating the physical environment, including natural and cultural assets. Again, an important contribution of biodiversity to territorial development can be seen.

Chapter 5 of the Community Strategic Guidelines focuses on the territorial dimension of cohesion policy, which is defined as cohesion policy's "capacity to adapt to the particular needs and characteristics of specific geographical challenges and opportunities."

The concept of territorial cohesion extends beyond the notion of economic and social cohesion. Its objective seeks for a more balanced development, to build sustainable communities in urban and rural areas and to aim at greater consistency with other sectoral policies which have a spatial impact. Therefore, territorial cohesion is from particular relevance for the territorial dimension of EU environmental policy.

In urban areas, the relevance of the rehabilitation of the physical environment, redevelopment of brownfield sites is pointed out in order to create the infrastructures necessary for sustainable economic development.

Cohesion policy can also play a key role in support of the economic regeneration of **rural areas**, complementing the actions supported by the new rural development fund. For cohesion policy, action in favour of rural areas should contribute to ensuring a minimum level of access to **services of general economic interest** with a view to improving conditions in rural areas that is needed in order to attract firms and qualified personnel and to limit emigration.

The territorial dimension of environmental policy becomes clear in this context by emphasising that "Actions should take advantage of, and seek to preserve natural and cultural assets which can have important positive spin-offs by protecting habitats and supporting biodiversity."

This aspect is obviously gathered from the 3rd cohesion report, part 1 "territorial cohesion" (Development priorities for regions geographical handicaps, p. 35): "The economic development of these sensitive areas, therefore, even more than elsewhere, must take account of the need to safeguard the environment, which means not only integrating this priority into the investment decision-making process, but also, wherever possible, searching for options which both improve the environment and strengthen regional competitiveness."

In the context of 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) for 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.

1.5 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.

The 6th EAP consists of four broad elements, which have to be considered for the test cases that are chosen for this project:

- effective implementation and enforcement of environmental legislation;
- integration of environmental concerns into other policies, including infrastructure and land use planning;
- use of a combination of means to achieve ends in the most efficient and effective way
- and wide stakeholder involvement in the development and implementation of policies.

Especially the connection of environmental concerns and sectoral policies is a task of high importance 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.

However, this territorial dimension is not limited to the potential impact on decision-making in sectoral policies. The 3rd Cohesion Report refers also to the ability of influencing territorial development through funding (p. 120): "The Structural Funds, therefore, have a clear potential role to play in helping these [less prospered] countries comply with EU environmental policy." In particular the following statement contains a clear message concerning the relevance of environmental policy for cohesion: "It is, therefore, important that the objectives of the Environmental Action Programme and the requirements of environmental legislation are taken into account in structural interventions across the EU."

1.6 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." (EU Commission 20002a, p. 37). 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 and underlines it with 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 revision process should be completed later in 2005 with the adoption of the revised 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." (EU 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. (EU 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.

The strategy addresses the most serious threats to sustainable development in Europe and the world; the so-called "unsustainable trends":

- Climate change, public health, transport, land-use, management of natural resources, the challenges of an ageing society as well as poverty and social exclusion.
- A sound environmental management is hence one of the underlying pillars of sustainable development.

1.7 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. In the ESDP (p. 17) the following environmental policies are regarded to contain provisions, which put particular emphasis on direct or indirect links with spatial development and, in particular, land use:

- EU-wide designation of protected areas ("Natura 2000"),
- EC Nitrate Directive which aims at reducing existing nitrate pollution from agricultural land and preventing further ground water pollution,
- Directive 85/337/EEC, which stipulates that environmental impact assessments for large projects have to be carried out and published,
- Defining quality standards for areas close to natural surroundings,
- Regulations aiming at reducing emissions,
- Integrated Coastal Zone Management (ICZM) which promotes sustainable management through co-operation and integrated planning, involving all the relevant players at the appropriate geographic level,
- Legislation on waste and water treatment, noise and air pollution; limits that can have direct impacts on urban development and industrial areas,
- Environment policy requirements are becoming important locational factors when it comes to setting up or relocating businesses and therefore may have considerable implications from an economic point of view.

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 can be seen as helping to implement the more general goals of the European Union like mentioned above.

Further environmental policies, laid down e.g. in the Water Framework Directive (WFD) or the SEA Directive are also important in this context. The rationale of the WFD has been already introduced by the ESDP, part 3.4.3 ("Water Resource Management – a Special Challenge for Spatial Development"). It is from particular interest, that the ESDP has indicated explicitly the spatial relevance of water management.

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). In particular, 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.

1.8 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. 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).

1.9 Commission Guidelines on Impact Assessment

The European Commission has been developing guidelines for assessing the future consequences of policies in different areas. 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. The new Impact Assessment process, which is set out in the Commission's Communication COM(2002)276 of 5 June 2002 on Impact Assessment, integrates the following aims (European Commission, http://europa.eu.int/comm/secretariat_general/impact/index_en.htm):

1. to consider the effects of policy proposals in their economic, social and environmental dimensions and
2. to simplify and improve the regulatory environment.

Impact Assessment is applied to major Commission proposals, i.e. those listed in its Annual Policy Strategy or its Work Programme, be they

- regulatory proposals
- other proposals having considerable economic, social and environmental impacts;
- proposals having a major impact on particular groups;
- proposals representing a major change or policy reform. The latter include proposals such as white papers, expenditure programmes, communications on policy orientations and negotiating guidelines for international agreements (European Commission, http://europa.eu.int/comm/secretariat_general/impact/index_en.htm).

The following documents are of relevance in the area of the Commission's Impact Assessment policy (European Commission, http://europa.eu.int/comm/secretariat_general/impact/key_en.htm):

- *Communication 2002*: In this Communication the Commission establishes a new integrated method for impact assessment, as was agreed at the Göteborg and Laeken European Councils. Impact Assessment is an action of the Better

Regulation Action Plan and of the European Strategy for Sustainable Development. It contributes to an effective and efficient Regulatory Environment and, with regard to the economic, social and environmental dimension of sustainable development, to a more coherent preparation of EU decision-making.

- *Report 2004:* This report summarises the Commission's assessment of how the Impact Assessment process is working and outlines the steps that the Commission intends to take in order to improve current practice.
- *Communication 2005:* In this Communication the Commission sets out key action lines, while ensuring coherence with the ongoing action for better regulation.
- *Commission Guidelines on Impact Assessment:* As of 15 June 2005 the Commission's internal Guidelines on Impact Assessment have been updated following a stocktaking exercise in 2004. The thoroughly revised document provides 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. These new Guidelines replace the "Impact Assessment in the Commission - Guidelines" and "A Handbook for Impact Assessment in the Commission - How to do an Impact Assessment".

The following table gives an overview of the impact assessments that have been carried out by DG Environment or which cover areas that touch EU environmental policies.

Table 1 Overview of impact assessments with an environmental focus carried out 2003-2005 (source: European Commission 2005d)

Lead DG	Date	Title	Impact Assessment	Proposal
ENV	2005/10/24	Thematic Strategy for the protection and the marine environment	SEC(2005)1290	COM(2005)504
ENV	2005/09/21	Thematic Strategy on Air Pollution	SEC(2005)1133	COM(2005)446
ENV	2005/04/06	Council Regulation establishing Community financial measures for the implementation of the Common Fisheries Policy and in the area of the Law of the Sea	SEC(2005)426	COM(2005)117
ENV	2005/04/06	Council Regulation establishing a	SEC(2005)439	COM(2005)113

		Rapid Response and Preparedness Instrument for major emergencies		
REGIO	2005/04/06	Regulation of the European Parliament and of the Council establishing the European Union Solidarity Fund	SEC(2005)447	COM(2005)108
ENV	2005/01/28	Mercury Strategy	SEC(2005)101	COM(2005)20
ENV	2005/	Communication on Winning the Battle against Global Climate Change	SEC(2005)180	COM(2005)35
ENV	2004/07/23	Directive establishing an infrastructure for spatial information in the Community (INSPIRE)	SEC(2004)980	COM(2004)516
ENV	2004/07/15	Communication on financing Natura 2000	SEC(2004)770	COM(2004)431
ENV	2004/06/09	Environment & Health Action Plan	SEC(2004)729	COM(2004)416 vol. 1 + vol. 2
ENV	2004/02/25	Environment & Standardisation	SEC(2004)206	COM(2004)130
ENV	2003/11/24	Directive on batteries and accumulators	SEC(2003)1343	COM(2003)723
ENV	2003/11/24	Directive on batteries and accumulators	SEC(2003)1343	COM(2003)723
ENV	2003/10/29	Framework Legislation on Chemical Substances (establishing REACH)	SEC(2003)1171	COM(2003)644
ENV	2003/10/29	Framework Legislation on Chemical Substances (establishing REACH)	SEC(2003)1171	COM(2003)644
ENV	2003/10/06	Directive of the European Parliament and of the Council concerning groundwater protection	SEC(2003)1086	COM(2003)550

ENV	2003/07/23	Legislation on the Kyoto flexible instruments Joint Implementation (JI) and Clean Development Mechanism (CDM)	SEC(2003)785	COM(2003)403
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Further explanations concerning territorial and environmental impact assessment approaches can be found in Chapter C, sub-sections 1 and 2.

2 Review of ESPON Programme

2.1 ESPON 1.2.1 Project

The ESPON 1.2.1 project "Transport services and networks: territorial trends and basic supply of infrastructure for territorial cohesion" was expected to make further contribution on the major ESDP concept of "parity of access to infrastructure and knowledge", understood as a guideline promoting territorial equity and a more balanced development. (ESPON project 1.2.1 2005)

Transport policy

The project identifies major transport policy objectives that have been expressed from the Commission point of view in the White Paper called "European transport policy for 2010: time to decide". In this document the Commission stressed a number of orientations and delimited its domain of intervention. The intention was to launch a new step in European transport policy, in order to progress in the direction of liberalisation and harmonisation, with a **special focus on environmental impacts and sustainable development**.

One of the inevitable steps towards the bridging of transport and spatial policies that is emphasized in the project is a **new definition of long-term decision-making process**. This one takes place in a context where different institutional actors must cooperate at European, national, regional or local level. Consultation of associations and groups of citizens is required, bringing more transparency and democracy in the process. Therefore, it is important to define new tools according to these objectives and context. **This makes a strong case for the concept of TIA as proposed in the ESDP.**

The project emphasizes several aspects, stemming from past experience, which can help each of the actors to better understand its role in the implementation of a more comprehensive policy:

- Importance of the definition of a common scenario of reference from which different policy options can be derived: this will concern socioeconomic environment and transport projection associated to it;
- A robust segmentation of the transport demand including a distinction between local, national, international and intercontinental traffic;
- An analysis of the performances of the transport operating system, in complement of the analysis of the quality and capacity of existing infrastructures;
- A specific description of intermodal transport chain including the location and performances of the nodal points so that terminal leg of transport can be associated to long haul transport;
- And finally a good visualisation of the results with GIS tools so that dialogue and consensus can be obtained on solid, convincing grounds.

These aspects represent also **a reference for a TIA approach** with specific focus on transport issues.

Indicators

A major part of the report consists of describing the transport system through indicators and maps. The indicators are presented in a way that follows the logic of transport modelling and later uses the results of the models in combination with regional data. **Issues of environmental policies are considered in a section dedicated to transport externalities, but indicators on traffic volumes and flows also present an important input for environmental considerations.**

Transport externalities indicators

Transport is facilitating social and economic relations and, at the same time, generating environmental externalities that reduce and constrain the capability of a given region to attract new activities, as well as to some extent the productivity of the already existing activities. Major externalities identified by the ESPON project 1.2.1 are accidents, emissions, land occupation, land fragmentation as well as energy consumption and noise exposure.

The project proposes and maps three indicators with regard to transport externalities that only partly cover the major identified externalities:

- Number of tons of goods going through nodes and edges

This indicator underlines the importance of each node in terms of flows exchanged. It completes maps and indicators based on flow by edge by supplying a nodal interpretation of these values. The role of crossroads node is reinforced. It is a first

step to evaluate the externalities by measuring the level of goods' transport (contamination, traffic jam etc.)

- Transit flow per area

The transit flows are often considered damaging in the areas concerned because people suffer from pollution problems of the traffic, which does not bring benefits to them. The choice was to only consider transit flows instead of all international flows.

- Emission of air pollutants

This indicator gives an idea of the level of pollution induced by freight transportation. Taking into account the flows of trucks and the characteristics of their emissions of air pollutants, it is possible to express the importance of this negative externality. It is successively expressed in a network logic (i.e. by edges) and in a spatial logic (i.e. by NUTS2).

Traffic volume indicators

Traffic indicators capture the actual use of the transport infrastructure networks and services. There are five types of traffic volume indicators: transport quantities, traffic on links and traffic in terminals, and also indicators describing the environmental effects of traffic in terms of consumption of natural resources and pollution as well as indicators describing transport safety.

Table 2 Existing traffic volume indicators (source: ESPON project 1.2.1 2005)

Indicator type	Samplers indicators
Transport quantities	km per person per mode by purpose km per ton by goods type per mode modal split (passenger and freight)
Link traffic	Traffic on roads by vehicle type Number of trains and passengers on rail links Number of passengers and freight, cars and lorries on ferries
Terminal traffic	Traffic volume (passenger and freight) of airports Traffic volume (passenger and freight) of ports Traffic volume (freight) in intermodal terminals
Energy consumption and pollution	Consumption of mineral oil products by link and by region Emission of green house gases by link and by region Emission by pollutant by link and by region
Transport safety	Number of persons killed by mode Number of persons injured by mode

Traffic flow indicators

Traffic flow indicators are different from traffic volume indicators as they always include origin and destination, i.e. the relationship between two different points in space.

Table 3 Existing traffic flow indicators (source: ESPON project 1.2.1 2005)

Indicator type	Sample indicator
Traffic flow	Passenger flows by user type, trip purpose Trade/goods flows by type of good

In the end it has to be noted that much of the data used in the project for mapping the indicators is not the actual data but modelled data. Unfortunately **very little data on actual transport flows and traffic volumes is available on a European scale**, so the project team complemented that with data from models. The back side of this approach is that reliability of such data is much more limited, which has to be considered in further use of it.

2.2 ESPON 1.3.1 Project

ESPON 1.3.1 project "The spatial effects and management of natural and technological hazards in general and in relation to climate change" has studied the spatial patterns of natural and technological hazards in Europe as an overview on all NUTS 3 areas and has identified possible impacts of climate change on selected natural hazards. The approach of the project was to use existing results of hazard research and to combine those in such a way, that the obtained information is comparable over the entire ESPON area. The natural and technological hazards that are relevant for the ESPON context were selected by specified risk schemes. The so-called spatial filter was applied to selected risks, i.e. selected hazards have to be relevant for spatial planning concerns. The occurrence of spatially relevant hazards is limited to a certain disaster area that is regularly or irregularly prone to hazards (e.g. river flooding, storm surges, volcanic eruptions). Spatially non-relevant hazards can occur more or less anywhere (e.g. car accidents, meteorite impacts).

Vulnerability and Risk

In order to determine a risk factor, the project has acknowledged damage potential and coping capacity as the two main sides of regional vulnerability. The definitions of risk and vulnerability are given below.

Risk: A combination of the probability (or frequency) of occurrence of a natural hazard and the extent of the consequences of the impacts. A risk is a function of the exposure of assets and the perception of potential impacts as perceived by a community or system. **Risk = Hazard potential x Vulnerability**

Vulnerability: Vulnerability is the degree of fragility of a (natural or socio-economic) community or a (natural or socio-economic) system towards natural hazards. It is a set of conditions and processes resulting from physical, social, economical and environmental factors, which increase the susceptibility of the impact and the consequences of natural hazards. Vulnerability is determined by the potential of a natural hazard, the resulting risk and the potential to react to and/or to withstand it, i.e. its adaptability, adaptive capacity and/or coping capacity. The overall regional vulnerability is thus measured as a combination of damage potential and coping capacity. The following formula is used: **Vulnerability = Damage potential + Coping capacity**

For both damage potential and coping capacity a set of indicators was chosen. The three dimensions of vulnerability are embedded in either damage potential or separate indicators measure coping capacity and each dimension. The basic criteria for choosing the indicators was that they should cover the range of all three vulnerability dimensions, as well as both damage potential and coping capacity.

Hazard Clusters

Hazard clusters shows the regions in Europe that are affected by certain areas. Main clusters which could be the basis for special policy recommendations and spatial planning response are among others coastal areas, Alpine areas, Mediterranean areas, river valleys, tectonic active zones and the Pentagon Area. These clusters and findings can be used when investigating the territorial trends of natural and technological hazards in European regions.

The report shows the spatial picture of natural and technological hazards that pose challenges for balanced and sustainable development in Europe. Regions are exposed to hazards in varying degrees, placing them in different "risk positions". The EU Policy instruments should be needed. The report therefore presents some policy recommendations and a proposal for a handbook for spatial planning and risk assessment. contribute to even out these differences as a matter of European solidarity. Overall, better inclusion of risks related to natural and technological hazards in EU policies is

Risk Management

Among the policy recommendations some are especially valuable and useful also for the ESPON 2.4.1 project, e.g. coordination of Structural Funds for risk management, implementation of the recommendations of the 6th Environmental Action Programme in broadening the scope of the SEVESO II Directive (Directive 1996/82/EC), ensuring the effective implementation of the Strategic Environment Assessment Directive (Directive 2001/42/EC), enhancing the use of the WFD (Directive 2000/60/EC) for integrating land use planning and water resources management.

2.3 ESPON 1.3.2 Project

In ESPON 1.3.2 project "Territorial trends of the management of the natural heritage" The thematic scope of the project has been on **natural heritage as an essential part of the environmental assets of each country**. As the value of (bio) diversity has been recognized by the EU policies, such heritage should not only be preserved but also creatively managed. This includes also recognition and integration of natural assets into development strategies. Another starting point was the European Landscape Convention, which states that the landscape contributes to the formation of local culture and is a basic component of the European natural and cultural heritage, promoting the consolidation of the European identity. Landscape is also an important part of the quality of life of different areas of the European continent.

Analysis

The project recognizes the European physical structure as a source of geomorphologic, natural and cultural differences, as well as a basis in terms of natural heritage. Among the territorial trends, which are seen as a threat as well as a challenge to nature, the following are discussed in detail: **agriculture, forestry, urbanization and tourism**. Methodologically the analysis of territorial trends leans on **DPSIR framework** (Driving Forces, Pressures, States, Impacts and Responses), pointing to complex links between causes and effects.

According to the project the role of natural heritage includes all the habitats and species in existence throughout Europe. **The general state of the environment is therefore a precondition of the management of the protected areas**. Themes that are dealt with regarding natural heritage include **landscapes, natural values, species diversity and species richness as well as fragmentation of natural heritage**. The findings could be useful for the purposes of the ESPON 2.4.1 project to make a proposal on feasible Territorial Impact Assessment of EU Environment Policy especially in a view of habitats and biodiversity.

In terms of management of natural heritage **the project limits itself to the management of protected areas**, according to IUCN Protected Areas Categories. Among the EU policy fields relevant for the management of natural heritage the project lists Natura 2000, ESDP and 3rd Cohesion Report, stressing the difficulties of geographically handicapped regions.

Indicators

In terms of indicators there are not many specific ones developed for the purposes of the project. For the analysis of the territorial trends the project instead develops a few interesting typologies that combine different sets of data on a regional level (NUTS 3).

Policy Responses

The project also proposes **a set of policy responses** to the identified territorial trends related to natural heritage:

- **Balanced development in corridors:** polycentric urban development along the main infrastructure Corridors - development axes to distribute the development pressure away from the Pentagon and concentrate development as nodes in linear zones;
- **Polycentric development in nodes:** development nodes should be developed near the highway accesses and high speed railway stations to avoid the landscape's fragmentation due to sub urbanization, as well as unnecessary mobility;
- **Selective accessibility:** balance between improving the accessibility and competitiveness of existing towns and the strategic value for the ecological network of natural areas;
- **Priority to old industrial areas:** to reconstruct and sanitize polluted industrial areas in order to minimize unnecessary land take for new developments;
- **Elaboration of ESDP:** spatial policies at the European level should be integrated, addressing the ecological (and hydrological) network as well the urban (and infrastructure) network;
- **International coordination:** territorial cohesion strongly supported by the elaboration and implementation of ecologic and urban cross-border networks;
- **Vertical integration:** the decisions about areas to be included within the ecologic or urban networks must be taken at the regional level, balancing all relevant interests, after the Commission's indication where the strategic connections are desired;
- **Regional development vision:** common visions on the regional development visions or plans should include the natural qualities as part of the common development potentials;
- **Regional variety as an asset:** spatial development visions or plans with regard to regional cultural and natural characteristics;
- **Natural values as an asset:** to be increasingly appreciated;
- **Community support:** regional spatial development visions should be financially supported by the Community.

Some of the more specific among the proposed policy responses could also be taken into account by the ESPON 2.4.1 project when elaborating its own policy recommendations.

2.4 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. 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. For this, three different forecasting models, which are the SASI model, CG Europe model and STIMA model, and a set of analytical techniques to post-process the model results were used. The project presents an example of TIA on the case of EU transport policy, using innovative tools for analysis.

Impacts of Scenarios

Among the impacts considered in the different scenarios one of the aspects is of special interest for the ESPON 2.4.1 project, as it can be used in further analysis as **an indication of potential pressures on environment**. It concerns transport flows, which were already addressed as an important source of pressures on the environment in ESPON 1.2.1 project. Indicator that was proposed in this project, takes into account the density of kilometres travelled within the road network at the NUTS 3 level.

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. They 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, and

(3) 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 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.

2.5 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.

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.

It has been argued that there is a lack of clearly specified environmental objectives in the scheme as established by the EU and in the majority of measures applied in Member States with objectives mainly focused on agricultural practices. It has also been argued that agri-environment payments function as income supports conditional upon delivering environmental benefits (cross compliance model) rather than as payments for environmental outputs.

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.

One of the main tasks of the ESPON 2.4.1 project will be the presentation of territorial trends in relation to the main environmental issues like in this case the pressure from agriculture. The environmental issues classified by type together with the findings of the ESPON 2.1.3 project will give more comprehensive picture of the territorial impact.

2.6 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.

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.

Security of energy supply and a better environment are the main objectives, which have tailored some important strategies – promotion of renewable sources, promotion of energy efficiency and energy networks development.

One of the findings of the project is also 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.

Especially the links between EU Energy Policy and EU Environment Policy are also in focus of the ESPON 2.4.1 project. 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.

The reduction in energy intensity in the period 1990-2002 in almost all EU27+2 countries is a positive factor for controlling overall greenhouse gas emissions. For example in the United Kingdom the reduction of greenhouse gas emissions was partly a result of the liberalisation of the energy market and subsequent changes in the choice of fuel used in electricity production from oil and coal to gas.

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.

2.7 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. 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).

2.8 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 Second Interim Report of the project is available for review of its results.

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 important additional task, which is of great importance 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.

2.9 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.

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 Literature/Projects

3.1 EU-funded Research in Impact Assessment and Sustainable Development

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). Impact Assessments in this area aim at the following:

- Promote sustainable development (Göteborg 2001 – the Sustainable Development Strategy proposed the introduction of Sustainable Development Impact Assessment, i.e. the economic, environmental and social impacts).

- Promote better law making and evidence based policy making (Laeken 2000 – Mandelkern Group Report and Seville 2002 – Better Regulation Action Plan proposed introduction of Regulatory Impact Assessment, i.e. regulatory analysis, subsidiarity and proportionality).

It is no surprise that among the identified “unsustainable trends” also those can be found that have indirect and even explicit territorial relevance like management of natural resources, land use and transport (Tamborra, 2005). So, although one has to acknowledge that sustainable development and law and policy making touch “territorial trends” (as defined by the ESPON 3.2 project) in many fields, these do not play a large role in research on Impact Assessment (see Table 4).

Table 4 EU projects with the assessment of impacts of EU environmental policies on different sectors. Source: Tamborra (2005)

Project	Objective/contents	Territorial aspects
PRIMES	Proposal and Impact Assessment of the Directive establishing a Scheme for GHG emission allowance trading	<i>Indirect</i> ; impacts of climate change policy on economy, society, ecology (some spatial trends are addressed)
POLES	Proposal and Impact Assessment of the Directive establishing a Scheme for GHG emission allowance trading and of the amending Directive integrating Kyoto protocol’s project based mechanisms (JI and CDM)	Indirect; impacts of climate change policy on economy, society, ecology (some spatial trends are addressed)
NEMESIS	Assessing impacts of FP7 on growth and employment	<i>Indirect</i> ; impacts of climate change policy on economy, society, ecology (some spatial trends are addressed)
GECS	Impact Assessment of the amending Directive integrating Kyoto protocol’s project based mechanisms (JI and CDM)	<i>Indirect</i> ; impacts of climate change policy on economy, society, ecology (some spatial trends are addressed)
ExternE	Impact Assessment of CAFÉ Strategy	<i>Indirect</i> ; impacts of air policy on economy, society, ecology (some spatial trends are addressed)

I.Q. TOOLS	Assess the potential effects of the policy on the three dimensions of sustainability if these effects lead to the sustainable objectives or not and the significance of these impacts	<i>Indirect</i> ; impacts of different policies on economy, society, ecology (some spatial trends are addressed)
MATISSE (2005-2008)	Achieve a step-wise advance in the science and application of Integrated Sustainability Assessment (ISA) of EU policies	<i>Addressed in case study</i> ; in four case studies the improved and new ISA tools will be applied and tested, among these one is about agriculture, forestry and <i>land-use</i>
IMP ³	Improvement of the implementation of the Environmental Impact Assessment	Addressed in one part of the project; territorial relevance exists in the following points: (a) better integration and more consistency of risk assessments, regarding various sources of risks (natural hazards, accidents, sabotage); (b) survey of project types subject to EIA

The projects MATISSE (<http://www.matisse-project.net>) and IMP³ (<http://www.oir.at>) are an exception. The MATISSE project however is still in the initial phase and there are first results still to be expected.

Concerning the IMP³ project, the following aspects should be highlighted:

As a result of the five-year-report, the Commission aimed for a deeper evaluation of problematic aspects of the EIA Directive and launched a project within the 6th framework programme (European Commission 2001b) The project IMP³ 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, are the second and third points clearly important in this context. The recommendations, the IMP³ project launched, were structures 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 proactive 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 structured along, as argued by Greiving (2004).

In the context of projects subject to the EIA, it has to be pointed out that The Commission's Five Year Report (EC 2001) emphasised that EIA is one of the sectors of Community environmental law where Member States have the worst implementation record. This is in particular 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 certainly 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.

3.2 References to Territorial Impacts of Policies Used by Other Strand 2 ESPON Projects

A review of the used references in interim and final reports of other strand 2 ESPON projects shows that none of the projects made use of scientific literature that explicitly deals with territorial impacts of policies. Because of the fact that strand 2 projects explicitly deal with such territorial impacts it can be assumed that relevant previous literature on this topic would have been taken into consideration in the project work.

However, some of the quoted literature at least covers some of the aspects that are characteristic of territorial impact assessment. The following table gives an overview of the literature that might be interesting in this area. It is obvious though that some of the policy impact projects did not use any literature on territorial impacts at all.

Table 5 Use of references with relation to “territorial effects of EU policies” in interim and final reports of ESPON policy impact projects.

ESPON project	References with respect to territorial impacts of policies
ESPON 2.1.1 'Transport Policy impact'	<ul style="list-style-type: none"> - Agence Européenne "Territories and Synergies", EURE-CONSULT S.A., Nederlands Economisch Instituut, Quaternaire Portugal, 2001, Spatial Impacts of Community Policies and Costs of Non-Co-ordination, report for European Commission, DG Regio - Bröcker, J. (1998): Spatial Effects of Trans-European Networks: Preliminary Results from a Spatial Computable General Equilibrium Analysis. Diskussionsbeiträge aus dem Institut für Wirtschaft und Verkehr der Technischen Universität Dresden 4/98, Dresden: TU Dresden - Bröcker, J. (2001): Trans-European effects of "Trans-European Networks": results from a spatial CGE analysis. In: Bolle, F., Carlberg, M. (eds.): Advances in Behavioral Economics. Heidelberg: Physica, 141-159 - Bröcker, J. (2002c): Spatial Effects of European transport Policy: A CGE Approach. In Hewings, G., Sonis, M., Boyce, D. (eds): Trade, Networks and Hierarchies - Modelling Regional and Interregional Economies, 11-28, Berlin/Heidelberg, New York: Springer - Wegener, M. (2004): Territorial Impact of EU Transport and TEN Policies. In: Datar (ed.): Territoires 2020 review
ESPON 2.1.2 'R&D Policy impact'	<ul style="list-style-type: none"> - Caloghirou, Y.D. and N. Vonortas (2000): Science and Technology Policies Towards Research Joint Ventures, Final Report to the Commission, DGXII, TSER Programme. The Territorial Impact of EU R&D Policies

ESPON 2.1.3 'CAP impact'	<ul style="list-style-type: none"> - Groier, M, (2004) Regional effects of the Austrian Agri-Environmental Programme ÖOPUL in the case study area Wien: Bludenz-Bregenzerwald, BA für Bergbauernfragen
ESPON 2.2.1 'Structural Funds impact'	<ul style="list-style-type: none"> - Faber O et al (2000), Thematic Evaluation of the Impact of Structural Funds on Transport Infrastructures, Final Report, November 2000

As it can be assumed that these TPGs would have made use of relevant literature in the field of territorial impact assessment, it can be stated that this has not been a research issue outside the ESPON environment so far.

Chapter B – Prioritised Compilation of Elements of EU Environmental Policy

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1 Overview of Elements of EU Environmental Policy and Their Spatial/Territorial Context

EU Environmental Policy covers a large variety of policy areas. In some of these areas, the environmental strategies have an explicit spatial dimension and therefore are in the range of the ESPON research agenda. This chapter will give an overview of EU Environmental Policy and will produce a prioritised compilation of elements of EU Environmental Policy, which are spatially/territorially relevant in the ESPON context, including a recommendation to the MC on three policy issues to select for the 3 test cases.

In the following, first the EU Environmental Policy areas and its main elements, as presented on the DG Environment website (http://europa.eu.int/comm/environment/policy_en.htm), are portrayed: Air, Biotechnology, Chemicals, Civil Protection and Environmental Accidents, Climate Change, Environmental Economics, Environment and Enlargement, Health, Industry, International Issues, Land Use, Nature and Biodiversity, Noise, Soil, Sustainable Development, Waste and Water.

1.1 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.

Concerning air quality, the following documents represent the basis for the EU air quality policy:

- Air quality framework directive: In 1996, the Framework Directive 96/62/EC on ambient air quality assessment and management was adopted which revises previously existing legislation and introduces new air quality standards for previously unregulated air pollutants, setting the timetable for the development of daughter directives on a range of pollutants.
- Directive on air pollutant values: This air quality framework directive was followed in 1999 by a "daughter Directive" (1999/30/EC) setting limit values for PM10 as well as the pollutants nitrogen dioxide, sulphur dioxide and lead. The limit values are to be met by certain dates (1 January 2005, with the exception of nitrogen dioxide).
- Clean Air for Europe (CAFE): The aim of this programme is to develop a long-term, strategic and integrated policy advice to protect against significant negative effects of air pollution on human health and the environment. The Commission adopted the Thematic Strategy on Air Pollution under the 6th Environmental Action Programme on 21 September 2005. It aims by 2020 to cut the annual number of premature deaths from air pollution-related diseases by almost 40% from the 2000 level. It also aims to substantially reduce the area of forests and other ecosystems suffering damage from airborne pollutants. While covering all major air pollutants, the Strategy pays special attention to fine dust, also known as particulates, and ground-level ozone pollution because these pose the greatest danger to human health. 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 (see Framework Directive 96/62/EC and Directive 1999/30/EC). 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.

1.2 Biotechnology

The rise of biotechnology and genetically modified organisms (GMOs) and the public concern about possible negative impacts has highlighted the need for policies at EU and international level to ensure that these concerns are addressed. Since the early 1990s the EU has adopted rules and regulations on GMOs, which cover the use, traceability and labeling of GMOs or products and feeds containing GMOs. Latest development was a Commission Decision of 21 June 2005 establishing a network group for the exchange and coordination of information concerning coexistence of genetically modified, conventional and organic crops (European Commission, 2005m). However, these policies do hardly have an explicit spatial/territorial dimension and are therefore not in the ESPON focus.

1.3 Chemicals

Since many decades it is a common European sense that there is a need to protect the Community's environment and to create common standards to protect consumers. Thus, the early environment legislation of the Community dealt with products, amongst them dangerous chemicals. In 2001, the European Commission adopted a White Paper describing the strategy for a future Community Policy for Chemicals. Although there might be some indirect connections to aspects of spatial development, these connections are too weak to be considered as spatially relevant in the ESPON context. However, chemical accidents will be considered due to their relevance in the context of civil protection policy.

1.4 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 under preparation (see also Chapter B Section 1.11).

For that purpose, attention will be paid to the whole disaster cycle (prevention, preparedness, information, intervention, post disaster analysis and recovery (http://europa.eu.int/comm/environment/civil/prote/cp01_en.htm). More information can be found in particular in the final report of the ESPON 1.3.1 project (Schmidt-Thomé, 2005). 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 environmental aspects into territorial development.

Disaster prevention is also an important part of the Cohesion Policy (European Union, 2004, p. 23f.). Table 6 indicates the strengthened role of risk prevention within cohesion policy:

Table 6 Cohesion policy and risk prevention (source: European Union 2004, p. 24)

	Period 2000 - 06	Period 2007 - 13
Regional development	<p>Revised strategic guidelines</p> <ul style="list-style-type: none"> Realisation of geological or stabilisation studies Prevention plans for natural risks <p>Interreg III</p> <ul style="list-style-type: none"> Joint planning and guidelines for the improvement and management of border areas Highlighting sustainable development and conservation of cross-border forestry resources; disaster prevention Development of joint risk management strategies 	<p>"Convergence" and "Competitiveness" objectives</p> <p>Plans aimed at preventing and managing natural and technological risks</p> <p>"Territorial cooperation" objective</p> <p>Themes:</p> <ul style="list-style-type: none"> Promotion of maritime security Protection against flooding and protection of internal maritime waters Prevention of and protection against erosion; earthquakes and avalanches <p>Actions:</p> <ul style="list-style-type: none"> Supply of equipment Development of infrastructure Drawing-up and implementation of transnational assistance plans Risk mapping systems Development of joint instruments for preventing, monitoring and combating risks
Rural development	<p>EAGGF</p> <p>Prevention and repair of natural risks and forest fires affecting agricultural and forestry production</p>	<p>EAFRD</p> <p>Prevention and repair of natural risks and forest fires affecting agricultural production and forestry production</p> <p>Development of forestry resources and improvement of their quality:</p> <ul style="list-style-type: none"> Initial forestation of agricultural and non-agricultural land Strengthening of the protective role of forests in combating soil erosion Management of water resources and water quality
Fisheries policy		<p>Reconstitution of the production potential of the fisheries sector damaged by natural or industrial disasters</p>

Source: info regio No. 15, December 2004.

