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The territorial dimension of environmental sustainability

Potential territorial indicators to support the environmental dimension of territorial cohesion

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European Environment Agency

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Contents

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Executive summary

Preface

With the entry into force of the Lisbon Treaty on 1 December 2009, territorial cohesion, along with economic and social cohesion, became a goal of the European Union as identified in the previous EU treaty (Title XVIII). This part of the Treaty mentions the role of the structural funds and the cohesion fund, but does not really define 'territorial cohesion'.

However, the Green Paper on Territorial Cohesion states that:

> *The concept of territorial cohesion builds bridges between economic effectiveness, social cohesion and ecological balance, putting sustainable development at the heart of policy design (p. 3).*

This aspiration has not yet been met by a clear definition of territorial cohesion. It is still subject of ongoing discussion although much of the discussion has focused on economic and social aspects rather than the environmental dimensions of the concept. As this study underlines, the environmental dimensions of territorial cohesion need to be clearly defined on equal terms with the economic and social elements of the concept. Indeed, without a strong enunciation of the environmental dimension of territorial cohesion, this concept could represent a step backwards in terms of European efforts for sustainable development.

Clearly it is fundamental to understand what is meant by the term *territorial cohesion* as a starting point; however 'territorial cohesion' is a term already in use and a concept underpinning policy and, as such, can be considered an important principle.

One potential danger is that territorial cohesion is seen only in terms of the spending of funds to support Cohesion Policy. In this restricted vision, the funds implement territorial cohesion and territorial cohesion is what the funds do. This circular approach would leave out the territorial dimensions of other European policies (agriculture and rural development in particular).

Purpose of the study

This study undertakes an analysis of the environmental dimensions of territorial cohesion and of related EU policies. It is intended to contribute to and support external processes including the European Commission's Green Paper on Territorial Cohesion, revision of the EU budget (e.g. regarding Cohesion Policy) and the work of ESPON (the European Spatial Planning Observation Network) on territorial indicator development.

It recognises the relevance of economic and social aspects as equal issues within the concept of territorial cohesion. As most discussions focus on the economic and social issues of territorial cohesion, it is pertinent to stress the environmental dimension of this concept. Hence, the choice of potential territorial indicators for consideration so that those could support the analysis of territorial cohesion by making better use of existing databases (like air quality, water, land use, climate change) in order to bring environmental aspects into the cohesion debate.

Thus emerge questions and challenges regarding data availability, the nature of potential analysis and its utility to support the consideration of the potential key elements of the environmental dimension of territorial cohesion. It aims to provide a structure within which further work can be undertaken in this area, including data analysis and development of potential indicators.

There were two main aspects to the study:

(1) *Policy analysis:* describe and analyse the context of territorial cohesion and the territorial dimension of environmental sustainability and illustrate, where possible, by practical examples at national, regional and local levels;
(2) *Characterisation and indicator analysis:* Draw up a first rough landscape characterisation tool based on environmental and natural assets to support the development of potential indicators for the environmental dimension of territorial cohesion.

Main findings

The term 'territorial cohesion' lacks a clear definition and is often used throughout the EU and its Member States, and between different disciples and interests, with differing shades of meaning

Territorial cohesion means furthering a more balanced and harmonious development of the European Union. Moreover, it should ensure that its citizens were able to use and benefit from the inherent features of their territories, but there is no one agreed definition.

Territorial cohesion should encompass the sharing of environmental responsibility and benefits among territories and throughout the EU. At a conceptual level, it includes managing shared spaces, and addressing common concerns whilst working out solutions for such environmental problems as pollution, water management and mitigation of and adaptation to climate change. It also includes the preservation of natural assets and the protection of natural areas as well as protecting the local ability to maximize gains from the territorial capital. Implicit in this are the ideas of resource efficiency and ecological balance. In considering the environmental facet of territorial cohesion, it is necessary to recognise local-regional-global linkages.

A potential danger of a narrow interpretation is that environment is seen as a peripheral or, at most, a sectoral part of territorial cohesion — for example, that in terms of Cohesion Policy, spending on environmental infrastructure, such as wastewater treatment, is seen as satisfying the environmental dimension.

To ensure that sustainable development is pursued throughout Europe, the concept of territorial cohesion needs to incorporate the idea of sustainable development — including the environmental dimension. In other words, the environmental and sustainability dimensions of territorial cohesion need to be enunciated.

Territorial cohesion can be seen as the 'spatial representation of sustainability', which would mean that assessing policies in terms of the environmental dimensions of territorial cohesion could become an important step towards the better integration of environment and sustainability

Indeed, the environmental dimensions of territorial cohesion need to be integrated more strongly as part of the development of key EU policies, such as cohesion, agriculture, energy and transport. While positive elements exist, conflicts remain and the mechanisms to address these (e.g. the Environmental Impact Assessment (SIA) and the Strategic Environmental Assessment (SEA) processes) have not always been effective.

In terms of environmental policy, both the Water Framework Directive and the Habitats Directive clearly put in place some of the environmental dimensions of territorial cohesion. For example, both pieces of legislation focus on natural geographic units. For both pieces of legislation, however, a number of problems are handled in terms of their full implementation.

Looking to the future, the importance of introducing a territorial dimension into policies to address climate change adaptation cannot be overestimated. Policies and the actions put in place need to be cross-cutting and cover areas from flood risk management through agriculture to biodiversity protection. Here it could be valuable to use territorial cohesion and incorporate its environmental dimensions as a reference point for developing and assessing policies and programmes in this area. This approach could help identify more effective and more sustainable adaptation strategies and actions.

It is imperative to identify essential factors of environment and sustainability in terms of the elements of territorial cohesion described in the Green Paper on Territorial Cohesion

As most discussions of 'territorial cohesion' lack a strong consideration of the environment, an initial proposal supporting potential key elements of the environmental dimension of territorial cohesion could be as summarised in Table ES.1.

In spite of the territorial focus inherent in Cohesion Policy, the environmental dimensions of territorial cohesion are not always well integrated

Here we show a summary of synergies and conflicts between the Cohesion Policy area and the environmental dimensions of territorial cohesion.

(a) *Potentially significant areas of synergy include:*
   (i) the use of the European Regional Development Fund (ERDF) mechanisms for the improvement of environmental conditions in applicant countries;
   (ii) the focus on cooperation and partnerships among regions as a result of the Interreg Programme helps regions to develop new solutions to economic, social and environmental challenges;
   (iii) the environment and climate change theme of Cohesion Policy can also be a source of economic growth.

Table ES.1 Potential key elements of the environmental dimension of territorial cohesion

Green Paper on Territorial Cohesion key elements of territorial cohesion	Potential key elements of the environmental dimension of territorial cohesion
Harmonious development: 1. building bridges between economic effectiveness, social cohesion and ecological balance; 2. putting sustainable development at the heart of policy design.	**Harmonious and sustainable development:** 1. achieving sustainable development, and thus integrating economic, social and environmental policy goals and actions; 2. environmental limits and carrying capacity (as a constraint on economic growth); 3. utilising a high quality environment as a good and service (e.g. recreation, agriculture, tourism, etc.).
Inherent features of territories — citizens able to use the inherent features of their territories 1. transforming diversity into an asset; 2. making best use of territorial assets. *(Three specific types of region are identified which can face particular development challenges: mountain regions; island regions; and the 18 sparsely populated regions, all rural and almost all border regions).*	**Inherent features of territories** — natural features are protected for future generations: 1. maintaining/improving natural capital — maintaining local features and environmental quality; 2. maintaining and enhancing current ecosystem services and recognising future needs; 3. recognising vulnerability to environmental risks.
Concentration — overcoming differences in density: 1. avoiding excessive concentrations of growth; 2. facilitating the access to the increasing returns of agglomeration in all territories; 3. recognising that whilst most economic activity is concentrated in towns and cities, rural areas remain an essential part of the EU and provide most of the natural resources and natural areas; 4. ensuring sustainable territorial development – strengthening economic competitiveness and capacity for growth, while respecting the preservation of natural assets and ensuring social cohesion.	**Concentration** — addressing differences in density and other natural features: 1. addressing environmental problems related to concentration (e.g. pollution and water needs), including negative effects within and among regions; 2. recognising environmental/ecosystem services; 3. concentrated spatial patterns are better performing than low density patterns (because of better energy performance of buildings, and a possibility to develop public transport facilities).
Connecting territories — overcoming distance or 'strengthening' connections: 1. ensuring good intermodal transport connections; 2. adequate access to services (e.g. health care, education and sustainable energy, broadband internet access, reliable connections to energy networks and strong links between business and research centres).	**Connecting territories** — strengthening positive natural connections and interactions between territories: 1. understanding environmental connections between and within regions, e.g. availability of water, materials and energy; and making these connections more sustainable; 2. recognising inputs and outputs (interdependences) of environmental (and ecosystem) services within and between regions on different scales; 3. recognising/avoiding negative environmental effects from one region to another (e.g. pollution, climate change — flooding, droughts, fires, etc.; biodiversity loss etc.); 4. avoiding the environmental impacts of connectivity (e.g. pollution, habitat loss, landscape intrusion etc.).
Cooperation — overcoming division: 1. addressing problems of connectivity and concentration through strong cooperating at different levels; 2. ensuring policy responses on variable geographical scales (e.g. neighbouring local authorities in different countries and between neighbouring countries); 3. addressing environmental problems that are transboundary and require cooperation (e.g. problems associated with climate change); 4. governance plays a major role in ensuring territorial cohesion.	**Cooperation** — overcoming division: 1. cooperation on implementing EU environmental laws and policy at all levels (national, regional and local); learning from different regions; supporting regions meet common environmental standards: these sections might encompass the 'traditional' view of environment into territorial cohesion and Cohesion Policy; 2. recognising the importance of administrative boundaries in territorial governance.

(b) *Potentially significant areas of conflict include:*
   (i) a central focus of Cohesion Policy on economic growth and social development where these potentially could conflict with environmental and sustainability goals;
   (ii) also, environmental dimensions such as 'green growth' have received increased attention but are not central to Cohesion Policy;
   (iii) current Cohesion Policy does not explicitly recognise or seek to address the connectivity between natural and protected areas, and between environmental assets and impacts, such as air and water pollution, and habitat degradation.

(c) *It will be important for Cohesion Policy to recognise and support the key environmental dimensions of territorial cohesion:*
   (i) these include harmonious and sustainable development, environmental limits and carrying capacity as well as the value of a high-quality environment; the inherent features of territories, including natural assets, ecosystem services and natural risks; addressing problems of concentration; supporting the connectivity between natural features and areas, environmental assets and issues; and recognising natural boundaries as well as administrative ones.

These elements need to be considered and should become part of the regulations governing the policy and spending of its funds. Measures are needed to put these principles into action as part of the overall programming as well as national programming. One is the SEA process, which can identify potential conflicts and trade-offs that arise. It is important that Member States should use Cohesion Policy for building links between spatial and territorial planning and funding. Ideally, such planning, based on the principle of territorial cohesion, would provide the framework for setting budget priorities. This would go a long way to address the key problem identified in Cohesion Policy: a lack of the coherent, place-based territorial perspective.

To what extent are the territorial dimensions likely to be included in the assessments of new policy and legislative proposals?

The European Commission's new impact assessment guidelines do not specifically mention territorial cohesion; however, they do refer to 'regional' issues among those that may require attention in an impact assessment. The Annexes to the Guidelines, which provide detailed recommendations and guidance on specific aspects of the Impact Assessment process, while not referring to territorial cohesion do require/ outline the consideration of regionally specific impacts.

It appears that in practice the first round of SEAs have had mixed results in terms of addressing territorial dimensions. Several analyses carried out, for example, by the European Network of Environmental Authorities (ENEA) and the World Wildlife Fund (WWF) indicate that Member States take different approaches in terms of the SEAs of their Operational Programmes. Notably, countries could do a better job of applying the SEA Directive fully and bringing the results of strategic assessment into the final Programmes. The SEA as a tool for integrating environment, including the environmental dimensions of territorial cohesion, has not been consistently used in an effective way.

Within environment policy areas identified by the European Commission only the chemicals policy lacks an explicit territorial dimension

All other policy areas have both explicit and implicit territorial dimensions. The European Commission's environment policy areas reveal overlapping in scope between various policy areas, for example, the policy relating to climate has key overlaps with policies relating to water, nature and biodiversity. Climate, nature and biodiversity, water and air policy areas all have strong territorial dimensions. Important examples follow.

(1) The White Paper on adapting to climate change (European Commission, 2009a) explicitly recognises that as impacts of climate change will vary by region and that certain areas will be more vulnerable than others, many adaptation actions will need to be carried out nationally, regionally and across borders.
(2) The Habitats and Birds Directives establish the Natura 2000 network. In addition, nature and biodiversity policy area promotes green infrastructure, ecological connectivity and maritime strategy/policy, which are all territorial in focus.
(3) Planning and management at the river basin level and the management of groundwater at risk under the Water Framework Directive present yet another example.
(4) One should also mention the new Air Quality Directive requiring that Member States should identify zones/agglomerations as the basis for air quality assessment and management.

For the waste, soil and noise policy areas, the territorial dimensions are less strong, though all of

these have both explicit and implicit elements, for example:

(a) the transport, treatment and safe disposal of waste and waste as a resource under Waste Directives;
(b) the identification and remediation of contaminated sites and soils under the Soil Thematic Strategy;
(c) the development of strategic noise maps and action plans for specific noise sources and agglomerations under the Environmental Noise Directive.

Synergies and conflicts exist between agricultural and rural development policy and the environmental dimensions of territorial cohesion

The assessment indicates that agri-environmental schemes as well as the rural development pillar of the Common Agricultural Policy (CAP) show some strong synergies with the environmental dimensions of territorial cohesion. This might not be the case, however, for direct farm support, which accounted for 75 % of the CAP budget in 2007. In particular, this support may encourage large-scale single crop farming and long-distance transportation of food, potentially undermining environmental goals.

(a) *Potentially significant areas of synergy include:*
  (i) CAP support for sustainable agriculture and better farm management and the 'improving the environment and countryside' thematic axes of rural development policy — these elements address environmental themes and should, in particular, support actions that are appropriate for regional territories;
  (ii) regulations that address biodiversity, natural resource protection and climate change

(b) *Potentially significant areas of conflict include:*
  (i) the CAP continues to place a strong emphasis on the competitiveness of European agriculture: thus, environmental dimensions appear to be secondary goals.
  (ii) the environmental impacts of Community Agricultural Policy have been, for several decades, an issue for concern and the policy debate has led to the development of programmes and axes that address environmental issues within the CAP as well as to the articulation of the so-called 'cross-compliance'.

There are fundamentally territorial dimensions of the policy for both energy and transport

Specific territorial elements of transport and energy policy include:

(a) the creation of a 'real' internal market for transport and energy;
(b) major infrastructure projects and the creation of trans-European networks and arteries;
(c) efforts to minimise the impacts of both sectors on CO_2 emissions and air pollution, including the promotion of renewable energy and connected energy systems;
(d) actions to control maritime pollution; and
(e) promotion of air transport (together with rail and road) both within and outside the EU.

For energy, key synergies include the recognition of the interdependencies between EU territories and of the territorial dimension of energy issues. The new energy policy goals also have important territorial impacts, for example the use of land for the production of biofuels and biomass and for generation of solar energy. While energy connections among territories improve the overall efficiency, they will also have impacts.

For both energy and transport policy, attempts to pursue sustainability mean paying attention to the environmental dimensions of territorial cohesion. For energy policy, these territorial dimensions include the impacts produced by the new infrastructure created for renewable energy generation, for example wind power in coastal zones and solar power in southern Europe. In addition, the EU's goals to increase the share of biofuels and biomass will affect territories throughout Europe.

Thus, the environmental dimension of territorial cohesion play an important role in identifying problems and trade-offs. It is important that these environmental dimensions are addressed on a range of spatial scales, including the European level, as both energy and transport policies are linking infrastructure across EU and the neighbouring countries.

The Water Framework Directive provides a good example of how the environmental dimensions of territorial cohesion can be integrated into policy

The Directive calls for water services (clean drinking water, irrigation, hydropower, wastewater treatment, etc.) to be charged at a price which fully reflects the services provided. This implicitly recognises the value of ecosystems services, and thus, the inherent features of a territory. It therefore provides a mechanism to address interdependencies and relationships between territories.

The Directive establishes governance by the natural geographical units. It has also increased the need for cooperation among administrative

units, such as regions that share common river basins. The Directive calls on the Member States to cooperate where river basins cross boundaries. This cooperation is seen in relation to the Saar and Mosel Rivers, where international cooperation had preceded and helped to inspire the Directive, which has, in turn, spurred further mechanisms for cooperation. Moreover, this mechanism builds on the natural connections between territories: in the case of the Saar and Mosel Rivers, these territories range from mountain areas (the Vosges in France) to down plains. In addition, the Directive calls specifically for a system whereby the citizens were informed and involved in the development of river basin management plans.

While the Directive provides a strong mechanism for addressing the environmental dimensions of territorial cohesion, it should be noted that in a number of cases implementation of the Water Framework Directive has been poor (European Commission 2007a). In 2007, the European Commission identified 'significant shortcomings' in several countries, both in terms of the legal transposition of the directive into national law and the initial work needed to assess water quality in river basins. In 'some Member States … there appears to be a systematic and serious problem with the WFD implementation resulting in significant delays'.

The Habitats Directive is very closely linked to territories: it calls for the protection of natural habitats across Europe — from Taiga forests to Mediterranean salt marshes, as well as for the protection of wild species

The Directive identifies Europe's 'biogeographical' regions that cross national and other administrative boundaries. The areas protected under the Directive can also cross boundaries, and therefore, transboundary impacts on these areas should also be addressed. Thus, the Directive seeks to protect the inherent features of territories.

The Directive calls for an assessment of the influences on a protected area, including activities in the surrounding territory, which means it looks at connections among habitats. While the Directive allows economic activities in the protected areas, these should be compatible with the site itself. The Directive sets up a mechanism for the assessment of potential impacts.

For individual protected areas, the Habitats Directive urges participation of local communities and stakeholders. It also calls on cooperative research among European Member States. An example of this cooperation can be seen in the HABITALP Project under the Alpine Space Programme, funded through the EU funds for Cohesion Policy.

While the Directive clearly embodies key elements of the environmental dimension of territorial cohesion, it should be noted that its implementation in the Member States has often been difficult. Nature protection is one of the environmental themes resulting in the highest number of cases opened in the European Court of Justice to settle disputes between the European Commission and Member States.

Recent assessments suggest that the Directive and the action plan are not sufficient to protect existing Natura 2000 sites. Agriculture remains a major pressure on biodiversity: a key need is to strengthen the integration between biodiversity and agricultural policy. The fragmentation of natural areas created by infrastructure continues and climate change may exacerbate these pressures. These problems call for a more in-depth analysis, including analysis from a territorial perspective. In this work, the environmental dimension of territorial cohesion could provide a valuable approach and also serve as a tool for assessment.

The Climate Change Adaptation White Paper and the work to put in place adaptation strategies have strong synergies with the concept of territorial cohesion including its environmental dimensions

These include:

(a) the role of environmental capacity, green infrastructure and ecosystem services in adaptation;
(b) a recognition of regional, and urban-rural differences;
(c) a call for more strategic long-term spatial planning and regional development.

The White Paper notes the importance of natural units, such as river basins, that cross regional and national administrative units. This underlines the connections between territories as well as their natural features. The White Paper also underlines the importance of green infrastructure, including connections among natural areas. It will be important to address climate change adaptation in water policies, which will require integrating adaptation into areas such as land use planning. Work has shown the importance of 'climate corridors' that can link wetlands (and other ecosystems) as part of adaptation strategies.

There is a need to define and better understand European territories, and the environmental assets and features they provide, currently or potentially

European territories have to be understood better – including a more precise idea of how to delineate them and what assets and features contribute to their identity. Environmental assets and features are key aspects of defining a territory. Characterisation, e.g. landscape and environmental characterisation, is one way of investigating, defining and recording the key assets and inherent features of a territory.

Potential objectives of characterisation as part of the territorial cohesion debate could include the following:

(1) environmental characterisation of European territories provides a scientifically relevant and politically operational description of these territories to support territorial cohesion;
(2) strengthening of territorial identity — the need to enable regions to identify their territorial assets within the framework of spatial development policies;
(3) identification of region-specific natural and environmental assets;
(4) help to assess and then monitor the positive and negative impacts of European policies, including the allocation of funding to support existing natural assets and regional sustainable development;
(5) identification of high diversity areas from the point of vulnerability of territories to natural risks.

Landscape and environmental characterisation of territories provide baseline information about the environmental assets of a specific region that makes it unique or important. The characterisation work in this report proposes a 'new geography' that supports territorial identity through the identification of natural and environmental assets. The characterisation of territories thus emerging provides baseline information about the environmental 'value' of a specific region, i.e. if the region owns environmental assets that make it unique and that hence could support the development of the region by exploiting the asset item properly and sustainably. Map ES.1 shows a proposal for characterisation of homogeneous regions based on environmental assets (from Class 1 with the lowest share of environmental assets to Class 5 with the highest share).

In developing this approach to environmental characterisation, existing environmental 'stratifications' of Europe, e.g. types of landscape character, biogeographical regions, etc., are utilised as spatial frameworks, which provides for a deeper understanding of environmental issues in the territorial context. These 'natural' spatial frameworks are useful in assessing impacts of policies and, therefore, have potential for inclusion into the analysis of territorial cohesion and being used as spatial units to map and analyse other indicators.

An important first step is to establish a potential framework for territorial indicators that would link the analysis of environmental dimensions of territorial cohesion to the DPSIR model for environmental indicators

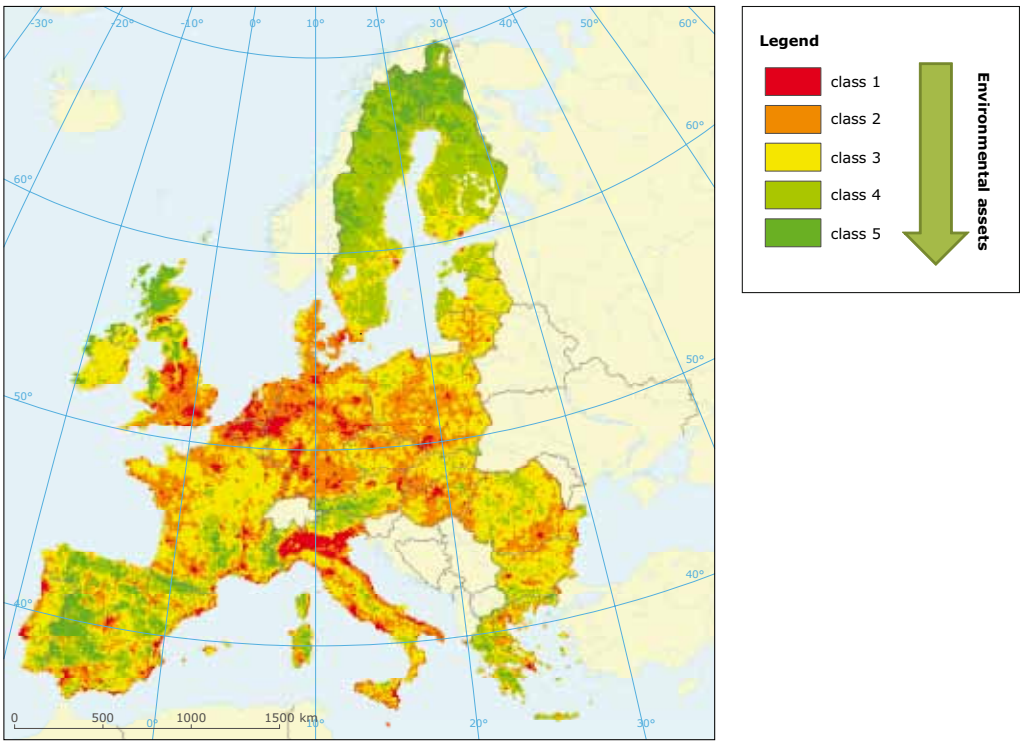
Territorial cohesion indicators should be placed within the DPSIR (Driving forces, Pressures, States, Impacts and Responses) assessment framework as it will help linking it to the ongoing indicator work. Table ES.2 proposes relationships between the elements of territorial cohesion (i.e. Harmonious and sustainable development, Inherent features of territories, Concentration, Connecting territories and Cooperation) and the DPSIR framework.

When developing territorial indicators, it is recommended to also have a forward-looking capacity — provide projections of possible developments in the coming decades. This will be valuable for many policy areas — including work on climate change adaptation where strategies and actions need to look ahead to the coming decades.

The Eurostat indicators for monitoring the sustainable development strategy can be considered as contributing to monitoring the environmental dimension of territorial cohesion. These indicators, however, appear to focus more on the national scale. The environmental accounts developed by Eurostat/EEA at the regional level would provide a very useful tool for comparison. This would be based on regional aggregation of, e.g. local/elementary/catchment analytical units.

Relevant data will also become available through ongoing initiatives, for example EURECA will provide information on stocks, flows and value of selected ecosystem goods and services at a European level. In addition, SEIS and the INSPIRE Directive (that puts in place EU-wide geo-referenced data by harmonising datasets and access across national boundaries) will be valuable in expanding the availability of data to support the analysis of territorial cohesion. This is important to bear in mind, as in some areas, the data for territorial

Map ES.1 Proposal for characterisation of homogeneous regions based on environmental assets



Note: Class 1 with the lowest share of environmental assets to Class 5 with the highest share.

indicators and the data on specific geographical scales may not be available at the present time.

Many existing indicators have potential utility as indicators of the environmental dimension of territorial cohesion, however, they need to be analysed on the appropriate geographical scale to provide the territorial dimension. Analysis should be carried out at the level of administrative units (e.g. NUTS 2 and NUTS 3 regions) as well as other geographical units, such as river basin districts (and, preferably, sub-basins), landscape character areas or biogeographical regions.

Characteristics and types of potential indicators to evaluate the environmental dimension of territorial cohesion

The work to identify current data available for territorial cohesion is underway. Table ES.3 indicates the initial areas where it would be useful to have data available in order to monitor the environmental dimension of territorial cohesion. The key to developing these indicators is through using the appropriate scale and utilising reporting units by 'territories' or natural units (e.g. landscape character areas, river basin districts, etc.), rather than administrative units. The list is organised by the key elements of the environmental dimensions of territorial cohesion and is intended as a proposal for discussion and further development.

Table ES.2 Proposal for relationships between the elements of territorial cohesion

Elements of territorial cohesion	Predominant relationships with DPSIR framework				
	Drivers	Pressures	State	Impact	Responses
Harmonious and sustainable development	√	√	√	√	√
Inherent features of territories			√		
Concentration	√	√	√		
Connecting territories	√	√	√		
Cooperation					√

Table ES.3 Initial areas to monitor the environmental dimension of territorial cohesion

Potential key elements of the environmental dimension of territorial cohesion	Characteristics and types of potential indicators to evaluate the environmental dimension of territorial cohesion	Overview of possible indicator availability/ source
Harmonious and sustainable development	1. Cross-cutting (and potentially composite) indicators considering broad principles like environmental limits and carrying capacity;	
	2. Composite approaches to characterise territories would fall into this category;	
	3. Could include indicators of broad concepts such as quality of life;	
	4. The Eurostat indicators for monitoring the sustainable development strategy could be considered for their suitability for monitoring the environmental dimension of territorial cohesion – in which case consideration would need to be given to how they fit into the DPSIR framework and to which appropriate scale and reporting units to use.	Eurostat's current sustainable development indicators are reported at the EU and the country level, rather than organised by 'territories' or natural reporting unit: it appears that there is a need for the geo-referenced data.
Inherent features of territories	1. Likely to include predominately state indicators and measures that characterise territories in terms of their environmental assets and features;	Indicators for these areas need to be developed: they may be a result of the Eureca project.
	2. Could include indicators of the current and potential availability of ecosystem services provided by the natural environment within territories;	
	3. Could include indicators of natural assets and natural capital;	
	4. Potential indicators could include the current status and the potential of:	
	(a) visual attractiveness of regions	Indicator currently not available
	(b) conservation status of habitats and species	EEA indicator CSI 007, threatened and protected species: available only at the national level.
	(c) habitat diversity	Not used currently; are the data available from EUNIS database?
	(d) high nature value farmlands	This indicator does not appear available at present. However, information can be found in Rural Development in the European Union – Statistical and Economic Information — Report 2009. Internet: http://ec.europa.eu/agriculture/agrista/rurdev2009/index_en.htm. Also, some agri-environment indicators could be relevant (though currently many of them are under preparation/updating). Internet: http://epp.eurostat.ec.europa.eu/portal/page/portal/agri_environmental_indicators/introduction; and the Eurostat publication 'Agricultural statistics' on the Internet site: http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-ED-09-001.
	(e) Air quality.	EEA has geo-referenced data.
	5. Water quality.	Data by water body may be available in near future. Thus, they will be geo-referenced. Water quality data, information / indicators at the EEA website: www.eea.europa.eu/themes/water.
Concentration	1. Likely to include predominately indicators of drivers, pressures and state;	
	2. Could include indicators of trends in the consumption of ecosystem services;	

Potential key elements of the environmental dimension of territorial cohesion	Characteristics and types of potential indicators to evaluate the environmental dimension of territorial cohesion	Overview of possible indicator availability/ source
Concentration (cont.)	3. Other potential indicators could include:	
	(a) extent of/change in green and agricultural land in peri-urban areas and urban sprawl,	Data for the indicators above should be available from Corine land cover.
	(b) extent of/change in green infrastructure, especially in urban areas,	
	(c) extent of/change in types of agricultural use, especially change from less to more intensive uses,	
	(d) fragmentation of habitats (for example by urban areas, transport and energy network development) — e.g. ESPON fragmentation index,	
	(e) number of inhabitants related to urbanised surface/urban density,	
	(f) levels of water and air pollution — intensity by area,	Geo-referenced data should be available from the E-PRTR.
	(g) water needs/consumption and water scarcity at regional or local level,	CSI 018, use of freshwater resources – data may be available only at the national level; WQ01c, water exploitation index – same?)
	(h) flood risks.	e.g. ESPON's Flood endangered area and artificial areas — available and geo-referenced
	4. Municipal waste generation.	CSI 016 — available only at the national level?
Connecting territories	1. Likely to include predominately indicators of drivers, pressures and state;	
	2. Potentially, indicators of resource connections between and within territories (availability and interdependences – net importers/exporters, self sufficiency), for example:	These indicators may not be available – under development?)
	(a) water	
	(b) materials	
	(c) energy;	
	3. Other potential indicators could include:	These indicators may not be available.
	(a) habitat connectivity (green corridors)	
	(b) presence of wildlife corridors of wider regional importance.	
Cooperation	(a) Likely to include predominately response indictors;	
	(b) One potential new indicator is being prepared by EEA/ETC-LUSI: this would measure joint administrative work and governance, collaborative work in river basins but also cross border agglomerations, mountain ranges, natural parks, sea basins, etc.;	
	(c) Could include indicators on public participation at different territorial levels;	
	(d) Indicators of EU cooperation, including:	
	(a) funding for environmental projects and actions;	Some work at the national level shown in EEA Technical Report No 10/2009
	(e) Integration of environmental concerns into spending in other sectors (e.g. funding with a 'win/win' approach; and compensation actions for projects and programmes that are potentially harmful to the environment).	