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 of spatial relevance, the SEVESO II Directive and its spatial relevance should be discussed in more detail.

Major accident hazards belong to some of the most important and best studied technological hazards. Within the European Union the SEVESO II Directive takes care of these types of hazard. The consideration of technological hazards however can be understood as a new task for spatial planning.

Council Directive 96/82/EC (SEVESO II) aims at the prevention of major accidents involving dangerous substances, and the limitation of their consequences. 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 and of the Council of 16 December 2003 amending Council Directive 96/82/EC has to be considered. This first amendment of the SEVESO II directive 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. The context is elaborated by Recital (22) of the SEVESO II Directive which states: "*Whereas, in order to provide greater protection for residential areas, areas of substantial public use and areas of particular natural interest or sensitivity, it is necessary for land use and/or other relevant policies applied in the Member States to take account of the need, in the long term, to keep a suitable distance between such areas and establishments presenting such hazards and, where existing establishments are concerned, to take account of additional technical measures so that the risk to persons is not increased.*"

Although land use planning requirements are newly introduced into Community legislation, several Member States have established practices for achieving a degree of separation between SEVESO establishments and residential population. In Germany, e.g., this has led to the so-called *Abstandserlass* (safety distance decree). This has just recently been backed by a new guideline of the national *Kommission für Anlagensicherheit* (KAS, commission for plant safety) on recommendations for suitable distances between hazardous installations and areas to be protected in the context of land use planning (SFK/TAA, 2005).

In general, the methods used are disparate, ranging from explicit consideration of the risks of major accidents in some cases to a generic 'zoning' approach based on distances derived historically, normally by taking into account various environmental factors such as noise, pollution, etc. which give separation distances

that are sometimes perceived to implicitly also take account of accident hazards. Some Member States have not yet established a land use planning policy and system that addresses major accident hazards.

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.

Keeping in mind that spatial planning is responsible for an entire area, a consideration of major accident hazards has to be spatially/territorially oriented and should not focus primarily on the permission of single facilities. The new SEA (2001/42/EC) offers a suitable instrument for dealing with hazards on a higher level of planning. Hazard related risk assessment and management of natural and technological hazards can be integrated into the SEA. Due to the given material and procedural similarities between the SEA on the one hand and risk assessment and management on the other hand such integration can be characterised as manageable and necessary at the same time for fulfilling the SEA requirements (Greiving, 2004). Moreover, the important role of spatial planning as one of the main addressees of the directive as well as the risk management of natural and techno-logical hazards has to be stressed.

1.5 Climate Change

Climate change is one of the four priority areas for urgent action in the 6th Environmental Action Programme. Apart from the contribution to international efforts to combat climate change (United Nations Framework Convention on Climate Change and its Kyoto Protocol), the EU is taking serious steps to reduce its own greenhouse gas emissions. The EU strategy is laid down in the European Climate Change Programme:

- European Climate Change Programme (ECCP): The goal of the ECCP is to identify and develop all the necessary elements of an EU strategy to implement the Kyoto Protocol. In a following ECCP report, 42 possible measures are identified, which could lead to some 664-765 Mt CO₂ equivalent emissions reductions that could be achieved against a cost lower than 20 €/tonne CO₂ equivalent.
- ECCP Phase II: In the Communication "Winning the battle against climate change", the Commission announced to launch a new phase of the European Climate Change Programme (ECCP II) which was finally done with a stakeholder Conference, held on 24 October 2005 in Brussels. The Second ECCP will provide a new policy framework for EU climate change policy, with

a scope and perspective beyond 2012. For this purpose, five working groups will be installed that cover the most demanding topics in climate change policy: review of achievements, road transport, aviation, technology, and adaptation (Dimas, 2005).

The effects of climate change touch spatial or territorial development in various areas, e.g. increase of natural hazards like droughts and river floods, water shortages or effects urban climates. However, only a few (e.g. emissions trading, infrastructure use and charging) of the 42 pro-posed and implemented measures identified in the ECCP will have spatially relevant effects (ECCP, 2001, pp. 162ff.)

Therefore, climate change as such will not be in the focus of the ESPON 2.4.1 project. However, some of the indirect spatial effects like the protection against extreme weather events, flood risk management or shift of ecosystems are covered by the policy areas of "Civil Protection and Environmental Accidents", "Nature and Biodiversity" or "Water".

1.6 Land Use

Land use can have major impacts on environmental conditions, which can be direct (e.g. destruction of natural habitats and landscapes) or indirect (e.g. increasing the amount of traffic on roads leading to more congestion, air pollution and greenhouse gases). The ESDP touches in many areas environmental concerns. With land use related environmental policy the European Commission tries to ensure that Member States take environmental concerns into account when setting up spatial planning documents. In the environmental theme of land use, the Commission has four major goals:

- Development of methods and tools to analyse the impact of future development, such as the Directive on Environment Impact Assessment (EIA) for projects and the Directive on Strategic Environmental Assessment (SEA) for plans and programmes, which might lead to serious impact on the environment. Relevant for spatial planning (land use planning) as well spatially relevant sectoral planning.
- Improvement of the information flow between policy-makers and citizens on land use issues by initiatives like INSPIRE (Infrastructure for Spatial Information in Europe) and GMES (Global Monitoring for Environment and Security).
- Development and implementation of a European urban environment strategy for a sustainable and integrated approach to urban development and management. The European Commission is developing a Thematic Strategy on the Urban Environment, which is scheduled for adoption by the

Commission in December 2005. The pilot European Urban Knowledge Network (<http://www.eukn.org>) has been launched on 27 October 2005 and provides a network of national focal points to provide advice and information to cities on a wide range of issues, including urban environment.

- Improvement of planning, management and use of Europe's coastal zones where the EU is working to introduce a coordinated policy for the Union's coastal zone regions. Main instrument is the 2002 EU Recommendation that urges Member States to put in place national strategies for Integrated Coastal Zone Management (ICZM), which promotes an integrated territorial approach, which covers coastal protection, landscape planning and spatial planning.

With the instruments in these areas the EU explicitly tries to influence spatial development in a way that negative impacts on the environment will remain low. Thus, the environmental policy area of land use has to be seen as one of the core areas for the ESPON 2.4.1 project. However, the EU has no direct competences in the field of spatial planning. In consequence, spatial development policies like the ESDP have to be seen to a certain extent as substitute, although its objectives are not legally binding. Nevertheless, as the Member States agreed voluntarily on the ESDP, a serious influence on national planning legislation and policy can be seen. In addition, the ESDP has to be understood as an orientation for the community initiatives like INTERREG. In consequence, EU land use policy will not be treated particularly as test case, but it will be taken into consideration in other contexts of the project anyway (especially EIA and SEA).

1.7 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". 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 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). As possible solutions for co-financing the implementation of Natura 2000, three options have been discussed:

1. make use of existing community funds,
2. make LIFE-nature the delivery mechanism and
3. create a new fund or initiative (European Commission, 2004, p. 23).

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.

1.8 Noise

The European Commission developed a new framework for noise policy which shares the responsibility between the EU, the Member States and the local level. It includes measures like the creation of a Noise Expert Network, the Directive on Environmental Noise, the Directive on Equipment Used Outdoors and the follow-up and development of existing EU legislation relating to sources of noise. The underlying principles of EU noise protection policy are (European Commission, DG Environment, Available:

<http://europa.eu.int/comm/environment/noise/home.htm>):

- Monitoring the environmental problem; by requiring competent authorities in Member States to draw up "strategic noise maps" for major roads, railways, airports and agglomerations, using harmonised noise indicators. These maps will be used to assess the number of people annoyed and sleep-disturbed throughout Europe.
- Informing and consulting the public about noise exposure, its effects, and the measures considered to address noise, in line with the principles of the Aarhus Convention.

- Addressing local noise issues by requiring competent authorities to draw up action plans to reduce noise where necessary and maintain environmental noise quality where it is good.
- Developing a long-term EU strategy, which includes objectives to reduce the number of people affected by noise in the longer term, and provides a framework for developing existing Community policy on noise reduction from source.

EU noise policy surely has some links to spatial/territorial development and e.g. helps to improve a sustainable spatial development. These links are however quite weak as EU noise policy does not contain any specific territorial goals.

1.9 Soil

EU soil policy started relatively late compared to other environmental themes. The commission started a thematic strategy on soil protection in 2004, consisting of legislation on a Community information and monitoring system on soil as well as a set of detailed recommendations for future measures and actions. The strategy is one of seven thematic strategies under the 6th EAP. A first step for the development of an EU policy to protect soils against threats such as erosion and pollution, the Commission has published a Communication "Towards a Thematic Strategy for Soil Protection" which will set the basis for more solid soil protection in the future. The Communication identifies eight threats: erosion, contamination (both local and diffuse), decline of soil organic matter, soil biodiversity, soil sealing, compaction, floods and landslides and salinisation. These threats have been discussed in five Technical Working Groups (TWGs) lead by DG Environment and in an Advisory Forum. In July 2005 the DG Environment launched a public online consultation to gather opinions on possible elements of a Proposal for a Soil Thematic Strategy. The results of this consultation are now online (<http://europa.eu.int/comm/environment/soil/index.htm>).

The TWG Contamination considered risk assessment as a useful tool for the identification and management of contaminated sites in Europe and recommended its further development and harmonization. This is also in line with the outcomes of several projects and networks at the European level (e.g. CARACAS and CLARINET) in the 90's. Risk-based criteria may also assist the identification and assessment of 'problem areas' of EU concern for soil contamination. Land use restrictions may contribute to other negative effects on territorial development in these problem areas. These problem areas may be candidates for TIA and detailed monitoring at the European level.

In 2004, the European Environment Agency and its European Topic Centre on Terrestrial Environment (ETC/TE) started a project on areas under risk for soil

contamination in Europe. Year 2004 activities comprise the following four reports available at <http://terrestrial.eionet.eu.int/activities/reports>:

- "Background and outcomes of the project" (EEA Technical Report, Volume 1).
- "Review and analysis of existing methodologies for preliminary risk assessment" (EEA Technical Report, Volume 2).
- "PRA.MS scoring model and algorithm" (EEA Technical Report, Volume 3).
- "Application of the PRA.MS model to selected industrial and mining sites" (EEA Technical Report, Volume 4).

These reports were discussed in an expert meeting held in Espoo, Finland, in September 2004. The experts suggested that the method should focus on site classification rather than on risk prioritisation. They also suggested the addition of a pre-screening level in order to better focus the assessment on problem areas of EU-relevance (including so called megasites) and limit data collection requirements.

These inputs have been taken up for project continuation in 2005-2006 (Gentile et al. 2006).

As this policy area is still at the beginning, it will be difficult to address spatial effects of the soil policy in the frame of the ESPON project 2.4.1, but it will be considered in the context of SEA and EIA. However, the quality of soils may have great influence on the development of European regions, and TIA approach focusing on the soil threats will be needed when the EU soil strategy will be implemented as a directive and related communications.

1.10 Waste

The waste management strategy of the European Union is based on the three principles of waste prevention, recycling and reuse and improvement of final disposal and monitoring. These principles are part of the Communication towards a thematic strategy on the prevention and recycling of waste (COM (2003) 301). This Thematic Strategy is one of the seven thematic strategies in the 6th Environmental Action Plan. The objective of this Communication is to launch a process of consultation of the Community institutions and of waste management stakeholders to contribute to the development of a comprehensive and consistent policy on waste prevention and recycling. Similar to the policy area of soil, also the waste policy area is still at the beginning. Similarly to soil policy, waste will be considered in the ESPON 2.4.1 project indirectly by the SEA and EIA.

1.11 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. The WFD aims at an integrated river basin management for Europe.
- Forthcoming Directive on Flood Risk management: Currently a directive on flood risk management is under development which aims at setting a framework for flood mapping and flood risk management plans in order to supplement the WFD in the areas of river and coastal flooding (European Commission 2005f; 2005g; see also http://europa.eu.int/comm/environment/water/flood_risk/).
- 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).

1.11.1 Directive 2000/60/EC (Water Framework Directive)

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.*"

The discrepancies between the water basin approach on the one side and legislative and administrative jurisdictions on the other side indicate the need for going beyond territorially based, hierarchical forms of governance. The integration of water basin oriented planning and policy at different spatial scales can be seen as one starting point for integrating policies and planning in complex, multi-agent

settings. This should not mean that more traditional forms of regulation (“command and control”) are totally obsolete or outdated. After all, instruments such as legally binding plans and project related permissions are important for fulfilling the main objectives of the WFD, determined mainly in Art. 4. The protection of water is often contradictive to several kinds of spatial development like further settlement, infrastructure and intensive agriculture, and thus requires clear regulatory measures.

However, integration and cooperation across scales helps to address the problem of compatibility between the scope of the river basin approach and the institutional arrangements (e.g. of the present water management authorities). According to Meadowcroft (2002) it has to be pointed out that “*There are many inconsistencies in this formal hierarchy of scale. [...] And territorially rooted institutions are constantly being stretched to engage with issues which escape their jurisdiction or infiltrate their frontiers.*” Other authors highlighted, that the effectiveness of the implementation of an EU directive depends in the first instance on the fitting of the directives approach (here: the water basin approach) on the one hand and the existing institutional arrangements on the other hand (Knill & Lenschow, 2000, p. 30).

The problems that are briefly outlined here already show the spatial relevance of the WFD as typical planning problems like the problem of fit or interplay are touched (Young, 2002, pp. 19ff.).

1.11.2 Forthcoming Directive on Flood Risk Management: Flood Mapping and Flood Risk Management Plans

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. General purposes of flood mapping (which consists of flood hazard maps and flood risk maps, where required) are to

- increase public awareness of the areas where floods can occur, the nature and degree of danger and what the consequences of floods can be,
- support the processes of prioritising, justifying and targeting investments and developing sustainable policies and strategies in order to manage the risk to people, property and the environment and
- support the flood risk management plans, spatial planning and emergency plans.

The principal purpose of the *Flood Risk Management Plans* will be to identify and address flood risk management objectives and promote sustainable flood management policies (European Commission, 2005g).

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. In its article 1 the WFD refers to "*contributing to mitigating the effects of floods and droughts*"; however, in its operational objectives (inter alia articles 4, 11, 13) it has no operational obligations as regards flood prevention or protection, with the exception of an obligation to provide for precautionary measures against pollution in the case of floods (article 11(3)l) (European Commission, 2005g). By the Council Conclusions of 14 October 2004 it was reconfirmed that "*the development of river basin management plans under the Water Framework Directive and of flood risk management plans are elements of integrated river basin management; the two processes should therefore use the mutual potential for synergies*".

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.

It is of great interest that a new working document, elaborated by the Directorate-General Environment of the Commission, has highlighted the potential relevance of the SEA for risk assessment: "*Community legislation already provides that major projects or programmes have to be accompanied by an environmental impact assessment. It is also important to ensure that projects and programmes do not unduly increase the risk to people or the environment. For this reason, a flexible tool should be conceived to ensure that proper account has been taken of the risk*" (European Commission, DG Environment, 2003, p. 4, subchapter safety impact assessment).

By now, an internet consultation on a proposal for a Floods Directive "Reducing the risks of floods in Europe" was closed on 14 September 2005. The evaluation of this consultation (European Commission, DG Environment, 2005h) revealed a general support for the approach taken by the Commission.

1.12 Policy Areas with no Specific Spatial Relevance or Covered by Other Policy Areas

Environmental Economics, Health and International Issues also belong to the EU Environmental Policy areas. These have no or only very indirect spatial relevance and will therefore not be considered in the ESPON 2.4.1 project.

Concerning the policy areas of *Environment and Enlargement, Industry and Sustainable Development* the case is different: These environmental policies do have some spatial effects. But in the case of Environment and Enlargement and Sustainable Development the areas comprise a very broad set of policies which make it difficult to extract those elements which are responsible for certain spatial effects. Further, these policies (also in the area of *Industry*) are also a part of other more specific policy areas (e.g. the Directive on the control of major-accident hazards as a part of the civil protection and environmental accidents policy area). A consideration of these would lead to some duplication.

2 Identification of Territorially and Spatial Planning Relevant Elements of EU Environmental Policy

In the previous sub-section, the environmental policy areas of the EU are also characterised 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 when-ever 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 7 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 reach 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. In the following sub-section, the selection of the three test cases will be explained.

3 Prioritised Compilation of Relevant Elements of the EU Environmental Policy

In the previous section, only some of the EU environmental policies have been considered to be of interest in the ESPON 2.4.1 project. This first 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, 2005c, 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.

By 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 will select one policy from each of the spatial dimensions for the assessment of territorial impacts. Based on the preliminary review of the elements of environmental policy the following issues that are considered to be important for territorial development are envisaged as 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 be 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 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 = Strategic Environmental Assessment: This EU policy will be considered as a part of the development of a TIA methodology (see Chapter C.1.3 of this report).

The following list of elements of EU Environmental Policy will be considered for the three test cases:

- The 6th EAP. Priority will be given to effective implementation and enforcement of environmental legislation and integration of environmental concerns into other policies, including infrastructure. Additionally some attention still has to be paid to the use of a combination of means to achieve ends in the most efficient and effective way and wide stakeholder involvement in the development and implementation of policies.

- LIFE programme, especially the LIFE-Environment and LIFE-Nature programme areas.
- Environmental assessments with a focus on the SEA.

Chapter C: Methodological Questions of a Territorial Impact Analysis of EU Environmental Policy

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1 Review of Current Models for the Assessment of EU Policies

Before the first ideas on methodological questions of a Territorial Impact Analysis of EU environmental policies will be presented, some current approaches and models of policy assessment shall be mentioned. These can serve as a common basis. Thus, the procedural assessment steps of the TIA to be developed will take into account findings and experiences from three different areas of impact assessments:

1. *Commission Guidelines on Impact Assessment*, which have recently been updated (15 June 2005; see European Commission 2005k).
2. *Findings and experiences from ESPON policy impact projects* like 2.1.1 Transport Policy impact, 2.1.2 R&D Policy impact, 2.1.3 CAP impact, 2.1.4 Energy, 2.1.5 Fisheries or 2.2.1 Structural Funds impact.
3. Procedural steps and experiences from the EIA and the SEA.

1.1 EU Approach: 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 type of assessments (see website "Impact Assessment in the Commission", available at http://europa.eu.int/comm/secretariat_general/impact/index_en.htm). 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, 2005, p. 4). An Impact Assessment of planned policy actions is considered to be important because of the following reasons (European Commission, 2005, p. 5):

- to ensure early coordination within the Commission,
- to demonstrate the Commission’s openness to input from a wide range of external stake-holders, and to show its commitment to transparency,
- to contribute to meeting the specific commitments of the Lisbon and Sustainable Development Strategies by providing a careful and comprehensive analysis of likely social, economic and environmental impacts, both direct and indirect
- to improve the quality of policy proposals, by keeping EU intervention as simple as possible, help to explain why an action is necessary and that the proposed response is an appropriate choice
- or, conversely, to demonstrate why no action at EU level should be taken.

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 specific nature. Within the ESPON 2.4.1 project a further focusing of the aim of a TIA has to be done because it has to deal with the effects of *environmental* policies. However, the basics are nevertheless the same and the methodology to be developed will have to take into account the elements mentioned above, taking into account certain specifications (territorial, environmental).

1.2 ESPON Approach: Findings/Experiences from 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 nevertheless interesting attempts which are worth being considered as a basis for the development of procedural steps for a TIA for EU environmental policies, especially from the 2.1.2 *R&D Policy impact*, the 2.1.3 *CAP impact*, and the 2.1.5 *Fisheries* projects (orientation at ESDP goals, testing of hypotheses etc.). 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 8 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 actual 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 addresses these constraints by a careful selection of territorially relevant environmental policies (see Chapter B). In this context, territorial relevance is de-fined 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 will develop an approach that will help to assess the achievement of spatial goals in a quantitative way.

1.3 EIA and SEA Approach

Certain assessment steps of the TIA for EU environmental policy can also be taken from the frameworks of the EIA Directive (85/337/EEC) and the SEA Directive (2001/42/EC). The table below also shows the equivalent parts as mentioned in the SEA and EIA Directives.

Table 9 Possible assessment steps of a TIA for EU environmental policies.
(source: Own elaboration)

Possible elements of a TIA for EU environmental policies	SEA Directive equivalent	EIA Directive equivalent
1. Description of the intervention (environmental policy) and identification of significant effects of environmental policy on the spatial structure	Art. 5, p. 1	Annex III (1)
2. Consultation of authorities	Art. 6, p. 3	-
3. Description of significant effects of environmental policy on the spatial structure	Art. 5, p. 1	Annex III (3)
4. Evaluation of significant effects of environmental policy on the spatial structure	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 territorial/spatial considerations into the programme or policy	Arts. 8, 9	-
8. Identification of reasonable alternatives aiming at a better coordination of environmental policies with sectoral policies	Art. 5, p. 1	Annex III (2)
9. Measures envisaged to reduce or eliminate contradictory or negative effects on the territorial/spatial structure	Art. 7, p. 2	Annex III (5)
10. A non-technical summary of the information provided under the above headings	-	Annex III (6)
11. Monitor the significant effects of the implementation of environmental policy on the spatial structure	Art. 10, p. 1	-

These 11 steps ideally shall be taken into consideration in the ESPON 2.4.1 project when carrying out a TIA on the three levels, especially in the case studies (EU, transnational/national, regional/local). The applicability of all of these steps for a certain level however has to be proven and eventually adapted in the case study work.

2 Principles, Context and Elements of a Methodology for the Assessment of Territorial Impacts of Environmental Policies

The methodology for the territorial impact assessment of EU environmental policies will be designed in a way that ESDP policy options can be operationalised. In general, one could of course ask how EU environmental policies influence any of the 60 policy options that are mentioned in Part A of the ESDP. However, the methodology to be developed in the ESPON 2.4.1 project will have to concentrate on the impact on territorial cohesion in its three dimensions as identified by the ESPON project 3.2. These policy options can be seen as an assessment basis for the application of the territorial impact assessment method. The methodology to be developed will take into account the following principles:

- Three-level-approach as the appropriate typology group for the analysis of environmental policies (as shown in the Crete Guidance Paper, ESPON, 2003, p. 11 and the Matera Guidance Paper, ESPON, 2004, p. 10f.),
- TIA minimum requirements as shown by the ESPON 3.1 project, Final Report, Part C, Annex 7 (ESPON project 3.1, 2004, pp. 453ff.),
- Further development of a TIA methodology as described in the ESPON project 3.2 Working Document and discussed on the ESPON Seminar in Manchester, 7-8 October 2005 (ESPON project 3.2, 2005).

2.1 Applying the ESPON Three-level Approach for Policy Analyses

According to the three-level approach as described in the Crete Guidance Paper (ESPON, 2003, p. 11) the analysis of the effects of EU environmental policies will be done along the following spatial levels:

- EU level: Environmental policies have effects on the spatial goals of the ESDP and the 3rd Cohesion Report (mainly polycentrism and cohesion) on the European level.
- Transnational/national level: At the same time, European environmental policy also has effects on spatial goals and objectives on the Member State level.

- Regional/local level: At the regional/local level the entirety of European, national and regional spatially relevant policies converge. At this level it becomes clear if certain policies are complemented, contradicted or duplicated.

The ESPON 2.4.1 project addresses these levels by assigning different levels of assessment to each of the three levels.

2.2 Minimum Requirements of a Territorial Impact Analysis of EU Environmental Policies

In the first phase of the ESPON programme, all TPGs developed their own TIA approach. The Final Report of the ESPON 3.1 project (ESPON project 3.1, 2004, pp. 433ff.) shows the large variety of approaches that has been developed in the ESPON policy impact projects. In parallel, the ESPON 3.1 project has developed TIA minimum requirements, which can be considered as a checklist for the ESPON priority-two projects. These requirements are also a result from the experiences made in other TPGs, which have developed very different approaches and methods to analyse impacts of policies and programmes. The following box lists the TIA minimum requirements.

Scoping

1. Reference to policy interventions

Designation of the causing interventions assignable to EU budget lines

Question to be answered: What is causing the impacts?

2. Hypothesis on cause-effect-relations

Basis: hypothesis concerning cause-effect-relations (with varying empirical proof)

Question to be answered: What is changed by the intervention(s)?

3. Regional scale of observation

Designation of geographic reference to be used: regions concerned by intervention/effect; territorial level(s) of observation; covering all or selected (by what criteria) regions cause-effect relations

Question to be answered: Level of observation and analysis?

4. Reference to past and future

Cause-effect relations in the past as the basis for predicting the effects of future interventions; empirical experiences as well as outlooks to the future crucial for analytic treatment and political perception

Questions to be answered: What has happened, what may happen in future?

Analysing

5. Interventions and effects measured

Implementation of the hypothesis concerning cause-effect-relations

Question to be answered: What is registered, measured, appraised?

6. Quantitative/qualitative appraisal

Designation of type of indicators selected

Question to be answered: By what kind of indicators the topic is described?

7. Technique of analysis

Designation of type of analysis used

Question to be answered: How is the analysis performed?

Assessing

8. Goals referred to

Designation of criteria for evaluation derived from the two ESPON key concepts focusing on the spatial dimension

- Polycentric spatial development
 - at European level: several metropolitan regions as global integration zones instead of only one
 - at transnational level: enforcement of a polycentric system of metropolitan regions, city clusters and city networks
 - at national level: systems of cities including the corresponding rural areas and towns open for application at lower levels, e.g. for the development within city regions (intraregional)
 - (polycentric development at one level does not necessarily go along with the same at the other levels)
- Cohesion
 - Economic: balanced territorial development concerning economic performance
 - Social: balanced territorial development concerning employment, income, education, population change
 - Territorial: fair access for citizens and economic operators to services of general economic interest; balanced distribution of human activities

Other goals derived from official documents may also be taken into account if they are related to types of regions or particular spatial entities mentioned below (9)

Question to be answered: What goals are referred to?

9. Applied meaning of 'spatial/territorial'

Designation of the concept of 'spatial/territorial' used according to the policy area concerned

Question to be answered: What concept of 'spatial/territorial' applied?

10. Territorial coverage of outcome

Designation of the general format of results covering the whole territory (referring to each region) or a selected sample of regions (case studies)

Question to be answered: What do the results look like?

Figure 2 Minimum requirements for TIA in ESPON 2006 projects (source: ESPON project 3.1, 2004, pp. 453ff.)

The ESPON 2.4.1 project aims at taking into account the listed minimum requirements. It will in specific refer to existing and relevant policy interventions (see Chapter B), and to identify cause-chain-effects of policies and consider

different spatial levels. Further, the hypotheses will be tested in case studies on a qualitative and quantitative way (see this chapter below). This will finally allow statements about the contribution of environmental policies to spatial goals like polycentric development or territorial cohesion.

2.3 Further Development of a TIA Methodology

At the ESPON Seminar in Manchester (7-8 November 2005) one of the main points of the agenda was dedicated to improving the progress of a TIA methodology. This point contained 4 parallel workshops (World Café methodology) of which one explicitly dealt with the further development of the TIA methodology ("Workshop A: Territorial Impact Assessment (TIA) methodology"). The workshop was guided by ESPON project 3.2 ("Spatial scenarios and orientations in relation to the ESDP and EU Cohesion Policy") which also provided a Working Document for the workshops.

The workshop targeted the question **what shall be assessed** by a TIA and pointed at a basic conflict concerning the development of a TIA: "If we are to measure concrete impacts on elements of territorial structure and development (for example in the form of territorial monitoring indicators) this is impossible on the basis of vaguely formulated policies. Only precisely defined projects and investments can be evaluated in such manner. If, on the other hand, TIA is only supposed to analyse policies, then this is only possible against equally vague spatial policy goals. TIA would, then, be reduced to a broad comparison and confrontation of aims as defined in different policies, i.e. how to compare the aims of policy X to the aims of spatial development in Europe. In that case, one can ask the question of whether any sophisticated methodology is needed, other than the common sense of those doing the evaluation" (ESPON project 3.2, 2005, p. 2). An emphasis was put on an **assessment of policies against indicators** because the assessment against policy goals "limits TIA to a more superficial and, to a certain extent, subjective comparison of aims" (ESPON project 3.2, 2005, p. 4). This quantitative approach however requires the development of a sophisticated methodology and the existence of appropriate indicators.

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 and 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 chain effects should ideally link elements of EU environmental policies with those territorial trends which have been identified by the ESPON 3.2 project (see Table 10) 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.

Of course, two limitations exist: (1) By such an approach only a target control is possible but not an effect control; (2) The control of effects seems to be at least to a certain extent possible on the level of case studies (local and regional level where an in-depth knowledge of regional contexts is possible) but not on the other areas of the ESPON three-level approach (national, transnational, European).

Table 10 European territorial trends (identified by ESPON project 3.2) (source: ESPON project 3.2, presented at the ESPON Seminar in Manchester on 8 November 2005)

Theme	Trend
1 Demography	A Continuing fall in birth-rates B Continuing extension of life expectancy C Increasing, but controlled external migration D Total stable, but ageing population
2 Socio-cultural	A Growing socio-cultural polarisation B Increasing ethnic tensions C Increasing religious tensions D More socio-economic division and tension
3 Economy	A Gradual increase in total activity rate B Improving R&D expenditure, but constant technological gap to USA C Decrease in public expenditure
4 Governance	A Increase in co-operation between cross-border regions B Increase in multi-level and cross-sectoral approaches, but only specific programmes C Continued competition between policies for competitiveness and for cohesion
5 Energy	A Steady increase in energy prices B Consumption stable/decreasing C Increase in the use of renewables
6 Climate change	A Moderate overall climate change until 2030 (+1°C) B Increase in extreme local events C Emission levels continuing with insufficient structural adaptation measures
7 Transport	A Continued growth of all traffic, but curbed by energy price/possible modal shift B Constant growth of infrastructure C Constant congestion levels D Application of the Kyoto agreement
8 Enlargement	A By 2008 Bulgaria & Romania, 2020 western Balkans, 2030 Turkey B Continued combination of deepening and widening C Enlargement of Eurozone
9 Rural development	A Further liberalisation of international trade B Increased industrialisation of agricultural production C More diversification and dualisation of functions of rural areas D Reduction of CAP budget

3 TIA Methodology of EU Environmental Policies

The TIA methodology that is suggested for the ESPON 2.4.1 project has – similar to the methodological framework suggested in the ESPON project 3.2 framework (ESPON project 3.2, 2005, pp. 9ff.) – two levels:

3. On the first (or general/or European/or abstract) level basic connections and influences between policies (e.g. 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 (see Chapter 2.2). This first level has been described by the ESPON 3.2 project 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)
4. On the second (NUTS3 level) 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 by the ESPON 3.2 project as TIM: “Territorial impact model for assessing the impact on single regions.”

3.1 PIM – the Potential Impact of a Policy

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

It classify these key policy elements 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 in 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 IA framework. Therefore, category C elements will be excluded from the TIA to be done within the ESPON 2.4.1 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 using indicators based on the money allocated to a certain region combined with the expected results can be considered.
- **Others:** These should be described more in detail if relevant for a certain cause-effect-chain.

As a first stage or scoping phase, the impact of the several environmental 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 effect to the three territorial objectives of territorial cohesion (Territorial quality, Territorial efficiency, Territorial identity). The chain from policy element to the general trends has to be defined separately for each policy element in the scoping phase. These are often side effects of an environmental focused policy element. On the other hand, the chains from general trends to territorial objectives in the assessment phase are predefined, they are usually strong and they can be found from look up tables verified by the ESPON Contact Point query.
- **Specific environmental trends** related to each of the three chosen environmental policy sectors (the three "test cases"). These trends have a

strong link from policy element to the observed trend but often a weaker link from environmental trend to the three territorial objectives of territorial cohesion (Territorial quality, Territorial efficiency, Territorial identity).

For the assessment phase, the following table lists all those general territorial trends that are influenced by the selected EU test case environmental policies and describes their influence on the elements of territorial cohesion.

Table 11 Territorial trends that are influenced by the selected EU test case environmental policies and description of their influence on the elements of territorial cohesion. (source: Own elaboration)

Theme	Trend (influenced by EU environmental policy and influencing territorial cohesion)	Character of influence on...	...element of territorial cohesion
2 Socio-cultural	D More socio-economic division and tension	- (weakening influence e.g. presence of social capital)	Territorial identity
3 Economy	A Gradual increase in total activity rate	+ (strengthening influence e.g. quality of living)	Territorial quality
		+ (strengthening influence e.g. resource efficiency and competitiveness)	Territorial efficiency
	C Decrease in public expenditure	- (weakening influence e.g. quality of living or access to services)	Territorial quality
4 Governance	A Increase in co-operation between cross-border regions	+ (strengthening influence e.g. comparable living standards across territories)	Territorial quality
	B Increase in multi-level and cross-sectoral approaches, but only specific programmes	+ strengthening influence e.g. resource efficiency and competitiveness)	Territorial efficiency
	C Continued competition between policies for competitiveness and for cohesion	- (weakening influence e.g. resource efficiency and competitiveness)	Territorial efficiency
5 Energy	A Steady increase in energy prices	+ (strengthening influence e.g. resource efficiency with respect to energy)	Territorial efficiency

	C Increase in the use of renewables	+ (strengthening influence e.g. resource efficiency with respect to energy)	Territorial efficiency
6 Climate change	B Increase in extreme local events	- (weakening influence e.g. quality of living, especially safety towards hazards)	Territorial quality
		- (weakening influence e.g. resource efficiency and competitiveness due to damages from hazardous events)	Territorial efficiency
7 Transport	B Constant growth of infrastructure	+ (strengthening influence e.g. similar access to services)	Territorial quality
		+ (strengthening influence e.g. internal and external accessibility)	Territorial efficiency
9 Rural development	A Further liberalisation of international trade	- (weakening influence e.g. resource efficiency e.g. due to higher negative transport effects)	Territorial efficiency
	B Increased industrialisation of agricultural production	- (weakening influence e.g. quality of living)	Territorial quality
		+ (strengthening influence e.g. resource efficiency with respect to energy, land and natural resources)	Territorial efficiency
	C More diversification and dualisation of functions of rural areas	+ (strengthening influence e.g. local know how and specificities)	Territorial identity

The results of the scoping phase will be presented as diagrams of cause effect chains for the three EU policy areas "Civil protection", "Water" and "Biodiversity". 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. This phase is comparable to the PIM phase of the TEQUILA model, which has been developed by the ESPON 3.2 project. The ideas behind and the description of the elements of the cause effect chains is explained in section 4 (Figure 3- Figure 5).