1 Introduction: Background and aims of the study

1.1 Objective of the study

With the entry into force of the Lisbon Treaty on 1 December 2009, territorial cohesion has become a goal of the European Union, along with economic and social cohesion — as identified in the previous EU treaty. The definition of territorial cohesion, however, is the subject of the ongoing discussion; but much of the discussion has focused on economic and social aspects, rather than the environmental dimensions of the concept. It recognises the relevance of the economic and social aspects as issues of equal importance within the concept of territorial cohesion.

The main objective of this study is to undertake an analysis of the environmental dimensions of territorial cohesion and of the related EU policies with the intention to provide contribution to and support for processes like the European Commission's Green Paper on Territorial Cohesion (European Commission 2008a), revision of the EU budget (e.g. regarding Cohesion Policy) and the work of ESPON (the European Spatial Planning Observation Network) on territorial indicator development.

There are two main aspects to the study.

(1) *Policy analysis*: To describe and analyse the context of territorial cohesion and the territorial dimension of environmental sustainability, where possible, illustrate the analysis by practical examples at national, regional and local levels.
(2) *Characterisation and indicator analysis*: Draw up a first rough landscape characterisation tool based on environmental and natural assets to support the development of potential indicators for the environmental dimension of territorial cohesion.

1.2 Priorities and approach

The focus of the study is set out below.

Firstly, in terms of the ***policy analysis*** dimension, the work includes the following elements.

(a) ***Conceptualisation***: the consideration of the key concepts, processes and definitions as viewed within the policy context, focussing on the Green Paper on Territorial Cohesion (European Commission 2008a) and EU budget revisions 2009, and used as a framework for the study. This sought to clarify the key concepts and questions, such as: *what is the definition of territorial cohesion and what is the difference between territorial cohesion policy, territorial development policy, spatial planning (including land-use) policy and territorial capital?*
(b) ***Policy context***: the context of the study was supported by a relatively short investigation of the importance of incorporating territorial needs, as regards the environment/natural assets, into Cohesion Policy. The analysis is illustrated by some examples.
(c) ***Analyse the integration of environmental objectives into territorial cohesion policy***: the study prioritises the consideration of the following issues:
  (i) the principles of a territorial policy;
  (ii) territorial policies at a community and national level — examples, whether those are consistent with principles and future challenges/opportunities;
  (iii) the integration of territorial cohesion into community policies — including Cohesion/ Rural Development Policy and other sectoral policies. The explicit territorial dimensions/ impacts and (potentially unintended) characteristics/aspects they exhibit, including the impact of environmental directives. This sought to investigate: *How are the territorial cohesion instruments working? How are instruments such as the environmental directives (e.g. directives on water and air quality) impacting territorial developments? How do EU instruments with strong territorial implications but non-territorial objectives capture the impacts of territorial developments on the environment?*
(d) ***Examples to support the analysis***: throughout the study, examples have been identified to illustrate the analysis. These focus on water and water resource management, biodiversity (e.g. Natura 2000) and climate change adaptation in particular.

Moreover, examples that have been sought illustrate national and/or regional territorial strategies that have taken account of the territory's identity, specialisation and position in the EU and of the impact of EU policies on the development of the territory. Some more examples reveal how regional policies and strategies for territorial development can have a pivotal role in offering an integrated and space-based framework for the development and how they add value to EU Cohesion Policy and Lisbon action plans. Consideration has also been given to the examples of linking national and regional territorial development strategies to the national and the EU strategic frameworks for cohesion, rural development and the Lisbon strategy.

Secondly, in terms of the ***indicators analysis***, the following work has been undertaken:

(a) critical review of the currently used indicators for territorial cohesion and Cohesion Policy (including ESPON indicators,);
(b) review of landscape and environmental characterisations of territories; and
(c) review of a potential framework for indicators of the environmental dimension of territorial cohesion and of the availability of potential indicators.

From the above analysis, conclusions are drawn on how to use the findings to provide feedback on policy processes and, in particular, on territorial cohesion.

2 Policy overview

Cohesion Policy oversees the spending of the three EU funds:

(1) *European Regional Development Fund (ERDF)* supports programmes for regional development, economic change, enhanced competitiveness and territorial cooperation;
(2) *European Social Fund (ESF)* provides support to anticipate and manage economic and social change;
(3) *Cohesion Fund* focuses on transport and environmental infrastructure, energy efficiency and renewable energy.

Other funding instruments include:

(4) *European Grouping of Territorial Cooperation* has the goal of overcoming obstacles to cross-border cooperation, and functions on the basis of a convention between national, regional and local administrations;
(5) *Instrument for Pre-Accession Assistance* replaced, in 2007, the financial instruments previously applied to Turkey and the Balkans: PHARE, ISPA, Sapard, CARDS and the pre-accession financial assistance for Turkey.

Together, these funding instruments accounted for about 30 % of the EU spending in 2007 ([1]). Thus, different instruments have a series of different goals. Across all the Cohesion Policy-related programmes, the main fields of investment are:

(a) knowledge and innovation (24 % of funds);
(b) transport (22 %);
(c) environmental protection and risk prevention (19 %);
(d) human resources (22 %).

Moreover, the overall objectives of Cohesion Policy are somewhat divided. The traditional objectives of Cohesion Policy have included support for convergence and cohesion among European regions by supporting infrastructure and other projects that should enhance growth. A more recent objective is to support the Lisbon Strategy, launched in 2000, which has sought to make the EU the most competitive economy by 2010 — though the renewed strategy, presented in 2005, has focused in particular on 'growth and jobs'. In the current 2007–2013 cycle, at least 60 % of cohesion spending in Objective 1 regions (poorest, or 'Convergence' regions) should be allocated towards meeting Lisbon objectives; this figure rises to 75 % for Objective 2 regions (competitiveness and employment regions).

While convergence and 'growth and jobs' are not too far apart, the concept still creates a certain degree of tension ([2]). This has been reflected in the conclusions of the Maribor Conference organised under the Slovenian Presidency:

> *Convergence should remain the primary focus of Cohesion Policy, giving priority to enabling areas lagging behind to catch up. Cohesion Policy should not become overloaded with a whole range of policy objectives. While strong commitment to the Lisbon Agenda was reaffirmed, Cohesion Policy was felt to be broader in scope* ([3]). Another objective — cited, for example, in the main European legislation governing the ERDF, ESF and Cohesion Fund for the 2007–2013 cycle — is the EU Sustainable Development Strategy.

A recent review of Cohesion Policy ([4]) performed by high-level experts for the European Commission,

([1]) Ecorys (2008), A Study on EU Spending (prepared for the European Commission, Directorate General for Budget)
([2]) See also: Milieu Consortium (2008), Territorial Cohesion — analysis of environmental aspects of EU regional policy, Final Report submitted to EEA, May 2008.
([3]) Government of Slovenia (2008), Presidency Conclusions, Conference on the Future of Cohesion Policy (Maribor, 7–8 April 2008). Available at: www.svlr.gov.si/en/slovenian_presidency_of_the_council_of_the_eu/events/conference_on_the_future_of_cohesion_policy/.
([4]) Barca, F. (2009), An Agenda for a Reformed Cohesion Policy: A place-based approach to meeting European Union challenges and expectations (prepared at the request of Danuta Hübner, Commissioner for Regional Policy).

the Barca report, identified a series of problems, including the following:

(a) a deficit in strategy planning;
(b) a lack of a coherent, place-based territorial perspective;
(c) a lack of focus on priorities;
(d) a lack of targets, indicators and information that can allow an assessment of what works;
(e) a remarkable lack of debate on results in terms of the well-being of people — for the focus is placed, instead, on issues related to financial absorption and financial irregularities.

The report sets out a series of recommendations, including a re-focusing of Cohesion spending, identifies a series of core priorities, including innovation and climate change (both focusing on economic efficiency); migration and children (for social inclusion); and skills and ageing.

The Barca report also notes that news of financial irregularities can be a distraction from a deeper debate on Cohesion spending. At the same time, such irregularities remain an important problem: the European Court of Auditors has found that in 2008, 'at least 11 % of the total amount reimbursed [by Cohesion spending] should not have been reimbursed' ([5]). These persisting irregularities (the Court found similar problems in previous years) may play an important role in the debate on the future of the EU budget.

2.1 The EU budget review

The Barca report proposes a major reform of Cohesion Policy. This recommendation comes in the context of the review of the EU budget, whose current framework runs to 2013. The current debate is looking at options for the next cycle, which will run for the period from 2014 to 2020 ([6]).

The future of Cohesion Policy is a key element of the budget review, due to the fact that it account for a large portion of total spending. The other major spending area in the EU is the Common Agricultural Policy (CAP), which accounted for an even larger share — 41 % — of the budget in 2007. Just over three-quarters of CAP spending is used to support the farmers (its first 'pillar', market and income support), and most of the remainder goes towards rural development (this is augmented by the Member States' money that co-finances EU support) ([7]). While the CAP has undergone major changes in recent years, some Member States and stakeholders have called for further reform. A discussion of the future direction of the CAP is taking place alongside the EU's budget review.

At a 2008 conference on reforming the EU budget, several issues and themes have become clear:

(a) discussions on the CAP are likely to be the most controversial;
(b) the European Commissioner for the Budget suggested shifting rural development spending to Cohesion Policy.
(c) the need for a radical reform of the CAP was voiced in a separate venue, where it was also said that the current system of farm supports should be phased out over the long term — which could be in the next budget period, or perhaps even afterwards (e.g. 2021 and beyond) ([8]).

While the review is to be completed in 2010, political discussions on the future EU budget will start then. These may prove difficult; agreement among Member States for the 2007–2013 cycle was reached only in the course of the year 2007.

2.2 The EU Sustainable Development Strategy

Another key element is — or could be — the EU's Sustainable Development Strategy (SDS). The European Council adopted the EU Strategy for Sustainable Development — 'A Sustainable Europe for a Better World' — at Gothenburg in 2001. In June 2006, the European Council adopted a Renewed SDS for an enlarged EU, building on the Gothenburg strategy (European Council, 2006). It identifies four key objectives: environmental protection, social

([5]) European Court of Auditors (2009), 'Annual reports concerning the financial year 2008' (published in the *Official Journal of the European Union*, 10 November 2009).
([6]) For example, the European Commission held a conference entitled 'Reforming the budget, changing Europe' on 12 November 2009 (see Internet: http://ec.europa.eu/budget/reform/index_en.htm).
([7]) Ecorys (2008), A Study on EU Spending (prepared for the European Commission, Directorate General for Budget).
([8]) Adelle. (2008), European Commission Conference on Reforming the Budget — CAP Proves the Most Controversial Topic, IEEP. Available at: http://cap2020.ieep.eu/2008/11/14/european-commission-conference-on-reforming-the-budget-cap-proves-the-most-controversial-topic.

equity and cohesion, economic prosperity and meeting the EU's international priorities.

The Strategy includes territorial cohesion among its social goals, and a recent European Commission document defines territorial cohesion in terms of economic and social inclusion ([9]).

The renewed SDS also identified seven priority challenges:

(a) climate change and clean energy;
(b) public health;
(c) sustainable consumption and production;
(d) sustainable transport;
(e) conserve and management of natural resources;
(f) social inclusion, demography and migration;
(g) global poverty and sustainable development challenges.

The European Commission's 2007 progress report on implementation of the strategy cited the ERDF and the Cohesion Fund as key financial instruments supporting developments in these areas, and notably climate change (receiving EUR 9 billion in the period of 2007–2013) and sustainable transport (EUR 36 billion).

2.3 Other relevant policy discussions

In addition to the three areas highlighted above, ongoing discussions on other policies will also influence the debate on territorial cohesion. These include the following policy areas and issues:

(a) how to implement the recommendation of the Green Paper on Maritime Policies;
(b) the development of the 7th Environment Action Programme of the EU;
(c) the reform of Transport Policy after the year 2010;
(d) Research and Innovation Policy;
(e) the future CAP with its 'greening' of second pillar, its adaptation to climate change and more attention given to biodiversity.

Section 4 of the EU's Neighbourhood Policy reviews a few key areas in further detail, including Cohesion Policy, the CAP and EU energy and transport policy.

([9]) European Commission (2007b), Progress report on the European Union sustainable development strategy in 2007 (Commission Staff Working Document).

3 The territorial dimension of Community policies

This section considers the territorial dimension of Community Policy and, in particular, the degree to which the environmental dimensions of territorial cohesion are integrated within key policy areas.

It considers in turn:

(1) **An overview of EU policy areas:** which of the main EU policy areas have an explicit or implicit territorial dimension?
(2) **An assessment of major EU policy areas:** as regards the EU policy areas and instruments with strong territorial implications (e.g. Cohesion Policy, agriculture and rural development, energy and transport), to what extent do they incorporate the environmental dimensions of territorial cohesion?
(3) **An assessment of key environmental policies:** of a selection of key environmental directives affecting territorial development (e.g. Water Framework Directive, Habitats Directive, Floods Directive and Climate Change Adaptation White Paper), to what extent do they incorporate the environmental dimensions of territorial cohesion?

The section seeks to present a preliminary analysis of the extent to which current EU policies have a territorial dimension and territorial impacts — and the extent to which they address issues of environmental sustainability. The section makes a similar analysis of key areas of the EU environmental policy. The chapter also highlights a small set of initial examples of 'good practice' that have been identified at the Community level and on the national scales.

3.1 Overview of EU policy areas

3.1.1 Initial overview across internal policy areas

A broad range of EU policy areas have either an explicit or implicit territorial dimension, as well as clear territorial impacts.

Table 3.1 sets out the main internal EU policy areas ([10]) and identifies which of those have an explicit or implicit territorial dimension. Many policy areas include policies that explicitly seek to address regional disparities and provide support for disadvantaged regions. Other policy areas may not explicitly address territorial issues, but may, due to the nature of the interventions they use, lead to some inevitable regional differentiation in implementation, which could be interpreted as a territorial dimension.

Areas that have an explicit territorial dimension:

(1) employment, social affairs and equal opportunities;
(2) energy and transport;
(3) environment;
(4) maritime affairs and fisheries;
(5) regional policy;
(6) agriculture and rural development.

The following policy areas address territorial issues either indirectly or as a result of their very nature of their focus:

(1) education and culture;
(2) enterprise and industry;
(3) information society and media;
(4) justice, freedom and security;
(5) research.

On the basis of this analysis, it has been concluded that the following policy areas do not include any significant explicit or implicit territorial dimension:

(1) competition;
(2) economic and financial affairs;
(3) health and consumers;
(4) internal market and services;
(5) taxation and customs union.

This brief review of the potential territorial dimension of EU policies areas indicates that the majority of the key EU policy areas have an explicit

([10]) The list is based on the policy areas identified on the European Commission's web site. Areas of external policy are not included. For further information, see Internet: http://ec.europa.eu/policies/index_en.htm.

Table 3.1 Potential territorial dimensions of EU policy areas

Policy area (dg)	Territorial dimension
Agriculture and rural development	(a) no explicit territorial dimension to CAP subsidies, but the activities (including land management) will strongly affect territories across the EU, (b) Rural Development Policy focuses on rural areas and on 'disadvantaged regions'; some MS have delegated management to regions.
Competition	(a) no explicit territorial focus (may have some influence in that it reviews regional aid to ensure that key programmes are focused on disadvantaged regions).
Economic and financial affairs	(a) no explicit territorial focus.
Education and culture	(a) not a focus, but cultural diversity, dialogue and exchange are among the goals.
Employment, social affairs and equal opportunities	(a) European Employment Strategy seeks to support skills, especially in disadvantaged regions, (b) supports the European Social Fund (one of the Structural Funds) as well as other funding programmes such as PROGRESS.
Energy and transport	(a) Transport Policy seeks to ensure connections among EU regions and also supports cooperation and projects in areas such as urban transport, (b) Energy Policy promotes the development of renewable energy and energy system connections across the EU, (c) supports Trans-European Networks (TEN) for energy (e.g. electricity and gas transmission projects) and transport, including highways, roads, maritime and inland waters, combined transport and air.
Enterprise and industry	(a) not a focus, but operates the Enterprise Europe Network with centres for SMEs across the EU.
Environment	(a) an explicit element of several areas of Environmental Policy. These areas are expanded in Table 3.2, below.
Maritime affairs and fisheries	(a) Maritime Policy focuses on coastal zones, regions and European seas; coastal regions have some role in its implementation.
Health and consumers	(a) no explicit territorial focus.
Information society and media	(a) one aspect is the promotion of high-speed Internet access across the EU, thus promoting connections.
Internal market and services	(a) no explicit territorial focus.
Justice, freedom and security	(a) includes policies on migration and border issues, which affect border regions (both land and sea).
Regional policy	(a) focus on territorial policies.
Research	(a) Research Policy, including the European Research Area, promotes cooperation among researchers across different parts of the EU.
Taxation and customs union	(a) no explicit territorial focus.

or indirect territorial dimension, with only a small number of policy areas having no territorial focus at all.

3.1.2 Key areas of EU Environmental Policy

Table 3.2 sets out the main policy areas within the European Commission environmental arena and identifies which of those have an explicit or implicit territorial dimension.

The analysis presented in Table 3.2 indicates that, among the European Commission's environment policy areas only Chemicals Policy lacks an explicit territorial dimension. In all other policy areas there are both explicit and implicit territorial dimensions and in each case a number of examples can be identified. The examples presented in Table 3.2 should not to be considered exhaustive. They are intended to illustrate territorial dimensions of each policy area. Another aspect of the European Commission's environment policy areas indicated in Table 3.2 is that many policy areas are overlapping in scope, for example, policy related to climate has key overlaps with policies relating to water, nature and biodiversity.

Climate, nature and biodiversity, water and air policy areas all have strong territorial dimensions. Important examples are as follows.

(1) The White Paper on adapting to climate change explicitly recognises that since impacts of climate change will vary by region and that certain areas will be more vulnerable than others, many adaptation actions will need to be carried out nationally, regionally and across borders (European Commission, 2009a).
(2) The Habitats and Birds Directives led to establishing the Natura 2000 network. In addition, nature and biodiversity policy area promotes green infrastructure, ecological connectivity and maritime strategy/policy, which are all territorial in focus.
(3) Planning and management at the river basin level and the management of groundwater at risk have been introduced by the Water Framework Directive.
(4) The new Air Quality Directive requires that Member States should identify zones/ agglomerations as the basis for air quality assessment and management.

As regards waste, soil and noise policy areas, the territorial dimensions are less strong, though all of these have both explicit and implicit elements, for example:

(1) the transportation, treatment and safe disposal of waste and the use of waste as a resource under Waste Directives;
(2) the identification and remediation of contaminated sites and soils under the Soil Thematic Strategy ([11]);
(3) the development of strategic noise maps and action plans for specific noise sources and agglomerations under the Environmental Noise Directive.

3.1.3 EC Impact Assessment requirements

The previous two sections have reviewed existing areas of EU policy. However, policy development is a dynamic and ongoing process and new policies and legislation are being developed and adopted all the time. All proposals for new European policies and legislation, as well as amendments to existing ones, must be assessed for their economic, social and environmental impacts, in line with the European Commission's Impact Assessment Guidelines of which the latest version was published in 2009 (European Commission, 2009b).

The main objective of impact assessment is to improve the quality, effectiveness and efficiency of Commission's proposals, to ensure that policy is more consistent and transparent and to improve and simplify the regulatory environment. The idea is that, through impact assessment, proposals do not only tackle the problem they aim to solve, but also take into account side effects that may influence other policy areas. In so doing, the procedure is regarded an aid to political decision making, not a substitute for it.

The Impact Assessment procedure is introduced by means of a gradual process that allows Commission officials and organisations to grow with it. New guidelines, having been issued in the years 2005 ([12]) and 2009 ([13]), serve as an indication of the progress and further evolvement of the Impact Assessment procedure since its introduction in 2002.

According to the Impact Assessment Guidelines, a number of following questions have to be answered.

(1) What is the nature and scale of the problem, how is it evolving, and who is most affected by it?
(2) What are the views of the stakeholders concerned?
(3) Should the Union be involved?
(4) If so, what objectives should it set to address the problem?
(5) What are the main policy options for reaching these objectives?
(6) What are the likely economic, social and environmental impacts of those options?
(7) How do the main options compare in terms of effectiveness, efficiency and coherence in solving the problems?
(8) How could future monitoring and evaluation be organised?

In terms of the actual design of policy, the fifth question is most critical. Here, the full array of possible policy instruments should be laid on the table. Answering Question 6, obviously, is the core of an Impact Assessment procedure. Here a three-step procedure has to be followed, in which every step is meant to sharpen the focus of the actual Impact Assessment and to deepen the assessment.

Step 1: Identification of economic, social and environmental impacts of a policy, why they occur and who is affected.
Step 2: Qualitative assessment of the more significant impacts.
Step 3: In-depth qualitative and quantitative analysis of the most significant impacts.

([11]) European Commission (2006a).
([12]) Impact Assessment Guidelines', SEC(2005)791, 15 June 2005.
([13]) Impact Assessment Guidelines', (European Commission 2009b) SEC 92, 15 January 2009.

Table 3.2 Potential territorial dimensions of environmental policy areas within the European Commission

Areas of environmental policy	Examples of territorial dimensions
Climate Key overlaps: (1) water (2) nature and biodiversity	(a) The White Paper on adapting to climate change (April 2009), which notes that since impacts will vary by region, and certain areas (e.g. coastal zones, mountains and flood plains) will be particularly vulnerable, many adaptation actions will need to be carried out nationally and regionally. The White Paper also proposes that the EU should play a role in support efforts to address cross-border issues. White paper explicitly seeks to increase resilience of agriculture and forests, biodiversity, ecosystems and water. (b) A European Commission Staff Working Document (European Commission 2009f) recognises the importance of incorporating adaptation in the implementation of water legislation, and the benefits of planning and acting at a river-basin district level. (c) European Climate Change Programme (ECCP) II working group is also considering regional planning, renewable energy infrastructure, Structural Funds and national strategies for mitigation and adaptation. These elements are likely to have a territorial dimension. (d) Climate change research activities seek to promote cooperation between researchers across the EU. This is intended to be international (external) as well as internal.
Nature and Biodiversity Key overlaps: (1) climate impacts and adaptation (2) water	(a) Explicit territorial focus. The Habitats and the Birds Directives led to the establishment of the Natura 2000 network through the identification of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) respectively. (b) Outside Natura 2000 sites, nature and biodiversity policy area promotes green infrastructure, ecological connectivity, marine strategy and maritime policy. All of these elements have an explicit territorial focus. Specific guidance and action plans have been developed, such as the *Guidance on the maintenance of landscape connectivity features of major importance for wild flora and fauna, and the Biodiversity Action Plan: Halting the loss of biodiversity by 2010 — and beyond* (2008).
Waste Key overlaps: (1) water (2) air (3) soil	(a) The Waste Framework Directive and Directives on Waste Incineration and the Landfill of Waste have implicit territorial dimensions, particularly in relation to the transportation, treatment, safe disposal and use of waste as a resource. (b) The Waste Framework Directive requires that Member States should draw up waste management plans. Article 28(1) states that Member States shall ensure that competent authorities establish 'one or more' waste management plans. This allows Member States to draw up regional plans where appropriate.
Water Key overlaps: (1) climate impacts and adaptation (2) nature and biodiversity (3) nitrates	(a) Measures proposed by the Water Framework Directive (WFD) are explicitly territorial in nature, for example the use of river basins as a key planning unit, and managing groundwater at risk, etc. (b) Marine Strategy Framework Directive is explicitly territorial in that it establishes European Marine Regions on the basis of geographical and environmental criteria. (c) The Floods Directive requires the development of national flood risk maps and management plans, based on an assessment of flood risks at the river-basin district level and in associated coastal zones. In some cases, cross-border flood risks will also be important. (d) Bathing Water and Drinking Water Directives have no explicit territorial dimension; however, both have implicit territorial dimension in relation to controlling sources of water pollution. (e) The Urban Waste Water Directive has an explicit territorial dimension in that it requires that Member States should identify and protect sensitive areas/ catchment areas from discharge of urban waste water. (f) The Nitrates Directive requires that Member States should designate territories draining into waters that are or could be affected by high nitrate levels or eutrophication as vulnerable zones. Austria, Denmark, Finland, Germany, Ireland, Lithuania, Luxembourg, Malta, the Netherlands and Slovenia decided to provide the same level of protection to their entire territory, rather than designate nitrate-vulnerable zones.
Air Key overlap: (1) transport	(a) The new Air Quality Directive includes explicit territorial dimension in establishing procedures for assessment of air quality; it requires that account should be taken of populations and ecosystems exposed to air pollution, and that each Member State should identify zones/agglomerations as the basis for air quality assessment and management.

Areas of environmental policy	Examples of territorial dimensions
Soil Key overlaps: (1) water (2) nature and biodiversity (3) chemicals (4) waste (5) agriculture	(a) The Soil Thematic Strategy calls on Member States to identify and remediate contaminated sites. Implicit territorial dimension, but relates to specific sites only. (b) Com(2006) 232 final, the proposal for a Soils Directive (European Commission, 2006a), recognises the transboundary effects of soil degradation (such as downstream damage to infrastructure due to sediments eroded in another region / country upstream). The proposed directive would seek to establish a framework for the protection of soil, which would enable Member States to identify the appropriate measures at the most appropriate geographical/ administrative level.
Chemicals Key overlaps: (1) agriculture (pesticides) (2) waste	(1) No explicit territorial dimension.
Noise Key overlap: (1) transport	(a) The Environmental Noise Directive has explicit territorial dimension, in that it requires that competent authorities should develop strategic noise maps and adopt action plans for specific noise sources (e.g. major roads and airports) and agglomerations.

Many of the questions guiding the Impact Assessment process are related to territorial interests. In Annex 3, the guidelines for impact assessments list questions regarding economic, social and environmental impacts that already have a territorial dimension. The list below summarises the most important territorial issues for the environmental component using the headings of the Impact Assessment questionnaire.

Environmental impacts (see Annex 3 and Table 3):

(1) influence on the demand for transport and/or modal split (obviously, a highly relevant spatial planning issue);
(2) effect on emissions of air pollutants (relevant for land-use and quality of life in general);
(3) influence on the number and varieties of species (this concerns the quality of areas and places in terms of natural heritage);
(4) effects on endangered species, their habitats or ecologically sensitive areas (different sorts of territorial units are explicitly mentioned here);
(5) effect on the increase of landscape fragmentation which may effect migration routes, ecological corridors or buffer zones (territorial integration of nature is the obvious spatial concept behind this);
(6) effects on the scenic value of protected landscapes (again, a territorial category is the key issue here);
(7) water quality and resources (the water system approach is leading, as is explicitly stated in the EU Water Framework Directive to which this refers);
(8) soil quality or resources, including the loss of soil through urbanisation (this basically addresses land use; the background is formed by the Soil Framework Directive, proposed in 2004 but eventually rejected in the EP);
(9) effects on land use mainly in terms of utilising greenfield sites and the divide between rural and urban areas (this is a classic core issue of spatial planning);
(10) waste production, generation and recycling (there are obvious links with land use here).

All questions in the Impact Assessment Guidelines table address single issues (see Annex 3). There are no questions that would address multi-dimensional spatial concerns. An integrating spatial element, like accessibility, seems to be missing. As the EU does not have an integrated, comprehensive spatial planning strategy, it is reasonable to believe that this is the reason for leaving out integrated spatial planning concepts of the Impact Assessment Guidelines.
It should be noted that the questions that are territorially relevant were already part of the previous 2005 Guidelines, partially revised in 2006 with the exception of the notion of cultural heritage ([14]).

To what extent are territorial dimensions likely to be included in the assessments of new policy and legislative proposals?

The European Commission's new guidelines do not specifically mention territorial cohesion; however, they do refer to 'regional' issues among those that may require attention in an impact assessment.

([14]) OTB Research Institute, Delft University of Technology, *EU Territorial Impact Assessment: Under what conditions?*, June, 2009.

All impact assessments are expected to consider significant economic, social and environmental impacts, and impacts on 'fundamental rights, certain economic sectors, on economic actors, groups of citizens, on businesses, SMEs, or regions, cultural goods, species or habitats'.

Under the subheading of 'impacts at national and regional levels' (page 40), the Guidelines point out that impacts may be of 'specific relevance for certain Member States, groups of Member States, or regions'. They also note that options developed to tackle any problems arising from a policy may also affect different parts of the EU in different ways. The Guidelines call for policy options to be assessed with a view to establishing whether impacts, positive or negative, would be spread unevenly. The Guidelines insist that regional or Member State-specific impacts (known as 'outlier' impacts) should be noted.

The Guidelines state that 'where such disparities appear to be significant, they should be analysed, as they may be a reason to adapt the initiative, for instance to offer mitigating or transitional measures for the 'outlier'. This may in some cases justify a further quantification and monetisation of costs and benefits for specific regions'. In order to carry out specific regional analysis of impacts, the Guidelines recommend that specialists leading the study, when considering territorial impact of EU policies, should make use of the results of ESPON research.

The Annexes to the Guidelines, which provide detailed recommendations and guidance on specific aspects of the Impact Assessment process, while not referring to territorial cohesion, do require/outline the consideration of regionally specific impacts.

Annex 1 includes a list of Treaty objectives that aim at helping describe problems, identify objectives and options. Strengthening economic and social cohesion is among those objectives. Referring to the EC Treaty (Article 158), this is to be achieved through reducing disparities between different levels of development of the various regions and the backwardness of the least favoured regions or islands, including rural areas.

In addition, the Annexes call on those preparing impact assessments to specify 'as relevant ... which social groups, economic sectors or particular regions are affected', and Section 11.2 describes the use of problem trees/causal models, setting out examples of the consideration of problems in these areas including 'huge and widening per capita income gap between the EU and the countries in the region, huge inequalities in income within the countries, gaps in basic services among areas and population groups (depressed rural areas, underprivileged farmers, women and the young), high population growth, high youth unemployment, severe environmental problems (coastal areas, quality of the water, desertification, urban and industrial waste)'.

Thus, while not explicitly mentioning territorial cohesion, the new Impact Assessment Guidelines do encourage those developing or amending policy to consider, in particular, regional differences in the impacts of new or amended policy proposals. In addition, reference in the main text of the Guidelines to the ESPON research indicators for territorial impact of EU policies should help ensure that emerging policies include and consider a territorial dimension.

However, the extent of this consideration will depend on each individual impact assessment, and if the environmental dimension of territorial cohesion is to be included, it is important that it is included within existing processes and information systems, such as ESPON.

3.1.4 Strategic Environmental Assessment and Environmental Impact Assessment

The EC impact assessment process is applied to proposals for new European legislation and policy. While several European countries have an analogous system of regulatory impact assessment, in particular concerning new legislation, this is not the case for all.

For upstream activities, i.e. new policies, public plans and programmes at national and sub-national levels, the European Directive (European Commission 2001) requires the preparation of a Strategic Environmental Assessment (SEA) ([15]). For downstream activities, i.e. public and private projects that are coming through at a later stage, the Environmental Impact Assessment (EIA) ([16]) applies. The two Directives address different subjects and are distinct in nature. The objectives of the SEA are expressed more in terms of sustainable development while the EIA aims purely at environmental issues.

([15]) Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment.
([16]) Directive 85/337/EEC, as amended by Directives 97/11/EC and 2003/35/EC.