Remark: Not every environmental policy element might have significant effects on territorial trends. Those elements will be excluded from the further analysis and assessment.

The long chains from policy elements through trends to territorial objectives will be applied for the analysis of effects related to each of the three environmental policy elements. Both general territorial trend and specific environmental 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 expert's judgements of potential trends.

The assessment of the effects linked with the cause-effect-relations is based on expert's meanings, taking into account the estimation of all project partners involved in the ESPON 2.4.1 project.

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

The long cause effect chains can be classified therefore 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 the long cause effect chains:

- Effect chains with overall positive effect on the studied Territorial objective: Plus-plus and minus-minus chains.
- Effect chains with overall negative effect on the studied Territorial objective: Plus-minus and minus-plus chains.

For example, there can be three chains with overall positive effect and two chains with negative effect on the territorial objective 1: Territorial Quality. In the next phase, these recognized effect chains are described using a story line: a short text, which describe 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 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 instruments.

3.2 The TIM Phase – 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 recognized 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 ($S_{r,c}$ in the TEQUILA model). The cause effect chains are weighed (Θ_c in the TEQUILA model) and given plus or minus sign according to the overall effect (PIM in the TEQUILA model). The weighed sums of cause-effect chains will be calculated for each of the three territorial objectives.

The end product will be three maps showing the overall impact of the studied environmental policy on regions for the three Territorial Objectives. The three TIM values are calculated as follows:

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

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

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.

This structure of the TIA shall also be used in the four case studies (Finland, Slovenia, Andalusia, Emsland; see Chapter G). In these case studies it might even be easier to find appropriate data that can describe the territorial trends because they can be provided by local and/or regional statistical authorities.

Remarks:

- The TIA approach, described above, will be applied on the European level as well as within the four case study areas. However, in view of the given differences in the physical characteristics as well as implementation of the EU policies in the four case study regions, some adjustments seem to be necessary.
- The weighting will be used only in the four national and regional case study areas in order to adjust the approach to regional circumstances, possibly applying the Delphi-method. Due to this fact, the weighting parameter will be kept in the model but not applied in the European scale. Thus the weighting parameter has to be seen as a regional parameter.
- The recognized cause effect chain might not be valid for all European regions, for ex-ample policy mechanisms targeted to coastal areas are not interesting for Austrian regions. Thus the whole cause effect chain could be left out for some regions. This is called the policy intensity (PI) parameter in the TEQUILA model. However, this parameter will be kept in the model but applied only if absolutely necessary due to the given difficulties in application. 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 since this might be different for different cause-effects. This seems to be not feasible in view of the given time limits in the ESPON 2.4.1 project on the European level, but should, nevertheless be addressed by the ESPON II programme. In addition, it will be explored, if the PI parameter could be feasible for some of the regional case study areas (in particular the Emsland County).

4 Application of the TIA Methodology

4.1 Civil Protection Policy

The Community Civil Protection Mechanism and Community Action Programme are not of territorial relevance. Moreover, the forthcoming EU directive on flood risk management will be excluded from the further analysis, since it belongs clearly to the Category C elements under regulation development in the EU level. Here, the Impact Assessment of the Commission should be used in order to avoid unwished negative side-effects on territorial cohesion. All other identified policy elements have been linked with territorial trends and objectives as illustrated by Figure 3 below.

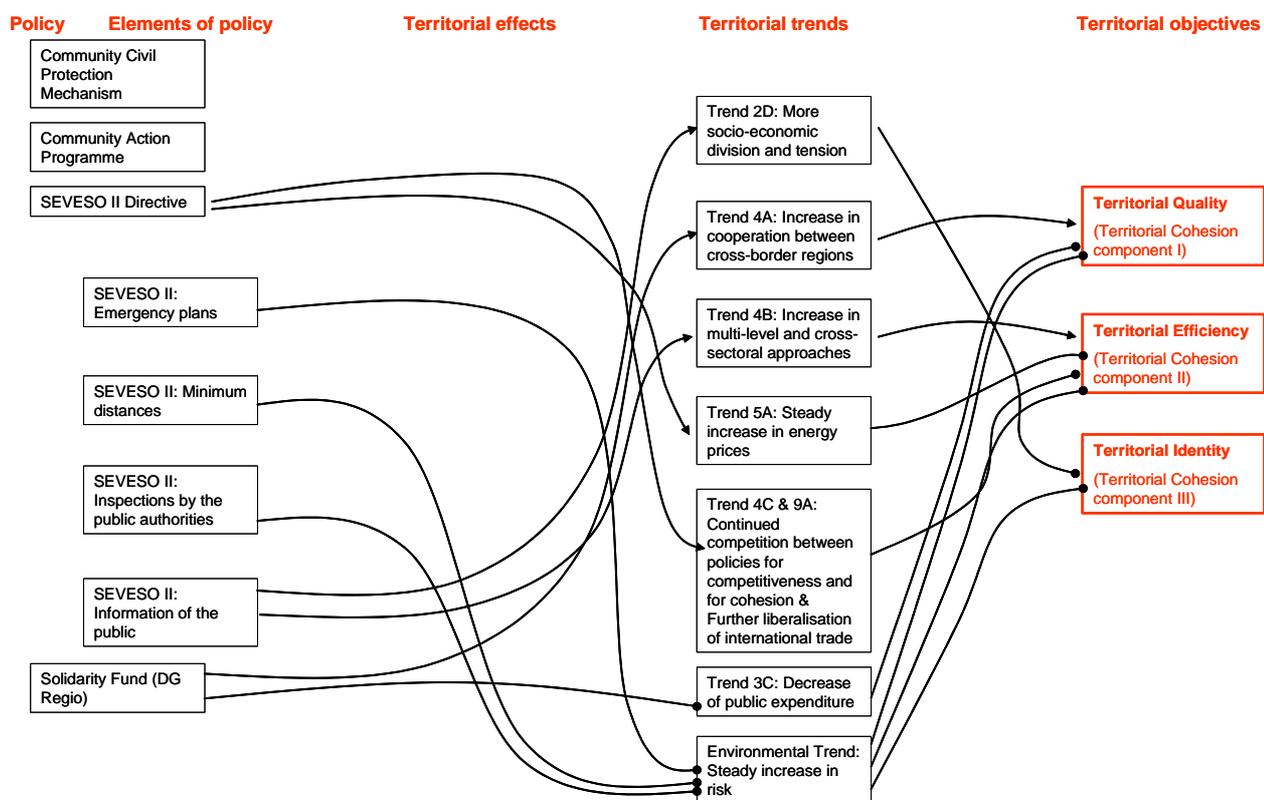


Figure 3 Explanation: arrows show positive, circles negative links. (source: own figure)

Story lines:

- The territorial efficiency may suffer from the steady increase of energy prices when oil refineries, nuclear power plants and others have to adapt SEVESO II requirements.
 - Best needed indicator (BNI): Impact of SEVESO requirements on energy production costs
 - Best available indicator (BAI): ?

2. The territorial efficiency may suffer from the continued competition between policies for competitiveness and for cohesion & further liberalisation of internal trade, because energy consumptive/ chemical/dangerous industries may emigrate to non-EU countries.
 - BNI: Trend of production of energy consumptive/ chemical/dangerous goods (e. g. aluminium, chemicals)
 - BAI: ?
3. The territorial quality of living and working environment may suffer from a steady in-crease 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.
 - BNI: Performance of emergency plan according to triennial tests
 - BAI: Existing of emergency plans (available at NUTS0 level 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)
4. The territorial efficiency (i. e. competitiveness and accessibility) 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.
 - BNI: Performance of emergency plan according to triennial tests
 - BAI: Existence of emergency plans (see above)
5. The territorial identity (i.e. social networks) 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.
 - BNI: Performance of emergency plan according to triennial tests
 - BAI: Existence of emergency plans (see above)
6. The territorial quality of the living and working environment may suffer from a steady increase in risks related to natural and technological hazards, but the Seveso II minimum distances (Art. 12) aim at the minimisation of consequences.
 - BNI: Effect of Art. 12 on land useplanning practice (extension of distances)
 - BAI: ?
7. The territorial efficiency (i. e. competitiveness and accessibility) may suffer from a steady increase in risks related to natural and technological hazards, but the

Seveso II minimum distances (Art. 12) aim at the minimisation of consequences.

- BNI: Effect of Art. 12 on land useplanning practice (extension of distances)
 - BAI: ?
8. The territorial identity (i.e. social networks) may suffer from a steady increase in risks related to natural and technological hazards, but the Seveso II minimum distances (Art. 12) aim at the minimisation of consequences.
- BNI: Effect of Art. 12 on land useplanning practice (extension of distances)
 - BAI: ?
9. The territorial quality of the living and working environment may suffer from a steady in-crease 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.
- BNI: Effect of Art. 18 on attention paid to Seveso II requirements
 - BAI: Percentage of inspected establishments in relation to the overall amount (available at NUTS0)
10. The territorial efficiency (i. e. competitiveness and accessibility) 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.
- BNI: Effect of Art. 18 on attention paid to Seveso II requirements
 - BAI: see above
11. The territorial identity (i.e. social networks) may be negatively influenced 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.
- BNI: Effect of Art. 18 on attention paid to Seveso II requirements
 - BAI: see above
12. The territorial identity may be negatively influenced by more socio-economic division and tension, but the information of the public can be seen in line with risk governance principles.
- BNI: Changes in community's perception of risks related to major accident hazards
 - BAI: Information to the Public issued; Percentage (%) of all establishments (Available at NUTS0)

13. The territorial efficiency may benefit from an increase in multi-level and cross-sectoral approaches which may be stimulated by the information of the public.

- BNI: Existing cooperation in context of projects under the regime of SevesoII
- BAI: Information to the Public issued; Percentage (%) of all establishments (Available at NUTS0)

14. The territorial quality may benefit from an increase in cross-border cooperation, which may be stimulated by financial aid, spent by the solidarity fund in case of disasters, related with transboundary effects.

- BNI: Recovery actions, cross-border coordinated
- BAI: ?

15. The territorial quality may suffer from a decrease in public expenditures, but aid spent by the solidarity fund may counterbalance this effect.

- BNI: Financial aid spent per year by the solidarity fund in relation to the population of a NUTS3 area
- BAI: Financial aid spent per year by the solidarity fund in relation to the population of a member state

Remark: In theory and in single cases most of the indicators, mentioned above, can be derived from existing data sets. For example, the performance of an emergency plan could be measured in the time needed for evacuation of the people within a certain radius. However, to be feasible for all hazardous establishments, standardised measures would have to be developed and implemented, as well as their documentation in accessible data bases. Only then aggregated measures such as at NUTS3 level could be extracted.

In the following, values are given based on experts' opinions of the ESPON 2.4.1 project to the links between a) policies and trends and b) trends and objectives which are multiplied to get PIM parameter for the chain and related story lines:

No.	Story line	Impact of environmental policy element on territorial trend	Impact of territorial trend on territorial objective	PIM
1	The territorial efficiency may suffer from the steady increase of energy prices when oil refineries, nuclear power plants and others have to adapt SEVESO II requirements	+ 1	- 2	- 2
2	The territorial efficiency may suffer from the continued competition between policies for competitiveness and for cohesion & further	+ 1	- 1	- 1

	liberalisation of internal trade, because energy consumptive/chemical/dangerous industries may emigrate to non-EU countries			
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	- 2	- 2	+ 4
4	The territorial efficiency (i. e. competitiveness and accessibility) 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	- 2	- 2	+ 4
5	The territorial identity (i.e. social networks) 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	- 2	- 1	+ 2
6	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 minimum distances (Art. 12) aim at the minimisation of consequences	- 1	- 2	+ 2
7	The territorial efficiency (i. e. competitiveness and accessibility) may suffer from a steady increase in risks related to natural and technological hazards, but the Seveso II minimum distances (Art. 12) aim at the minimisation of consequences	- 1	- 2	+ 2
8	The territorial identity (i.e. social networks) may suffer from a steady increase in risks related to natural and technological hazards, but the Seveso II minimum distances (Art. 12) aim at the minimisation of consequences	- 1	- 1	+ 1
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	- 1	- 2	+ 2

10	The territorial efficiency (i. e. competitiveness and accessibility) 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	- 1	- 2	+ 2
11	The territorial identity (i.e. social networks) may be negatively influenced 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	- 1	- 1	+ 1
12	The territorial identity may be negatively influenced by more socio-economic division and tension, but the information of the public can be seen in line with risk governance principles	- 1	- 1	+ 1
13	The territorial efficiency may benefit from an increase in multi-level and cross-sectoral approaches which may be stimulated by the information of the public	+ 1	+ 1	+ 1
14	The territorial quality may benefit from an increase in cross-border cooperation which may be stimulated by financial aid, spent by the solidarity fund in case of disasters, related with transboundary effects	+ 1	+ 1	+ 1
15	The territorial quality may suffer from a decrease in public expenditures, but aid, spent by the solidarity fund may counterbalance this effect	- 1	- 2	+ 2
	Sum			+ 22

Remark: Even in view of the fact that the result of + 22 is only fictional, it becomes clear that the overall territorial effect of the civil protection policy can be estimated as quite positive.

4.2 Water Policy

Regulative elements (like EU Directives) are not the only instruments that may cause territorial effects. The LIFE programme with the sub-group "Environment" as well as the ERDF with the sub-group "Cooperation" might have territorial effects. They can provide funding for the implementation of the WFD directive in terms of measures that will be chosen by a management plan in future. However, such

effects are not considered as cause-effect chains because the policies do not belong to water policy, but have a broader scope.

Moreover, it has to be stressed, that the relation of the EU water policy to other policy fields shows synergies as well as potential conflicts:

- Synergies between WFD and FFH Directive
- Potential conflicts between WFD and Civil Protection Policy: Technical/structural flood protection measures versus a good quality of the structure of aquatic ecosystems

Again, this connection cannot be considered as a cause-effect chain, but has to be taken into account by the four case studies by the example of single plans/projects.

All other identified policy elements have been linked with territorial trends and objectives as illustrated by Figure 4 below.

However, it has to be stressed that most of the identified cause-effect relations may occur in future after the management plans and programme of measures will be implemented. Therefore, water policy belongs to a certain extent to the category B policies. For an ex-ante assessment, the classical indicators, showing the state of the environment, are not suitable.

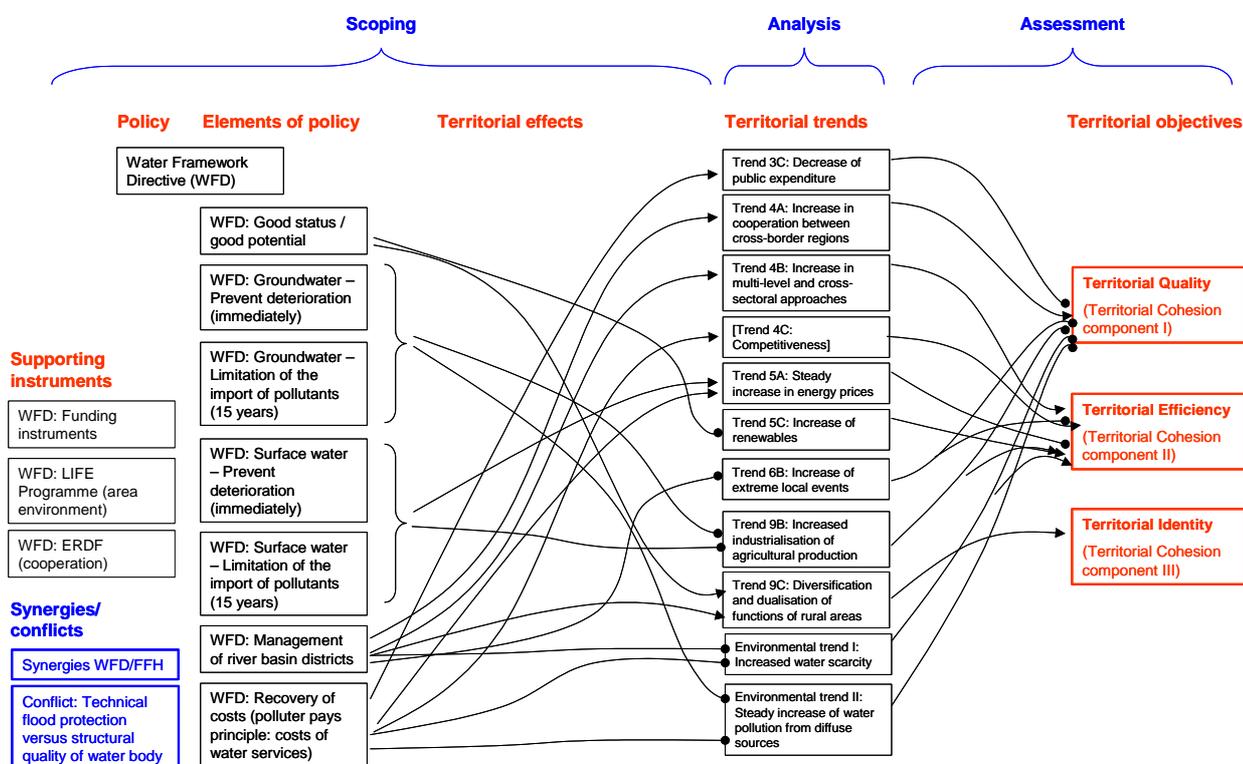


Figure 4 Explanation: arrows show positive, circles negative links. (source: own figure)

Story lines:

1. The territorial quality may suffer from a decrease in public expenditures when water production becomes more expensive (recovery of costs) also for public bodies as consumer of water services
 - BNI: Development of water prices during the last years on NUTS3 level
 - BAI: ?
2. The territorial quality may benefit from an increase in cooperation between cross-border regions which will be supported by setting up transnational management plans
 - BNI: Success of transnational cooperation in a sub river-basin
 - BAI: Existence of transnational management plan for a NUTS3 region
3. The territorial efficiency may benefit from an increase in multi-level and cross-sectoral approaches which will be supported by setting up management plans by involving all relevant stakeholders
 - BNI: Full participation of all stakeholder groups in the setting-up process of a management plan
 - BAI: ?
4. The territorial efficiency may be negatively influenced by a continued competition between policies for competitiveness and for cohesion when the high costs for restoration and regeneration of water bodies deteriorate the competitiveness of the EU.
 - BNI: Opposition to the polluter pays principle in a NUTS3 region
 - BAI: Opposition to the polluter pays principle propagated by politicians and/or lobbyist on the national level
5. The territorial quality may suffer from the steady increase of groundwater pollution, but the import of pollutions to surface water bodies will be limited by the WFD.
 - BNI: Nutrients in freshwater (EEA CSI 020)
6. The territorial efficiency may suffer from the steady increase of energy prices when the water production becomes more expensive.
 - BNI: Development of water prices after implementation of management plans on NUTS3 level
 - BAI: ?

7. The territorial efficiency may benefit from an increase in the use of renewables, but the requirement of a good structural quality of a water body reduces the possibility of energy production by hydroelectric power plants.
 - BNI: Impact of management plans on production of hydroelectricity on NUTS3 level
 - BAI: ?
8. The territorial quality may suffer from an increase in extreme events, but the implementation of the management plans has to be coordinated with the flood risk management plans.
 - BNI: Share of measures, aiming at flood hazard reduction, being part of the programme of measures relevant for a certain NUTS3 region.
 - BAI: ?
9. The territorial efficiency may suffer from an increase in extreme events, but the implementation of the management plans has to be coordinated with the flood risk management plans.
 - BNI: Share of measures, aiming at flood hazard reduction, being part of the programme of measures relevant for a certain NUTS3 region.
 - BAI: ?
10. The territorial quality may suffer from an increased industrialisation of agricultural production, but the protection of the groundwater the WFD aims at, may contradict this trend.
 - BNI: Nutrients in freshwater (EEA CSI 020)
11. The territorial quality may suffer from an increased industrialisation of agricultural production, but the protection of the surface water the WFD aims at, may contradict this trend.
 - BNI: Nutrients in freshwater (EEA CSI 020)
12. The territorial efficiency may benefit from an increased industrialisation of agricultural production, but the protection of the groundwater the WFD aims at, may contradict this trend.
 - BNI: Nutrients in freshwater (EEA CSI 020)
13. The territorial efficiency may benefit from an increased industrialisation of agricultural production, but the protection of the surface water the WFD aims at, may contradict this trend.
 - BNI: Nutrients in freshwater (EEA CSI 020)

14. The territorial identity may benefit from a diversification and dualisation of functions of rural areas, which will be supported by a good ecological status/potential of water bodies, tourist potentials may benefit from.
- BNI: 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)
15. The territorial identity may benefit from a diversification and dualisation of functions of rural areas when the management plans will be implemented.
- BNI: Achievement of good status/potential in 2015 as targeted by the WFD
 - BAI: Probability of achievement of good status/potential (available from status reports, which have been reported to the commission)
16. The territorial quality may suffer from an increased water scarcity, but the implementation of the management plans may contradict this trend.
- BNI: Use of freshwater resources (EEA CSI 018)
17. The territorial efficiency may suffer from an increased water scarcity, but the implementation of the management plans may contradict this trend.
- BNI: Use of freshwater resources (EEA CSI 018)
18. The territorial quality may suffer from an increased water scarcity, but the polluter pays principle may contradict this trend, because it may lead to a more reasonable use of water resources.
- BNI: Consumer costs for drinking water/waste water in a NUTS3 region in 2015 in comparison to present costs
 - BAI: Average costs on NUTS0 level
19. The territorial efficiency may suffer from an increased water scarcity, but the polluter pays principle may contradict this trend, because it may lead to an increased thrift in use of water resources.
- BNI: Consumer costs for drinking water/waste water in a NUTS3 region in 2015 in comparison to present costs
 - BAI: Average costs on NUTS0 level
20. The territorial quality may suffer from a steady increase of water pollution from diffuse sources, but the protection of the groundwater bodies may contradict this trend.
- BNI: Improvement of the groundwater status till 2015 in comparison to the present status in a certain NUTS3 region
 - BAI: ?

21. The territorial quality may suffer from a steady increase of water pollution from diffuse sources, but the polluter pays principle may contradict this trend.

- BNI: Consumer costs for drinking water/waste water in a NUTS3 region in 2015 in comparison to present costs
- BAI: Average costs on NUTS0 level

No.	Story line	Impact of environmental policy element on territorial trend	Impact of territorial trend on territorial objective	PIM
1	The territorial quality may suffer from a decrease in public expenditures when water production becomes more expensive	+ 1	- 2	- 2
2	The territorial quality may benefit from an increase in cooperation between cross-border regions which will be supported by setting up transnational management plans	+ 2	+ 1	+ 2
3	The territorial efficiency may benefit from an increase in multi-level and cross-sectoral approaches which will be supported by setting up management plans by involving all relevant stakeholders	+ 1	+ 1	+ 2
4	The territorial efficiency may be negatively influenced by a continued competition between policies for competitiveness and for cohesion when the high costs for restoration and regeneration of water bodies deteriorate the competitiveness of the EU.	+ 1	- 1	- 1
5	The territorial quality may suffer from the steady increase of groundwater pollution, but the import of pollutions to surface water bodies will be limited by the WFD	- 1	- 2	+ 2
6	The territorial efficiency may suffer from the steady increase of energy prices when the water production becomes more expensive.	+ 2	- 2	- 4

7	The territorial efficiency may benefit from an increase in the use of renewables, but the requirement of a good structural quality of a water body reduces the possibility of energy production by hydroelectric power plants.	- 2	+ 2	- 4
8	The territorial quality may suffer from an increase in extreme events, but the implementation of the management plans has to be coordinated with the flood risk management plans	- 1	- 2	+ 2
9	The territorial efficiency may suffer from an increase in extreme events, but the implementation of the management plans has to be coordinated with the flood risk management plans.	- 1	- 2	+ 2
10	The territorial quality may suffer from an increased industrialisation of agricultural production, but the protection of the groundwater the WFD aims at may contradict this trend.	- 1	- 2	+ 2
11	The territorial quality may suffer from an increased industrialisation of agricultural production, but the protection of the surface water the WFD aims at may contradict this trend.	- 1	- 2	+ 2
12	The territorial efficiency may benefit from an increased industrialisation of agricultural production, but the protection of the groundwater the WFD aims at may contradict this trend.	- 1	+ 1	- 1
13	The territorial efficiency may benefit from an increased industrialisation of agricultural production, but the protection of the surface water the WFD aims at may contradict this trend.	- 1	+ 1	- 1
14	The territorial identity may benefit from a diversification and dualisation of functions of rural areas, which will be supported by a good ecological status/potential of water bodies, tourist potentials may benefit from.	+ 1	+ 1	+ 1

15	The territorial identity may benefit from a diversification and dualisation of functions of rural areas when the management plans will be implemented	+ 1	+ 1	+ 1
16	The territorial quality may suffer from an increased water scarcity, but the implementation of the management plans may contradict this trend.	- 1	- 2	+ 2
17	The territorial efficiency may suffer from an increased water scarcity, but the implementation of the management plans may contradict this trend.	- 1	- 2	+ 2
18	The territorial quality may suffer from an increased water scarcity, but the polluter pays principle may contradict this trend, because it may lead to an increased thrift in use of water resources.	- 1	- 2	+ 2
19	The territorial efficiency may suffer from an increased water scarcity, but the polluter pays principle may contradict this trend, because it may lead to an increased thrift in use of water resources.	- 2	- 2	+ 4
20	The territorial quality may suffer from an steady increase of water pollution from diffuse sources, but the protection of the groundwater bodies may contradict this trend.	- 1	- 2	+ 2
21	The territorial quality may suffer from a steady increase of water pollution from diffuse sources, but the polluter pays principle may contradict this trend.	- 2	- 2	+ 4
	Sum			+ 21

Opposite to civil protection policy, water policy is obviously related with several negative side effects, in particular for the territorial efficiency. However, the envisaged positive effects on given environmental trends are more important than these negative side effects. 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 problem might be relevant also for habitat policy and others, related with restrictions for those who are acting in space. Therefore, an appropriate strategy should be addressed explicitly, particularly as part of our policy recommendations.

4.3 Habitat and Biodiversity

As already stated in chapter 4.7, the establishment of the Natura 2000 network according to Birds and Habitats Directive with its requirements to create protection areas is of high spatial and territorial relevance. Management of designated Natura 2000 areas has raised the need for implementation of specific management plans. For example, many of the projects financed by LIFE Nature have included management plans (European Commission 2005e). The Biodiversity Strategy of Commission, in turn, defines relevant territorial concepts in the view of sustainable use of biodiversity across the territories that do not constitute protected areas, such as ecological corridors and buffer zones.

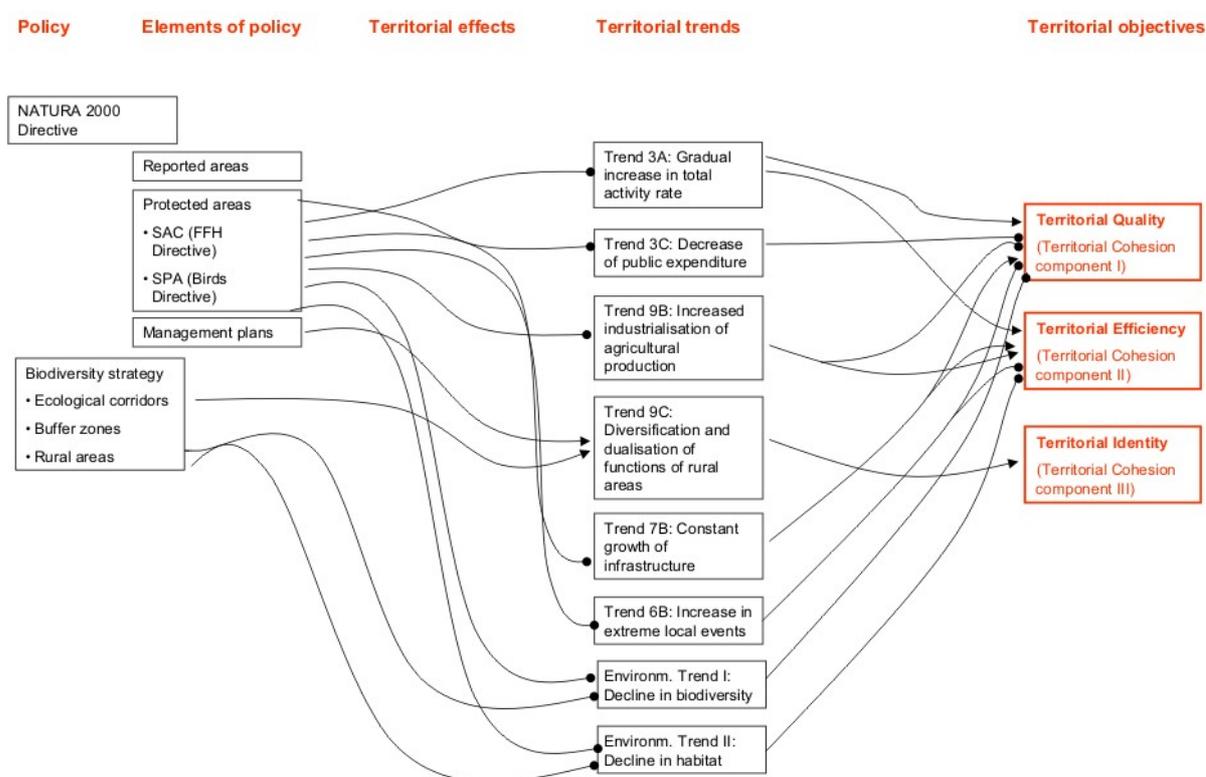


Figure 5 Diagram of cause effect chains of EU biodiversity policy. Explanation: arrows show positive, circles negative links. (source: own figure)

Story lines:

1. The territorial quality gets benefit from the gradual increase in total activity rate, but re-servicing the land for protected areas may have negative impact on the activity rate. Reservation of land for protection areas prevents other use of the protected areas and may hinder other important activities in the region. For example, if the mining and quarrying industry are important for employment in the region and large protected areas restrict the use of natural resources, the environmental policy can lead to unemployment.

- Best needed indicator (BNI): Change of employment rate after implementation of protection areas
 - Best available indicator (BAI): Case study example: Percentage of people working in mining or quarrying industry x percent of NATURA 2000 areas of the whole region
2. The territorial quality will suffer from the decrease of public expenditures, but the territorial quality may improve when more public expenditures are allocated to the region when the new NATURA 2000 areas are established.
- BNI: Amount of additional public funds granted to the region for the establishment of new protection areas/size of the region.
 - BAI:
3. The territorial quality of living and working environment may suffer from the increased industrialisation of agricultural production, while protection of areas for birds can slow down the industrialisation of the agriculture and thus improve the territorial quality.
- BNI: Intersection of the SPA areas and agricultural land use/size of the region.
 - BNI2: Ratio of SPA areas and agricultural output per AWU (agricultural work unit)
 - BAI:
4. The territorial quality 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.
- BNI: Intersection of transport networks (existing and planned) and new protected areas
 - BNI2: Ratio of protected areas and accessibility of the region
 - BAI:
5. The territorial quality can suffer from increasing number of extreme local events related to climate change. Large protection areas can reduce the negative effects of extreme natural events. This is valid only for areas, which have the potential threat of natural hazards linked to the climate change. Valid areas (PI = 1) are defined by the ESPON project 1.3.1.
- BNI: Size of protected areas/(risk) size of the region
 - BAI:
6. The territorial efficiency gets benefit from the gradual increase in total activity rate, but reserving the land for protected areas may have negative impact on it.

Reservation of land for protection areas prevents other use of these areas and may hinder other important activities in the region. For example, if the mining and quarrying industry are important for employment in the region and large protected areas restrict the use of natural resources, the environmental policy can lead to unemployment.

- BNI: Change of employment rate after implementation of protection areas
 - BAI: example: Percentage of people working in mining or quarrying industry x percent of NATURA 2000 areas of the whole region
7. The territorial efficiency may benefit from the increasing industrialisation of agriculture, but the new enlarged protection areas will decrease the industrialisation trend.
- BNI: Size of agricultural land located in protected areas
 - BNI2: Ratio of protected areas and agricultural output per AWU
 - BAI:
8. Territorial 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.
- BNI: Overlap of transport networks (existing and planned) and new protected areas
 - BNI2: Ratio of protected areas and accessibility of the region
 - BAI:
9. The territorial efficiency can suffer from increasing number of extreme local events related to climate change. Large protection areas can reduce the negative effects of extreme natural events. This is valid for areas which have the threat of natural hazards linked to the climate change. Valid areas (PI = 1) are defined by ESPON project 1.3.1.
- BNI: Size of protected areas/(risk) size of the region
 - BAI:
10. The territorial identity will benefit from diversification and dualisation of functions of rural areas, and this trend is supported by management plans of Natura 2000 directive and biodiversity strategy.
- BNI: Implementation of management plans of the NATURA 2000 directive and biodiversity strategy
 - BAI:

11. The territorial quality can suffer from the environmental trend of decline in biodiversity. This trend is decreasing while the Natura 2000 directive is implemented and thus the increasing protected areas can finally improve the territorial quality.

- BNI:
- BAI:

12. Man has always changed natural areas into agricultural, industrial and housing use. Thus decline in habitat has had a positive effect on territorial efficiency. Implementation of Natura 2000 will decrease this trend by limiting the utilisation of natural areas.

- BNI: Area of NATURA 2000 areas
- BAI:

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

- BNI:
- BAI:

14. Natural areas have been changed and cultivated for agricultural, industrial and housing use. Thus decline in habitat has had a positive effect on territorial efficiency. The protection and creation of ecological corridors and buffer zones will decrease this trend by limiting the utilisation of natural areas.