The boundaries between what constitutes a plan, a programme or a project are not always clear, and there may be some doubts as to whether the subject of the assessment meets the criteria of either or both Directives. In this regard, the definitions of some project categories listed in Annex II of the EIA in relation to changes in land use are not clear, which could create confusion between the EIA and the SEA ([17]).

The SEA process can address environmental issues related to territories. The EU legislation highlights that the SEA process is intended:

> *'… to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations ...' (Art. 1).*

Where a relevant plan or programme in preparation is considered likely to have a significant effect on the environment, the Member State should prepare an environmental report on these potential effects and also consult with the public and other stakeholders. Where transboundary effects are possible, the consultation should involve the neighbouring countries. The report and the results of these consultations should then be taken into account in the preparation of the plan or programme, before its approval.

While the SEA requirements do not specifically mention 'territorial cohesion', the criteria to determine whether or not a plan or a programme is likely to have 'significant effects' include the following elements (from Annex II of the Directive):

(4) the value and vulnerability of the area likely to be affected due to:
- special natural characteristics or cultural heritage;
- exceeded environmental quality standards or limit values;
- intensive land use;
- the effects on areas or landscapes which have a recognised national, Community or international protection status.

These criteria incorporate issues related to at least two of the key environmental elements identified for territorial cohesion. The SEA requirements are relevant for Cohesion Policy: starting with the 2007–2013 programming cycle, all the Operational Programmes, the main vehicles for spending at a regional level as well as for cross-regional actions, should undergo SEA.

3.2 Assessing selected EU policy areas

Next, our analysis looks more closely at a few EU policy instruments with strong territorial implications and reviews them in the light of the environmental dimensions of territorial cohesion. The policy instruments considered are:

(5) Cohesion Policy
(6) agriculture and rural development
(7) energy and transport.

The text below includes a summary of the analysis in tables; analysis tables can be found in full in Annex 1.

3.2.1 Cohesion Policy

In spite of the inherent territorial focus of Cohesion Policy, the assessment (see Table 3.4 and Annex 1) indicates that the environmental dimensions of territorial cohesion are not always well integrated.

There are elements of synergy. Only in relation to the *connecting territories* element is it considered that there is a potential overall conflict between policy and the environmental dimensions of territorial cohesion. In relation to other elements, the analysis identifies a mix of both synergies and conflicts between the Cohesion Policy area and the environmental dimensions of territorial cohesion.

These initial conclusions suggest that the sustainability dimension of territories is not fully addressed. They follow some of the conclusions from a previous study (EEA, 2009), where it was indicated that the sustainability dimension is only partly integrated into Cohesion Policy.

(a) *Potentially significant areas of synergy include:*
  (i) ERDF mechanisms for the improvement of environmental conditions in applicant countries;
  (ii) the environment and climate change theme of Cohesion Policy, which would recognise that the environment can be a source of economic growth;
  (iii) the focus on cooperation among regions, seen for example in the Interreg Programme (a box in Section 4.4.2 describes an example of cooperation over protected areas through the Alpine Space Programme).
(b) *Potentially significant areas of conflict include:*
  (i) the central focus of Cohesion Policy on economic growth and social development.

([17]) COM (2009) 469 final, Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the Directive on Strategic Environmental Assessment (Directive 2001/42/EC).

Whilst the importance of these twin objectives is recognised, a focus on economic growth could conflict with environmental and sustainability goals. Here, environmental dimensions such as 'green growth' have received increased attention but are not central to Cohesion Policy;

(ii) current Cohesion Policy does not explicitly recognise or seek to address the connectivity between natural and protected areas, and between environmental assets and impacts, such as air and water pollution, and habitat degradation.

Environmental issues, and the potential trade-offs between environmental and other objectives in Cohesion Policy could be addressed through the SEA process. Member States are required to prepare SEAs of all the Operational Programmes funded via Cohesion Policy instruments (the Cohesion Fund and the Structural Funds). In principle, the SEAs should identify environmental impacts, including those on the connectivity between natural and protected areas, and help policymakers address conflicts that can arise.

It appears, however, that in practice the first round of SEAs have had mixed results in terms of addressing these issues. An analysis of 11 case studies prepared by WWF's European Policy Office found that Member States took very different approaches in terms of the SEAs of their Operational Programmes for 2007–2013 ([18]). Notably, WWF concluded that only 3 of the 11 countries examined applied the SEA Directive fully and brought the results of strategic assessment into the final programmes. It is possible to quote, as an example, the situation with considering proposals for projects that have potentially harmful effects on the environment: while in a few Member States such as Estonia, trade-offs with the environment were identified and analysed to assist decision-making; in others, these were not discussed at all.

WWF's results suggest that SEA as a tool for integrating environment, including the environmental dimensions of territorial cohesion, was not been consistently used in an effective way.

Table 3.3 Summary review of regional policy against the environmental dimension of territorial cohesion

Policy area	Environmental dimensions of territorial cohesion				
	Harmonious and sustainable development	**Inherent features in territories**	**Concentration**	**Connecting territories**	**Cooperation**
Cohesion Policy	😐	😐	😐	☹	😐
Potential synergies	ERDF funds aim to improve environmental conditions in applicant countries. Climate change and environment theme seeks regional development which respects the environment.	Programmes to promote sustainable urban development (e.g. Urban II).			
Potential conflicts	Central aim is economic growth and social development, which could conflict with environmental and sustainability goals.			No explicit recognition of connections between natural areas.	

Note: The table above and the subsequent tables all use the following scoring system for the 'overall assessment' against each f the five elements of the environmental dimension of territorial cohesion. This is based on a subjective assessment of the degree to which the policy etc. is considered synergistic or conflicting with the potential criteria listed in Table 3.1 for evaluating the environmental dimension of territorial cohesion.

☹	Overall potentially synergistic
😐	Overall potentially neutral
☹	Overall potentially conflicting

([18]) WWF European Policy Office, *How green is the future of EU Cohesion Policy? A WWF score-card analysis of the Regional Funds Programming for 2007–2013*, April 2007 (WWF, 2007).

Member States and regions have a considerable role in determining how the Cohesion Policy funds are used, as they shape national strategies for spending (called the National Strategic Reference Framework) as well as the for shaping individual Operational Programmes. Perhaps even more important are national policies and strategies: Member States with strong existing policies can more effectively employ the European funds working towards a consistent goal ([19]). This is seen in Spain's efforts to tackle desertification: here, the national programme seeks to integrate actions against desertification into activities funded through EU Cohesion Policy (see the box Case study 1).

Case study 1 — Combating desertification in Spain

Project: National Action Programme (NAP) to combat desertification.
Location: Spain.
Funding: Various: no specific budget.
Partners: Various governmental and non-governmental/community based organisations throughout Spain.

Recognising that desertification is a less prominent issue than other environmental problems (e.g. climate change), and under the aegis of the UN Convention to Combat Desertification, the Spanish National Action Programme (NAP) to combat desertification has focussed on participation, communication of information and public awareness regarding the combating of desertification and mitigation of the effects of drought. A key aim of the NAP is the introduction and inclusion of desertification and drought into the campaigns and plans launched by the General State Administration and regional governments, as well as into actions of professional (e.g. forest and agrarian) and non-governmental organisations.

The coordination and implementation of NAP in Spain overarches existing mechanisms and organisations, in particular: the National Commission for the Protection of the Environment; the Sectoral Environmental Conferences; the Advisory Environmental Council; and, the National Forest Council. Other parties involved include the Ministry of the Environment, the Ministry of Agriculture, Fisheries and Food and the autonomous communities (note that in 2008 the name of the Ministry was changed, After merging departments of agriculture and environment, it has come to be called the Ministry of Environment, Rural Areas and Marine).

Coordination is of particular importance, given the decentralised nature of the Spanish political system. An example of such coordination includes the work of the Environmental Authorities Network in the integration of environmental preservation in every action funded by EU funds. Although it has no specific budget itself, the NAP's duty is to promote and increase financial support given to innovative measures aimed at combating desertification and to foster the allocation of funds to areas most affected.

Within the legal framework of the NAP, in recent years sector-specific regulations linked to combating desertification have been elaborated or amended in the areas of agriculture, forestry and water. An example is the implementation of 'cross compliance' in the agrarian sector, through the compulsory fulfilment of environmental requirements in receiving direct payments under the CAP. In the forest sector, initiatives include the creation of a new management tool — the Plans for the Management of Forest Resources, which, among others lines of activity, fosters planning to combat forest fires; proposes the establishment of forest fire danger zones; requires the mandatory restoration of burnt areas; and prohibits changing burnt forest land to other uses for a period of 30 years.

Environmental dimensions of territorial cohesion addressed are formulated below.

(1) The main function of the NAP is to promote the **Coordination** of action and policy within Spain to combat the issues of desertification and drought.
(2) Through its encouragement and enforcement of environmental practices to combat desertification (such as forest protection), the NAP also promotes **Harmonious and sustainable development.**
(3) Recognising that the characteristics of certain areas place them at a higher risk of desertification and drought, the NAP also seeks to address the **Inherent features of territories** within Spain.

Source: *Summary of the Third Spanish Report on the National Action Programme to Combat Desertification,* report presented to the 5th Conference of the Parties (COP5) of the UNCCD, www.unccd.int/cop/reports/northmed/national/2006/spain-summary-eng.pdf (UNCCD, undated).

([19]) EEA (2009), *Territorial cohesion: Analysis of environmental aspects of the EU Cohesion Policy in selected countries*, EEA Technical report No 10/2009.

The following changes to Cohesion Policy are recommended to support the environmental dimensions of territorial cohesion better.

(i) It is important that Cohesion Policy should recognise and support the key environmental dimensions of territorial cohesion:
  (a) harmonious and sustainable development, including environmental limits and carrying capacity as well as the value of a high-quality environment;
  (b) the inherent features of territories, including natural assets, ecosystem services and natural risks;
  (c) addressing problems of concentration;
  (d) supporting the connectivity between natural features and areas, environmental assets and issues;
  (e) recognising natural boundaries as well as administrative ones.

(ii) These elements should become part of the regulations governing the policy and spending of its funds.

(iii) Measures are needed to put these principles into action; they should be included in the overall programming as well as in the national programming. One type is the SEA process, which can identify potential conflicts and trade-offs that arise.

(iv) It is important for the Member States to build links between spatial and territorial planning and funding through Cohesion Policy. Ideally, such planning, based on the principle of territorial cohesion, would provide the framework for setting budget priorities. This would go a long way to address the key problem identified in the Barca review of Cohesion Policy,– the lack of a coherent, place-based territorial perspective.

3.2.2 Agriculture and rural development

The assessment (see Annex 1) indicates that agri-environmental schemes as well as the rural development pillar of the Common Agricultural Policy (CAP) show some strong synergies with the environmental dimensions of territorial cohesion.

This is not the case, however, for direct farm support, which made up 75 % of the CAP budget in 2007. In particular, this support may encourage large-scale single crop farming and long-distance transportation of food, potentially undermining environmental goals.

(a) *Potentially significant areas of synergy include:*
  (i) CAP support for sustainable agriculture and better farm management and the 'improving the environment and countryside' thematic axes of rural development policy: these elements address environmental themes and should in particular support actions that are appropriate for regional territories;
  (ii) regulations that address biodiversity, natural resource protection and climate change.

(b) *Potentially significant areas of conflict include*:
  (i) despite carrying out a series of reforms in recent years, the CAP continues to place a strong emphasis on the competitiveness of European agriculture: thus, environmental dimensions appear as secondary goals.

The environmental impacts of Community Agricultural Policy have been an issue for several decades, and the policy debate has led to the development of programmes and axes that address environmental issues within the CAP as well as to the articulation of the so-called 'cross compliance'([20]). The debate over the future of the CAP continues ([21]).

Incorporating the environmental dimensions of territorial cohesion into planning and policy-making can play an important role in continuing this process. Adaptation to climate change may be an important issue that brings in these dimensions ([22]).

([20]) For further details, see Internet: http://ec.europa.eu/agriculture/envir/cross_com/index_en.htm.

([21]) On the current debate, see:
Presidency note 9269/09 AGRI 196 Common Agricultural Policy post-2013: What future for direct payments?;
European Commission Staff Working Document: *The role of European agriculture in climate change mitigation*, Brussels, 23.7.2009 SEC(2009) 1093 final (European Commission, 2009c);
Land Use Policy Group (2009), *Securing our Common Future through Environmentally Sustainable Land Management — The Land Use Policy Group Vision for the Future of the CAP post 2013* (April 2009);
BirdLife (2009) *Could do better. How is EU Rural Development policy delivering for biodiversity?*, Birdlife International;
(WWF, 2009)Reforming the CAP.,WWF Vision for Rural Europe: 2013 and beyond — A discussion paper;
Visions for the future of agricultural policy in Europe — Declaration on the occasion of the 2008 Congress of European Farmers (2008);
EEA Technical report: *Distribution and targeting of the CAP budget from a biodiversity perspective.* (forthcoming);
Further information, in particular on the environmental dimensions of the debate, can be found on Directorate General Transport, Internet: http://cap2020.ieep.eu/ (CAP2020).

([22]) The topic of agriculture and climate change adaptation is receiving increasing attention at the EU level: for example, the Swedish Presidency organised a Conference on Climate Smart Food (Lund, 23–24 November 2009).

3.2.3 Energy and transport

The European Commission (DG for Energy and Transport) states that no single national government can address the issues and challenges of policy in both these fields, and that success and sustainability in relation to energy and transport will require Member States and industry to work 'in concert' to develop transport and energy sectors which best meet the needs of citizens and our economy, whilst minimising damage to the environment ([23]).

There are fundamentally territorial dimensions to policy in both energy and transport. Specific territorial elements of transport and energy policy include: the creation of a 'real' internal market for transport and energy; major infrastructure projects and the creation of trans-European networks and arteries; efforts to minimise the impacts of both sectors on CO_2 emissions and air pollution, including the promotion of renewable energy and connected energy systems; actions to control maritime pollution; promotion of air transport (together with rail and road) within and outside the EU.

For energy, key synergies include the recognition of the interdependencies among EU territories and of the territorial dimension of energy issues. The new energy policy goals can also have important territorial impacts, for example the use of land for biofuel and biomass production and for solar energy generation. While energy connections among territories will improve the overall efficiency, they will also have impacts.

Roads and other transport infrastructure projects can also have negative impacts on the environment, including the fragmentation of natural areas ([24]).

For transport as well, connecting territories is an important goal. One of the major policy objectives of the European Commission's recent paper on future transport policy calls for 'a well-maintained and fully integrated network'. The policy paper entitled *A sustainable future for transport* ([25]), recognises that transport in Europe has created environmental problems such as air pollution, in particular in urban areas. It notes that 'The expansion of transport infrastructure has also resulted in habitat loss and landscape fragmentation'. While the paper emphasises the importance of reducing carbon emissions, it also recommends that in the future 'all elements of sustainability should be taken into account', including emissions, noise, land occupancy and biodiversity.

For both energy and transport policy as well, paying attention to the environmental dimensions of territorial cohesion will be important in terms of pursuing sustainability.

For energy policy, these territorial dimensions can include the impacts produced by new infrastructure created for renewable energy generation, for example wind power in coastal zones and solar power in southern Europe. In addition, the EU's goals to increase the share of biofuels and biomass will affect territories throughout Europe.

Thus, the environmental dimension of territorial cohesion can play an important role in identifying problems and trade-offs. It is important that these environmental dimensions are addressed across a range of spatial scales, including the European level, as both energy and transport policies are linking infrastructure across EU and neighbouring countries.

3.3 The impact of key environmental policies

This section looks briefly at how several key environmental directives are affecting territorial development and how they incorporate the environmental dimensions of territorial cohesion. The analysis focuses on the Community level and the examples that look at cooperation among countries and regions.

The analysis looks at four environmental policy areas that have a strong territorial dimension:

(1) Water Framework Directive;
(2) Floods Directive;
(3) Habitats Directive;
(4) Climate Change Adaptation White Paper.

([23]) Internet: http://ec.europa.eu/dgs/energy_transport/index_en.htm.
([24]) BirdLife International (2007), *TEN-T and Natura 2000: the way forward*, November 2007.
See also: EEA (2009), *Territorial cohesion: Analysis of environmental aspects of the EU Cohesion Policy in selected countries*, EEA Technical report No 10/2009.
([25]) European Commission (2009e), *A sustainable future for transport: Towards an integrated, technology-led and user friendly system*, (COM(2009) 279/4).

Table 3.4 Summary review of agriculture, energy and transport policies against the environmental dimensions of territorial cohesion

Policy area	Environmental dimensions of territorial cohesion					Summary of potential synergies and conflicts
	Harmonious and sustainable development	Inherent features in territories	Concentration	Connecting territories	Cooperation	
Agriculture and rural development	😐	😐	😐	😐	😐	*Key potential synergies:* (1) CAP support for sustainable agriculture and better farm management; (2) 'Improving the environment and countryside' thematic axes of rural development policy; (3) regulatory support for biodiversity, protection of natural resources and climate change; (4) explicit recognition of diversity and sustainable development in rural and peri-urban areas; (5) explicit support for inter-territorial cooperation. *Key potential conflicts:* (1) promotion of competiveness may encourage large-scale single crop farming/transportation; (2) direct support for farmers may promote intensive agriculture with associated environmental impacts.
Energy	😐	☹	☹	😐	☹	*Key potential synergies:* (1) recognition of need to reduce emissions, increase efficiency and promote renewables; (2) key role of suitable territorial characteristics in renewables viability; (3) explicit consideration of interdependencies and interrelationships between territories (e.g. TEN-E). *Key potential conflicts:* (1) potential impacts of energy policies on territories (biofuels and biomass; solar energy); (2) unclear if environmental and natural resource connections are recognised.
Transport	☹	😐	😐	☹	😕	*Key potential synergies:* (1) aim to disconnect mobility from adverse effects and ensure sustainable transport networks; (2) greening transport package, including internalisation of external costs; (3) clean urban transport and sustainable urban mobility; (4) coordination and cooperation in transport management and infrastructure. *Key potential conflicts:* (1) establishment and construction of trans-European networks and arteries in support of Europe's economic and social potential; (2) promotion of air transport and increased mobility; (3) transport networks 'blurring' recognition of historic and natural areas and boundaries.

3.3.1 Water Framework Directive and the Floods Directive

The Water Framework Directive ([26]) establishes a legal framework to protect and restore surface waters and groundwater across Europe and ensure their long-term and sustainable use. The directive establishes water management based on river basin districts, and thus governance is linked to the physical territory. It sets deadlines for Member States to achieve environmental objectives for aquatic ecosystems. Each river basin district should have a management plan to achieve these objectives by 2009. The plans will be revised every six years to address remaining and new challenges.

The Directive provides a good example of how the environmental dimensions of territorial cohesion can be integrated into policy.

Its requirements are formulated to ensure good chemical and ecological status work towards harmonious development. The Directive calls for water services (clean drinking water, irrigation, hydropower, wastewater treatment, etc.) to be charged at a price which fully reflects the services provided. This implicitly recognises the value of ecosystems services, and thus the inherent features of a territory. It hence provides a mechanism to address interdependencies and relationships between territories.

As noted above, the Directive establishes governance by the natural geographical units — river basins. This has increased the need for cooperation among administrative units, such as regions that share common river basins. The Directive calls on Member States to cooperate where river basins cross boundaries. This cooperation can be seen in the example of the Saar and Mosel Rivers (see the box Case study 2), where international cooperation had preceded and helped to inspire the Directive, which then in turn spurred further mechanisms for cooperation. Moreover, this mechanism builds on the natural connections between territories: in the case of the Saar and Mosel Rivers, these territories range from mountain areas (the Vosges in France) to down plains. In addition, the Directive calls specifically for the creation of a system where citizens would be informed and involved in the development of river basin management plans.

The Directive also has specific mechanisms to address issues and potential trade-offs where its objectives may not be met. This can include river bodies that have been heavily modified, for example with dams or other infrastructure works, as well as those that flow through urban areas.

Another important element in the Water Framework Directive is its role in bringing together European water legislation. It indeed provides a framework, including new initiatives such as the Floods Directive and the new Marine Strategy Framework Directive.

The Floods Directive ([27]) calls on Member States to assess the flood risks in each river basin district. They are to develop flood risk management plans for the period by 2015: this date coincides with the second river basin management plans to be prepared under the Water Framework Directive.

The Floods Directive thus echoes the WFD in the way it puts in place the environmental dimension of territorial cohesion.

While these directives provide a strong mechanism for addressing the environmental dimensions of territorial cohesion, it should be noted that implementation for the Water Framework Directive has been poor in a number of cases. In 2007, the European Commission identified 'significant shortcomings' in several countries, both in terms of the legal transposition of the directive into national law as well as the initial work needed to assess water quality in river basins. In 'some Member States … there appears to be a systematic and serious problem with the WFD implementation resulting in significant delays' ([28]).

3.3.2 Habitats Directive and biodiversity policy

The Habitats Directive is very closely linked to territories: it calls for the protection of natural habitats across Europe — from Taiga forests to Mediterranean salt marshes, as well as for the protection of wild species.

The Directive identifies Europe's 'biogeographical' regions, which cross national and other administrative boundaries. The areas protected under the Directive can also cross boundaries, and transboundary impacts on these areas should be

([26]) 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 (European Commission, 2000).
([27]) European Commission (2000) Directive 2007/60/EC on the assessment and management of flood risks.
([28]) European Commission (2007a), *Commission staff working document: First stage in the implementation of the Water Framework Directive* 2000/60/EC (SEC(2007) 362).

Case study 2 — Cohesion Policy and WFD/Saar and Mosel Rivers

Project: International Commission for the Protection of Mosel and Saar (IKSMS)
Location: Mosel and Saar rivers, Germany, Luxembourg and France.
Funding: Various.
Partners: Various agencies in Germany, Luxembourg and France.

Coordinated actions in relation to the Mosel and Saar rivers dates back to the 1950s — when the Convention on canalisation of the Mosel River was first signed in 1956. Since this time, a number of protocols, programmes and working groups have been agreed and established to coordinate the protection and management of the Mosel-Saar catchment. In recent years, this has included a flood action plan (1998) and since 2000, transition to and implementation of the WFD (2000/60/EC; European Commission, 2000).

The first draft Mosel-Saar river basin management plan (as per the WFD) was published in 2008. The national and international management plans under the WFD were to be finalised and submitted to the European Commission by late 2009.

By bringing together national plans, the international Mosel-Saar management plan will include a large number of coordinated actions. In particular, the management plan will seek to address the following six key issues:

(1) pollution, in particular with nutrients (nitrogen and phosphorus) — diffuse pollution;
(2) 'passability' is not assured, which disrupts fish migration;
(3) water use and spatial planning along the Mosel and Saar rivers contrary to the WFD, in particular in the domains of shipping, energy production and flood protection;
(4) diffuse pollutants impacting upon groundwater quality (pesticides, nitrates and metals);
(5) mining (coal and ore) disturbs water ecological balance;
(6) high levels of contamination with hazardous materials in sever areas of the catchment.

The management plan seeks to address and respond to these problems, through the following key elements:

(1) the establishment of monitoring arrangements;
(2) definition of environmental goals and management objectives;
(3) programme of measures to support goals and objective and assessment of measure's feasibility and costs.

A number of shared issues are addressed by the management plan, including: groundwater bodies and aquifers; protected areas; surveillance networks; and, common environmental objectives.

Environmental dimensions of territorial cohesion addressed are summarised below.

(1) As a management plan spanning three countries and a number of key cross-border environmental and planning issues, the IKSMS strongly promotes **Coordination** in the delivery of environmental objectives related to the WFD.
(2) Through measures to coordinate action in relation to environmental objectives, the IKSMS promotes **Harmonious and sustainable development**.

Source: Cooperation as one major component of territorial cohesion — IKSMS Management Plan. Briefing note prepared by EEA/ETC-LUSI.

addressed. Thus, the Directive seeks to protect the inherent features of territories. Moreover, the protected areas, Natura 2000 sites, are considered part of a common European network.

The Directive calls for an assessment of the influences on a protected area, including activities in the surrounding territory: thus, it looks at connections among habitats. While the Directive allows economic activities in the protected areas, these should be compatible with the site itself. Besides, the Directive sets up a mechanism for the assessment of potential impacts.

For individual protected areas, the Habitats Directive calls for the participation of local communities and stakeholders. Across Europe, the Directive calls on cooperative research among Member States. An example of this cooperation can be seen in the HABITALP Project under the Alpine

Space Programme, funded through the EU funds for Cohesion Policy (see the box Case study 3).

While the Directive clearly embodies key elements of the environmental dimension of territorial cohesion, it should be noted that its implementation in the Member States has often been difficult. Nature protection is one of the two environmental themes with the highest number of cases ending up in the European Court of Justice to settle disputes between the European Commission and Member States (the other cause for disputes being waste) ([29]).

This review has focused on the Habitats Directive; it should be noted that this is supplemented by the EU Biodiversity Action Plan, which focuses on integrating biodiversity goals into other policy sectors. Notably, one of the Plan's 10 objectives is to 'to reinforce compatibility of regional and territorial development with biodiversity in the EU'.

According to the European Commission's 2008 progress report, however, the overall goal of halting biodiversity loss in the EU by 2010 is unlikely to be met. For the topic of regional and territorial development, the report focuses on the funds under Cohesion Policy: it notes that these have financed a number of biodiversity projects, but also notes that there is a lack of common biodiversity indicators that would be included in set of the core Structural Fund indicators for 2007–2013. The report also underlines that infrastructure projects supported by the funds increase pressures on biodiversity, especially in the new EU Member States ([30]).

Indeed, recent assessments suggest that the Directive and the action plan are not sufficient to protect biodiversity in Europe and its protected sites. Agriculture remains a major pressure on biodiversity: a key need is to strengthen the integration between biodiversity and agricultural policy. The fragmentation of natural areas created by infrastructure continues; and climate change may exacerbate these pressures. These problems call for a more in-depth analysis, including analysis performed from a territorial perspective ([31]). In this work, the environmental dimension of territorial cohesion could provide a valuable approach as well as a tool for assessment.

The importance of the biodiversity aspects of territorial cohesion transcends Europe and the EU. UNESCO's Man and the Biosphere Programme is an important international initiative for biodiversity protection, and a recent cooperative project between Spain and Morocco has established a common biosphere reserve (see the box Case study 4). This case study shows the opportunity and value of extending the territorial cohesion approach to Europe's cooperation with neighbouring countries.

3.3.3 Climate Change Adaptation White Paper

Climate Change Adaptation White Paper proposes a European 'framework for action' for adaptation to climate change. It acknowledges that 'most adaptation measures will be taken at national, regional or local level', to reflect variations in climate change impact. However, it calls for EU action to strengthen these measures, in particular in the most vulnerable regions (e.g. Southern Europe and the Arctic; here, the paper recognises some of the inherent features of territories).

Moreover, EU action will be valuable for sectors linked by the single market and common EU policies: sectors identified include agriculture, water, biodiversity and energy — and thus, many of those addressed earlier in this chapter. Here, the paper calls for integrating climate change adaptation into EU policies: for example, increasing the resilience of agriculture, forests, ecosystems and water systems. As noted above, this is a growing concern for EU agricultural policy.

This integration is already foreseen in the actions planned in order to implement the Water Framework Directive: the River Basin Management Plans, due in 2009, should take into account climate change, and the next round of plans, due in 2015, should be 'climate-proofed'. The paper also identifies the importance of ecosystem services in assisting climate change adaptation.

The White Paper notes the importance of natural units, such as river basins, that cross regional and national administrative units. This underlines the connections between territories as well as their natural features. Indeed, the White Paper underlines the importance of green infrastructure, including connections among natural areas.

The White Paper and the work to put in place adaptation strategies have strong synergies with

([29]) Kees Wielenga, FFact Management Consultants, personal communication (March 2009), based on data from the European Commission.
([30]) European Commission (2008b), *A Mid-Term Assessment of Implementing the EC Biodiversity Action Plan*, COM(2008) 864 final.
([31]) *European Topic Centre on Biological Diversity(2008a), Strenghtening the coherence of the N2000 network: a European analytical framework*, (presentation to the Workshop on 'Towards a Green Infrastructure for Europe', Brussels, 25–26 March 2008). Available at: http://green-infrastructure-europe.org/download/19.pdf.

Case study 3 — Habitats Directive/Cohesion Policy

Project: HABITALP — Alpine Habitat Diversity. Project period: 2002 — 2006.
Location: 11 protected areas of alpine habitat: Germany (1), Austria (1), Italy (5), France (3) and Switzerland (1).
Funding: INTERREG IIIB Alpine Space Programme. Total budget EUR 2.1 million, EU contribution EUR 1 million (ERDF).
Partners: Lead partner: National Park Berchtesgaden, Germany. Other partners include national parks and conservation agencies in Italy, France, Austria and Switzerland (non-EU).

The aim of the HABITALP project is to create internationally comparable landscape data for alpine protected areas on the basis of colour infrared aerial photographs. Building on previous work in developing comparable databases of aerial photographs, HABITALP sought to develop the concept on an alpine-wide scale.

The national parks, natural parks and other protected areas in the Alps make up about 23 % of the total area of the Alpine arc. The HABITALP project focussed on 11 protected alpine areas and sought to develop and test standardised methods for monitoring, suitable for transfer to other alpine areas.

The HABITALP project developed a transnational spatial database, using aerial photographs to support the monitoring of alpine landscapes, structures, diversity with a focus on long-term change, particularly in relation to Natura 2000 habitats. The improved analysis of landscape diversity and habitat change is intended to contribute to coordinated alpine planning and management.

The results of the HABITALP project have been made available through an internet based geographic information system (GIS) (Internet: www.habitalp.org) — a spatial database to form the basis for standardised analysis of landscape structure and diversity in the protected alpine areas, which in turn should provide an instrument for planning and control of habitat management measures.

The database can be expanded to densely populated areas in the periphery of alpine protected areas, and it is intended that transfer of the methods developed through HABITALP to other high mountain landscapes outside the Alps will be possible.

Thus, the following environmental dimensions of territorial cohesion are addressed.

(1) The long-term goal of the HABITALP project is to provide information and practice to support monitoring and management of Alpine protected areas better. This is likely to help indirectly support **Harmonious and sustainable development** in these areas.
(2) The HABITALP project focuses on sharing knowledge and expertise through **Cooperation** between the partners, and on developing a methodology transferable to other alpine areas.

Source: Project description on the Alpine Space programme, Internet: www.alpinespace.org/habitalp.html. HABITALP webpages (www.habitalp.de) and the HABITALP project booklet.

territorial cohesion, including its environmental dimensions. These include:

(i) the role of environmental capacity, green infrastructure and ecosystem services in adaptation;
(ii) a recognition of regional, and urban-rural differences;
(iii) a call for more strategic, long-term spatial planning and regional development (the Espace project, carried out under Cohesion Policy, addresses, in particular, the need to integrate adaptation into spatial planning: see the box Case study 5).

A recent EEA report has highlighted the importance of addressing climate change adaptation in water policies, and emphasised that this will require integrating adaptation into areas such as land use planning ([32]). Other work has shown the importance of approach such as 'climate corridors' that can link up wetlands (and other ecosystems) as part of adaptation strategies ([33]).