- BNI:
- BAI:

No.	Story line	Impact of environmental policy element on territorial trend	Impact of territorial trend on territorial objective	PIM
1	The territorial quality 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. Reservation of land for protection areas prevents other use of the protected areas and may hinder other important activities in the region.	- 1	+ 2	- 2
2	The territorial quality will suffer from the decrease of public expenditures,	- 1	- 2	+ 2

	but the territorial quality may improve when more public expenditures are allocated to the region when the new NATURA 2000 areas are established.			
3	The territorial quality of living and working environment may suffer from the increased industrialisation of agricultural production, while protection of areas for birds can slow down the industrialisation of the agriculture and thus improve the territorial quality.	- 2	-2	+ 4
4	Territorial quality 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.	-2	+1	- 2
5	The territorial quality can suffer from increasing numbers of extreme local climate events. Large protection areas can reduce the negative effects of extreme natural (climate) events. This is valid only for areas which have the potential threat of natural hazards linked to the climate change.	-1	-2	+ 2
6	The territorial 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. Reservation of land for protection areas prevents other use of the protected areas and may hinder other important activities in the region.	-1	+2	- 2
7	The territorial efficiency may benefit from the increasing industrialisation of agriculture, but the new enlarged protection areas will decrease the industrialisation trend.	-1	+1	- 1
8	Territorial efficiency may benefit from the constant growth of infrastructure, but the new protected areas can limit the development of infrastructure such as building new transport networks.	-2	+1	-2
9	The territorial efficiency can suffer from increasing number of extreme local climate events. Large protection areas can reduce the negative effects	-1	-2	+2

	of extreme natural (climate) events. This is valid only for areas which have the threat of natural hazards linked to the climate change.			
10	The territorial identity will benefit from diversification and dualisation of functions of rural areas, and this trend is supported by management plans of Natura 2000 directive and biodiversity strategy.	+1	+1	+1
11	The territorial quality can suffer from the environmental trend of decline in biodiversity. This trend is decreasing while the Natura 2000 directive is implemented and thus the increasing protected areas can finally improve the territorial quality.	-2	-2	+4
12	Man has always changed natural areas into agricultural, industrial and housing use. Thus decline in habitat has had a positive effect on territorial efficiency. Implementation of Natura 2000 will decrease this trend by limiting the utilisation of natural areas.	-2	+2	-4
13	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 strategy should slow down this process, preserving biodiversity and territorial quality as well.	-2	-2	+4
14	Natural areas have been changed and cultivated for agricultural, industrial and housing use. Thus decline in habitat has had a positive effect on territorial efficiency. The protection and creation of ecological corridors and buffer zones will decrease this trend by limiting the utilisation of natural areas.	-2	+2	-4
	Sum			+2

EU 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. The overall result from the table above does not show a clear tendency for the impact on the territory.

Chapter D - European Wide Environmental Indicators

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1 Introduction

1.1 Methodological Approach

The methodological procedure adopted to compile all the information and interact with the existing knowledge in the ESPON 2.4.1 project is the following:

Documentation

- a. Description of the **state-of-the-art** of selected Environmental **Policies** affecting the EU Territory
- b. **Review and compilation** of existing **datasets and indicators** in EEA, OECD, EUROSTAT, ESPON.

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

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.

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.

Update the methodological Indicator Fact Sheets 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.

The **output** of this task is a **proposal for and definition of additional indicators** integrating data from **spatial and statistical** databases, showing an example of **impact of Environmental policies in the EU Territory**.

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.

2 Conceptual Framework for New Indicators

2.1 State of the Art of EU Environmental Policies Affecting the Territory

The review of the policies is focused on the **environmental policies** affecting the EU territory such as the Habitat Directive or the 6th Environment Action Programme of the European Community (EAP). Moreover, in this review are included the **policies affecting the territory** such as the Common Agriculture Policy (CAP).

A summary can be found in the following table.

Table 12 Environmental Policies affecting the EU Territory

Policy	Description
6 th EAP Environmental Action Programme	<p>The programme identifies four environmental areas to be tackled for improvements:</p> <ul style="list-style-type: none"> – Climate Change – Nature and Biodiversity – Environment and Health and quality of life – Natural Resources and Waste <p>http://europa.eu.int/comm/environment/newprg/</p>
Water Framework Directive (2000/60/EC)	<p>The WFD is a new pan European initiative that is currently under implementation. The purpose of the WFD is to establish a framework in order to achieve the objectives of a sustainable water policy. This directive will effectively replace the existing Directives for water quality standards and will cover ground and surface water as well as coastal and inland waters, including rivers, lakes and transitional waters. The main implications of the WFD are catchments wide management as opposed to administrative and political boundaries and establishing common implementation practices. These factors will necessitate greater national, regional and international co-operation.</p> <p>http://europa.eu.int/eur-lex/pri/en/oj/dat/2000/l_327/l_32720001222en00010072.pdf</p> <p>http://europa.eu.int/comm/environment/water/water-framework/index_en.html</p> <p>Through its integrated river basin management approach, the WFD (and its daughter directives) will open scientific challenges for the next 20 years with respect to ecological and chemical status of surface water management and use, taking into consideration environmental and socio economic aspects.</p>
Conservation of Natural Habitats and Wild Flora and Fauna (92/43/EEC) (1992)	<p>Habitat Directive. The Conservation of Natural Habitats and Wild Fauna and Flora Directive came into force in 1994. It requires Member States to protect areas that support certain natural habitats or animal and plant species of Community interest. It provides for a range of measures including, conservation of important wildlife features, the protection of agreed species and monitoring of natural habitats and species. Member States are also required to designate suitable sites as Special Areas of Conservation (SACS).</p> <p>http://europa.eu.int/comm/environment/nature/habdir.htm</p>

<p>Biodiversity 2010</p>	<p>The main objective of the meeting was to articulate a framework for action for achieving the internationally agreed 2010 target. The specific objectives of the meeting were:</p> <ul style="list-style-type: none"> To review approaches for understanding and measuring biodiversity loss; To review the 2010 target in the context of other biodiversity-related targets To identify key initiatives in addressing biodiversity loss (such as Multilateral Environment Agreements (MEAs)) and how they relate to the 2010 target; and To review and agree on the most appropriate approaches for reporting on progress. <p>This meeting is also part of the ongoing efforts of the Secretariat of the Convention on Biological Diversity and other partners that specifically focus on integrating biodiversity issues in initiatives aimed at meeting the Millennium Development Goals.</p> <p>A summary report of the meeting is available online at www.iisd.ca/linkages/sd/sdgbc</p>
<p>European Landscape Convention</p>	<p>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. The European Landscape Convention aims at filling the legal vacuum caused by the absence, at European level, of a specific, comprehensive reference text devoted entirely to the conservation, management and improvement of European landscapes in the international legal instruments on the environment, regional planning and the cultural heritage.</p> <p>http://glossary.eea.eu.int/EEAGlossary/E/European_Landscape_Convention http://conventions.coe.int/Treaty/en/Treaties/Html/176.htm</p>
<p>Thematic Strategy for Soil Protection</p>	<p>The purpose of this Communication is to build on the political commitment to soil protection in order that it will be achieved more fully and systematically in coming years. As it is the first communication addressing soil protection, it is both descriptive and action orientated in order that a full picture of the complexity of the issue can be fully understood and it can serve as a basis for future work. A distinction is made between soil, which is the subject of this communication and land use, which will be the subject of a separate communication addressing the territorial dimension to be published in 2003.</p> <p>http://europa.eu.int/comm/environment/soil/index.htm#1</p> <p>The Soil Thematic Strategy asks for a background knowledge information on European soils, incl. characterisation, processes, pressures and impacts). Information needs worth to be mentioned are: flooding issues and the EU Water initiative, which aims to coordinate the needs</p>
<p>Common agriculture policy - CAP</p>	<p>The Common Agricultural Policy (CAP), originally introduced in 1962, was driven by a strategic need for food security in Europe, which led to a deliberate increase in domestic food production and reduced dependence on imports. Its main mechanisms were market management to remove surpluses and protection for the domestic market through import taxes and export subsidies. As production responded surpluses became chronic and required increasingly heavy expenditure. This led to friction with other suppliers to the world market who were not so reliant on subsidy. In some areas the intensification of agricultural production led to environmental damage. The</p>

	<p>key objectives of the CAP, as enshrined in Article 33 (39) of the (consolidated) Treaty of Rome are to increase agricultural productivity thus to ensure a fair standard of living for agricultural producers; stabilise markets; assure availability of supplies and ensure reasonable prices to consumers.</p> <p>http://europa.eu.int/comm/agriculture/capreform/index_en.htm</p> <p>http://europa.eu.int/scadplus/leg/en/lvb/l60002.htm</p> <p>http://glossary.eea.eu.int/EEAGlossary/C/Common_Agricultural_Policy</p>
<p>White paper "European transport policy for 2010: time to decide"</p>	<p>"This White Paper sets out some sixty measures designed to bring about a substantial improvement in the quality, safety and efficiency of European transport, the main issues being to reduce the growing congestion of road and air transport routes and to limit environmental nuisance and health hazards, while maintaining the European Union's competitiveness. Implementation of the measures in the White Paper should contribute to achieving the objective of breaking the link between economic growth and growth in transport, as requested by the Gothenburg European Council"</p> <p>TEN: Generic term for interconnected networks and services available on a pan-European basis.</p> <p>TINA: Transport Infrastructure Needs Assessment</p> <p>http://europa.eu.int/scadplus/leg/en/lvb/l24007.htm</p> <p>http://europa.eu.int/abc/doc/off/bull/en/200109/p104043.htm</p> <p>http://glossary.eea.eu.int/EEAGlossary/T/trans_European_networks</p> <p>http://themes.eea.eu.int/Sectors_and_activities/transport/indicators/supply/capacity/index_html</p>
<p>Thematic Strategy on the Urban Environment</p>	<p>In order to fulfill the mandate set out in the Sixth Environmental Action Program, the Thematic Strategy for the Urban Environment will focus on four cross-cutting themes which are essential to the long-term sustainability of towns and cities, which have clear connections to the economic and social pillars of sustainable development and where the most significant progress can be achieved. These themes, which have been determined in consultation with the EU Expert Group on the Urban Environment and other stakeholders, are sustainable urban management, sustainable urban transport, sustainable construction and sustainable urban design. The themes are presented separately but clearly have strong interactions. Other priority themes will be identified and addressed at a later stage, in line with the incremental approach of the Thematic Strategies.</p> <p>http://europa.eu.int/comm/environment/urban/thematic_strategy.htm</p>
<p>Urban Waste Water Treatment (91/271/EEC) (1991)</p>	<p>This Directive addresses the problem of urban sewage in relation to water quality standards. The policy states that all urban wastewater requires secondary treatment before release into coastal, estuarine and inland waters. Member States were obliged to phase out the disposal of sewage sludge at sea by 31st December 1998 and consequently this directive has had a profound impact on the quality of coastal waters. Much of the national legislation that results from this Directive defines suitable water quality monitoring strategies for inland and coastal waters. The conditions of the Urban Waste Water Treatment Directive will now be implemented under the 'umbrella' of the WFD.</p> <p>http://europa.eu.int/comm/environment/water/water-urbanwaste/index_en.html</p>
<p>Integrated</p>	<p>The EU has a set of common rules on permitting for industrial installations.</p>

<p>Pollution Prevention and Control (96/61/EC) (1996)</p>	<p>These rules are set out in the so-called IPPC Directive of 1996. In essence, the IPPC Directive is about minimising pollution from various point sources throughout the European Union. All installations covered by Annex I of the Directive are required to obtain an authorisation (permit) from the authorities in the EU countries. Unless they have a permit, they are not allowed to operate. The permits must be based on the concept of <i>Best Available Techniques</i> (or <i>BAT</i>), which is defined in Article 2 of the Directive. In many cases BAT means quite radical environmental improvements and sometimes it will be very costly for companies to adapt their plants to BAT. To impose new and considerably tougher BAT rules on all existing installations in the European Union could jeopardise many European jobs, and therefore the Directive grants these installations an eleven-year long transition period counting from the day that the Directive entered into force.</p> <p>http://europa.eu.int/scadplus/leg/en/lvb/l28045.htm</p>
<p>United Nations Convention on Climate Change (1992)</p>	<p>The ultimate objective of the Climate Change Convention is "to achieve stabilisation of atmospheric concentrations of greenhouse gases at levels that would prevent dangerous anthropogenic (human-induced) interference with the climate system...". The Convention does not define what levels might be "dangerous", although it does state that ecosystems should be allowed to adapt naturally, food supply should not be threatened, and economic development should be able to proceed in a sustainable manner. The Convention sets the overall framework for intergovernmental efforts to address climate change. It establishes an objective and principles, commitments for different groups of countries, and a set of institutions to enable governments to monitor the progress of implementation</p> <p>http://unfccc.int/resource/conv/</p>
<p>Life</p>	<p>In addition to the four elements of the EAP (Environmental Action Programme), the financial instrument for the environment (LIFE) should be explicitly named and considered. This Regulation repeals Regulation (EEC) No. 1973/1992 establishing the LIFE financial instrument. The objective of this financial instrument is to contribute to the development, implementation and updating of Community environment policy and environmental legislation, especially as regards the integration of the environment into other policies, and to sustainable development in the Community.</p>
<p>EIA & SEA</p>	<p>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 [1] on the environment" [2], which came into force on 27th of June 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</p>

	<p>changes on the project could be taken into consideration as a result of an EIA.</p> <p>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).</p> <p>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. In view of the short time since the SEA came into force, only a few examples can be assessed in the case study areas in order to give a first impression about the impact of the SEA on territorial development.</p>
ESDP	<p>In the ESDP (p. 17) the following environmental policies are regarded to contain provisions which put particular emphasis on direct or indirect links with spatial development and, in particular, land use:</p> <p>EU-wide designation of protected areas ("Natura 2000"; see Chapter 5.1.4),</p> <p>EC Nitrate Directive which aims at reducing existing nitrate pollution from agricultural land and preventing further ground water pollution (see Chapter 5.1.6),</p> <p>Directive 85/337/EEC, which stipulates that environmental impact assessments for large projects have to be carried out and published (see Chapter 6.2.2),</p> <p>defining quality standards for areas close to natural surroundings,</p> <p>regulations aiming at reducing emissions,</p> <p>Integrated Coastal Zone Management (ICZM) which promotes sustainable management through co-operation and integrated planning, involving all the relevant players at the appropriate geographic level,</p> <p>legislation on waste and water treatment, noise and air pollution; limits that can have direct impacts on urban development and industrial areas (see Chapters 5.1.1, 5.1.5, 5.1.6),</p> <p>environment policy requirements are becoming important locational factors when it comes to setting up or relocating businesses and therefore may have considerable implications from an economic point of view (see Chapters 2.1.3 and 6.2.1, Table, Row 5).</p>
European Funding	<p>The European Social Fund (ESF) aims with objective 4 at "training related to the introduction, use and development [...] particularly with regard to the protection of the environment." The current Regulation establishes that the ESF's remit is among others to promote sustainable development and economic and social cohesion.</p> <p>One of European Regional Development Fund's (ERDF) general objectives is fostering productive investment and investment in infrastructure aimed at environmental protection, in accordance with the principles of sustainable development, where such investment is linked to regional development.</p>

2.2 Compilation of Indicators and Datasets

Existing indicators cover different environmental topics affecting the territory. A first selection has been made and related topics are the following:

- Urban
- Air, Water
- Land, Soil, Agriculture, Forest
- Wild Life, Fisheries
- Energy, Transport, Industry
- Climate Change, Risk
- Household, Tourism, Waste
- General data

The compilation of the indicators and datasets is given in annex 1 to 4, with information coming from EEA, OECD, EUROSTAT, and ESPON.

More details on each of the listed indicators can be found in the web pages of each institution (see Indicator Fact sheets from EEA, EUROSTAT, OECD, ESPON).

2.3 Criteria for Indicator Selection and Consultation

It was decided to identify the indicators through a conceptual approach but it appears the need of a more pragmatic approach, that bring limitations into the definition, in order to be able to develop the indicators in a further step of the project.

In that sense, a set of criteria has been established to select, from the previous compilation, the main indicators and datasets useful to define the new relevant indicators. The following table gives the priorities given for the selection.

Table 13 Criteria for selection

Criteria	Foreseen Goals
Available data for the development of the indicator	Be able to develop the indicator in a further step, an EU pilot site.
Good spatial coverage	Be able to cover a large area, if possible covering ESPON space (EU25 + Bulgaria, Romania, Norway and Switzerland)
Possibility to combine spatial and statistical information	Aim of the ESPON 2.4.1 project.

In order to have a first feedback, the consortium and external experts were asked to select 10 indicators from the compilation list, which pretended to bring an overview of the most important topics for new relevant indicators. This preliminary investigation was used as precious input in the definition of the new indicators.

2.4 Proposal of Relevant Indicators

The analysis of the compiled information together with the existing knowledge from the consortium and the external experts has not been an easy task. The results from the evaluation show that there are not too many options those are compliant with the criteria. The compliance is shown in the following table.

Table 14 Compliance between the criteria and the selected indicators and datasets

Criteria / Indicators	Policies	Selected Indicators and Data sets		
		Combine Statistics and Spatial data	Spatial Coverage	Availability
Increasing of protected areas due to Natura 2000	Habitat Directive	Area of National Designated Areas	EU	Yes, ETC-BD
		NATURA2000	EU	Yes, DG-ENV
		EUNIS Database		
Impact of afforestation on soil erosion and desertification	Soil Thematic Strategy, CAP, Kyoto Protocol, UNCCD	Afforested areas (1990-2000; LEAC derived from CLC90, CLC2000)	EU (23)	Yes, EEA
		Map of Soil Erosion Risk in Europe (PESERA project)	EU	Yes, EEA
		Desertification Sensitivity Index (DISMED)	Mediterranean (part of Spain, France and Italy, all Greece)	Yes, DISMED project
		Gross Value Added	EU	Eurostat
Urban Sprawl	-	CLC90 and CLC2000	EU 15, without Finland, Sweden, Greece, UK	EEA

The proposal is based on 3 indicators:

Indicator 1: Increasing of protected areas due to Natura 2000

The increase of protected sites in EU due to the implementation of Natura 2000 can have positive effects of the loss of biodiversity. Two scenarios are possible:

- More protection sites/area with the existence of Natura 2000, meaning a good impact of the Habitat Directive.
- Same protection sites/area with the existence of Natura 2000, meaning no visible impact of the Habitat Directive.

Indicator 2: Impact of afforestation on soil erosion and desertification

Prevention and mitigation of soil erosion and degradation is crucial for sustainable use of soils. The Soil Thematic Strategy, parts of the CAP and the Kyoto Protocol can be instrumentalised to support this objective.

By combining information on soil erosion risk and desertification with data on afforestation (from CLC) the success of bringing environmental thoughts into sectoral policies can be assessed.

In a final step the drivers of afforestation should be analysed.

Indicator 3: Urban sprawl

Various factors - such as increase of the urban population, decentralisation of urban land uses, rising living standards, tourism, migration from rural to urban areas - have contributed to the growth of the urban development.

The indicator shows the expansion trends of urban growth as well as the intensity pattern of the urban development.

More detailed information on these 3 indicators is given in the Indicator Fact sheets presented in the next chapter.

3 Indicator 1: Increasing of Protected Areas due to Natura 2000

Indicator Fact Sheet

Increasing of protected areas due to Natura 2000

Results and assessment

Policy relevance:

- 6th Environment Action Program, COM (2001)31 & Common Regional - Development Policy
- Habitat Directive
- Biodiversity 2010

Policy context:

EU Nature conservation policy is based on two main pieces of legislation - the Birds directive and the Habitats directive - and benefits from a specific financial instrument - the LIFE-Nature fund. Its priorities are to create the European ecological network (of special areas of conservation), called NATURA 2000, and to integrate nature protection requirements into other EU policies such as agriculture, regional development and transport.

Environmental context:

This indicator is a first approximation to provide information on the evolution in the level of protection for nature and biodiversity in the European Union. In order to have a common and coherent approach at European level, the analysis is based on national protected areas before (during 1990s??) and the designated sites proposed by Member States in compliance to the EC Fauna, Flora and Habitats Directive. These sites are called potential Sites of Community Interest (pSCI). Therefore, the aim of this exercise is to evaluate the increase of protected areas after the application of the EC Fauna, Flora and Habitat Directive.

Assessment:

TO BE DONE AFTER THE PREPARATION OF THE MAPS

Meta data

Technical information

Data source: EUNIS Database V.2

Geographical data:

1. Description of data:

EUNIS data are collected and maintained to be used as a reference tool or dataset:

- for assistance to the NATURA 2000 process (EU Birds and Habitats Directives) and coordinated with the related EMERALD Network of the Bern Convention,
- for the development of indicators (EEA Core Set, Bio-IMPS, IRENA)
- for environmental reporting connected to EEA reporting activities

2. Geographical coverage:

National Protected Sites: Depends on availability

Natura 2000: EUR25 except Sweden

Emerald Network for Non EU 25 countries

3. Temporal coverage:

Depends on each database

4. Methodology and frequency of data collection:

Depends on each database

5. Methodology of data manipulation:

Statistical task to be done

4 Indicator 2: Impact of Afforestation on Soil Erosion and Desertification

Indicator Fact Sheet

Impact of afforestation on soil erosion and desertification

Results and assessment

Policy relevance:

In response to concerns about the degradation of soils in the EU, the European Commission, the Commission published in April 2002 a Communication "Towards a Thematic Strategy for Soil Protection". This was the first occasion on which the Commission has addressed soil protection for its own sake and therefore the Communication is both broad and descriptive in approach as well as charting the way forward. It outlined the first steps that lead to the development of a Thematic Strategy to protect soils in the European Union. The strategy is one of seven 'thematic strategies' foreseen under the EU's 6th Environment Action Programme.

Policy context:

As stipulated in the 6th Environmental Action Programme, the European Union has decided to adopt a Thematic Strategy on Soil Protection as part of its aim of protection and preservation of natural resources. In this context the Commission services are currently finalising a proposal for this Thematic Strategy on Soil Protection. Building on the results of previous discussions with stakeholders, the Commission is now seeking to elicit relevant opinions from stakeholders on specific measures being considered for inclusion in the Thematic Strategy.

The Strategy will comprise three elements:

- a Communication laying down the principles of Community Soil protection Policy
- a Legislative proposal for the protection of soil- A Soil Framework Directive that would aim to strike the right balance between EU action and subsidiarity
- an analysis of the environmental, economic and social impacts of the proposals

On the other hand, several EU sectoral policies are more or less related with the impacts of soil erosion and desertification. The most significant ones are described below by topic:

Forestry

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.

- Afforestation regulation 2080/92. Available information suggests a positive impact, mainly when planting on slopes and arable land. However, some negative effects were observed regarding improper site preparation techniques and extensive afforestation of grasslands.
- Council Regulation No 2158/92 of 23 July 1992 on protection of the Community's forests against fire (OJ L217, 31.7.1992). Direct impact on soil erosion is difficult to measure. However, the scheme has contributed to improve the efficiency of forest fire prevention and control systems.
- Forestry measures within Rural Development Policy(Council Regulation (EC) No 1257/1999). These measures include afforestation of agricultural land, improvement of the multifunctional role of forestry and improvement of the protection value. However few data are still available. It needs to be assessed to what extent these measure are applied in areas under mid/high risk of soil erosion.
- Natura 2000. Soil protection is one of the elements considered under habitat protection and taken into account in the delineation of the Natura 2000 network. In addition, in some countries, considerable part of the forests are included in Natura 2000.
- Regulation (EC) No 2152/2003 of the European Parliament and of the Council of 17 November 2003 concerning monitoring of forests and environmental interactions in the Community (Forest Focus). It is argued that "the protection of forests from fires is a matter of particular importance and urgency in order, inter alia, to fight against desertification and to avoid the negative effects on climate change"

Transport

The major environmental concern is on emissions, and, to a lesser extent biodiversity and protected areas. Hence, protection of soil against soil erosion is only a secondary issue, which is addressed indirectly through the protection of natural areas.

Protection of specific areas: mountains and coast

- **Alpine Convention and related Protocol on Soil Protection.** This is an important step forward integrating environmental issues, specifically soil protection, into sectoral policies. However, its slow implementation makes it still difficult to assess its impact on the area. The Convention and related protocols increased public awareness of the environmental problems, in particular to practices enhancing soil erosion.
- The EU commission has agreed on a **Communication regarding Integrated Coastal Zone Management(ICZM)** COM(2000)547. ICZM is based on an integrated and broad "holistic" approach and could be an important instrument

for land use planning of coastal areas. Best results have been obtained by combining different types of measures ('hard' and 'soft' measures), and taking into account non-local drivers. Furthermore, it is crucial to set clear measurable objectives (e.g. tolerated loss of land, beach carrying capacity) in order to optimise the long term effectiveness and social acceptability of coastal erosion measures, whereby multifunctional technical designs are the most acceptable and economically viable.

Environmental context:

Erosion is a natural process enhanced by human activities. Hence, soil erosion is driven by both natural and anthropogenic causes. The later increase the magnitude and frequency of the process.

At the same time, desertification is a land degradation problem of major importance in the dry regions of the world. The international community has long recognized that desertification is the most important economic, social and environmental problem of concern to many countries in all regions of the planet.

Agriculture is the one of the main drivers of unnatural soil erosion, since many farming practices are soil-unfriendly and almost half of the European territory is intensively farmed, often in an unsustainable way. Farmer's management decisions are determined by market conditions, technological development, changes in the wider economy, particularly the rising relative cost of labour, and a range of structural changes. As a result, pressures on the environment increased by changes in land structure (land levelling or disappearing of landscape elements such as hedges, shelterbelts, etc.), changes in crop patterns and inappropriate agricultural practices.

In the more disadvantaged areas, land abandonment is the main driver, potentially leading to desertification if the soil productivity and erosion tolerance are low, and the bioclimatic conditions do not allow a speedy recovery of vegetation.

The increase of forest area in Europe, and in particular in the Mediterranean countries, can be considered as a positive driving force. However, a more detailed analysis is needed because changes in land structure may have impacts on the hydrogeological cycle and may increase wildfire risk. In addition, certain forestry practices may create the potential for negative impacts. Inappropriate practices prior to planting, and clear cuttings may have catastrophic effects. Poor design and maintenance of forest roads and bad drainage are of special concern.

Assessment

TO BE DONE AFTER THE PREPARATION OF THE MAPS

Meta data

Technical information

Data source: CLC 2000

(<http://dataservice.eea.eu.int/dataservice/metadetails.asp?id=759>)

DISMED (Desertification Information System for the Mediterranean)

(<http://dismed.eionet.eu.int/>)

PESERA (Pan-European Soil Erosion Risk Assessment)

(http://eussoils.jrc.it/ESDB_Archive/pesera/pesera_download.html)

EUROSTAT Statistics on Gross Value Added

Geographical data:

1. Description of data:

CLC 2000: Corine land cover 2000 (CLC2000) is an update for the reference year 2000 of the first CLC database which was finalised in the early 1990s as part of the European Commission programme to COoRdinate INformation on the Environment (Corine). It provides consistent information on land cover and land cover changes during the past decade across Europe. At present, the Corine land cover database covers 30 countries and is expected to expand its geographical coverage by the end of 2005.

DISMED: Sensitivity to desertification and drought in the Mediterranean Basin. The Sensitivity Desertification Index (SDI) is derived from three datasets (also maps): Vegetation Sensitivity Index, Soil Sensitivity Index and Climate Sensitivity Index.

Climate quality index. Structural analysis 1961-1990. Climate data in DISMED will be based on the aridity index, which requires a harmonized way of computing evapotranspiration, that at present differs among countries. In this respect FMA will be in charge of defining the most suitable algorithm(s) concerning evapotranspiration and the correct time frame, which depends on the available data and on the methodological approach adopted.

Soil quality index is one of the components of the sensitivity to desertification index. It is based on: soil parent material, soil depth, soil texture and the slope of the land surface.

Vegetation quality index is one of the components of the sensitivity to desertification index. It is based four aspects of the vegetation: the fire risk, the protection provided against different types of erosion, the resistance to water shortages and the amount of land surface coverage. The dataset was created by assigning values for each parameter to Corine Land Cover third level classes.

PESERA: The Pan-European Soil Erosion Risk Assessment - PESERA - uses a process-based and spatially distributed model to quantify soil erosion by water and assess its risk across Europe. The conceptual basis of the PESERA model can also be extended to include estimates of tillage and wind erosion. The model is intended as a regional diagnostic tool, replacing comparable existing methods, such as the Universal Soil Loss Equation (USLE), which are less suitable for European conditions and lack compatibility with higher resolution models.

2. Geographical coverage:

CLC 2000: EU 25, AC 3 (with the exception of Turkey), Albania, Bosnia and Herzegovina, Croatia, Macedonia- the Former Yugoslav Republic of

DISMED: Algeria, Egypt, France, Greece, Italy, Libya, Portugal, Morocco, Spain Tunisia, Turkey

PESERA: Pan-European

3. Temporal coverage:

CLC 2000: The Corine Land Cover 2000 inventory was performed in a 3 years period from 1999 to 2001

DISMED: TBC

PESERA: TBC

4. Methodology and frequency of data collection:

CLC2000: Data are derived raster product based on rasterisation of vector CLC00 database as provided by National Teams within ICLC2000 project. All features in original vector database were classified and digitised based on satellite images with 100 m positional accuracy (according to CLC specifications) and 25 ha minimum mapping unit into the standardized CLC nomenclature (44 CLC classes). The resolution of the raster data is 100 x 100 metres, compatible with standard EEA reference grids (as released 08 April 2005).

DISMED: TBC

PESERA: TBC

5. Methodology of data manipulation:

TBD

5 Indicator 3: Urban Sprawl

Indicator Fact Sheet

Three subindicators are currently under development:

- **Sub #1: Urban growth 1990 – 2000 (DRAFT)**

Regional level: NUTS3

Method for indicator calculation: Relative difference (in %) between urban areas of the year 2000 and urban areas of the year 1990;

Residential and industrial areas comprise the following CLC classes:

“1.1.1. Continuous urban fabric”

“1.1.2. Discontinuous urban fabric”

“1.2.1. Industrial or commercial units”

“1.2.2. Road and rail networks and associated land”

“1.2.3. Port areas”

“1.2.4. Airports”

- **Sub #2: Growth of residential areas 1990 – 2000 (DRAFT)**

Regional level: NUTS3

Method for indicator calculation: Relative difference (in %) between residential areas of the year 2000 and residential areas of the year 1990;

“Residential areas” comprise the following CLC classes:

“1.1.1. Continuous urban fabric”

“1.1.2. Discontinuous urban fabric”

- **Sub #3: Growth of industrial areas 1990 – 2000 (DRAFT)**

Regional level: NUTS3

Method for indicator calculation: Relative difference (in %) between industrial areas of the year 2000 and industrial areas of the year 1990;

“Industrial areas” comprise the following CLC classes:

“1.2.1. Industrial or commercial units”

“1.2.2. Road and rail networks and associated land”

“1.2.3. Port areas”

“1.2.4. Airports”

Extension of urban growth indicator

It is envisaged to extend the indicator to a typification of NUTS-3 regions based on the synoptic analysis of urban development (from CLC) and population & GDP development. Typification will be based on comparisons of the rate of population development and urban development to identify trends in urban development, such as densification and scattering / sprawl. In addition, the inclusion of GDP and its relationship to built-up area will serve to get an indication on the productivity and sustainability of land consumption.

Chapter E - Suggestion of Key Map Elements

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1 Introduction

In the chapter D the project team has collected and evaluated a list of existing environmental data and indicators developed by the EEA, Eurostat, OECD and other ESPON projects. Particular the EEA core set of indicators has been taken into consideration. All of these preceding indicator selections are divided in widely similar themes. Those themes are, for example; air pollution and ozone depletion, biodiversity, climate change, terrestrial, waste, water, land use, agriculture, energy, fisheries and transport.

The ideally geographical level of the indicators is NUTS3 and below, but in reality a great majority of the EEA, Eurostat and OECD environmental indicators show the statistical variables only in NUTS0 level e.g. in national level. On this account, extensive environmental statistical data on regional or local level is truly difficult to get from any of these sources.

To represent territorial structures and trends in relation to the main environmental issues in Europe the project team selected and elaborated so far three relevant matters to be presented as key indicators. These matters are clearly linked to current European policies and policy implementations and the challenges for the future policy targets. The three key indicators are

1. Increase of protected areas due to Natura 2000
2. Impact of afforestation on soil erosion and desertification
3. Urban growth

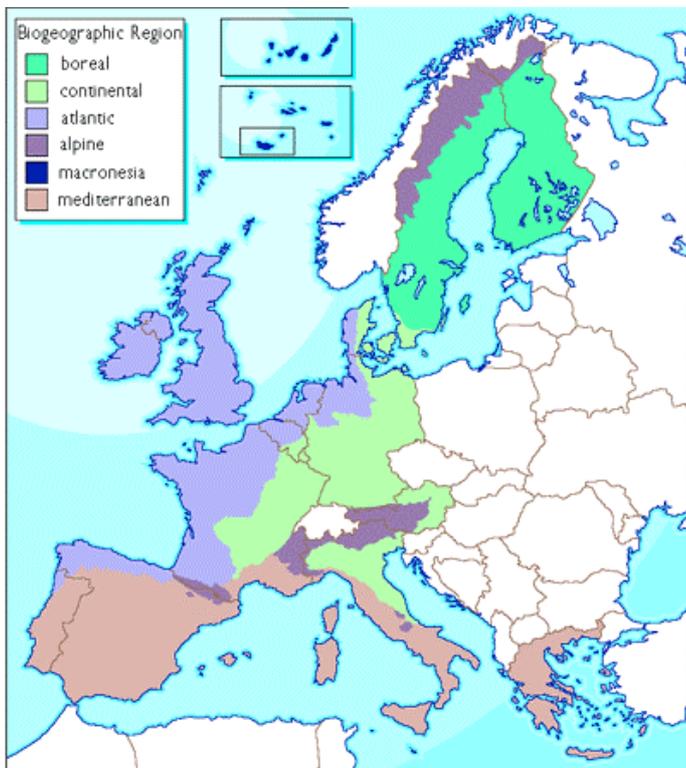
More detailed descriptions of these key indicators/maps can be found in chapter D. To accomplish the presentation of these indicators on maps some crucial source GIS data layers like the Natura 2000 network maps and Corine Land Cover data are needed and some map calculation methods should be performed. As a result the project team can provide key maps in NUTS3 level or even more detailed if needed (for instance the case study areas). The preliminary selection of these key indicators is strongly supported by the indicator selection that each member of the TPG did individually. All TPG members identified "Designated areas" and "Land take" from the EEA Core Set of Indicators as important (see Annex 1). Besides on protected areas the indicator suggestions of the TPG members set a highlight on land use change and fragmentation. Below two successful European wide long-term projects are described, the Natura 2000 network and Corine Land Cover project.