([32]) EEA (2007), *Climate change and water adaptation issues*, EEA Technical report No 2/2007.
([33]) European Topic Centre on Biological Diversity (2008b), *Adapting the landscape to climate change: Example — climate corridor for wetlands.*

Case study 4 — Spain/Morocco Biosphere reserve

Project: Mediterranean Intercontinental Biosphere Reserve, Andalusia (Spain) — Morocco.
Location: Andalusia, Spain and Morocco, and the interconnecting marine corridor.
Funding: UNESCO Man and Biosphere Program.
Partners: Spanish Autonomous Community of Andalusia/Morocco.

The Mediterranean Intercontinental Biosphere Reserve was established in 2006 through the UNESCO Man and Biosphere Programme. The Mediterranean Intercontinental Biosphere Research is the first of its kind in the Mediterranean.

The Biosphere Reserve includes Spanish national parks of Del Estrecho, Sierra de las Nieves, Los Alcornocales, Sierra de Grazalema and the Moroccan national park of Talassemtane. Through the Biosphere programme, communities from both Spain and Morocco are promoting the education of the public, research into the different species in the biosphere, promoting development in biodiversity conservation and supporting socio-economic growth. Communities are also involved in training, management and the monitoring of the reserve.

The CLICO project is seeking to map external pressures in the Biosphere Reserve, evaluate risks to the local population in relation to conflict and vulnerability, especially in the context of climate change, and establish sustainability measures. Examples of specific pressures include those shown below.

(1) In Spain, priority is given to tourist areas (e.g. golf courses) during drought periods, which serves to reduce the use of those areas by urban dwellers and families.
(2) In Morocco, foreign-financed agricultural and tourist enterprises are putting pressure on water availability, especially in rural areas.

Environmental dimensions of territorial cohesion addressed through the following efforts:

(1) identifying environmental risks and seeking measures to address these are likely to support **Harmonious and sustainable development**;
(2) a key aspect of the Biosphere Reserve is that it recognises and seeks to protect the **Inherent features of the territories** in Spain and Morocco;
(3) as an international initiative, the Biosphere Reserve is intended to enhance and encourage **Cooperation** in the management and protection of the environment in these areas.

Source: Project summary documents provided by EEA/ETC-LUSI.

Case study 5 — Climate change adaptation and Cohesion policy

Project: ESPACE (European Spatial Planning: Adapting to Climate Events).
Project period: 2003–2008.
Location: North West Europe (no specific site/region).
Funding: INTERREG IIIB Programme, together with the ESPACE partnership and the Department for Communities and Local Government (UK).
Partners: the ESPACE Partnership included a number of civic society representatives from four North West European countries: Belgium, Germany, the Netherlands and the United Kingdom.

Recognising the vital role that spatial planning can play in enabling society to adapt to climate change, the ESPACE project had the key aim of changing the philosophy and practice of spatial planning. The main focus of the ESPACE project was on managing climate change impacts on spatial planning for water management, including flooding, water resources and water quality.

The project defined spatial planning thus: *Spatial planning is a process that assimilates and interprets evidence-based knowledge to inform those activities that aim to ensure spatial development takes place in an appropriate, sustainable way, from a functional, social, economic and environmental point of view*.

The ESPACE project was split into two key phases.

(I) Core project (2003–2007) culminating in the Publication of a strategy: *Planning in a Changing Climate* **(ESPACE, 2007).**

The strategy contains a set of 14 recommendations that are complemented by a series of case studies, tools and examples of policy advice developed by the ESPACE Partnership. The 14 recommendations are aimed at all levels of governance, including European institutions, national governments and regional and local authorities:

(1) make climate change adaptation a core objective of spatial planning;
(2) look beyond the lifetime of your plan by understanding your climate risks;
(3) combine change and risk management approach for integrating adaptation into spatial planning;
(4) ensure and integrated approach to adaptation;
(5) review existing plans, policies, directives, regulations, legislation, codes of practice and guidance related to spatial planning;
(6) fund appropriate research on climate risks;
(7) assess vulnerabilities to, and opportunities from a changing climate;
(8) identify spatial planning policies and measures to manage risks;
(9) assess the level of climate adaptation provided by the spatial plan as a whole;
(10) implement the adaptation policies and explain to stakeholders what residual risks will be;
(11) develop ambition, long-terms solutions;
(12) foster 'climate change champions';
(13) politicians must accept the longer-term policy making perspectives;
(14) adaptation is an ongoing process: spatial plans and measures must be reviewed and revised regularly.

(II) Extension (2007–2008) focussing on understanding barriers to and solutions for successful implementation of adaptation policies.

The project extension led to the development of case studies (the United Kingdom and the Netherlands) and organisational change tools to assist in decision making and implementation of adaptation strategies.

ESPACE outputs are intended to provide both a strategy for a better incorporation of adaptation into the spatial planning and a concrete guidance for planners wanting to deliver adaptation on the ground. It can be of use to planners and decision makers in all EU countries.

Environmental dimensions of territorial cohesion addressed are presented in the following list.

(1) Improved spatial planning and decision making in relation to climate change adaptation is likely to support **Harmonious and sustainable development**.
(2) Incorporating climate change adaptation into spatial planning at the local level will require the consideration of current and future environmental vulnerabilities and respect for the **Inherent features of different territories**.
(3) Improved adaptation to climate change through spatial planning (especially in relation to issues such as flooding and water resources) should help address environmental problems associated with higher **Concentrations** of development.
(4) Fundamental to the ESPACE project has been working in partnership, the sharing of knowledge and **Cooperation** between countries, regions and organisations.

Source: ESPACE project website: www.espace-project.org.

Table 3.5 Review of key environmental policies against the environmental dimensions of territorial cohesion

Policy area	Environmental dimensions of territorial cohesion					Summary of potential synergies and conflicts
	Harmonious and sustainable development	Inherent features in territories	Concentration	Connecting ter. ritories	Cooperation	
Water Framework Directive	☹	☹	☹	☹	☹	Key potential synergies: (1) central aim is to 'protect and restore clean waters across Europe and ensure its long-term sustainable use'; (2) river basin scale management and water bodies approach; (3) aim for wate- related charges to reflect fully the services provided; Key potential conflicts: (1) none identified.
Habitats Directive	☹	☹	😐	☹	☹	Key potential synergies: (1) central aim to establish Natura 2000 network of sites for the conservation of habitats and species; (2) explicit identification of biogeographical regions; Key potential conflicts: (1) the Habitats Directive does permit development with negative implications for Natura 2000 sites where there are 'imperative reasons of overriding public interest'.
Floods Directive	☹	☹	☹	☹	☹	Key potential synergies: (1) requires assessment, mapping and planning for flood risk management; (2) flood risk management at the level of the river basin and coastal area, including transboundary; (3) recognition of urban flooding. Key potential conflicts: (1) some flood risk management infrastructure may impact upon protected areas / features of territories.
Climate Change Adaptation White Paper	☹	☹	☹	☹	☹	Key potential synergies: (1) objective is to improve resilience to climate change and support sustainable development; (2) need for EU, national and regional cooperation recognised; (3) recognition of the role of environmental capacity and green infrastructure in adaptation; (4) recognition of regional, urban / rural differences; (5) call for more strategic, long-term spatial planning and regional development. Key potential conflicts: (1) none identified.

4 The environmental dimensions of territorial cohesion

4.1 Discussion on developing a definition

According to a policy document endorsed by European Ministers of Sustainable Development and the European Commission, the two overarching goals of EU development policy are: balanced competitiveness and sustainable development ([34]).

One EU government has further stated that territorial cohesion can be a mechanism through which these broader policy goals can be translated into regionally-focused actions through the enhancement of territorial capital and the promotion of territorial integration, ultimately achieving Community-wide economic, social and environmental balance in development ([35]).

Territorial cohesion is seen by some national governments as an inextricable concept already underlying the overall development goal of economic, social and environmental balance. The territorial component seeks to respect and protect geographic or spatial diversity within the EU while ensuring sustainable economic and social growth with equal access to services and infrastructure for all EU citizens ([36]).

The debate has continued, both within and outside the Commission, with four main areas standing out as the most relevant for fostering territorial cohesion:

(1) cooperation between territories for bolstering European integration;
(2) fostering liveable urban and rural communities and strengthening 'territorial programming' in cohesion policy;
(3) coordination of policies to achieve greater policy coherence;
(4) analysis and data collection for evidence-based policy making ([37]).

Furthermore, territorial cohesion should encompass the sharing of environmental responsibility and benefits among territories and throughout the EU. At a conceptual level, this includes managing shared spaces and common concerns of environmental problems and solutions such as: pollution, water management, and climate change mitigation and adaptation. It also includes the preservation of natural assets and the protection of natural areas as well as protecting the local ability to maximize gains from territorial capital ([38]). Implicit in this are the ideas of resource efficiency and ecological balance ([39]). In considering the environmental facet of territorial cohesion, it is necessary to recognise local-regional-global linkages.

It is also relevant here to introduce the concept of *ecosystem services*. An ecosystem services approach has been developed to aid understanding of the human use and management of natural resources. Our health and wellbeing depends upon the services provided by ecosystems and their components: water, soil, nutrients and organisms. Therefore, ecosystem services are the processes by which the environment produces resources utilised by humans, such as clean air, water, food and materials. Ecosystem services can be defined in various ways. The Millennium Ecosystem Assessment ([40]) provided the most comprehensive assessment of the state of the global environment to date; it classified ecosystem services as follows:

(1) ***Supporting services:*** The services that are necessary for the production of all other

([34]) Luxembourg meeting, 2005, *Scoping document and summary of political messages for an assessment of the Territorial State and Perspectives of the European Union towards a stronger European territorial cohesion in the light of the Lisbon and Gothenburg ambitions.* (Endorsed for further development by the Ministers for Spatial Development and the European Commission at the Informal Ministerial Meeting on Regional Policy and Territorial Cohesion, 20 and 21.5.2005, Luxembourg).
([35]) Ministry of Housing, Spatial Planning and the Environment, Netherlands (2010). On *Territorial Cohesion*, Internet: www.vrom.nl/pagina.html?id=37410.
([36]) European Commission (2008c). Fifth progress report on economic and social cohesion.
([37]) DG Regional Policy, Territorial Cohesion: unleashing the territorial potential, Kiruna, 10–11 December 2009.
([38]) The Green Paper on Territorial Cohesion (European Commission, 2008).
([39]) The Green Paper on Territorial Cohesion (European Commission, 2008).
([40]) Internet: www.maweb.org.

ecosystem services including soil formation, photosynthesis, primary production, nutrient cycling and water cycling;
(2) ***Provisioning services:*** The products obtained from ecosystems, including food, fibre, fuel, genetic resources, biochemicals, natural medicines, pharmaceuticals, ornamental resources and fresh water;
(3) ***Regulating services:*** The benefits obtained from the regulation of ecosystem processes, including air quality regulation, climate regulation, water regulation, erosion regulation, water purification, disease regulation, pest regulation, pollination, natural hazard regulation;
(4) ***Cultural services:*** The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences — thereby taking account of landscape values.

One could see that understanding the ecosystem services in a particular territory and the interdependences between territories for different supporting, provisioning, regulating and cultural services could provide a useful context to policy development and evaluation.

In their responses to the Green Paper on Territorial Cohesion, several contributors have emphasised the need to incorporate both sustainable development and the environment in particular (including ecosystem services) within the definition of territorial cohesion. These dimensions clearly have some resonance with the purpose of the EEA work on territorial cohesion and these contributions are useful in forming a working definition of territorial cohesion.

For example, the contribution from the European Regional Policy Group (ERPG) ([41]) suggests that the concept of territorial cohesion must incorporate the following principles:

(1) the environmental attributes of an area (territory) must be explicitly recognised as a legitimate aspect of territorial cohesion, in order to ensure that sustainable development should lie at the heart of policy design;
(2) a well-cared for environment is a social and economic asset, vital to the wellbeing of Europe's citizens and to our future prosperity; and
(3) the territorial approach must allow for environmental issues to be addressed across a range of spatial scales, through effective vertical and horizontal coordination.

They also contend that:

(1) territorial cohesion can provide a framework to deliver sustainable development, thus helping to deliver the EU commitment to mainstream environmental policy;
(2) an integrated territorial approach will only be achieved if we can develop robust environmental indicators with similar weight to current well-known socio-economic indicators (such as GDP or employment).

ERPG believe that the definition of territorial cohesion must:

(1) recognise explicitly the importance of the environmental dimension of a territory, including its ecosystem services, landscape, biodiversity and resource protection, requiring that those were given due weight within a context of sustainable development — with regard to both policy and delivery;
(2) focus on achieving sustainable development;
(3) acknowledge that economic development is limited by environmental carrying capacity: regions are coming close to their environmental limits as they pursue economic development agendas;
(4) secure the integration, co-ordination and devolved governance of sectoral policies at the most appropriate level;
(5) ensure that all issues which increase disparities between territories, including climate change, environmental quality and ecosystem services, can be addressed in a place-based context.

A similar case is made by the European coalition for sustainable use of funds (2009) ([42]) in their contribution ([43]):

> *The priorities for territorial cohesion are not shaped according to its environmental and social needs but mainly by the goal to achieve economic growth.*
>
> *This is why territorial cohesion should focus on identifying the potential for synergies and functional*

([41]) The European Regional Policy Group comprises the Countryside Council for Wales, Environment Agency, Joint Nature Conservancy Council, Natural England and Scottish Natural Heritage.
([42]) The European coalition for the sustainable use of funds, which includes environmental NGOs — Friends of the Earth Europe, CEE Bankwatch Network, WWF, Royal Society for the Protection of Birds (RSPB) and CEEWEB.
([43]) Contribution to the Public Consultation on the Green Paper on Territorial Cohesion, February 2009.

> *interdependencies between regions, rather than take a simple approach to cohesion by growth. This would mobilise much more regional and local potential towards a sustainable territorial development.*
>
> *The overarching goal of the territorial cohesion policy should be to achieve the sustainable development of the territory of the EU. This means that economic, social and environmental goals form the key pillars of territorial cohesion. There should be neither hierarchy nor trade-off between these goals.*

It is noted that a paper entitled *Territorial Cohesion under the Looking Glass* ([44]) has been added to the consultation page on the website presenting DG Regional Policy's Green Paper on Territorial Cohesion. In it, Faludi (2009) argues that definitions tend to be relative, i.e. they depend on who gives them, when, and with which purpose. He nonetheless advocates the importance of territorial cohesion policy, because by giving consideration to where policies are implemented and to what effect, the result is likely to be more coherent, and thus, lead to a higher effectiveness and efficiency. Faludi goes on to suggest that territorial cohesion does not necessarily require extra funding, but requires good territorial governance – from the level of the EU down to the local level, and that this is the chief consequence of adopting territorial cohesion as an objective of the Union.

The paper concludes with what may be taken as a definition of territorial cohesion:

> *Territorial cohesion refers to a situation whereby policies to reduce disparities, enhance competitiveness and promote sustainability acquire added value by forming coherent packages, taking account of where they take effect, the specific opportunities and constraints there, now and in the future.*
>
> *Territorial cohesion policy refers to measures promoting good territorial governance with the aim of achieving coherence as described. European territorial cohesion policy refers in particular to such measures taken by EU institutions.*

A last thought on the definition is taken from a study prepared earlier this year in the Netherlands. The Netherlands Environmental Assessment Agency (PBL) prepared an assessment of the possible impacts of this new concept on the Netherlands.

The first task was to define the concept, and here the authors identified five possible definitions, focusing on very definite approaches, rather than the ones that synthesize different elements:

(1) socio-economic convergence (focus on social and economic disparities);
(2) economic competitiveness (focus on the Lisbon Treaty);
(3) rural perspectives (focus on rural problems);
(4) spatial planning (focus on sprawl and unbalanced development);
(5) policy coordination.