2 NATURA 2000 Network in Europe

At the European Council meeting in Gothenburg in June 2001, European Heads of State and Government made a commitment to reverse the decline of biodiversity in the European Union by the year 2010. So far, a significant progress has been made in the establishment of the Natura 2000 network through designation of more than 18,000 sites by Member States. The Natura 2000 network comprises both special areas of conservation (SACs) designated under the 1992 Habitats Directive, and special protection areas (SPAs) classified under the 1979 Birds Directive. Now it is a key pillar of the Community action for the conservation of biodiversity (European Commission 2004b).

2.1 Process of designation

The first stage in the designation process was for the Member States to carry out a comprehensive assessment at a national level of each of the listed habitat types and species which occur in their country. Each of the European biogeographical zones (Map 1) has its own character and originality in terms of habitats and species, although some may be common to two or more regions. Thus, the second stage of the designation process was to identify Sites of Community Importance (SCIs) which will make up the NATURA 2000 network. This work was undertaken by the Commission in collaboration with the Member States.



Map 1 Biogeographical regions of the EU (source: European Topic Centre on Nature Conservation)

As soon as a site had been adopted as a SCI, Member States were required to designate it as a Special Area of Conservation (European Commission 1996). The whole preceding process was carried out at the latest by 2004. Although some minor additions are still needed, the Natura 2000 network is now virtually complete in most of Europe's biogeographic regions.

Today, the network covers an area of 63.7 million hectares, including a significant marine area of 7.7 million hectares, while the terrestrial area of the network (around 56 million hectares) accounts for approximately 17.5% of the EU-15 terrestrial area (Commission of the European Communities 2004). Now, when the network is nearing completion, there is a need to increase the focus on the active management of the sites so as to ensure long-term conservation and the achievement of the economic and social objectives of the network. (European Commission 2004b)

2.2 Impacts of the Natura 2000 Network

The expectations of the effects and benefits of the Natura 2000 network are high. The following sentences are from the paper of "Communication from the Commission to the Council and the European Parliament".

"Protection of biodiversity through the Natura 2000 network can offer significant economic and social benefits. Economic benefits can stem from ecosystem services (for example water purification and supply, protection against soil erosion), provision of food and wood products, and activities on the site or/and related to the site such as tourism, training and education, as well as the direct sale of products from Natura 2000 sites. This can lead to significant local income and employment gains as well as wider regional development benefits. Social benefits can include broader employment and diversification opportunities for local people leading to greater economic stability and improved living conditions; safeguarding cultural (as well as natural) heritage; and opportunities for environmental education and leisure, health and amenity." (European Commission 2004b).

Since the program was mainly based on ecological considerations, it met strong public opinions from different interest groups across the Member States. Many enquiries and researches indicated that the level of awareness of the Natura 2000 network of sites in Europe amongst the general public was/is low, and that designation of land as an SAC or an SPA was generally seen negatively, with little understanding of the potential benefits of the network for both birds and people.

Local communities and landowners play a vital role in the success of Natura 2000. Natura 2000 sites have been selected because they represent the best areas for wildlife - usually due to the type of management that has been carried out by past and present generations of local landowners.

Clear objectives must also be set so that the nature conservation interest off sites can be retained. This will involve careful planning and the need to include all relevant stakeholders in the management of the Natura 2000 network.

2.3 Availability of Natura 2000 Data

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 2005I).

The elaboration of a GIS on Natura 2000 network is an ongoing project, which has not yet been 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 2005I)

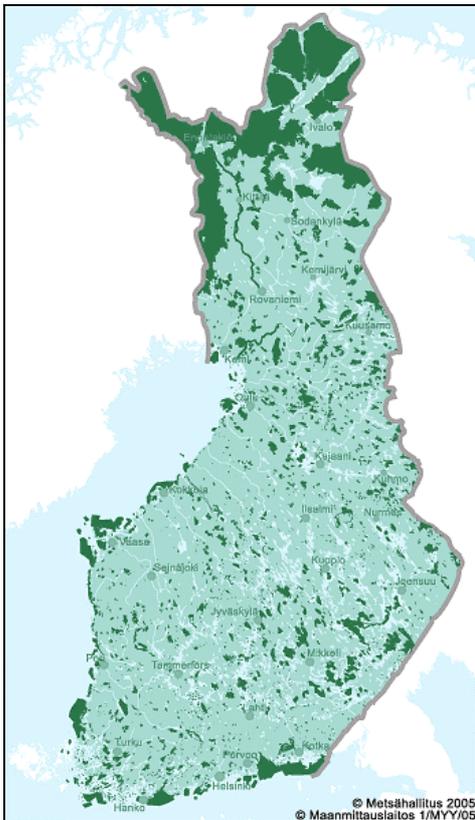
At the moment a coherent dataset including the entire Natura 2000 data is not publicly available. However, at least one version of Natura 2000 sites covering almost the total EU15 (only Sweden is missing) exists in the EUNIS Database. The EUNIS Database is the European Nature Information System, developed and managed by the European Topic Centre on Biological Diversity (ETC/BD) for the European Environment Agency (EEA) and the European Environmental Information Observation Network (EIONET). To get access for this data a permission of data owner is needed.

The ESPON 2.4.1 project. has sent 16th of November 2005 a data request to the DG Environment to get access for the current Natura 2000 data but unfortunately no permission was admitted so far. However, country-specific databases and geographical information of Natura 2000 areas are available from the national authorities. For example, the Geological Survey of Finland has an agreement with Finland's Environmental Administration to use Finnish Natura 2000 data.

2.4 NATURA 2000 Network in the Case Study Area Finland

The total area of the Natura 2000 network in Finland is 49 000 km², which is approximately 15 % of Finland's total surface area. The sites proposed for inclusion in Natura 2000 are mainly existing protected areas, wilderness areas, and sites covered by national protection programmes. Most of the Finnish Natura 2000 sites belong the boreal region (Map 1). The Natura 2000 network proposals submitted to the EU commission by the Finnish Government in 1998, 1999, 2002, 2004 and 2005 included a total of 1,860 sites compliant with the EU Habitats Directive or the

Bird Directive. Map 2 displays the Natura 2000 sites in Finland. (Metsähallitus 2005)



Map 2 Natura 2000 sites in Finland 2005 (source: Metsähallitus 2005)

Natura 2000 network data is planned to be used at least together with two indicators by the ESPON 2.4.1 project. The first indicator (indicator 3 - Increasing of protected areas due to Natura 2000) is a first approximation to provide information on the development of natural protection.

The second indicator contributes to the TIA and displays the proportion of continental Natura 2000 network areas of the total area together with the number of personnel earning their livelihood in the mining industry. Chapter C 4.3 describes how this indicator can support the story lines developed for the Territorial Impact Assessment.

3 Corine Land Cover

Corine Land Cover (CLC) is a data set of the European environmental landscape intended for use by policy makers as well as others. Based on interpretation of satellite images, CLC provides comparable digital maps of land cover for each country for much of Europe. This is useful for environmental analysis and comparisons as well as for policy making and assessment. No other land cover information programme in the world covers such a wide geographical area in such

detail. CLC consists of a detailed electronic map of 44 bio-physical land cover classes arranged in a 3-level hierarchical nomenclature (1.1.2. Artificial surfaces -> urban areas -> discontinuous urban fabric, for example). Currently exist two versions of Corine, one from 1990 and the latest CLC2000. The aim of CLC2000 is to update the Corine Land Cover map for the year 2000 and to collect information on land cover changes in Europe during the last decade (1990-2000). The CLC data sets are available as 100m and 250m grids.

The inventory of land cover changes is necessary for the analysis of trends, causes and consequences of natural and artificial processes, impact assessment, maintenance of ecological stability and its observation in decision-making processes. The change detection process and the mapping of the land cover changes are carried out by means of image comparison, using computer assisted image interpretation tools. The Corine Land Cover data is used by two of the key indicators by the ESPON 2.4.1 project. These indicators are 1) Impact of afforestation on soil erosion and desertification and 2) Urban growth.



Map 3 Coloured countries (blue, navy and pattern) are all part of CLC2000, but those with navy colour (darker blue) DO NOT have LCC (Land Cover Changes database). (source: EEA)

3.1 CLC Used to Assess the Development of Urban Area Between 1990 and 2000

In order to quantify urban area development between 1990 and 2000, Corine Land Cover was used as the main data source. Urban area development ('urban growth', Map 4) is referred to as the sum of both, the development of residential areas ('residential growth', Map 5) and the development of industrial areas ('industrial growth', Map 6). For the generation of the draft maps the 100m grid versions of CLC1990 and CLC2000 data have been obtained from the EEA data service and are

subsequently used to analyse urban development on NUTS-3 level¹. The target geographical coverage to be achieved covers EU25 plus Bulgaria, Romania, Norway and Switzerland.

Land cover data are missing for the following countries:

- CLC 1990: Finland, Greece, United Kingdom, Sweden, Malta, Cyprus, Norway, Switzerland
- CLC 2000: Norway, Switzerland

¹ Please note that the CORINE change database was not available upon production of the draft maps. For the final report the CORINE change database will be used. Usage of this database may yield different results for some NUTS3 regions.

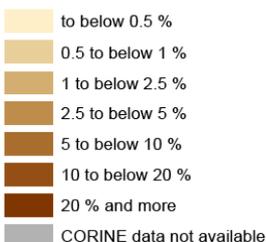
3.1.1 Urban growth 1990 – 2000 (DRAFT)

- Regional level: NUTS3
- Method for indicator calculation: Relative difference (in %) between urban areas of the year 2000 and urban areas of the year 1990;
- Urban areas comprise the following CLC classes:
 - "1.1.1. Continuous urban fabric"
 - "1.1.2. Discontinuous urban fabric"
 - "1.2.1. Industrial or commercial units"
 - "1.2.2. Road and rail networks and associated land"
 - "1.2.3. Port areas"
 - "1.2.4. Airports"

Urban growth 1990 - 2000



Relative growth in %



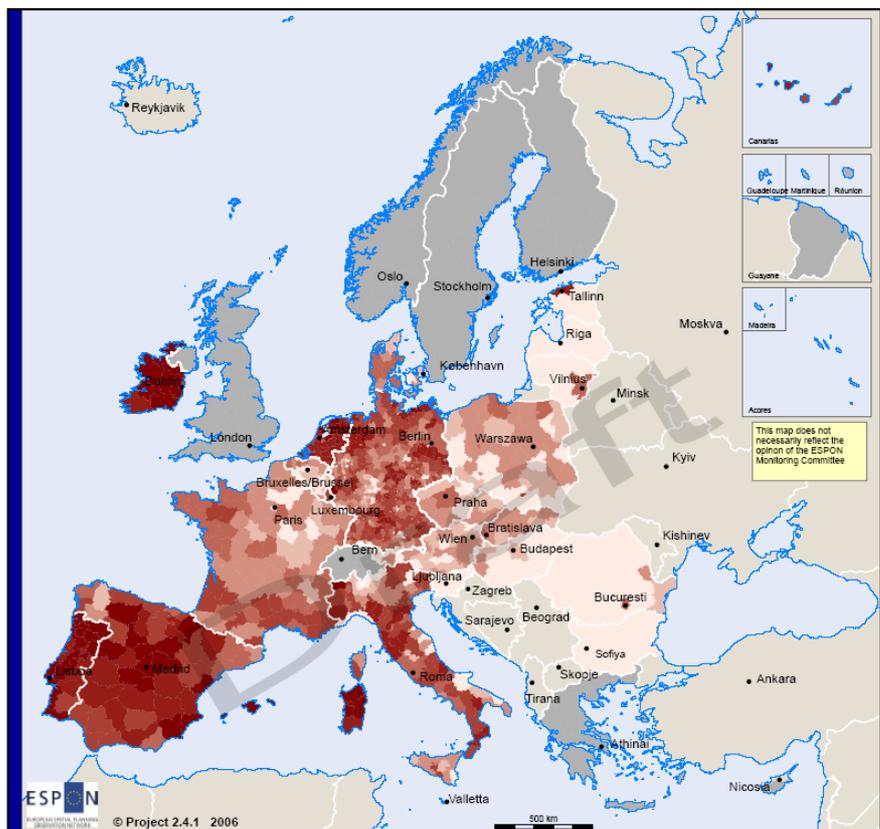
Origin of data: CORINE 1990 & 2000; European Environment Agency
 Geographical base: Eurostat GISCO
 Regional level: NUTS 3

Map 4 Urban growth 1990 – 2000 (DRAFT)

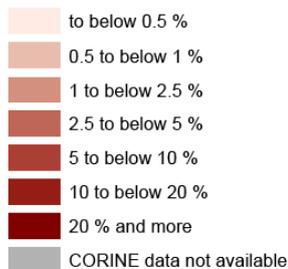
3.1.2 Growth of Residential Areas 1990 – 2000 (DRAFT)

- Regional level: NUTS3
- Method for indicator calculation: Relative difference (in %) between residential areas of the year 2000 and residential areas of the year 1990;
- "Residential areas" comprise the following CLC classes:
 - "1.1.1. Continuous urban fabric"
 - "1.1.2. Discontinuous urban fabric"

Growth of residential areas 1990 - 2000



Relative growth in %



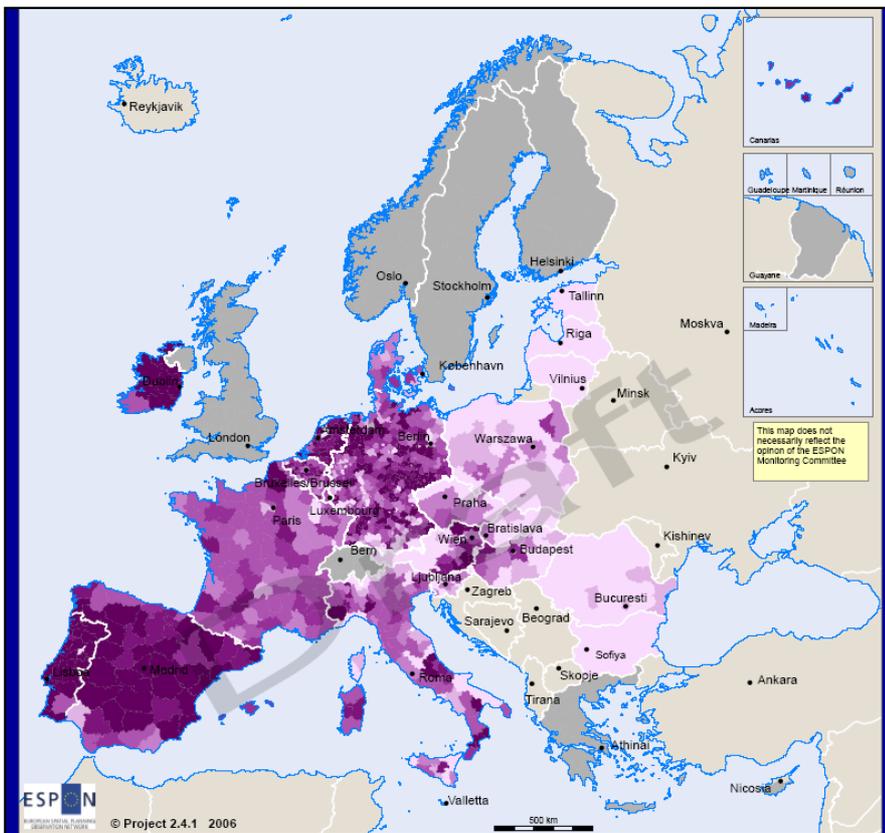
Origin of data: CORINE 1990 & 2000: European Environment Agency
 Geographical base: Eurostat GISCO
 Regional level: NUTS 3

Map 5 Growth of residential areas 1990 – 2000 (DRAFT)

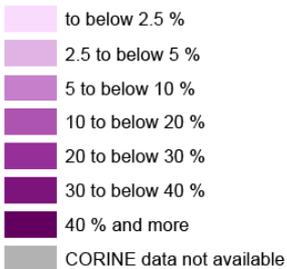
3.1.3 Growth of Industrial Areas 1990 – 2000 (DRAFT)

- Method for indicator calculation: Relative difference (in %) between industrial areas of the year 2000 and industrial areas of the year 1990;
- “Industrial areas” comprise the following CLC classes:
 - “1.2.1. Industrial or commercial units”
 - “1.2.2. Road and rail networks and associated land”
 - “1.2.3. Port areas”
 - “1.2.4. Airports”

Growth of industrial areas 1990 - 2000



Relative growth in %



Origin of data: CORINE 1990 & 2000: European Environment Agency
 Geographical base: Eurostat GISCO
 Regional level: NUTS 3

Map 6 Growth of industrial areas 1990 – 2000 (DRAFT)

3.1.4 Extension of Urban Growth Indicator

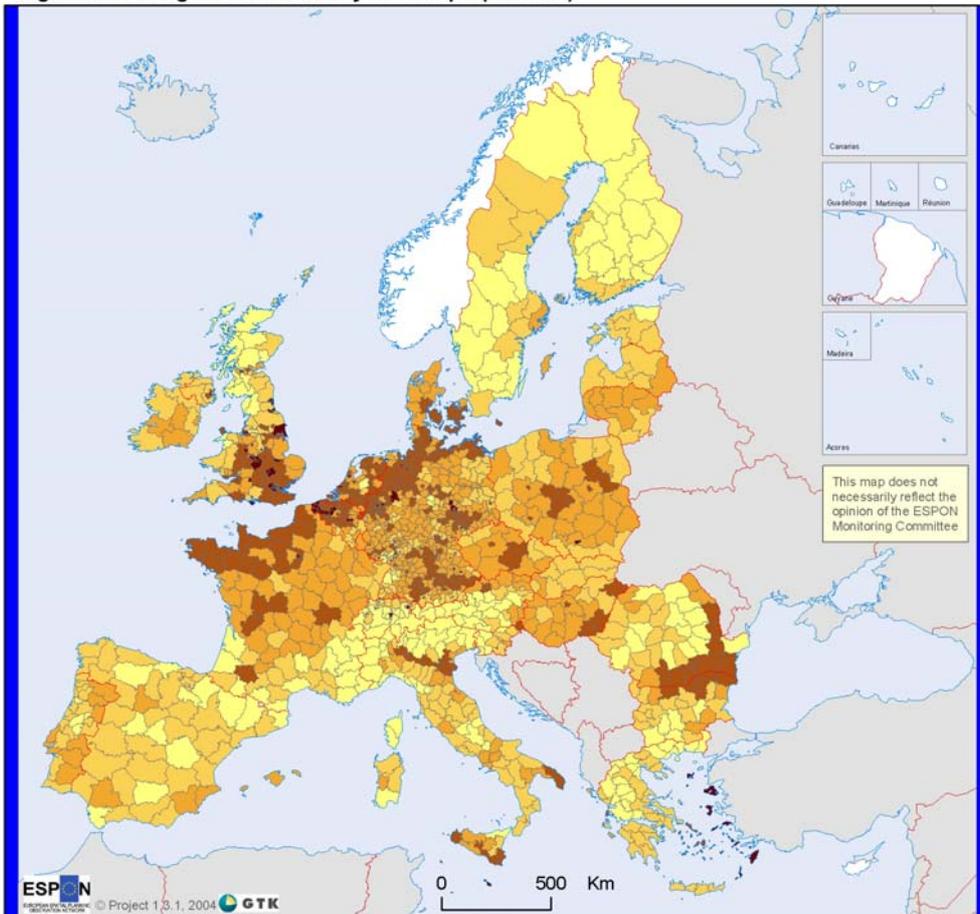
It is envisaged to extend the above shown indicators to a typification of NUTS-3 regions based on the synoptic analysis of urban development (from CLC) and population & GDP development.²

3.2 Corine Land Cover Used in Other Environmental Related Indicator Making Processes in ESPON Projects

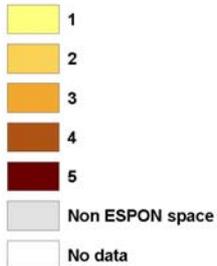
Landscape indicators, such as fragmentation, are gaining more and more political and scientific attention, as they help to understand the complexity of the European landscape. The ESPON 1.3.1 project used fragmentation of semi-natural and natural areas as ecological vulnerability indicator. Vulnerability is defined by the project as a set of conditions and processes resulting from physical, social, economic and environmental factors that increase the susceptibility of a community to the impact of hazards. The CLC data was used as the main data source for analysis. 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).

² At present no comprehensive statistical database containing population and GDP data for the required timeframe is available in a ready-to-use GIS format. However, such a database may be produced by amalgamating existing databases.

Degree of ecological vulnerability in Europe (NUTS 3)



The degree of fragmentation



Origin of the data: © EuroGeographics Association for the administrative boundaries
CLC90 european 250 m grid EEA
Source: ESPON Data Base

Degree of ecological vulnerability is based on fragmentation of natural areas. This indicator shows the proportion of fragmented areas to homogeneous areas.

Map 7 The degree of fragmentation semi-natural and natural areas as ecological vulnerability indicator by ESPON project 1.3.1.

Chapter F – First Ideas Concerning Recommendations and Proposals for Future Applied Research Integrating the Environmental Dimension in Territorial Analysis

Authors: Stefan Greiving (PRC), Mark Fleischhauer (PRC), Marko Peterlin (MESP-OSD), Blanka Bartol (MESP-OSD)

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, 2005). 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.

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 results of the qualitative and quantitative analysis and especially the application of the TIA in the three case studies will enable the TPG to formulate policy recommendations which at the same time have to be reflected against the objectives in existing policy documents. The TIA will be elaborated later on. As a consequence, only some very preliminary recommendations can be integrated in this interim report.

1 Recommendations on the EU Level

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."

1.1 Environmental Policy Integration

The EEA report "Environmental policy integration in Europe" follows this approach and calls for an "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." (EEA 2005, p. 11). 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 (EEA 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 (EEA 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.

1.2 Strategic Environmental Assessment

As a kind of ex-ante assessment of policy proposals, the SEA can be understood as an important element of an EPI in context of spatially relevant decision-making. However, further research is needed in order to get a better picture to what extent the SEA leads in the daily planning practice to a better integration of environmental issues not only in terms of a more careful identification, description and assessment of plans related effects on the environment, but also in terms of the resulting decision-making.

In this context a few questions could be addressed in future research. For instance, to what extent is the SEA integrated in the decision-making process? Is it used as the most important analytical part of the (spatial) planning procedure and not only as an assessment of the alternatives prepared during planning? Namely, the SEA could be understood as (spatial) planning optimisation tool by integrating the environmental issues in the procedures as early as possible. In doing so the decision-making process would be improved and a wider acceptance of the final decisions guaranteed.

Is SEA implemented at proper planning levels? Ex-ante assessments of planning proposals at too detailed planning levels do not seem to have any sense, since it is

not possible to influence more general policy decisions, adopted at higher levels. In this regard the use of the SEA could show a spatially very limited impact. However, here the Impact Assessment of the Commission has to be regarded.

Shall there be any general methodological guidelines from EU level to steer proper implementation of SEA in order to develop comparable procedures? 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.

In addition, it should be discussed to what extent strategic programmes should be assessed by the SEA (e. g. funding programmes which are relevant in an environmental context). Here, a strategic project could be of great benefit.

1.3 Strategic Projects

As suggested by the "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 is 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."

2 Recommendations on the Transnational and National Level

2.1 Transnational Level

Although only a few from the instruments that could contribute to a better coherence between different policies are available at transnational level directly (legislative competences are in the hands of the EU or the Member States, for instance), it is exactly at this level where policy coherence is the natural way to develop policies aiming at "integration of economic, social and environmental considerations so that they are coherent and mutually reinforce each other" (European Commission, 2005a). Whenever countries or regions find common interests 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 results 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 in order 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. An example could be the Alpine Convention, which is an initiative with a strong environmental dimension. It is a framework agreement for the protection and sustainable development of the Alpine region. Austria, France, Germany, Italy, Switzerland, Liechtenstein and the EU signed it in 1991, Slovenia signed the convention in 1993 and Monaco became a party on the basis of a separate additional protocol. The Convention entered into force in 1995. The Convention recognises the Alps as a single space in a global context, its parts – nature, economics and culture - being interdependent. The specific features of the region are recognised as a basis of an identity, which requires a supra-national protection. The Alpine Convention aims at a long term protection of the natural ecosystem of the Alps and at promoting a sustainable development, considering the economic interests of the local population. Establishing these principles cooperation among the Alpine Countries is indispensable.

To achieve such aims, the contracting parties are requested to develop appropriate measures in twelve sectors. For each sector the elaboration of the executing protocol is expected and nine out of twelve have already been signed to date. It is unclear though to what extent the signed protocols are or will be actually implemented by the contracting parties. Some first evidence suggests that the implementation is more successful when it is also backed by some EU instruments, which support the implementation of the protocol. In other cases EU can be seen as an obstacle for the implementation of the protocols as in the case of the transport

protocol, 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)

One of the important common projects within the Alpine Convention is also monitoring the state of the environment in the Alps, as it turned out that few data is available on a comparable basis between the contracting parties. Some future applied research on transnational level could be thus dedicated to preparation of databases on important environmental issues at transnational and national level. This would help on the one hand to monitor the state of certain systems and on the other hand to have available data for territorial analysis (including the SEA) in the planning processes at different levels.

2.2 National Level

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" (EEA, 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".

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" by stating that Member States define the consultation process and the timing between themselves. Some future research could thus be addressing the question of trans-boundary impact assessments.

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).

Therefore, research is needed on what are the really necessary and useful implementation measures and should be avoided in order to be practicable.

3 Recommendations on the Regional and Local Level

It is quite interesting, that the 3rd Cohesion Report itself contains a special chapter about the given perception of Community policies at the regional level (pp. 136ff). Based on case studies were carried out in 28 regions across the EU, an examination has taken place how Community policies (CAP, competition policy and policy on R&D) and their effects were perceived by those on the ground responsible for implementing them. Unfortunately, environmental policy was not considered in this examination, because the results, the 3rd Cohesion Report refers to, are to a certain extent different from the experiences, which have been made in the context of the ESPON 2.4.1 project. Whereas in most cases related to the mentioned policies above, 'Community policy' is taken to mean 'Community funding', environmental policy has been perceived mainly with respect to its legislative, mandatory component (see case study Emsland).

In general, the positive contribution of integrating environmental considerations into regional development policy was acknowledged, as was, in particular, the requirement for stricter norms. A similar perception as in the Emsland case was reported in the cohesion report: the introducing procedures are seen both ill suited to regional circumstances and too bureaucratic.

Furthermore, the 3rd Cohesion Report points out, that in nearly all cases, the close relationship between environmental and cohesion policy was emphasised as well as the positive synergy between the two policies. In almost all Objective 1 regions, environmental policy was viewed as the projects financed by the Structural Funds on the environment rather than the Directives or Community regulations. This estimation is obviously not the case in more prosperous regions. For such regions, some findings, gathered from the interviews with representatives from the Emsland county administration have to be highlighted:

- Lack of acceptance of EU legislative activities in the field of environment is mainly driven by
- missing financial support provided by the EC in order to avoid excessive burden for affected stakeholders (i.e. agricultural sector, management of reported NATURA 2000 areas, WFD)
- missing integration of regional and local authorities in the process of directive's implementation
- lack of communicating to public administration objectives and positive effects which might be related to EU policies

It is recommended to add similar findings from the other case studies.

In view of these observations, research is needed in order to find appropriate ways to communicate the objectives, existing funding options and mutual benefits for regional and local stakeholders from the early beginning of a legislative procedure.

Moreover, 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.

Chapter G – The Case Study Areas

1 Case Study Finland

Authors: Timo Tarvainen (GTK), Hilikka Kallio (GTK), Jaana Jarva (GTK)

1.1 Civil Protection Policy

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. 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. The best available indicator will be the percentage of inspected establishments in relation to the overall amount of establishments. In Finland, the inspection is lead by the Safety Technology Authority TUKES. The state of the art will be compared to other Member States in NUTS0 level.

1.2 Water Policy

Northern European countries are rich in surface waters. Although there is plenty of water visible on the surface, most of these waters are not very deep. Shallow lakes are easily contaminated by pollution. Even relatively low concentrations of excess nutrients, acidic deposition or other harmful contaminants can easily disrupt their sensitive aquatic ecosystems.

Groundwater is widely used by local residents and by waterworks, since it is often much purer and better protected from contamination than the water in lakes and rivers. It can usually be safely consumed without any treatment.

Groundwater reserves are particularly widespread in areas with extensive deposits of permeable sands and gravels formed during the last ice age. The depth of the water table may vary from less than a metre to more than thirty metres, but is typically about 2–5 metres below ground level. Groundwater reserves can be significantly depleted, and the water table lowered, due to the excessive use of groundwater, or after major groundwork or excavation, as well as following droughts.

Groundwater reserves in Northern Europe do not normally suffer from contamination on a wider scale, since individual aquifers tend to be small. The risk of contamination is highest in areas where soil consists of coarser sands and

gravels. Groundwater reserves are also vulnerable to acidification in the same areas where there have been acidification problems in lakes.

The EU WFD aims at standardising water protection activities within EU. Its main target is to reduce the surface- and groundwater pollution in European countries. The main targets of the directive are: 1) to prevent degradation of the quality of water ecosystem, 2) to promote sustainable use of water resources, 3) to reduce groundwater pollution, 4) to strengthen water protection via reducing the emissions of harmful substances, and 5) to reduce effects from floods and droughts. The directive is still in the implementation phase.

Example: Nutrient loading from agriculture

The amounts of nutrients (nitrogen and phosphorus) discharged to surface waters have decreased in Finland during the recent decades. This has been achieved by considerable investments in water protection, mainly by improving municipal and industrial wastewater purification. However, similar decreasing nutrient load has not been reported for non-point loading from agriculture (Räike et al. 2003).

The Finnish Agri-Environmental Programme was implemented in 1995 when Finland joined the European Union. The aim of this financial incentive programme is to ensure the development agricultural practices towards higher sustainability (Granlund et al. 2005). According to the European Environment Institute, more than 20% of the EU15 farm land was covered by agri-environmental management contracts (EEA indicator YIR01AG11 Area under agri-environmental management contracts). In Finland, the coverage of the agri-environmental measures was one of the highest among the Member States. In 2002, the basic measures of the Finnish Agri-Environmental Programme covered 92% of Finnish farm lands.

Finnish agri-environmental support is much directed towards eutrophication control and it has two levels: in basic level a farm environmental management plan must be prepared, farmers must establish filter strips on the sides of main ditches and water courses and target levels of fertilization and manure application must not be exceeded. In the second level, farmer can undertake 'additional measures' such as establishment of buffer zones, wetlands and sedimentation ponds (Granlund et al. 2005). The implementation of the WFD will be reflected in the future environmental support scheme.

As described above, Finland is far beyond most of the other Member States in the implementation of agri-environmental management contracts. Finland belongs to the highest category in the EEA indicator called 'Area under agri-environmental management contracts'. However, another EEA indicator called 'WEU2c: Statistically significant trends in concentrations of nutrients at river monitoring stations' reports that 'about 40% of Finnish stations showed an increasing nitrate concentration between 1992 and 2001, perhaps indicating increasing pressure from

agriculture and other sectors' and 'all EU countries assessed except Finland had a higher proportion of stations with decreasing phosphate concentration than those with increasing trends.' Because the phosphate concentrations are so low they cannot easily be decreased further in Finland.

Granlund and her colleagues (2005) studied the impact of the agri-environmental support on nutrient loading in Finnish agricultural catchments. They concluded that the water protection targets assigned to agricultural nutrient loading (50% reduction of annual N and P loads by the end of 2005) were too optimistic. Even when more than 90% of the farmers are participating in the agri-environmental support, the response of water quality is very low and it will take years to achieve a clear reduction in nutrient loading.

In the PIM assessment of water policy, story line 11 states that the territorial quality may suffer from an increased industrialisation of agricultural production, but the protection of surface water the WFD aims at may contradict that trend. The overall PIM value for this cause-effect chain relationship is +2. However, the experience from the Finnish agri-environmental support shows that the effects of the improved policy will be slow.

1.3 Habitat and Biodiversity

Example: Mining activities and environment protection programmes

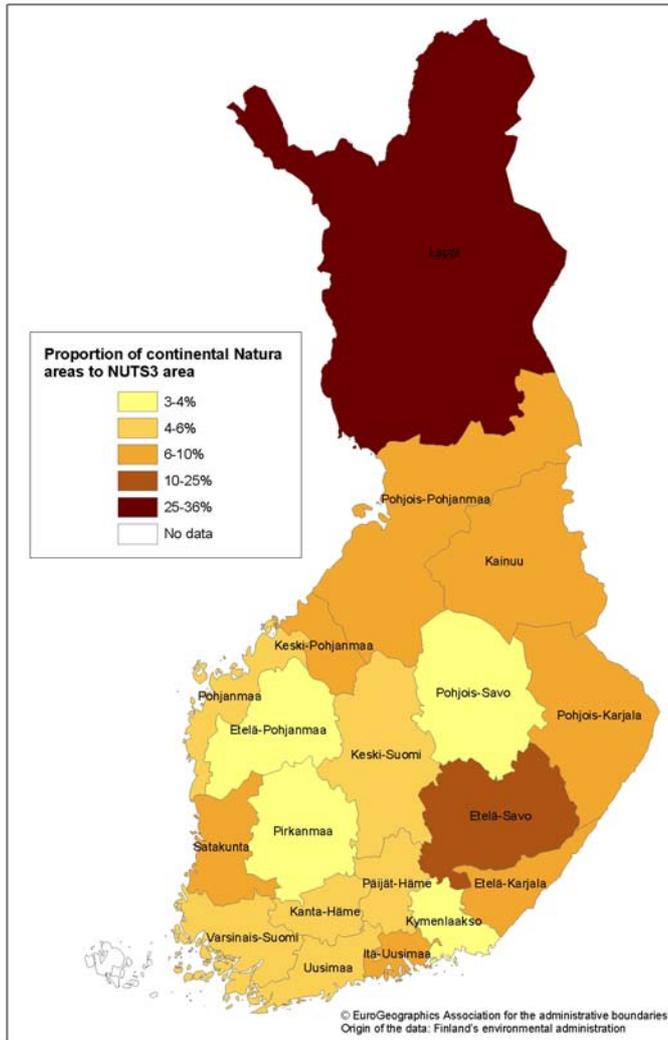
The largest natural areas in Europe can be found from Northern Europe (mainly extensive forests). Northern Europe also has a lot of semi-natural areas (or forest) and the degree of fragmentation of these areas is low. Northern Europe is rich from its nature but also from its mineral resources. This situation can arise a question in which terms exploration and mining activities can be possible and feasible at nature conservation areas. There exist national and international legislations and regulations of exploration and mining activities within or near the NATURA 2000 Network or other nature conservation areas. Especially the areas that belong to EU's NATURA 2000 Network usually have European wide protection interest. The effects of mining on the balance between the three dimensions of sustainable development (social, economic and ecological), becomes manifest not only in the relation to NATURA 2000 areas but as well to the main targets of the WFD. However, mining industry could be a significant benefit for the economy of northern periphery. According to Court of Justice of European Communities social and economical benefits are justified motives to consider exploration and mining activities even at nature conservation areas. One speciality in Northern European countries is the original Lappish people whose source of livelihood, i.e. fishing, hunting and reindeer management, must not be endangered.

In the PIM, the first story line is the following: The territorial quality 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. Reservation of land for protection areas prevents other use of the protected areas and may hinder other important activities in the region. For example, if the mining and quarrying industry are important for employment in the region and large protected areas restrict the use of natural resources, the environmental policy can lead to unemployment. The recognized best indicator would be the change of employment rate after implementation of protection areas. The best available indicator (BAI) in Finnish case is the percentage of people working in mining or quarrying industry x percent of NATURA 2000 areas of the whole region, and the overall PIM estimate for this cause-effect chain is -2.

The Finnish Natura 2000 database used in this work was updated 16.6.2005 and it includes the new sites submitted to the EU commission by the Finnish Government in 2.6. 2005. All together in this version the number of Natura 2000 sites digitized as polygons is 1762. In addition there is seven sites digitized as lines. Natura 2000 sites located in the County of Ahvenanmaa are not included in this database.

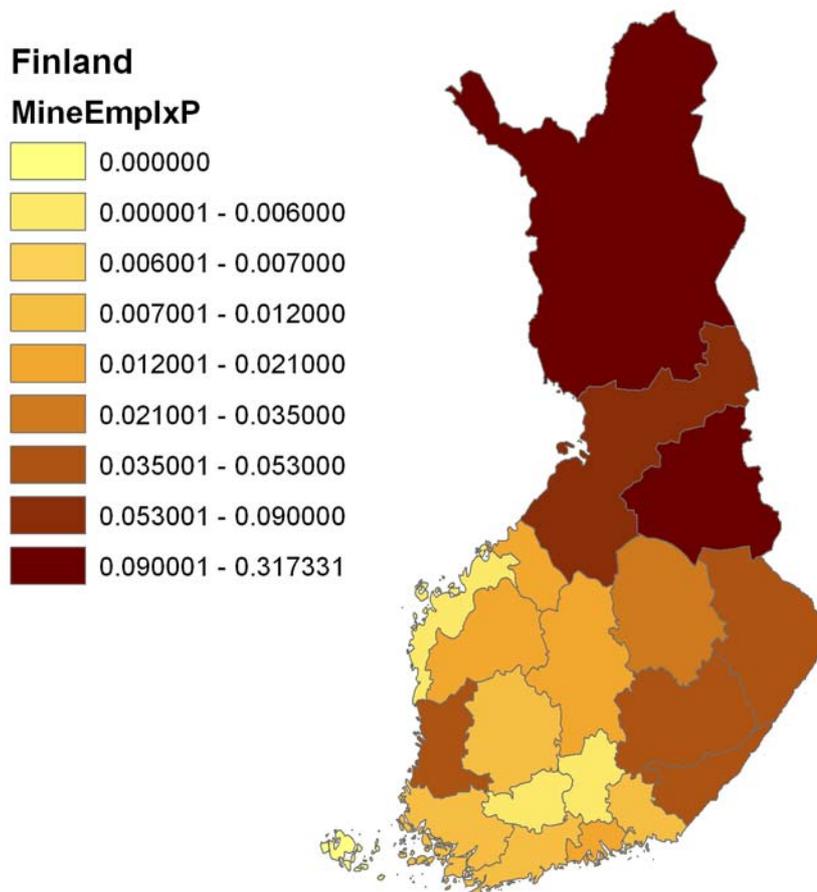
The aim of the map calculation procedure were to count the proportion of Natura 2000 sites to the NUTS3 areas. To execute the area calculation only the Natura 2000 sites with continental location were taken into account.

Map 8 shows the proportion of continental Natura 2000 sites to NUTS3 areas in Finland.



Map 8 Proportion of continental Natura areas to NUTS3 areas in Finland (source for Natura 2000 sites: Finnish Environmental Administration)

Map 9 shows the values of the suggested indicator for Finnish NUTS3 areas. The negative effect of the policy on the activity rate and thus to the territorial quality is higher in northern and eastern Finland compared to the rest of the country.

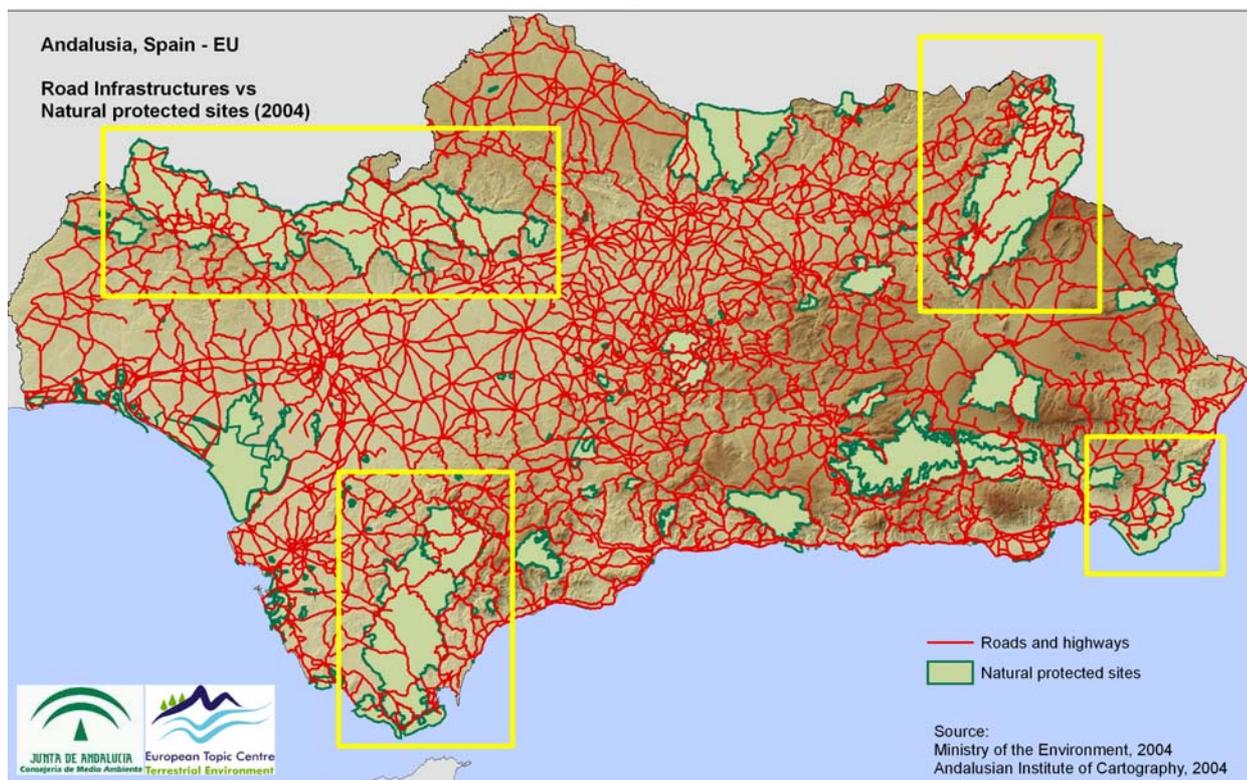


Map 9 Indicator percentage of people working in mining or quarrying industry x percent of NATURA 2000 areas of the whole region (MineEmplxP). In the North and East Finland relatively high percent of the personnel are working for mining industry and on the same time large areas belong to the NATURA 2000 network (source: personnel working in mining and quarrying industry 2002: Statistics Finland. Values for regions Ahvenanmaa/Åland, Varsinais-Suomi and Kanta-Häme estimated from other similar size regions)

2 Case Study - The Autonomous Community Of Andalusia, Spain

Author: Alejandro Iglesias-Campos (UAB – ETC/TE)

The Autonomous Community of Andalusia in Spain supports 30% of its territory under different figures of environmental protection. Following the different tasks proposed in the Tender Document for the ESPON 2.4.1 project, the Spanish case study would be based on the degree and type of land utilization that can produce conflicts, especially the impact of urban and infrastructure developments on the coastal zone in Spain and in a concrete case, in Andalusia.



Map 10 Road-infrastructures and Natural protected areas

The European Habitat Directive (92/43/CEE) about natural habitat, fauna and flora conservation and its transposition into the Spanish legislation through the Royal Decree 1997/1995 establishes that in all plans, programmes or public interest projects that can affect negatively the Natura 2000 sites, should be adopted as much compensatory measures as it would be necessary to guarantee the global coherence of the Natura 2000 sites, also EIA contains following the Royal Decree 1997/1995 obligations, that the environmental administration must ensure the

Royal Decrees in force after the Habitat Directive implementation by the Kingdom of Spain.

The compensatory measures are not focused to correct the consequences of the highway construction; it will focus to reduce possible diffuse effects on the ecosystems. These measures will reinforce the most sensitive elements and species in Los Alcornocales ecosystem, to reduce its fragility. The most sensitive parts of an ecosystem in a humanized environment like the Natural Park of Los Alcornocales coincide with the peculiar elements and other with direct exposition to the human activity.

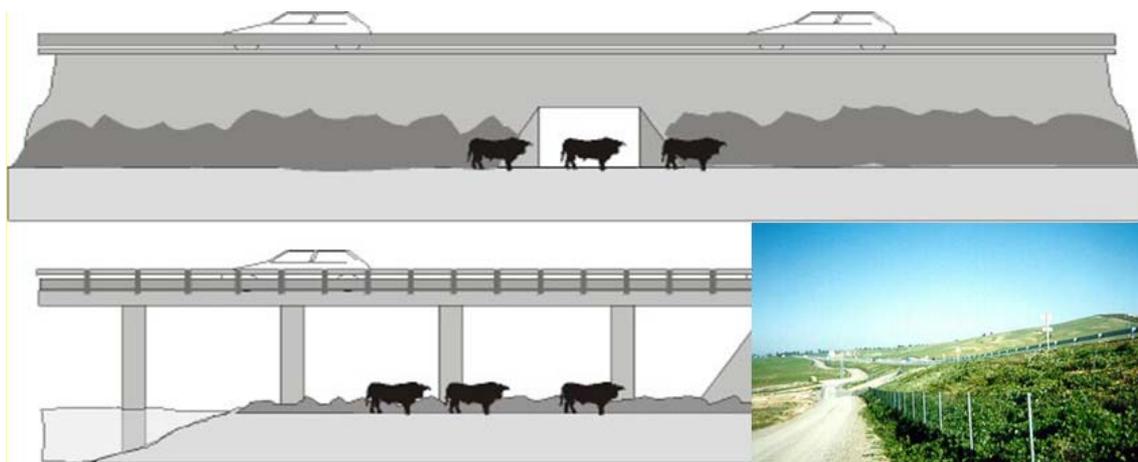


Figure 6 Measurement to reduce fragmentation

3 Case Study Slovenia

Author: Marko Peterlin (MESP-OSD)

3.1 Scope of the Study

The scope of this case study is assessing the territorial impacts of EU environment policies on a case of planning a high-speed railway (HSR) section between Italy and Slovenia. This particular planning process is interesting because it involves all the difficulties of planning on a trans-national level, as well as difficulties associated with Karst terrain, changes of altitudes as well as crossing a well-preserved natural area, to a large extent designated as part of Natura 2000 network. It also involves territorial impacts of EU transport policy, because it constitutes part of Pan-European Transport Corridor V.

One of the interesting aspects is to assess the different impacts in different territorial scales. On the one extreme there are EU-wide considerations of territorial cohesion, biodiversity or CO₂ emissions, on the other extreme there are local population and specific species' habitats. In-between there are states and regions with their diverse interests.

The study focuses on trans-national and national level of spatial planning and takes into account especially the aspects of habitats and biodiversity, to a lesser extent also water management. It considers the diverse direct and indirect impacts of EU environment policies and points to possibly contradicting impacts of these policies. It also considers the relations between SEA and TIA on a trans-national and national scale.

3.2 Planning Context

The context of planning HSR on this section is defined by a few important starting-points. First, as already noted, the section makes part of the Pan-European Transport Corridors network and is as such subject to EU transport policy regulations regarding high-speed railways. This poses some serious restrictions on a choice of technical parameters for this railway section.

Second, physical characteristics of the territory are rather extreme, with fast changes of altitudes from sea level to the Karst plateau and back down to Ljubljana basin as well as mountainous terrain in-between. Probably in some connection to these characteristics are also low population density and well-preserved natural areas.

This also leads to the third important starting point, which is large proportion of protected areas and Natura 2000 sites in the area. Perhaps even more important than surface habitats are subsurface habitats and geomorphologic phenomena of

extreme interest in the Karst area, that covers most of the area HSR needs to cross.

Another important circumstance is also sharp increase of road freight transport on Corridor V in the last years, partly as a consequence of Slovenia entering the EU. Although existing capacities of railroads could satisfy much of the demand for freight transport crossing the area, the increase rates suggest that in the circumstances of better competitiveness of rail transport some sections may soon face congestion rates.

Last but not least, strong interests of some states and regions, particularly on the Italian side, determine planning of this particular HSR section. This often leaves little space for true cooperation that would make possible effective trans-national planning.



Figure 7 Pan-European Transport Corridors in South East Europe and section of proposed HSR between Italy and Slovenia

3.3 Planning Process

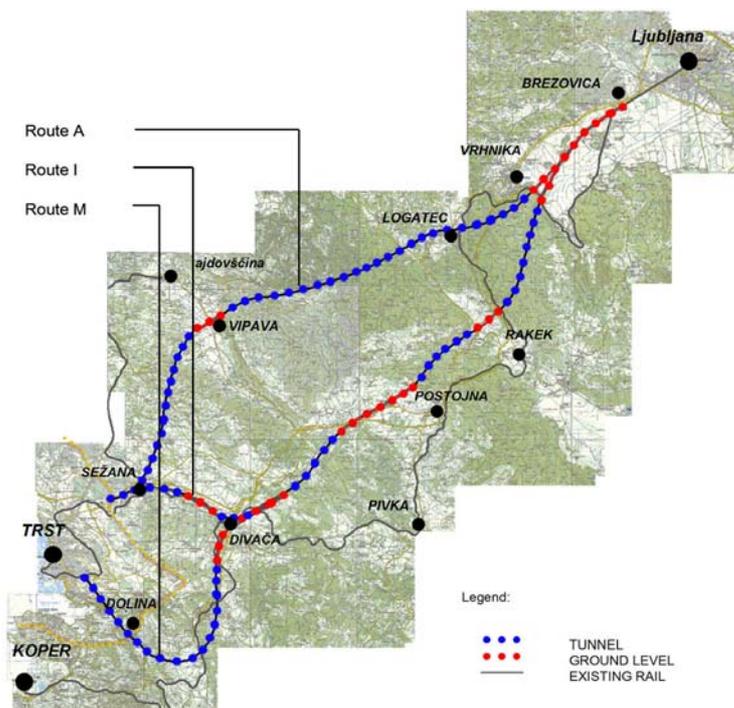
Planning of HSR in this area has started already in early 1980s, but in the 1990s the focus has shifted to what later became part of Corridor V and planning has intensified after 1993. A number of studies were initiated in this period that were the basis for national transport plans and other strategic documents. Some studies took into account both EU transport policy at that time and Slovenian accession strategy, others reflected needs and desires of neighbouring countries that were indirectly dictating dynamics of planning activities. The result was the proposal of constructing the HSR for combined freight transport – speed of 250 km/h –, which should take over also an important portion of highway transport. This would in principle contribute to implementation of EU transport policy as defined in the White Paper “European transport policy for 2010: time to decide”. (European Commission, 2001a)

In 2002, three alternative routes of HSR in this section, called A, I and M, were chosen for further examination. All three were mostly underground in this section. From 2002 to 2004 an SEA (Kontič et al., 2004) was made for these three routes. The conclusions of the study stated that the HSR project as proposed is problematic from environmental point of view and none of the three alternative routes was assessed as suitable.

Perhaps even more importantly, SEA made evident that on the Slovenian side some key questions regarding HSR remained open. These questions are at the core of current planning debate:

- Is speed of 250 km/h appropriate for combined freight transport? At present upper speed on conventional railways is 160 km/h in most of Europe;
- Should the infrastructure be multi-purpose, meaning that both freight and passenger transport is possible at the same time? How much can technology support differences in technical characteristics for both types of transport in this case? If not, one should consider constructing separate infrastructure. Should Slovenia insist on multi-purpose infrastructure and lower speed with the justification based on characteristics of the territory? Or should Slovenia construct HSR for passenger transport only?

Provision of answers to these questions was not possible based on a project describing three alternative routes for HSR from Trieste to Ljubljana. More comprehensive and more strategic documents were needed as an input, which would enable SEA on the corridor as well as EU transport nodes network level.



Map 12 Proposed routes of HSR between Trieste/Trst and Ljubljana

Since these inputs were missing SEA made an attempt to complement some of them with wider considerations. In this way it came close to what Territorial Impact Assessment (TIA) for this kind of plans/projects may look like. As it is shown in the Figure 8 economic and transport needs, associated with HSR need to be clarified first, i.e. before any environmental impacts are evaluated. The analyses in the SEA therefore covered the following main areas:

- Needs for railway transport in the country (existing, future; what generates these needs, what is inevitable for Slovenia? The answers have been extracted from Slovenian strategic documents like National Development Programme 2002-2006, Strategy of Economic Development of Slovenia, National programme of the modernisation of the railway infrastructure, Spatial Development Strategy of Slovenia etc.);
- Needs for new infrastructure (is it possible to meet the needs with existing infrastructure provided its modernisation or is it necessary to build new infrastructure?);
- Changes and effects in the environment/territory (what is the difference between modernisation of existing infrastructure and building new one, what are indirect impacts due to expected economic development in either case?).

The study did not provide definite answers to all these questions; there are uncertainties associated with a number of issues at this planning stage of the HSR, which could not be re-moved/reduced in the study itself. However, the conclusion in the context of the terms of reference for the study is: a new HSR infrastructure between Trieste and Ljubljana, which will enable speed of 250 km/h for combined freight transport and at least 300 km/h for passenger transport, is problematic from environmental point of view. Not any of the alternative routes A, I, M is assessed as suitable. Therefore, it is recommended to the planners to check other possibilities for routing HSR in the fifth trans-European corridor through Slovenia.

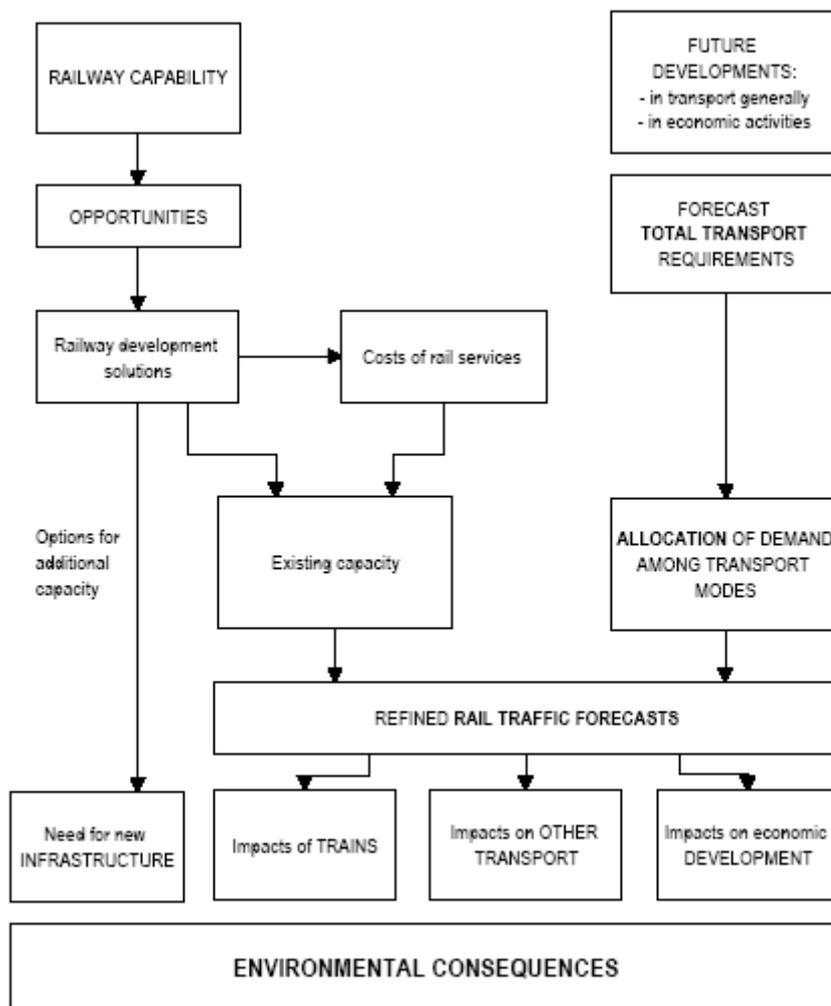


Figure 8 Schematic presentation of the approach to SEA for HSR Trieste-Ljubljana (Source: T.Carpenter: The Environmental Impacts of Railways, 1994)

Main environmental reasons for such a conclusion are on the one hand multiple uncertainties connected with building tunnels through the Karst terrain present in this section, which make environmental predictions limited and construction costs uncertain, and on the other hand conflicts with Natura 2000 and groundwater/drinking water resources protection.

The study also suggests that HSR may not be a necessity from economic point of view, and that investments would not prove reasonable and profitable. This, in turn, suggests that it would be difficult to engage private capital in the project. Therefore it seems reasonable to focus on the modernization of existing railway infrastructure. On the other hand, *"the opposite conclusion can be reached if the new HSR is evaluated in the EU context i.e. from the point of view of networking urban, logistic, multimodal transport nodes, and transit from West to East. In that connection Slovenia has political responsibility and obligation to support such net-*

working which makes HSR through Slovenia, especially for passenger transport, a necessity". (Kontič et al., 2004)

As a possible solution to the dilemma, the study suggests that additional alternative routes should be developed. Modelling results of spatial suitability of SW Slovenia for HSR routing show that a new railway through Vipava valley could be a better option. Whether this is feasible needs to be checked/agreed with Italy, since routing through Vipava valley would require certain adaptation of the route in Italy, probably starting from Venice and then near Trieste and further towards Slovenia. This 'new' alternative, in fact, has already been studied in the past, but was later on excluded from detailed analysis. SEA study suggested its re-analysis in cooperation with Italian planners of the HSR.

Lessons learned from this planning exercise point to two main weak points regarding assessments of projects/plans of trans-national character that apply to SEA as well as TIA:

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

3.4 Impacts of EU Environment Policy

Learning from this planning exercise we can also make a few preliminary observations of the role of EU environment policy in the context of planning new railway sections and particularly HSR sections in general.

One of the main objectives of EU transport policy is the support to modal shift from road to rail transport, as the transport mode causing less damage to the environment. Many of the priority projects along the Pan-European Transport Corridors are therefore dedicated to the development of new rail infrastructure and particular attention in the framework of TEN policies goes to the development of high-speed railway (HSR) network, which presents a realistic alternative to motorways on the one hand and air transport on the other.

In many European countries, especially in Central and Eastern Europe investment in infrastructure has focused on the construction of motorway networks in the last decades. As a result motorway networks are now rather well developed while rail infrastructure was slowly deteriorating over the same period of time.

Competitiveness of road over rail transport has thus increased greatly. Even though rail has now gained importance in EU policies, the competitive advantage of road is still increasing due to inertia of capital movements and long investment cycles.

EU environment policies have an interesting role in this respect. As most of the motorways were constructed in the period when many measures of environmental policies have not been implemented yet, their planning and construction processes were quicker and cheaper compared to more recent rail projects, that have to take into account also measures designed to protect the environment. This is indirectly helping road transport improve its competitive position over rail, causing also many damaging effects on the environment in the longer term.

4 Case Study Emsland - Peripheral Rural Area in Central Europe

Author: Stefan Greiving (PRC)

4.1 Introduction

The following report contains the preliminary results of the application of the TIA approach on the regional level. For that purpose, the case study area will be described first, followed by the analysis phase, taking into account the regional performance of the key territorial trends, identified by project 3.2 and used by the ESPON 2.4.1 project in context of the TIA. The scoping (cause-effect-chains) was designed on a general, abstract level. However, the plausibility of the different cause-effects has been proven for the case study, gathered from the different interviews. Finally, a first assessment will be presented, based on these experts' interviews with those who are responsible for the implementation of the EU environmental policy within the case study area.

4.2 Status of the Environment

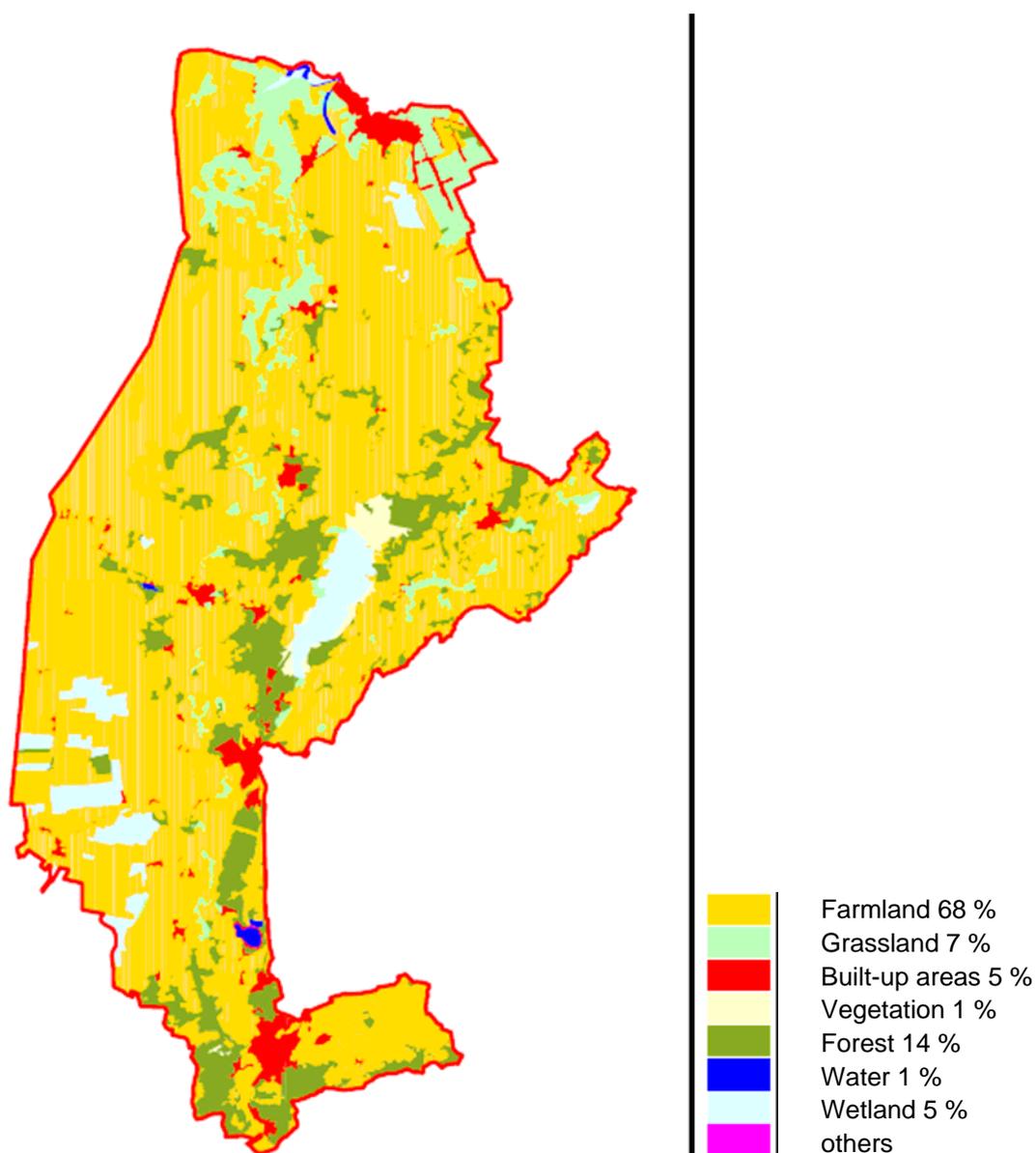
4.2.1 Description of the Case Study Area

The Emsland county is located in central Europe. The landscape can be characterised as a typical lowland area, dominated by a river, which flows from the south to the north of the region. The territory encompasses 2,880 km², the population is about 310,000 (2005). The region can be characterised as a peripheral rural area as its whole (only 6.5% of the territory is built-up), bordering the Netherlands in the west and the North Sea in the north as illustrated by Figure 9 below on the left. Figure 9 on the right shows the territories of the 19 municipalities, the county consists of.

for) and local land use planning which is under the authority of the municipalities has to be seen as important. In addition, the relationship between the higher sectoral planning authority (the different state ministries) and the lower authorities, which are part of the county administration, is of interest.

4.2.2 Status of the Environment

In the following, the actual status of the environment related to the three test cases, chosen for the project will be described. First, the land cover is shown by Map 13 below:



Map 13 Land cover in the Emsland County (source: <http://www.wasserblick.net/servlet/is/29247/>)

4.2.2.1 Water Policy

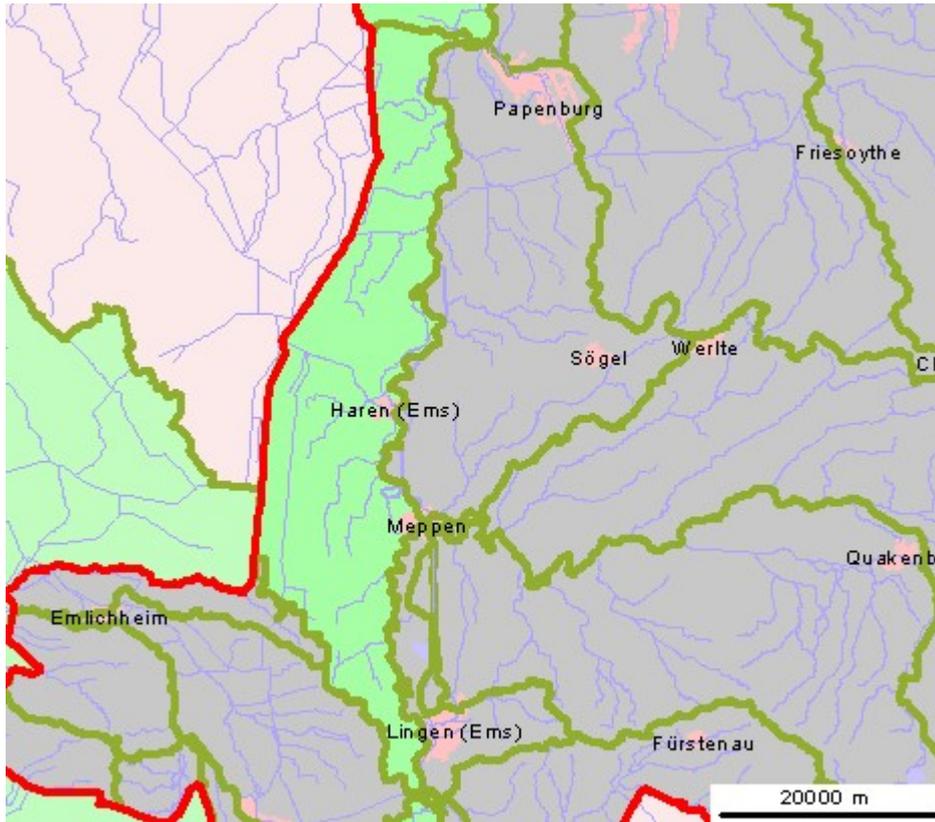
DIRECTIVE 2000/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2000 establishing a framework for Community action in the field of water policy

The main river in the case study region is a relatively small water body (overall length 371 km) with a catchment area of about 18,100 km². The river basin is divided into eight sub basins of which the sub basin "Middle Ems" completely covers the Emsland County.

The agricultural sector can be expected to be the greatest opponent to the implementation of the WFD, because it is the main causer of anthropogenic pressures from diffuse sources, which have to be considered for the first time by implementing the WFD. In opposite to this contradiction, landscape planning could be surely an ideal partner for the protection and the development of ecosystems, which depend on water resources and quality. Probably the greatest problem in context of the implementation process is caused by the very strict and unrealistic time frame (management plans till 2009, good status till 2015), see interview with Mr. Kopmeyer. However, these are still assumptions because the WFD is up to now not in focus of a public political debate. This is understandable, since the process of implementation is thus far just an internal, technical task, whereas the measures, which may affect certain stakeholders negatively, will become well known first in 2008.

The status report has been presented at the end of 2004. Presently the monitoring is being prepared. The status report contains a couple of information about the present status of the surface and ground water bodies for the whole river basin. In this context it has become obvious that the different states (Lower Saxony, North Rhine-Westphalia, The Netherlands), involved in the implementation process in the Ems river basin, have different understandings and definitions about basic assumptions like: What is a heavily modified water body?

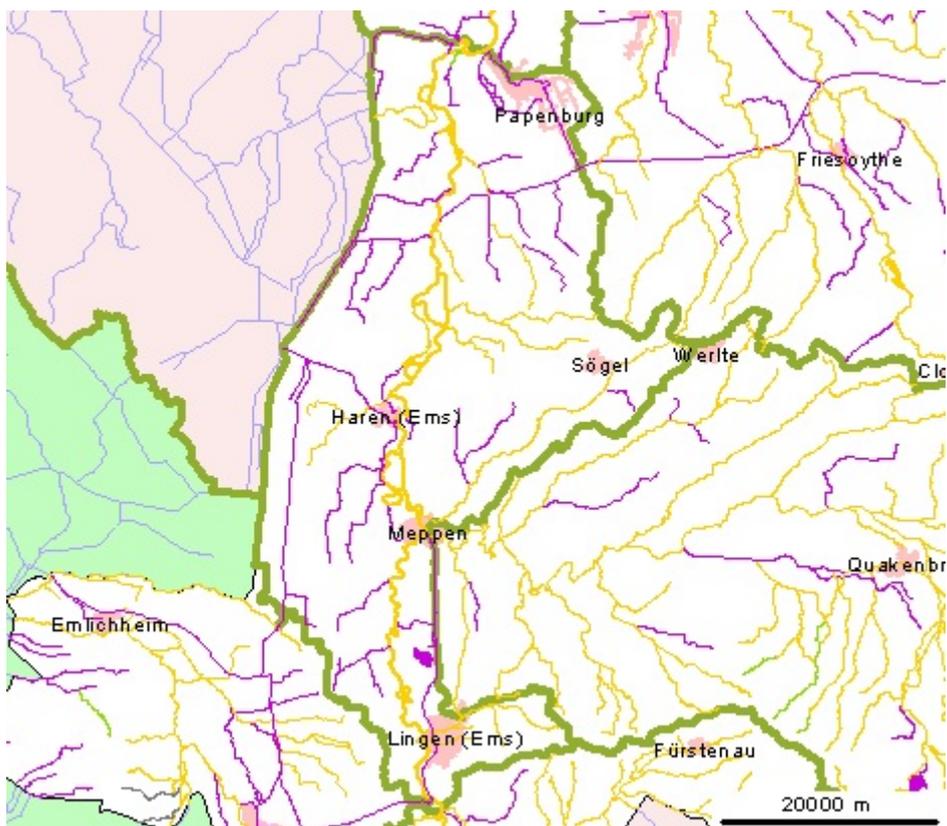
As visible from the following Map 14 and Map 15, the expected fulfilment of the good ecological status in most cases is yet not foreseeable or even unlikely. Moreover, simply no solution is expectable in the context of financing the measures, which will be identified as necessary.



Map 14 Status of the groundwater bodies, pressure of diffuse sources (source: <http://www.wasserblick.net/servlet/is/29247/>)

The achievement of a good ecological status until 2015 is likely for the areas west of the Ems and unlikely for those which are located east of the Ems River.

Most of the given problems related to the surface water bodies are connected with the hydromorphological conditions, whereas and physiochemical conditions are already well performed in terms of a good ecological status. This is clearly visible by the following example which is related to the Ems River itself, which is marked yellow as a heavily modified water body, since the river has been modified for flood protection and shipping. Nearly 99% of all surface water bodies in the Emsland County are artificial or heavily modified.



Map 15 Status of the surface water bodies in the sub basin "Middle Ems" source: <http://www.wasserblick.net/servlet/is/29247/>

4.2.2.2 Habitat/Biodiversity

Since the agricultural sector has still to be understood as an important economic factor in the county, the NATURA 2000 areas are causing permanent controversies. In this context, especially the economic implications of different possible preservation instruments should be discussed and analysed in the case study.

Aside the discussion about the management of reported and designated NATURA 2000 areas, some problems have arisen in the context of the reporting procedure. Here, in particular the lack of open communication has to be emphasised which took place between the federal government, responsible for the reporting procedure, and the affected farmers as owners of most of the areas which were not already protected by national law (mostly the so called coherent areas). Due to this fact, the reporting procedure became highly controversial and led to a fundamental distrust in the NATURA 2000 concept as its whole.

However, up to now, no plan or project has been blocked in consequence of a negative assessment (see Art 6 § 4 FFH directive) although in several cases plans have been subject to appropriate assessment of its implications for the site in view of the site's conservation objectives (see Art 6 § 3 FFH directive). Either the assessment stated no significant effects or the plan was carried out for imperative

reasons of overriding public interest, including those of a social or economic nature (see Art 6 § 4 FFH directive). This was the case in context of the extension of existing harbours in the cities of Papenburg, Lathen and Haren. In all three cases no priority natural habitat type and/or a priority species were hosted, because in such cases the only considerations, which may be raised are those relating to human health or public safety.

Most of the reported NATURA 2000 areas belong to the river valleys and one great heath area as shown in Figure 10 below:

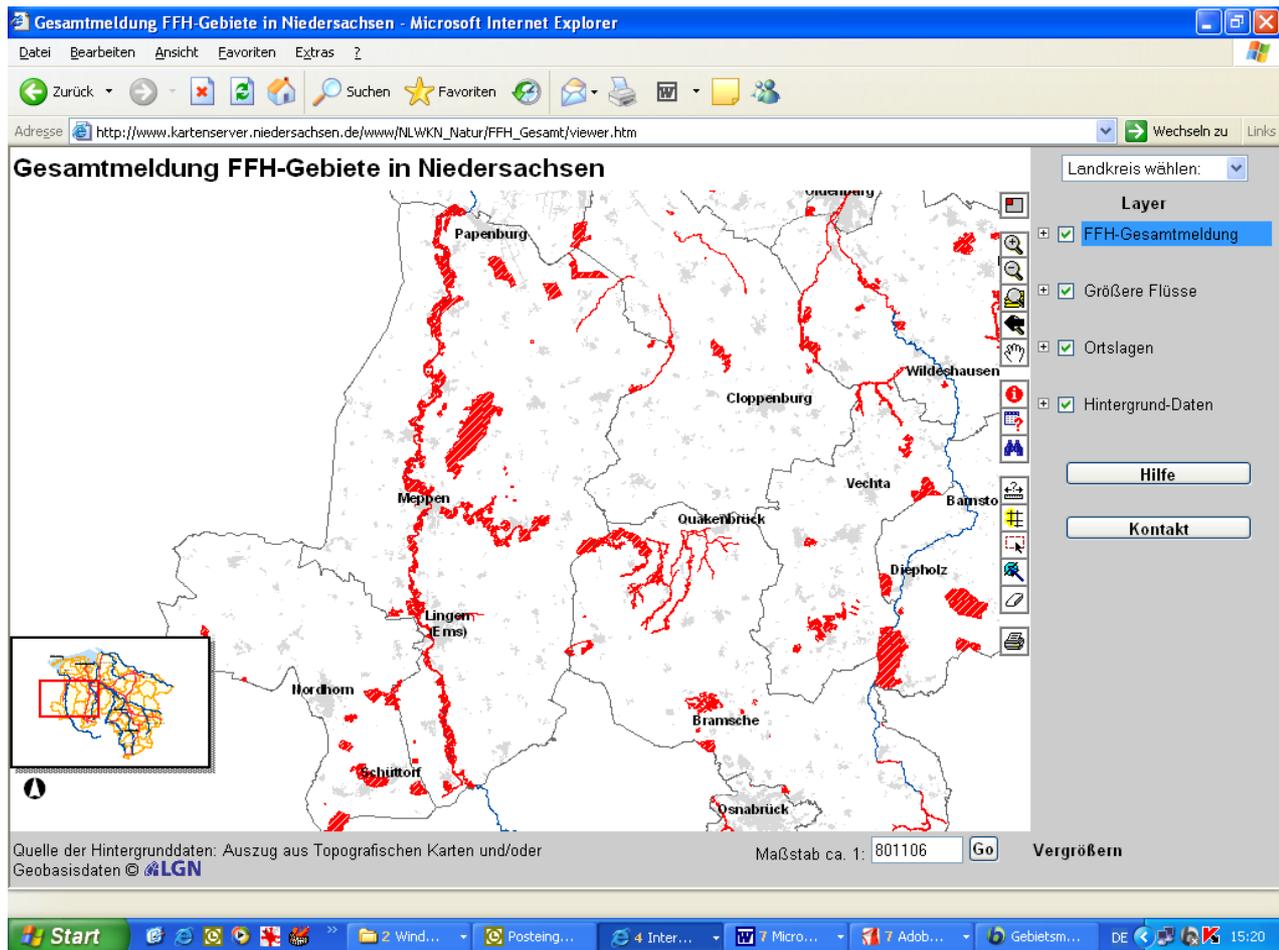


Figure 10 Reported NATURA 2000 areas in the western part of Lower Saxony (source: http://www.kartenserver.niedersachsen.de/www/NLWKN_Natur/FFH_Gesamt/viewer.htm)

A most remarkable initiative in context of the management of the reported areas is the LIFE project "River Dynamics of the Ems River being Close to Nature" (<http://www.emsland.de/life/dasprojekt.htm>).

Background:

Besides a number of typical and original elements of a floodplain, the Ems Valley and the Ems River consist of a man-made landscape, changed by man to an

essential extent in order to get meadows, pastures and, in modern times, arable soil. Moreover, dam units for river control and for river traffic were erected. Preventing bank erosion stones were built in for long stretches.

Project's objectives:

It is planned to make a different use of the river land, to carry out changes to the river and the buildings in the river. Suitable areas will be given back to successive nature. In the river itself man-made bank reinforcement will be removed. By changing the Listrup weir ecological through flow will be re-established, especially upstream.

The project is funded by the EC up to 50% of the overall costs (2 Mio. €), the other 50 % are equally spent by the State of Lower Saxony and the Emsland county (each € 500,000).

The envisaged runtime for the project is 2004 – 2008.

The project is located as shown below in the following Map 16:



Map 16 The area of LIFE project “River Dynamics of the Ems River being Close to Nature” (source: <http://www.emsland.de/life/dasprojekt.htm>)

Project’s measures:

The measures and steps concerned will be especially taken to the property owners, based on a voluntary cooperation by means of contractual agreements. Land will have to be bought respectively some rights of use will have to be paid.

Public relations work is needed in order to take care of a participation of all affected stakeholders (residents, the public as well as tourists) because there is some resistance to a larger extent in connection with a protection declaration of the area as a part of the NATURA 2000 network.

Reservations against it shall be reduced. All society-relevant groups and authorities in connection with the municipality are integrated within the project by means of a “local action group”.

The project is integrated within an overall concept regarding the development of the reported area "Ems". By the responsible body of the project (county administration Emsland) more than 700 hectares of land have either been bought, secured by means of a contract or mandatory protected. This land has been adapted to the special conservation and development targets of NATURA 2000. A further 450 hectares, part of the "Lower Hase River area", being directly situated to the Ems river have been bought and developed.

Expected results:

The own dynamics of the river can redevelop itself close to nature. Regular river maintenance will be stopped in the areas bought. Genetic isolation of partial populations of animals bound to water also including Appendix II of the FFH regulation will come to an end. Local residents will be hopefully more interested in the matters of the "Natura 2000" network.

By means of educational foot paths and adventure foot paths the area will also attract the interest of tourists. They will be informed about the values of nature and nature protection activities as well as about functional correlations.

Information flow will be carried out by using information technology, by carrying out two local conference meetings and exchanging the experience of other LIFE-nature-projects.

In so doing, the existing conflict between environmental protection, the agricultural sector, water management and tourism shall be reduced.

4.2.2.3 Civil protection

Council Directive 96/82/EC (SEVESO II) aims at the prevention of major accidents involving dangerous substances, and the limitation of their consequences. 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 and of the Council of 16 December 2003 amending Council Directive 96/82/EC has to be considered. This first amendment of the SEVESO II directive 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 useplanning (Art. 12 SEVESO II Directive, appropriate distances) are newly introduced into Community legislation on major-accident hazards; the SEVESO I Directive did not contain such requirements. Although land useplanning requirements are newly introduced into Community legislation, Germany has established practices for achieving a degree of separation between

SEVESO establishments and residential population (e. g. in Germany: so called "Abstandserlass").

Therefore, it was no surprise, that in the Emsland County not in a single case the appropriate distances have been relevant for decision-making (see interview with Dr. Kuckuck in the annex). However, the external safety plans, introduced by the directive, have influenced the relationship between companies, public administration and the public. It is clearly characterised by more openness; the involvement of the public has been understood as a very new, but positive tool in order to improve the acceptance of existing facilities. Moreover, the emergency response has got the feeling to be better informed about possible events.

In the context of disaster prevention, only the designation of flood prone areas can be stressed. However, these areas have been designated without any influence of the EC's disaster prevention policy, which is totally unknown in the Emsland, as pointed out by the interviewees.

4.3 Regional performance of key territorial trends

In the following, those trends, which could be performed differently from region to region in one member state, will be analysed. Others, depending on more global trends like climate change, energy prices, European policies (e. g. continued competition between policies for competitiveness and for cohesion) or national/state frameworks (e. g. Improving R&D expenditure, but constant technological gap to USA) will be excluded.

4.3.1 Demography

As visible from the table below, the population has increased continuously during the last centuries. Moreover, it is expected that the population will increase further up to a peak, which is expected for 2014. Afterwards a slight decrease is prognosed as visible from Table 15 below:

Table 15 Vital statistics for the period from 1978 – 2002 (source: Emsland County)

Municipality	1978	1980	1985	1990	1995	2000	2001	2002
Dörpen	10390	10537	11082	12186	13744	14862	15005	15142
Emsbüren	6848	7052	7515	8137	8942	9503	9565	9504
Freren	8996	9095	9095	9288	10429	10585	10697	10773
Geeste	8720	8760	9136	8543	10541	10924	10994	11228
Haren (Ems)	16649	16982	17517	18875	21450	22316	22389	22601
Haselünne	10509	10620	10900	11009	11783	12436	12458	12543
Herzlake	7305	7337	7650	8234	8988	9381	9436	9663
Lathen	7767	7690	7555	8136	9601	10441	10592	10770
Lengerich	7453	7661	7949	8098	8732	8883	8891	8931

Lingen (Ems)	43659	44097	45433	49137	52270	51684	51362	51423
Meppen	27807	28135	28888	30508	32093	33412	33764	33904
Nordhümml.	8421	8497	8832	9608	11245	11937	11989	12045
Papenburg	27236	27571	28565	30078	33624	34096	34266	34403
Rhede (Ems)	3367	3365	3444	3741	3974	3948	4071	4070
Salzbergen	6186	6219	6221	6369	6825	7166	7256	7281
Sögel	10840	11146	11863	12221	14399	15165	15232	15267
Spelle	7438	7600	8012	8778	10838	11887	12102	12291
Twist	7826	7848	7814	8419	9132	9426	9474	9497
Werlte	10358	10536	10684	11525	14383	14982	15155	15349
Total	237750	240748	248112	263890	292993	303034	304698	306685

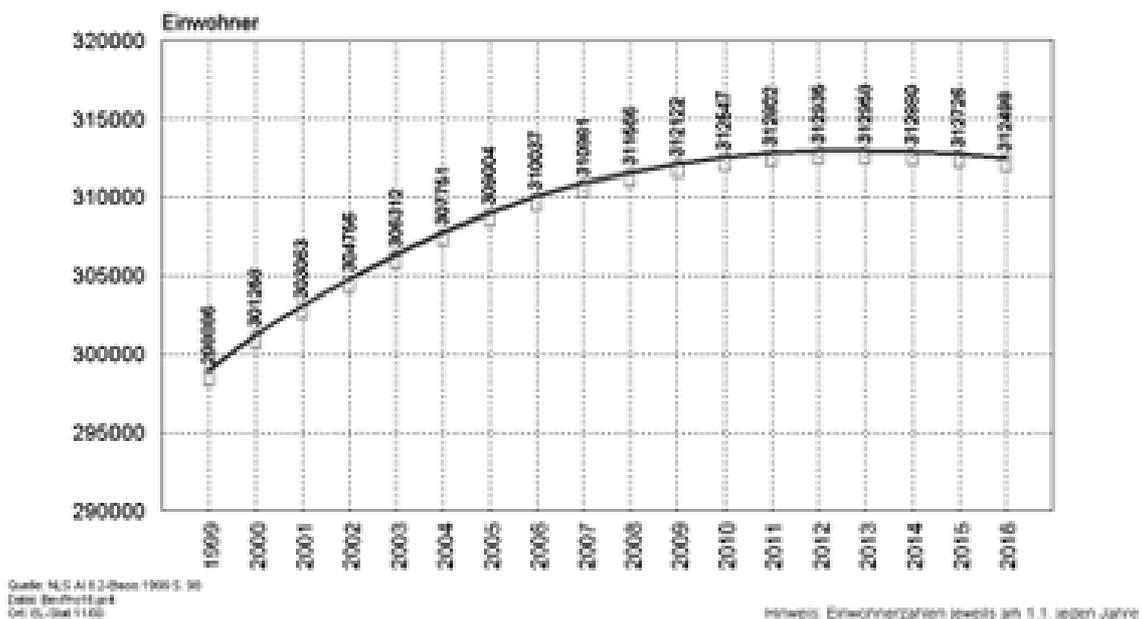


Figure 11 Population forecast for the period from 1999 – 2016 (source: Emsland County)

The birth rate (1.9) belongs still to the highest in the whole country although it has been decreasing seriously during the last decades (only from 1990 to 2003 the decrease was about 28%). In consequence, the population is relatively young, but ageing.

The share of foreigners of the population is compared with the whole Germany (10%) relatively small: 12,188 persons (2003) or 4%.

Migration exists and is increasing, but on a relatively low level compared with other parts of Germany. In 2004, 2,983 persons immigrated coming from foreign countries, compared with 2,354 emigrants.

Concluding from the available data, the following performance of the demographic trends can be stated for the Emsland:

1 Demography	A Continuing fall in birth-rates	True
	B Continuing extension of life expectancy	True
	C Increasing, but controlled external migration	True
	D Total stable, but ageing population	True

4.3.2 Socio-cultural

In general, the Emsland seems to be a rural area with an ethnical and religious homogenous population not in focus of socio-cultural polarisations and tensions. There might be slight increase following the individualisation of the society and the decrease in public welfare, but still on a very low level compared with other parts of the country and Europe.

2 Socio-cultural	A Growing socio-cultural polarisation	False
	B Increasing ethnic tensions	False
	C Increasing religious tensions	False
	D More socio-economic division and tension	False

4.3.3 Economy

The total activity rate of Emsland's population is more or less stable and not increasing, in the tendency even decreasing:

12.2005 28.64%

12.2003 28.73%

12.2002 29.34%

12.1999 29.33%

The public expenditure decreases, as shown by the example of the county's budget for investments:

2005 32,8 Mio

2004 35 Mio

2003 39 Mio

2002 71 Mio

R&D expenditure is mainly located on the national and state government. In general, the R&D expenditures in Germany have decreased in the last years, but the new coalition of CDU and SPD has agreed on a substantial increase for the next budget periods.

3 Economy	A Gradual increase in total activity rate	False
	B Improving R&D expenditure, but constant technological gap to USA	True
	C Decrease in public expenditure	True

Trend 9 B (Increased industrialisation of agricultural production): Absolutely the truth, as indicated by the following change in the sum of farms and their average amount of arable land: Whereas in 1980 all in all 9,483 farms had been operating in the Emsland, in 2003 only 4,593 remained. In the same period of time the

number of farm with 50 – 75 hectares arable land has increased from 56 to 295 and bigger than 100 hectares from just 20 to 178.

The performance of the other trends cannot be assessed on a regional level. All of them or most likely equally performed in the whole Germany.

4 Governance	A Increase in co-operation between cross-border regions B Increase in multi-level and cross-sectoral approaches, but only specific programmes C Continued competition between policies for competitiveness and for cohesion
5 Energy	A Steady increase in energy prices B Consumption stable/decreasing C Increase in the use of renewables
6 Climate change	A Moderate overall climate change until 2030 (+1°C) B Increase in extreme local events C Emission levels continuing with insufficient structural adaptation measures
7 Transport	A Continued growth of all traffic, but curbed by energy price/possible modal shift B Constant growth of infrastructure C Constant congestion levels D Application of the Kyoto agreement
8 Enlargement	A By 2008 Bulgaria & Romania, 2020 western Balkans, 2030 Turkey B Continued combination of deepening and widening C Enlargement of Eurozone
9 Rural development	A Further liberalisation of international trade B Increased industrialisation of agricultural production C More diversification and dualisation of functions of rural areas D Reduction of CAP budget

4.4 Assessment

A first assessment of the impact of environmental policies on territorial goals has been made by means of in-depth interviews with those who are responsible for the implementation of the EU policy as well as with spatial planners.

The most important findings, gathered from these interviews are as follows:

Environmental policy has been perceived mainly with respect to its legislative, mandatory component. In general, the positive contribution of integrating environmental considerations into regional development policy was acknowledged, as was, in particular, the requirement for stricter norms. However, the introducing procedures are seen both ill suited to regional circumstances and too bureaucratic.

Furthermore, the lack of acceptance of EU legislative activities in the field of environment is mainly driven by:

- missing financial support provided by the EC in order to avoid excessive burden for affected stakeholders (i. e. agricultural sector, management of reported NATURA 2000 areas, WFD)

- missing integration of regional and local authorities in the process of directive's implementation
- lack of communicating to public administration objectives and positive effects which might be related to EU policies

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ANNEX 1: Indicator Feedback from Espon Partners

A- Slovenian Ministry of the Environment and Spatial Planning

Partner: Ministry of the Environment and Spatial Planning, Directorate of Spatial Planning. Dunajska 21, SI-1000 Ljubljana

Slovenia

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EEA INDICATORS	EEA CORE SET OF INDICATORS	Designated areas (CSI 008) Renewable electricity (CSI 031) Land take (CSI 014) Progress in management of contaminated sites (CSI 015) Freight transport demand (CSI 036) Municipal waste generation (CSI 016) Bathing water quality (CSI 022) Urban waste water treatment (CSI 024)
	AGRI-ENVIRONMENTAL INDICATORS (IRENA)	IRENA Ind. Nr. 1 - Area under agri-environment support IRENA Ind. Nr. 4 - Area under nature protection
	OTHER EEA INDICATORS	External costs of transport Fragmentation of ecosystems and habitats
	CONTENT OF THE EEA DATA SERVICE	Corine land cover 1990 Corine land cover 2000 Corine land cover changes 1990-2000 Urban morphological zones
	ADDITIONAL DATA SETS	Dominant landscape types Landscape fragmentation (Meff) Population density (source: JRC) Population versus urban development
OECD INDICATORS	Air	1 Total emissions of traditional air pollutants 3C Total emissions of major greenhouse gases
	Inland waters	4B Population connected to public waste water treatment plants

	Wild life	1A State of mammals, birds and fish 1B State of reptiles, amphibians and invertebrates 1C State of vascular plants, mosses, lichens, fungi and algae 3B Major protected areas
	Risk	2A Major floods and related losses 2B Major natural disasters of geological origin 2C Major climatic and meteorological disasters
	Waste	2A Generation of municipal waste
	Energy	5A Total final consumption of energy 5D Total final consumption of energy per unit of GDP and per capita
EUROSTAT INDICATORS		LB-1: Protected area loss, damage and fragmentation UP-2: Non-recycled municipal waste UP-4: Share of private car transport

B- PRC

Partner: PRC

Contact: Mark Fleischhauer

Institution: PRC
Date: 14 December 2005
Brief explanation about the criteria followed to do the selection: Introduction Before we explain the selection criteria we would like to give a short introduction to the necessity of the use of indicators in context with the TIA methodology: At the ESPON Seminar in Manchester (7-8 November 2005) one of the main points of the agenda was dedicated for improving the progress of a TIA methodology. This point contained 4 parallel workshops (World Café methodology) of which one explicitly dealt with the further development of the TIA methodology ("Workshop A: Territorial Impact Assessment (TIA) methodology"). The workshop was guided by ESPON project 3.2 ("Spatial scenarios and orientations in relation to the ESDP and EU Cohesion Policy") which also provided a Working Document for the workshops. The workshop targeted the question what shall be assessed by a TIA and pointed at a basic conflict concerning the development of a TIA: "If we are to measure concrete impacts on elements of territorial structure and development (for example in the form of territorial monitoring indicators) this is impossible on the basis of vaguely formulated policies. Only precisely defined projects and investments can be

evaluated in such manner. If, on the other hand, TIA is only supposed to analyse policies, then this is only possible against equally vague spatial policy goals. TIA would, then, be reduced to a broad comparison and confrontation of aims as defined in different policies, i.e. how to compare the aims of policy X to the aims of spatial development in Europe. In that case, one can ask the question of whether any sophisticated methodology is needed, other than the common sense of those doing the evaluation" (ESPON project 3.2 2005, p. 2). An emphasis was put on an **assessment of policies against indicators** because the assessment against policy goals "limits TIA to a more superficial and, to a certain extent, subjective comparison of aims" (ESPON project 3.2 2005, p. 4). This quantitative approach however requires the development of a sophisticated methodology and the existence of appropriate indicators.

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 and 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 ESPON project 3.2 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 Priority 2 ESPON projects.

Importance for ESPON 2.4.1 project

This sets the frame for ESPON 2.4.1 project in order to guarantee compliance between both projects (ESPON projects 2.1.4 and 3.2): Cause chain effects should ideally link elements of EU environmental policies with those territorial trends which have been identified by ESPON project 3.2 (see below) 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.

For that purpose, a methodological framework for the TIA has been elaborated by PRC and will be presented as part of Chapter B of our interim report (you will be informed about this approach more in detail latest Friday, 16 December 2005). However, in order to implement this approach, suitable indicators are needed which are able to address the different territorial trends which are mentioned below on the European level as well as for the different case studies:

European territorial trends (identified by ESPON project 3.2 and presented at the ESPON Seminar in Manchester on 8 November 2005)

Theme	Trend
1 Demography	A Continuing fall in birth-rates B Continuing extension of life expectancy C Increasing, but controlled external migration D Total stable, but ageing population
2 Socio-cultural	A Growing socio-cultural polarisation B Increasing ethnic tensions C Increasing religious tensions D More socio-economic division and tension
3 Economy	A Gradual increase in total activity rate B Improving R&D expenditure, but constant technological gap to USA C Decrease in public expenditure
4 Governance	A Increase in co-operation between cross-border regions B Increase in multi-level and cross-sectoral approaches, but only specific programmes C Continued competition between policies for competitiveness and for cohesion
5 Energy	A Steady increase in energy prices B Consumption stable/decreasing C Increase in the use of renewables
6 Climate change	A Moderate overall climate change until 2030 (+1°C) B Increase in extreme local events C Emission levels continuing with insufficient structural adaptation measures
7 Transport	A Continued growth of all traffic, but curbed by energy price/possible modal shift B Constant growth of infrastructure C Constant congestion levels D Application of the Kyoto agreement
8 Enlargement	A By 2008 Bulgaria & Romania, 2020 western Balkans, 2030 Turkey B Continued combination of deepening and widening C Enlargement of Eurozone
9 Rural development	A Further liberalisation of international trade B Increased industrialisation of agricultural production C More diversification and dualisation of functions of rural areas D Reduction of CAP budget

Selection criteria

There are the following criteria for the selection of indicators:

1. They should cover the area of the three selected test cases (civil protection, nature and biodiversity and water), ideally on NUTS3 level.
2. They should show the present (and if possible future) state of environment in the test cases), ideally on NUTS3 level.
3. They should be able to figure the key territorial trends, as presented by ESPON project 3.2 in context of the baseline scenario – at least those trends that have been identified to be influenced by environmental policies (see also Chapter C of First Interim report) in the areas of civil protection, nature and biodiversity and water), ideally on NUTS3 level. This is important for the implementation of the TIA.

First selection of indicators

The selected indicators show either the state of the environment in the test cases or can be used to show territorial trends (see also last table "Selection of 10 indicators from those mentioned above"). It is obvious that there is still a lack of indicators in the civil protection test case area.

EEA Indicators	Comments
<p>1. Biodiversity Indicators</p> <ul style="list-style-type: none"> - Designated areas (CSI 008) - Species diversity (CSI 009) - Threatened and protected species (CSI 007) <p>Biodiversity change</p> <ul style="list-style-type: none"> - EU Habitats Directive: sufficiency of Member State proposals for protected sites. [2004.10] - EU Habitats Directive: sufficiency of Member State proposals for protected sites. [2004.06] 	<p>Nature and Biodiversity test case: State of the environment</p>
<p>2. Terrestrial Indicators</p> <ul style="list-style-type: none"> - Land take (CSI 014) 	
<p>3. Water Indicators</p> <ul style="list-style-type: none"> - Chlorophyll in transitional, coastal and marine waters (CSI 023) - Nutrients in freshwater (CSI 020) - Nutrients in transitional, coastal and marine waters (CSI 021) - Oxygen consuming substances in rivers (CSI 019) <p>Water</p> <ul style="list-style-type: none"> - Hazardous substances in lakes [2003.1001] - Hazardous substances in marine organisms [2004.06] - Hazardous substances in marine organisms and loads to coastal waters [2003.1017] - Hazardous substances in river water [2003.1001] - Hazardous substances in rivers [2004.05] - National river classification schemes [2003.1013] - Nitrate in groundwater [2003.1001] - Nitrate in groundwater [2004.05] - Nitrogen and phosphorus in rivers [2004.01] - Nitrogen concentrations in rivers [2001] - Nutrients in coastal waters [2004.05] 	<p>Water test case: State of the environment</p>

<ul style="list-style-type: none"> - Nutrients in rivers [2004.05] 	
<p>4. IRENA Ind. Nr. 1:</p> <ul style="list-style-type: none"> - Area under agri-environment support: trends in agri-environment expenditure per ha of utilised agricultural area 	
<p>5. IRENA Ind. Nr. 4</p> <ul style="list-style-type: none"> - Area under nature protection: Proportion of Natura 2000 sites covered by Natura 2000 habitats that depend on a continuation of extensive farming practices. 	<p>Nature and Biodiversity test case: State of the environment</p>
<p>6. IRENA Ind. Nr. 15</p> <ul style="list-style-type: none"> - Intensification/ Extensification: Intensification/extensification is indicated by: - Trends in the share of agricultural area managed by low-input, medium-input or high-input farm types (based on the average expenditure on inputs per hectare) 	
<p>7. Transport</p> <ul style="list-style-type: none"> - Fragmentation of land and forests [2002] - Fuel prices and taxes [2003.10] - Fuel prices and taxes [2002] - Investments in transport infrastructure [2002] - Investments in transport infrastructure [2001] - Land take by transport infrastructure [2002] - Land take by transport infrastructure [2001] - Passenger transport [2001] - Passenger transport demand [2002] 	
<p>8. Land cover</p> <ul style="list-style-type: none"> - Corine land cover 2000 - Corine land cover changes 1990-2000 	
<p>9. Urban morphological zones</p>	
<p>10. Energy Indicators</p> <ul style="list-style-type: none"> - Renewable electricity (CSI 031) - Renewable energy consumption (CSI 030) 	

³ IRENA 4 relies on data from sites proposed by Member States under the Habitats Directive. For the purpose of this indicator these sites are referred to as "Natura 2000 sites".

OECD Indicators
1. Land <ul style="list-style-type: none"> - 1A Land use - 1B Changes in land use
2. Energy <ul style="list-style-type: none"> - 3C Total energy supply per unit of GDP and per capita - 5A Total final consumption of energy
3. Transport <ul style="list-style-type: none"> - 6B Road fuel prices and taxes
4. Agriculture <ul style="list-style-type: none"> - 3B Tractors and combined harvester-threshers in use - 4 Total energy consumption by agriculture - 5A Apparent consumption of nitrogenous fertilisers - 5B Apparent consumption of phosphate fertilisers - 5C Apparent consumption of commercial fertilisers (NPK)

Eurostat Indicators	Comments
1. Loss Of Biodiversity <ul style="list-style-type: none"> - LB-4: Fragmentation of forests and landscapes by roads/intersections - LB-5: Clearance of natural and semi-natural forested areas - LB-6: Change in traditional land usepractice 	Nature and Biodiversity test case: State of the environment
2. Urban environmental problems <ul style="list-style-type: none"> - UP-6: Land use (change from natural to built-up area) 	

Selection of 10 indicators from those mentioned above

The Indicators suggested here are indicators that might be suitable to measure those territorial trends that have been identified to be influenced by EU environmental policy in the areas of civil protection, nature and biodiversity and water (see Introduction to this selection and Chapter C of First Interim Report).

Territorial trend	Indicators
2D - More socio-economic division and tension	???

3C - Decrease in public expenditure	???
4A - Increase in co-operation between cross-border regions	???
4B - Increase in multi-level and cross-sectoral approaches, but only specific programmes	???
4C - Continued competition between policies for competitiveness and for cohesion	???
5A - Steady increase in energy prices	<ul style="list-style-type: none"> - OECD: 6B Road fuel prices and taxes - EEA: Fuel prices and taxes [2003.10] - EEA: Fuel prices and taxes [2002]
5C - Increase in the use of renewables	<ul style="list-style-type: none"> - EEA: Renewable electricity (CSI 031) - EEA: Renewable energy consumption (CSI 030)
6B - Increase in extreme local events	<ul style="list-style-type: none"> - ESPON: Indicators from ESPON project 1.3.1
7B - Constant growth of infrastructure	<ul style="list-style-type: none"> - EEA: Fragmentation of land and forests [2002] - EEA: Investments in transport infrastructure [2002] - EEA: Investments in transport infrastructure [2001] - EEA: Land take by transport infrastructure [2002] - EEA: Land take by transport infrastructure [2001] - EEA: Corine land cover 2000 - EEA: Corine land cover changes 1990-2000 - OECD: 1A Land use - OECD: 1B Changes in land use - Eurostat: LB-4: Fragmentation of forests and landscapes by roads/ intersections - Eurostat: UP-6: Land use (change from natural to built-up area)
9A - Further liberalisation of international trade	???
9B - Increased industrialisation of agricultural production	<ul style="list-style-type: none"> - EEA: Area under agri-environment support: trends in agri-environment expenditure per ha of utilised agricultural area - EEA: Trends in the share of agricultural

	<p>area managed by low-input, medium-input or high-input farm types (based on the average expenditure on inputs per hectare)</p> <ul style="list-style-type: none"> - OECD: 3B Tractors and combined harvester-threshers in use - OECD: 4 Total energy consumption by agriculture - OECD: 5A Apparent consumption of nitrogenous fertilisers - OECD: 5B Apparent consumption of phosphate fertilisers - OECD: 5C Apparent consumption of commercial fertilisers (NPK)
9C - More diversification and dualisation of functions of rural areas	???

C. GTK

Institution: GTK
Date: 21.12.2005
<p>Brief explanation about the criteria followed to do the selection:</p> <p>There is need for two kind of indicators: indication on state of the environment in the EU and in addition to that specified indicators linked to the TIA approach at least from the case study areas.</p> <p>The selection is based on these two approaches (see indicator comments).</p> <p>However, there can be another way to select suitable indicators to give an overview of the state of the environment by studying EEA's report on 'The European Environment: State and Outlook 2005'. In that report, EEA has selected nine indicators from the core set to build so-called score-card. The score-card is used to compare the Member States.</p>

First selection of indicators

EEA Indicators	Comments
1. Area under organic farming (IRENA CSI 026)	<p>resolution and coverage: NUTS3/NUTS2 EU15</p> <p>Organic farming area/utilised</p>

	agricultural area (UAA) in 2000
2. Designated areas (CSI 008)	resolution and coverage: NUTS0 EU15 Total surface areas only designated for Habitats Directive and for EC Birds Directive.
3. Renewable energy consumption (CSI 030)	resolution and coverage: NUTS0 EU25 Contribution of renewable energy sources to total energy consumption in EU25 1990-2002
4. Land take (CSI 014)	resolution and coverage: NUTS0 EU23 (FIN, NET, SWE, CYP and MAL missing) Mean annual urban and infrastructures land take as % of total Europe23 urban land take
5. Progress in management of contaminated sites (CSI 015)	resolution and coverage: NUTS0 EU23 Soil polluting activities from localised sources as % of total
6. Nutrients in freshwater (CSI 020)	resolution and coverage: NUTS0 EU25 Present concentration of nitrate in groundwater bodies in European countries 2002. Trends in nitrate concentrations in rivers (1990s and early 2000s). Present concentration of phosphorus in lakes (total phosphorus). Trends in phosphorus concentrations in lakes (tot. phosphorus) in Europe during the 1990s and early 2000s.
7. Use of freshwater resources (CSI 018)	resolution and coverage: NUTS0 EU25 (Slovakia missing) Water exploitation index. Total water abstraction per year as percentage of long-term freshwater resources in 1990 and 2002.
8.	
9.	
10.	

OECD Indicators	Comments
1. Inland waters: 1 Estimation of	Indicator for the state of the

renewable freshwater resources	environment in Europe coverage: EU25 without LT, LV, EE
2. Inland waters: 2A Intensity of use of fresh water resources	Indicator for the state of the environment in Europe depending on the country the data were collected between 1993 and 2002 coverage: EU25 without LT, LV, EE
3. Wild life: 3A Biosphere reserves and wetlands of international importance	Indicator for the state of the environment in Europe coverage: EU25 without LT, LV, EE
4. Wild life: 3B Major protected areas	Indicator for the state of the environment in Europe coverage: EU25 without LT, LV, EE
5. Agriculture: 6B Trends in the consumption of pesticides	Indicator for the state of the environment in Europe coverage: EU25 without LT, LV, EE
6. Environmental expenditure and taxes: 4B Trends in revenues from environmentally related taxes	Indicator for the state of the environment in Europe coverage: EU25 without LT, LV, EE
Eurostat Indicators	Comments
1. LB-1: Protected area loss, damage and fragmentation	Conflict between nature protection and spatial development?
2. LB-3: Agriculture intensity: area used for intensive arable agriculture	Trend 9B: Increased industrialisation of agricultural production Combination with EEA-indicator CSI 026 "Area under organic farming"
3. LB-6: Change in traditional land use practice	More information is needed
4. RD-3: Increase in territory permanently occupied by urbanisation	Decrease of free space
5. UP-6: Land use (change from natural to build-up area)	Does this indicator differ from the EEA's analysis of CLC changes 1990-2000

ESPON Indicators	Comments
1. Aggregated technological hazard	Good coverage on NUTS3 level,

indicador (ESPON 1.3.1)	important for civil protection
2. Aggregated natural hazard indicador (ESPON 1.3.1)	Good coverage on NUTS3 level, important for civil protection
3. Fragmented natural areas from ESPON 1.3.1 vulnerability indicators	Good coverage on NUTS3 level, state of the environment linked to land use and biodiversity
4. Total Pillar 1 support per agricultural Work unit (ESPON 2.1.3)	4&5: share of environmental support to agricultura of all agricultural support mechanisms
5. Total Pillar 2 support per agricultural Work unit (ESPON 2.1.3)	4&5: share of environmental support to agricultura of all agricultural support mechanisms
6. Utilisable Argicultural Area (UUA) as a percentage of total land area (ESPON 2.1.3)	May be an important component for integrated indicators

Annex 2: EEA Indicators

The EEA has developed a Core Set of Indicators (CSI) with the aim to:

- **Provide a manageable and stable basis for indicator reporting** by the EEA
- **Prioritise improvements in the quality** and geographical coverage of data flows, especially priority data flows of the European environment information and observation network (Eionet)
- **Streamline EEA/Eionet contributions** to other European and global indicator initiatives, e.g. structural indicators and sustainable development indicators and OECD environmental indicators

The core set supports EU policy priorities, is regularly updated, and is of known quality. It is based on nine selection criteria (e.g. policy relevance, available data) and is approved by EEA member countries.

The 37 indicators from the EEA CSI can be accessed individually through the following web page: <http://themes.eea.eu.int/IMS/CSI>.

However, a list of all published environmental indicators is available as well in the EEA web page, organised by:

- Indicator section (http://themes.eea.eu.int/indicators/all_indicators_box)
- Environmental themes (<http://themes.eea.eu.int/>) such as:
 - Environmental issues (air quality, climate change,...)
 - Sector and activities (agriculture, tourism, transport,...)
 - Information related to specific media (air, nature, soil, water)
 - Environment in different regions and specific areas (coast and sea, regions, urban)
 - Actions for improving the environment

These indicators measure developments in selected issues, including progress towards agreed targets. EEA publishes indicators on a regular basis, both in the annual "Environmental Signals" report and in indicator-based reports covering specific sectors and topics

A- EEA CORE SET OF INDICATORS

The establishment and development of the EEA core set of indicators⁴ has been guided by the need to identify a small number of policy-relevant indicators that are stable, but not static, and that give answers to selected priority policy questions. They should, however, be considered alongside other information if they are to be fully effective in environmental reporting.

The core set covers six environmental themes (air pollution and ozone depletion, climate change, waste, water, biodiversity and terrestrial environment) and four sectors (agriculture, energy, transport and fisheries). All the topics address EU policy priorities, as described in the EEA strategy.

Just the black ones are "directly" related with the aim and the objective of the ESPON 2.4.1 project "Territorial trends in Environment and Impacts of EU Environment Policy"

Theme	Indicator
Agriculture Indicators	Area under organic farming (CSI 026) Gross nutrient balance (CSI 025)
Air pollution and ozone depletion Indicators	Emissions of acidifying substances (CSI 001) Emissions of ozone precursors (CSI 002) Emissions of primary particles and secondary particulate precursors (CSI 003) Exceedance of air quality limit values in urban areas (CSI 004) Exposure of ecosystems to acidification, eutrophication and ozone (CSI 005) Production and consumption of ozone depleting substances (CSI 006)
Biodiversity Indicators	Designated areas (CSI 008) Species diversity (CSI 009) Threatened and protected species (CSI 007)
Climate change Indicators	Atmospheric greenhouse gas concentrations (CSI 013) Global and European temperature (CSI 012) Greenhouse gas emissions and removals (CSI 010) Projections of green-house gas emissions and removals and policies and measures (CSI 011)
Energy Indicators	Final energy consumption by sector (CSI 027) Renewable electricity (CSI 031) Renewable energy consumption (CSI 030)

⁴ Complete information concerning each EEA Indicator is available in <http://themes.eea.eu.int/indicators/>

	Total energy consumption by fuel (CSI 029) Total energy intensity (CSI 028)
Fisheries Indicators	Aquaculture production (CSI 033) Fishing fleet capacity (CSI 034) Status of marine fish stocks (CSI 032)
Terrestrial Indicators	Land take (CSI 014) Progress in management of contaminated sites (CSI 015)
Transport Indicators	Freight transport demand (CSI 036) Passenger transport demand (CSI 035) Use of cleaner and alternative fuels (CSI 037)
Waste Indicators	Generation and recycling of packaging waste (CSI 017) Municipal waste generation (CSI 016)
Water Indicators	Bathing water quality (CSI 022) Chlorophyll in transitional, coastal and marine waters (CSI 023) Nutrients in freshwater (CSI 020) Nutrients in transitional, coastal and marine waters (CSI 021) Oxygen consuming substances in rivers (CSI 019) Urban waste water treatment (CSI 024) Use of freshwater resources (CSI 018)

B- Agri-environmental indicators (IRENA)

Theme	Indicator
IRENA Ind. Nr. 1 - Area under agri-environment support	Trends in agricultural land enrolled in agri-environment measures and share of the total agricultural area. Sub-indicators show trends in agri-environment expenditure per ha of utilised agricultural area and the cover endangered breeds under agri-environment measures.
IRENA Ind. Nr. 2 Regional levels of good farming practices	Range and type of relevant categories of farming practices covered by the codes of good farming practices defined by Member States in their rural development programmes
IRENA Ind. Nr. 3 Regional levels of environmental targets	Environmental targets set at country or regional level relevant to agriculture

IRENA Ind. Nr. 4 – Area under nature protection	Proportion of Natura 2000 sites covered by Natura 2000 habitats that depend on a continuation of extensive farming practices.
IRENA Ind. Nr. 7 - Area under organic farming	Trends in the organic farming area and the share of the organic farming area in the total utilised agricultural area (UAA).
IRENA Ind. Nr. 13 – Cropping/livestock patterns	Cropping patterns: trends in the share of the utilised agricultural area occupied by the major agricultural land uses (arable, permanent grassland and permanent crops).
IRENA Ind. Nr. 15 - Intensification/Extensification	Intensification/extensification is indicated by: Trends in the share of agricultural area managed by low-input, medium-input or high-input farm types (based on the average expenditure on inputs per hectare), Livestock stocking densities, and Trends in yields of milk production and cereals
IRENA Ind. Nr. 16 - Specialisation/diversification	Specialisation is indicated by trends in the share of the agricultural area managed by specialised types of farm. Diversification is indicated by the share of agri-environment payments in gross farm income
IRENA Ind. Nr. 17- Marginalisation	Marginalisation is estimated by the share of holdings with low income (Farm Net Value Added per Annual Work Unit) in combination with a high share of holdings with farmers close to retiring age.
IRENA Ind. Nr. 23 – Soil erosion	Annual soil erosion risk by water.
IRENA Ind. Nr. 26 – High nature value (farmland) areas	This indicator shows the share of the Utilised Agricultural Area that is estimated to be High Nature Value farmland.
IRENA Ind. Nr. 29 – Soil quality	Topsoil (0-30cm) organic carbon content
IRENA Ind. Nr. 33 – Impact on habitats and biodiversity	Agricultural impacts on habitats and biodiversity are illustrated by: The share of Important Bird Areas affected by agricultural intensification and abandonment. Population trends of agriculture related butterfly species.

C- Other EEA Indicators

⁵ IRENA 4 relies on data from sites proposed by Member States under the Habitats Directive. For the purpose of this indicator these sites are referred to as "Natura 2000 sites". See the introduction for further clarification.

Theme	Indicator
Agriculture	Agri-environmental management contracts [2001]
	Agricultural intensity [2001]
	Agriculture eco-efficiency [2001]
	CAP expenditures [2001]
	Nutrient surpluses [2001]
	Organic farming [2001]
Air and air quality	EEA18 Emissions of primary particulates (PM10) and secondary particulate precursors [2003]
	EEA31 NH3 emissions [2003]
	EEA31 NOx emissions [2003]
	EEA31 emissions of SO2 [2003]
	Ecosystem damage area by air pollution, EEA18 [2001]
	Emission of ozone precursors [2001]
	Emission of particulates, EU 15 [2001]
	Emissions of acidifying substances [2003]
	Emissions of acidifying substances [2001]
	Exceedance of the EU human health threshold value for ozone in urban areas [2001]
	Exposure to fine particles above EC threshold values [2001]
	EEA31 NMVOC emissions [2003]
	Ecosystem damage area by air pollution, EEA18 [2001]
	Emission of ozone precursors [2003]
	Emission of ozone precursors [2001]
	Emission of ozone precursors [2003]
	Emission of particulates, EU 15 [2001]
	Emissions of acidifying substances [2003]
	Emissions of acidifying substances [2001]
	Exceedance of the EU human health threshold value for ozone in urban areas [2001]

	Exposure to fine particles above EC threshold values [2001]
Biodiversity change	Cumulated area of nationally designated areas over time in (Pan) Europe [2004.11]
	EU Habitats Directive: sufficiency of Member State proposals for protected sites. [2004.10]
	EU Habitats Directive: sufficiency of Member State proposals for protected sites. [2004.06]
Coasts and seas	Chlorophyll-a in transitional, coastal and marine waters [2003.08]
	Hazardous substances in blue mussels in the north-east Atlantic. [2001]
	Input of hazardous substances in the north-east Atlantic [2001]
Fisheries	Aquaculture production [2004.05]
	Catches by major species and areas [2004.05]
	Fish stocks outside Safe Biological Limits in 2002 [2004.05]
	Fish stocks outside safe biological limits [2002]
	Fisheries impact habitats and ecosystems [2003.1017]
	Fishing fleet - trends [2002]
	The North Sea Cod (Gadus morhua) stock [2004.05]
	The North Sea cod (Gadus morhua) stock. [2002]
	Trends in aquaculture [2002]
Households	Household energy consumption [2001]
	Household expenditure categories [2001]
	Household number and size [2001]
	Penetration of environmentally friendly products [2001]
Nature	Change in area and use of grasslands [2001]
	Pressures on grasslands [2001]
	Protection of grasslands [2001]
	Species in dry grasslands [2001]
Soil	Expenditure on remediation of contaminated sites [2002.11]
	Expenditures on clean-up of contaminated sites [2001]
	Percentage contribution to soil contamination from localised sources [2001]

	Progress in management of contaminated sites [2001]
	Progress in the management of contaminated sites [2002.11]
	Soil-polluting activities from localised sources [2002.11]
Tourism	Household expenditure for tourism and recreation [2001]
	Tourism eco-labelling [2001]
	Tourism intensity [2001]
	Tourism travel by transport modes [2001]
Transport	Access to basic services [2001]
	Access to transport services [2001]
	Accessibility to basic services and markets by transport mode [2003.10]
	Accidental and illegal discharges of oil by ships at sea [2001]
	Accidental and illegal discharges of oil by ships at sea [2002]
	Average age of the vehicle fleet [2001]
	Average age of the vehicle fleet [2002]
	Capacity of transport infrastructure networks [2001]
	Capacity of transport infrastructure networks [2002]
	Capacity of transport infrastructure networks [2003.10]
	Emissions per passenger-km and per tonne-km [2001]
	Energy consumption [2002]
	Energy consumption [2003]
	Energy efficiency for passenger and freight transport [2002]
	Energy efficiency for passenger and freight transport [2001]
	Exposure of population to exceedances of EU air quality standards [2001]
	Exposure of population to exceedances of EU air quality standards [2002]
	External costs of transport [2001]
	External costs of transport [2002]
	Fragmentation of ecosystems and habitats [2001]
Fragmentation of land and forests [2002]	

Freight transport [2001]
Freight transport demand [2002]
Freight transport demand by mode and group of goods[2003.10]
Fuel prices and taxes [2003.10]
Fuel prices and taxes [2002]
Implementation of internalisation instruments [2001]
Implementation of internalisation instruments [2002]
Implementation of strategic environmental assessment in the transport sector [2001]
Implementation of strategic environmental assessment in the transport sector [2002]
Institutional cooperation on transport and environment [2002]
Institutional cooperation on transport and environment [2001]
Integrated transport and environment strategies in ACs [2002]
Investments in transport infrastructure [2002]
Investments in transport infrastructure [2001]
Land take by transport infrastructure [2002]
Land take by transport infrastructure [2001]
Load factors for freight transport [2001]
Load factors for freight transport [2002]
National transport and environment monitoring systems [2002]
National transport and environment monitoring systems [2001]
Number of Member States that implement an integrated strategy [2001]
Number of transport accidents [2001]
Occupancy rates of passenger vehicles [2002]
Occupancy rates of passenger vehicles [2001]
Overall energy efficiency and specific CO2 emissions for passenger and freight transport [2003.09]
Passenger transport [2001]
Passenger transport demand [2002]
Passenger transport demand by mode and purpose [2003.10]

Progress in charge levels [2003.10]
Progress in charge structure and internalisation policies [2003.10]
Proportion of the vehicle fleet meeting certain emission standards (by mode) [2003.09]
Proportion of vehicle fleet meeting certain air and noise emission standards [2002]
Proportion of vehicle fleet meeting certain air and noise emission standards [2001]
Proximity of transport infrastructure to designated areas [2002]
Proximity of transport infrastructure to designated areas [2001]
Public awareness and behaviour [2001]
Real change in transport price by mode [2001]
Real change in transport price by mode [2002]
Regional access to markets [2001]
Size and composition of the vehicle fleet [2003.09]
Size of the vehicle fleet [2002]
Specific emissions of air pollutants [2003.09]
Traffic noise: exposure and annoyance [2001]
Transport accident fatalities [2002]
Transport accident fatalities [2003]
Transport accident fatalities [2001]
Transport contribution to air quality [2003.09]
Transport emissions of air pollutants [2002]
Transport emissions of air pollutants (CO, NH3, NOx, NMVOC, PM10, SOx) by mode [2003.09]
Transport emissions of air pollutants TERM 2001 [2001]
Transport emissions of greenhouse gases [2001]
Transport emissions of greenhouse gases [2002]
Transport emissions of greenhouse gases by mode [2003.10]
Transport energy consumption [2001]
Uptake of cleaner and alternative fuels [2003.09]

	Uptake of cleaner fuels and numbers of alternative-fuelled vehicles [2001]
	Uptake of cleaner fuels and numbers of alternative-fuelled vehicles [2002]
	Urban spatial characteristics and transport [2003.10]
	Waste from road transport [2001]
	Waste from road vehicles [2002]
Waste	Generation and treatment of sewage sludge [2001]
	Landfilling of biodegradable municipal waste [2001]
	Total waste generation [2001]
	Waste generation from household and commercial activities[2001]
Water	Accidental by-catch: birds, mammals and turtles [2004.05]
	Accidental oil spills from marine shipping [2004.05]
	Ammonium concentrations in rivers [2001]
	Bathing Water Quality [2004.05]
	Biochemical oxygen demand in rivers [2001]
	Biological quality of lakes [2004.05]
	Chlorophyll-a concentrations in transitional, coastal and marine waters [2004.05]
	Classification of coastal waters [2004.05]
	Classification of coastal waters [2003.1017]
	Demonstration indicator: biological quality of lakes [2003.1001]
	Discharge of nitrogen and phosphorus from urban wastewater treatment plants [2003.1001]
	Discharge of oil from refineries and offshore installations [2004.05]
	Drinking Water Quality [2004.05]
	Drinking water quality [2003.1013]
	Emissions of nitrogen (N) and phosphorus (P) from urban wastewater treatment (UWWT) plants [2004.05]
	Emissions of organic matter [2004.05]
	Emissions to water of hazardous substances from industry [2004.05]
	Emissions to water of hazardous substances from urban sources [2004.05]

Frequency of low bottom oxygen concentrations in coastal and marine waters [2004.05]
Hazardous substances in lakes [2003.1001]
Hazardous substances in marine organisms [2004.06]
Hazardous substances in marine organisms and loads to coastal waters [2003.1017]
Hazardous substances in river water [2003.1001]
Hazardous substances in rivers [2004.05]
Illegal discharges of oil at sea [2004.05]
Loads of hazardous substances to coastal waters [2004.05]
Mean water allocation for irrigation in Europe [2003.1001]
National river classification schemes [2003.1013]
Nitrate in groundwater [2003.1001]
Nitrate in groundwater [2004.05]
Nitrogen and phosphorus in rivers [2004.01]
Nitrogen concentrations in rivers [2001]
Non-indigenous species in rivers and lakes [2003.1010]
North Atlantic Oscillation [2004.05]
Nutrients in coastal waters [2004.05]
Nutrients in rivers [2004.05]
Organic matter in rivers [2003.1010]
Overall reservoir stocks [2003.1001]
Pesticides in Groundwater [2004.05]
Phosphorus concentrations in rivers [2001]
Phosphorus in lakes [2003.1001]
Phosphorus in lakes - Eutrophication indicators in lakes[2004.05]
Phytoplankton algae in transitional and coastal waters [2004.05]
Saltwater intrusion [2003.1001]
Sectoral use of water [2003.1003]
Source apportionment and loads (riverine and direct) of nutrients to coastal waters [2004.05]

	Trends in aquaculture production, and newly introduced cultured and associated species in European Seas. [2004.05]
	Urban waste water treatment [2003.1015]
	Urban waste water treatment [2004.05]
	Urban wastewater treatment [2001]
	Water exploitation index [2003.1001]
	Water exploitation index [2004.05]
	Water prices [2003.1002]
	Water use by sectors [2004.05]
	Water use efficiency (in cities): leakage [2003.1001]
	Water use in urban areas [2003.1001]

D- Content of the EEA data service

The EEA data service contains a series of spatial data (GIS layers). It can be accessed via: <http://dataservice.eea.eu.int/dataservice>.

Data sets in the EEA data service are freely accessible to the general public for non-commercial purposes. It provides almost all data sets and applications which have been used in EEA's periodical environmental reports.

For most data the customer needs to fill a data request form before being able to actually download the information. The data request form is used to track the use of the data (e.g. type of organisation requesting the data, sector of application).

Data sets under responsibility of the ETC/TE

Corine land cover 1990	Raster data at 100 & 250 m grid size. Revised version as part of CLC2000 update – includes major correction in some countries compared to the original data.
Corine land cover 2000	Raster data at 100 & 250 m grid size. Vector data also available. Update of the CLC database for the reference year 2000 (+/- 1 year).
Corine land cover changes 1990-2000	Raster data at 100 & 250 m grid size. Vector data also available. Validated land cover changes between CLC90 and CLC2000.
Urban morphological zones	Data set derived from CLC90. Urban areas less than 200 m apart are considered to belong to the

	same morphological zone. Classification into 3 population size classes.
Vegetation quality index	Raster data set. This index is one of the components of the sensitivity to desertification index. The dataset was derived from Corine Land Cover.

Soil quality index	Raster data set. This index is one of the components of the sensitivity to desertification index. It is based on: soil parent material, soil depth, soil texture and the slope of the land surface
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The EEA data service contains an additional section on “Maps & graphs” – a collection of illustrations of specific issues (e.g. “areas remote from urban and transport pressure”, “forests and urban areas”, “forest fires”, “occurrence of major natural disasters”).

E- Additional data sets

A series of additional spatial data sets has been created by the ETC in support of specific projects.

Spatial data

Dominant landscape types	Data derived from CLC and elevation data. Shows dominant landscape types
Areas sensitive to pressure	Reclassification of areas sensitive to pressure (natural & semi-natural land)
Natural areas	Data set derived from CLC by smoothing.
Landscape fragmentation (Meff)	Fragmentation of the European landscape by transport networks and urban areas. Result is the average size of the remaining unfragmented patches in a reporting unit (e.g. NUTS).
Coast by administrative boundaries	Selection of NUTS units touching the coast.
Coast (10 km buffer)	Buffer of 10 km along the coastline.
Coast (geographical definition)	Coastal area defined by criteria of elevation and distance to the coast.
Mountain areas	2 different definitions (1 internal, 1 external project)
Population density (source: JRC)	Population density remapped to CLC classes (1 ha grid cells)
Land take by urban and transport area	Part of the core set of indicators. Information on land cover and land cover changes caused by the

(in the coastal zone)	conversion to artificial areas (urbanisation, transport).
Rate of development in previous undeveloped land	Assessment of land cover changes due to urbanisation processes in the coast by NUTS.
Coast protected by Natura 2000	Percentage of the coastal zone protected by N2000 areas by NUTS
Coastal erosion patterns (source: EuroSION project)	Tendencies of coastal erosion (erosion, stability, sedimentation) of the coastline (vector data, 200 m minimum segment length)
Population versus urban development	Comparison of population increase versus rate of urban development by NUTS

F- Other related / relevant databases and data sets

EUNIS database	http://eunis.eea.eu.int/index.jsp EUNIS is the European Nature Information System designed and used for environmental reporting and for assistance to the NATURA2000 process (EU Birds and Habitats Directives) and coordinated to the related EMERALD Network of the Bern Convention.
Airbase	http://airbase.eionet.eu.int AirBase is an air quality information for a selection of stations and a number of components, and meta information on air quality monitoring networks and stations.

Annex 3: OECD Indicators

The *OECD Environmental Data Compendium*⁴, published every two years, presents data linking pollution and natural resources with economic activity placing pressures on the environment. It provides data on the state of air and climate, inland waters, land, forests, wildlife, waste, and risks as well as data on pressures on the environment made by energy production and consumption, transport, industry, and agriculture. Data are provided for OECD countries for recent years for which data is available.

Theme	Indicator
Air	1 Total emissions of traditional air pollutants
	2A Emissions of SOx by source
	2B Emissions of NOx by source
	2C Emissions of particulates by source
	2D Emissions of CO by source
	2E Emissions of VOC by source
	3A Emissions of CO2 from energy use
	3B Emissions of CO2 from energy use by source
	3C Total emissions of major greenhouse gases
	3D Emissions of major greenhouse gases by gas
Inland waters	1 Estimates of renewable freshwater resources
	2A Intensity of use of freshwater resources
	2B Freshwater abstractions by source
	2C Freshwater abstractions by major use
	3 Water use by supply category
	4A Population connected to sewerage
	4B Population connected to public waste water treatment plants
	5 Sewage sludge production and disposal
	6 Water quality of selected rivers
	6A Dissolved oxygen
	6B Biochemical oxygen demand
	6C Nitrates

⁴ Complete information concerning each OECD Indicator is available in http://www.oecd.org/document/58/0,2340,en_2649_34441_34747770_1_1_1_1,00.html

	6D Phosphorus
	6E Ammonium
	6F Lead
	6G Cadmium
	6H Chromium
	6I Copper
	7 Water quality of selected lakes
	7A Total phosphorus
	7B Total nitrogen
Land	1A Land use
	1B Changes in land use
Forest	1 Forest and other wooded land 1 Forêt et autres terres boisées
	2 Production of industrial roundwood and forest industry products
	3A Trade in forest industry products, total and per capita
	3B Trade in roundwood and forest industry products, by product
	3C Trade in roundwood and forest industry products, by world region
	4 Burned area of forest and other wooded land
Wild life	1A State of mammals, birds and fish
	1B State of reptiles, amphibians and invertebrates
	1C State of vascular plants, mosses, lichens, fungi and algae
	2A Catches of fish and other aquatic animals and products
	2B Fishery production
	2C Fish consumption
	3A Biosphere reserves and wetlands of international importance
	3B Major protected areas
Risk	1 Accidental oil spills from tankers
	2A Major floods and related losses
	2B Major natural disasters of geological origin
	2C Major climatic and meteorological disasters
Waste	1A Amounts of waste generated by sector
	1B Amounts of waste generated by selected waste stream
	2A Generation of municipal waste
	2B Composition of municipal waste
	2C Disposal of municipal waste

	3 Production, movement and disposal of hazardous waste	
	4A Waste recycling rates: paper and cardboard	
	4B Waste recycling rates: glass	
	5 Waste treatment and disposal installations	
	6 Nuclear waste: spent fuel arisings	
Energy	1A Indigenous energy production	
	1B Indigenous energy production by source	
	2 Net oil imports	
	3A Total primary energy supply	
	3B Energy supply by primary source	
	3C Total energy supply per unit of GDP and per capita	
	4A Electricity generated	
	4B Electricity generated by source	
	5A Total final consumption of energy	
	5B Total final consumption of energy by type	
	5C Total final consumption of energy by sector	
	5D Total final consumption of energy per unit of GDP and per capita	
	Transport	1A Road network length: all roads
1B Road network length: motorways		
2 Road vehicle stocks		
8.2A Motor vehicles		
8.2B Passenger cars in use		
8.2C Goods vehicles in use		
3 Road traffic volumes		
8.3A Motor vehicles		
8.3B Passenger cars		
8.3C Goods vehicles		
4 Transport by mode		
8.4A Passengers		
8.4B Freight		
5 Total final energy consumption by the transport sector		
6A Consumption of road fuels		
6B Road fuel prices and taxes		
Industry		1 Industrial production

	2 Business sector investment
	3 International tourism receipts
Agriculture	1 Agricultural land
	2 Irrigated area
	3A Economically active population in the primary sector
	3B Tractors and combined harvester-threshers in use
	4 Total energy consumption by agriculture
	5A Apparent consumption of nitrogenous fertilisers
	5B Apparent consumption of phosphate fertilisers
	5C Apparent consumption of commercial fertilisers (NPK)
	6A Consumption of pesticides
	6B Trends in the consumption of pesticides
	7 Livestock
8 Agricultural production	
Environmental expenditure and taxes	1 Pollution abatement and control expenditure 1 Dépenses de lutte contre la pollution
	2 Public R & D expenditure for environmental protection
	3 Official development assistance
	4A Structure of revenues from environmentally related taxes
	4B Trends in revenues from environmentally related taxes
General data	1A National populations
	1B Population density
	2A Trends in gross domestic product
	2B Structure of gross domestic product
	3A Trends in private final consumption expenditure
	3B Structure of households' consumption expenditure

Annex 4: Eurostat Indicators

Within the DPSIR framework, Eurostat (the Statistical Office of the European Communities) focuses on the *Driving forces*, *Pressure* and *Response* categories.

In the context of "The Environmental Pressure Indices Project", conducted by Eurostat and financed by the European Commission's Environment DG, which aims at a comprehensive description of the most important human activities that have a negative impact on the environment. This project reflected the efforts undertaken by the European Commission to provide decision-makers and the general public with the information necessary for the design and monitoring of an adequate environment policy for the European Union. The first indicator publication, "*Towards Environmental Pressure Indicators*" (Eurostat 1999)⁵, covers the following 60 indicators:

Theme	Indicators
Air Pollution	AP-1: Emissions of nitrogen oxides (NOx)
	AP-2: Emissions of non-methane volatile organic compounds (NMVOCs)
	AP-3: Emissions of sulphur dioxide (SO ₂)
	AP-4: Emissions of particles
	AP-5: Consumption of petrol and diesel oil by road vehicles
	AP-6: Primary energy consumption
Climate Change	CC-1: Emissions of carbon dioxide (CO ₂)
	CC-2: Emissions of methane (CH ₄)
	CC-3: Emissions of nitrous oxide (N ₂ O)
	CC-4: Emissions of chlorofluorocarbons (CFCs)
	CC-5: Emissions of nitrogen oxides (NOx)
	CC-6: Emissions of sulphur oxides (SO _x)
Loss of Biodiversity	LB-1: Protected area loss, damage and fragmentation
	LB-2: Wetland loss through drainage
	LB-3: Agriculture intensity: area used for intensive arable agriculture

⁵ Complete information concerning each Eurostat Indicator is available in the report: European Commission (1999), *Towards environmental pressure indicators for the EU*, Luxembourg: Office for Publications of the European Communities.

	LB-4: Fragmentation of forests and landscapes by roads/intersections
	LB-5: Clearance of natural and semi-natural forested areas
	LB-6: Change in traditional land use practice
Marine Environment and Coastal Zones	ME-1: Eutrophication
	ME-2: Fishing pressure
	ME-3: Development along shore
	ME-4: Discharges of heavy metals
	ME-5: Oil pollution at coast and at sea
	ME-6: Discharges of halogenated organic compounds
Ozone Layer Depletion	OD-1: Emissions of bromo fluorocarbons (halons)
	OD-2: Emissions of chlorofluorocarbons (CFCs)
	OD-3: Emissions of hydro chlorofluorocarbons (HCFCs)
	OD-4: Emissions of nitrogen oxides (NOx) by aircraft
	OD-5: Emissions of chlorinated carbons
	OD-6: Emissions of methyl bromide (CH ₃ Br)
Resource Depletion	RD-1: Water consumption
	RD-2: Energy use
	RD-3: Increase in territory permanently occupied by urbanisation
	RD-4: Nutrient balance of the soil
	RD-5: Electricity production from fossil fuels
	RD-6: Timber balance
Dispersion of Toxic Substances	TX-1: Consumption of pesticides by agriculture
	TX-2: Emissions of persistent organic pollutants (POPs)
	TX-3: Consumption of toxic chemicals
	TX-4: Index of heavy metal emissions to water
	TX-5: Index of heavy metal emissions to air
	TX-6: Emissions of radioactive material
Urban Environmental	UP-I: Energy consumption
	UP-2: Non-recycled municipal waste

Problems	UP-3: Non-treated waste water
	UP-4: Share of private car transport
	UP-5: People endangered by noise emissions
	UP-6: Land use (change from natural to built-up area)

Annex 5: Espon Indicators

- Fragmentation of nature (ESPON 1.3.2)
- Single hazard indicators, e.g. chemical plants density, major river flood events 1987-2002, oil transport (ESPON 1.3.1)
- Aggregated technological hazard indicator (ESPON 1.3.1)
- Aggregated natural hazard indicator (ESPON 1.3.1)
- Aggregated hazard indicator (ESPON 1.3.1)
- Vulnerability indicators, e.g. fragmented natural areas (degree of natural vulnerability), integrated vulnerability of Europe (ESPON 1.3.1)
- Climate change indicators, e.g. change of dry spell length or precipitation between present day and 2071-2100 (ESPON 1.3.1)
- Hazard interaction indicators (ESPON 1.3.1)
- Total Pillar 1 support per agricultural work unit (ESPON 2.1.3)
- Total Pillar 2 support per agricultural work unit (ESPON 2.1.3)
- Value of fertilizer input per hectare of arable land (ESPON 2.1.3)
- Utilisable Agricultural Area (UUA) as a percentage of total land area (ESPON 2.1.3)
- Agricultural output per hectare (ESPON 2.1.3)
- Agricultural output per AWU (ESPON 2.1.3)
- FNVA (Farm Net Value Added) per AWU (Agricultural Work Unit) (ESPON 2.1.3)
- Emission of greenhouse gases (ESPON 1.2.1)
- Emission of air pollutants (ESPON 1.2.1)
- Fossil fuels dependency (ESPON 2.1.4)
- Greenhouse gas emissions (ESPON 2.1.4)
- Acidification gas emissions (ESPON 2.1.4)