After undertaking their impact analysis, however, the authors consider a broader meaning of territorial cohesion. Rather than a specific policy, they believe that:

> *… territorial cohesion is more likely to remain a bridging concept between different policy areas, rather than a policy in its own right. It could, for example, increase the frequency of geographic criteria used in certain sector policies and allow more flexibility in the disbursement of structural funds. In this sense, territorial cohesion can take its place next to other complicated but powerful meta-concepts such as sustainability. In fact, it has even been defined as being the spatial representation of sustainability (which is time-oriented), since both territorial cohesion and sustainability represent an integration of people, planet and profit (Camagni, 2007).*

This idea — that territorial cohesion is a 'spatial representation of sustainability' — is similar to the approach launched in 1999 by the European Spatial Development Perspective, which calls for the 'balanced and sustainable development of the territory of the EU'. The European Commission (2008a) Green Paper on Territorial Cohesion also supports this approach where it states that:

> *The concept of territorial cohesion builds bridges between economic effectiveness, social cohesion and ecological balance, putting sustainable development at the heart of policy design,* p. 3.

The next section elaborates on the approach that identifies the environmental dimensions of territorial cohesion. This approach follows the concept whereby territorial cohesion is inherently linked to sustainability.

([44]) Faludi (2009)., *Territorial Cohesion under the Looking Glass*, Synthesis paper about the history of the concept and policy background to territorial cohesion, 2009. Internet: http://ec.europa.eu/regional_policy/consultation/terco/index_en.htm.

4.2 Identifying the environmental dimensions of territorial cohesion

For the purposes of operationalising the concept of territorial cohesion, it would clearly be ideal to have a single working definition of territorial cohesion to draw on. However, the above discussion illustrates the challenges this presents and the range of dimensions that according to different commentators are, or should be, included within a definition of territorial cohesion.

A conclusion that can be drawn is that any new working definition of territorial cohesion for these studies should link territorial cohesion with the environment and sustainability. As most discussions of 'territorial cohesion' lack a strong consideration of the environment, here we explore this dimension specifically, for we see it as a vital part of the whole concept.

As an initial proposal for discussion, the table below seeks to identify essential elements of environment and sustainability in terms of the approach to territorial cohesion described in the Green Paper on Territorial Cohesion.

Table 4.1 Potential key elements of the environmental dimension of territorial cohesion

Green Paper on Territorial Cohesion: key elements of territorial cohesion	Potential key elements of the environmental dimension of territorial cohesion	Potential criteria to evaluate the environmental dimension of territorial cohesion
Harmonious development: (1) building bridges between economic effectiveness, social cohesion and ecological balance; (2) putting sustainable development at the heart of policy design.	**Harmonious and sustainable development:** (1) achieving sustainable development, and thus integrating economic, social and environmental policy goals and actions; (2) environmental limits and carrying capacity (as a constraint on economic growth); (3) utilising a high quality environment as goods and services (e.g. recreation, agriculture, tourism , etc.).	*(1) Does the policy seek to integrate environmental limits and carrying capacity as a potential constraint on economic growth?* *(2) Does the policy seek to utilise a high quality environment as valuable goods/services?*
Inherent features of territories – citizens able to use the inherent features of their territories: (1) transforming diversity into an asset; (2) making best use of territorial assets. *(Three specific types of region are identified as those that may face particular development challenges: mountain regions; island regions; and the 18 sparsely populated regions, all rural and almost all border regions).*	**Inherent features of territories:** natural features are protected for future generations: (1) maintaining/improving natural capital – maintaining local features and environmental quality; (2) maintaining and enhancing current ecosystem services and recognising future needs; (3) recognising vulnerability to environmental risks.	*(1) Does the policy seek to promote/ utilise/respect the inherent environmental features and assets of different territories?* *(2) Does the policy consider current and future environmental vulnerabilities and challenges?* *(3) Does the policy promote concepts such as self sufficiency and eco-efficiency in the management of natural resources?*
Concentration — overcoming differences in density: (1) avoiding excessive concentrations of growth; (2) facilitating the access to the increasing returns of agglomeration in all territories; (3) recognising that whilst most economic activities are concentrated in towns and cities, rural areas remain an essential part of the EU and provide most of the natural resources and natural areas; (4) ensuring sustainable territorial development — strengthening economic competitiveness and capacity for growth, while respecting the preservation of natural assets and ensuring social cohesion.	**Concentration:** addressing differences in density and other natural features: (1) addressing environmental problems related to concentration (e.g. pollution and water needs), including negative effects within and among regions; (2) recognising environmental/ecosystem services.	*(1) Does the policy seek to address environmental problems associated with higher concentrations of development, such as pollution to air and water, water resource scarcity, urban heat island effect, etc., as well as promote/recognise the environment efficiencies of high concentration (e.g. provision of environmental infrastructure such as water treatment and certain forms of energy — CHP; public transport, recycling, etc.)?* *(2) Does the policy recognise and seek to promote or protect the value of territories to social and economic wellbeing and success, including such factors as carbon sinks, flood risk attenuation, health and quality of life (exercise and visual amenity), etc.?*

Green Paper on Territorial Cohesion: key elements of territorial cohesion	Potential key elements of the environmental dimension of territorial cohesion	Potential criteria to evaluate the environmental dimension of territorial cohesion
Connecting territories — overcoming distance or 'strengthening' connections: (1) ensuring good intermodal transport connections; (2) adequate access to services (e.g. health care, education and sustainable energy, broadband internet access, reliable connections to energy networks and strong links between business and research centres).	**Connecting territories** — strengthening positive natural connections and interactions between territories: (1) understanding environmental connections between and within regions, e.g. water, materials, energy, and making these connections more sustainable; (2) recognising inputs and outputs (interdependences) of environmental (and ecosystem) services within and between regions on different scales; (3) recognising/avoiding negative environmental effects from one region to another (e.g. pollution, climate change — flooding, droughts, fires, etc., biodiversity loss, etc.); (4) avoiding the environmental impacts of connectivity (e.g. pollution, habitat loss, landscape intrusion, etc.).	*(1) Does the policy consider the interdependences and relationships between territories?* *(2) Does the policy seek to understand and consider the inter-regional/ transnational connections in relation to environmental and natural resources, for example provided by wildlife corridors, bird migration routes, river corridors, etc.?* *(3) Does the policy seek to minimise the impact of constructing new transport infrastructure to overcome distance or strengthening connections (e.g. pollution, habitat loss, landscape intrusion, etc.)?* *(4) Are inter-regional and transnational environmental and natural resource connections reflected in policy and does policy seek to ensure that outcomes are sustainable and equitable?* *(5) Does the policy recognise and seek to avoid new and reduce the existing inter-regional and transnational environmental impacts arising from connectivity, such as water pollution, losses to habitats and species, etc.?*
Cooperation — overcoming division: (1) addressing problems of connectivity and concentration through strong cooperating at different levels; (2) ensuring policy responses on variable geographical scales (e.g. neighbouring local authorities in different countries and between neighbouring countries); (3) addressing environmental problems which do not respect borders and require cooperation (e.g. problems associated with climate change); (4) governance plays a major role in ensuring territorial cohesion.	**Cooperation** — overcoming division: (1) cooperation on implementing EU environmental laws and policy at all levels (national, regional and local); learning from different regions; supporting regions in meeting common environmental standards: these sections might encompass the 'traditional' view of environment in territorial cohesion and Cohesion Policy; (2) recognising the importance of natural as well as just administrative boundaries in territorial governance.	*(1) Does the policy encourage a cooperative approach to implementation and learning in relation to meeting environmental standards and addressing transboundary environmental effects between and within regions and Member States?* *(2) Does the policy promote the consideration of natural boundaries/ areas (such as river catchments/ basins) as the most appropriate unit to manage certain environmental assets and issues which cut across administrative boundaries?*

5 Characterisation and indicators to support the analysis of territorial cohesion

This section considers the potential of regional or territorial characterisation and territorial cohesion indicators to support the analysis of the environmental dimensions of territorial cohesion. The task of this report is to raise questions and identify challenges regarding data availability. Questions should be asked also about the potential analysis and its utility for supporting the use of the potential key elements of the environmental dimension of territorial cohesion. It aims to provide a structure within which further work can be undertaken in this area, including data analysis and development of potential indicators.

It starts with a review of existing indicators, and in particular those developed by ESPON. The section then provides an overview of recent work by EEA/ETC-LUSI on landscape characterisation of territories that can provide baseline information about the environmental assets of a specific region – those that make it unique or important. It goes on to propose a framework for territorial indicators. This framework seeks to link the analysis of the environment dimensions of territorial cohesion reviewed in Chapter 3, and in particular, the potential key elements of the environmental dimension of territorial cohesion identified in Table 3.1, with the conceptual model used by the EEA for analysing the inter-related factors that impact on the environment (i.e. DPSIR, Driving forces, Pressures, States, Impacts and Responses).

The section then uses the framework to analyse possible indicators. Here and in general, it should be emphasised that this section provides a set of ideas for further work. It is hoped that this framework will provide the basis for discussion.

The overall aim of this section (as regards indicators), is to consider potential territorial indicators to support the analysis of environmental aspects of Cohesion Policy. This may be achieved by making better use of existing databases (like air quality, water, land use and climate change) in order to bring environmental aspects into the cohesion debate.

5.1 Reviewing current indicators for territorial cohesion and Cohesion Policy

This section provides a brief overview of the current data and indicator sets available and under development, with a particular focus on the ESPON programme focusing on territorial indicators, including some work on possible indicators for territorial cohesion.

In addition to ESPON, it is worth noting that the EEA holds relevant data on the regional/local scale and relevant work is also ongoing. For example, the topic of ecosystem services will potentially play a key role in the analysis of territorial cohesion, but data may not be available at present. However, the work on biodiversity assessment for EURECA (European Ecosystem Assessment) initiative may provide results on ecosystem services in the future. The EEA launched EURECA to contribute to the follow-up process of the UN Millennium Ecosystem Assessment. EURECA will address the stocks, flows and value of selected ecosystem goods and services using a variety of policy-relevant scenarios. The EEA will deliver the first assessments in 2011. EURECA will pay particular attention to improving our knowledge of how ecosystems function, of the services they provide, involving analysis of stakeholders and of developing tools for political decision-making in Europe. It will provide a platform for people to exchange knowledge and bring national assessments together at a European level.

This section also provides a brief note on the development of SEIS, the Shared environmental information system for Europe, as well as the INSPIRE Directive that is putting in place the EU-wide geo-referenced data by harmonising datasets and access across national boundaries. The section closes with a note concerning the differences between spatial and territorial indicators.

5.1.1 The ESPON Programme

The ESPON Programme, partly funded by the EU Cohesion funds, seeks to support policy

development and to build a European scientific community in the field of territorial development. ESPON has undertaken work on territorial indicators, including research on indicators of territorial cohesion. A brief review of this work — focusing on documents available on the ESPON web site — suggests that the environmental dimension has not been a strong element so far.

The establishment of the ESPON public database ([45]) was one of the essential tasks within the programme. It basically distinguishes between two types of data ([46]):

(a) basic regional statistical data, e.g. population data on or areas of different NUTS levels; and
(b) theme-oriented project data and computed indicators.

Out of the multitude of project indicators, several subsets have been identified, and in particular the following categories that are listed below.

(1) *Core indicators* that represent the most important indicators for the themes analysed by the project teams.
(2) *Key indicators* — these have been selected from the list of core indicators as ones that link closely to territorial policy objectives.
(3) *Routing indicators* — this set contains indicators that represent a wider context and should be capable of showing tendencies and trends. They are supposed to have a so-called 'lighthouse' function in relation to policy objectives and also highlight shortcomings in data availability. Routing indicators are built using the ESPON database and its core indicators; they also include data from other sources.

One recent ESPON project aimed at improving, further developing and implementing monitoring systems for the ESPON programme as a whole ([47]). The approach focused on six main policy areas:

(1) cohesive spatial structure;
(2) competitiveness (Lisbon Strategy);
(3) infrastructure and accessibility;
(4) environment (Gothenburg Strategy) ([48]);
(5) socio-cultural aspects;
(6) governance.

A set of 30 key indicators was selected, being partly routing indicators and partly, 'wish list' indicators. A total of six indicators are indentified for the environment (see Box 5.1). All of these have important territorial aspects. The approach, however, does not appear to provide a clear framework for the environmental dimension of territorial cohesion.

Under 'environment', the project then identifies two existing ESPON routing indicators: flood endangered settlement and artificial areas (CORINE) and biodiversity fragmentation index. In addition, there are identified three 'wish list' indicators: protected areas, municipal waste, and evolution of natural surfaces (these are described in the box below). Note that whilst ESPON refer to a 'wish list', there is plenty of information available on evolution of natural surfaces, Natura 2000 and national protected areas, though not all these data might be geo-referenced. Some data are available, for example, on the Internet site: http://eunis.eea.europa.eu/ and in Article 17 of the Natura 2000 reporting, complied and analysed by the European Topic Centre on Biological Biodiversity. Internet: http://biodiversity.eionet.europa.eu/article17.

Another ESPON project has sought to develop a European Territorial Cohesion Index ([49]). The work draws on the European Spatial Development Perspective, which calls for a 'balanced and sustainable development' of Europe's territory. The results available, however, do not include a strong focus on the environmental dimension. Indeed, the reports note that while economic data are the most extensive, comparative social data at regional levels are in many cases not available. Citing this factor, the ESPON work has focused on developing an index of sustainable demographic development ([50]). Thus, based on the information reviewed on the ESPON website, and in particular the information on these two major ESPON projects, the programme's indicator work has focused mainly on

([45]) Available at: www.espon.eu/mmp/online/website/content/tools/832/index_EN.html.
([46]) Definitions and descriptions are taken from the ESPON (2006) report *Applied Territorial Research: Building a scientific platform for competitiveness and cohesion*, ESPON Scientific Report II.
([47]) Bundesamt für Bauwesen und Raumordnung, (2007), ESPON project 4.1.3: Feasibility study on monitoring territorial development based on ESPON key indicators, Part A: Tentative Spatial Monitoring Report, Final Report,June 2007. Available at: www.espon.eu.
([48]) This approach thus appears to identify the Gothenburg Strategy for sustainable development with environment only.
([49]) IGEAT,(2007), ESPON project 3.2: *Spatial Scenarios and Orientations in relation to the ESDP and Cohesion Policy*, Final Report, October 2006. Available at: www.espon.eu.
([50]) See also: Grasland (2008). *European Territorial Cohesion Index*: Recent progress and new perspectives, Presentation to the ESPON Workshop on Territorial Indicators and Indices, Esch-sur-Alzette, Luxembourg, 2 April 2008. Available at: www.espon.eu.

Box 5.1 ESPON's monitoring indicators for environment

The final list of indicators contains six environment-related indicators. The first two are ESPON routing indicators; the remaining four are termed 'wish list' indicators, though some of these may be available from other sources.

(1) Fragmentation index: an indicator of the fragmentation of the natural areas can be used to depict the environmentally 'sensitive' areas. For example, the survival of threatened species requires populations that are large enough to maintain genetic diversity. If the habitats of these species are reduced or fragmented by human activities (e.g. transport infrastructure, built-up areas or noise propagation), it may lead to the isolation of individuals and groups from main population. The fragmentation index is considered superior compared to similar indicators such as 'proportion of forest areas', because indicators of the latter type do not say anything about the spatial distribution and patch sizes, however, both are important for the quality of any habitat.
(2) Flood endangered area and artificial areas (CORINE): this indicator identifies flood-endangered settlements. Areas with a high number of flood events and a large share of artificial surface (i.e. settlement areas) are considered most vulnerable. This indicator does not reflect protective measures that have been implemented (e.g. river dikes) and might limit the adverse effects of flood events in densely populated areas.
(3) Land consumption by transport infrastructure: as transport demand is growing, so is the land occupied by transport infrastructure. For some regions, the (annual) increase of transport infrastructures is significant, so it is a matter of concern. It is, therefore, important to analyse in which region and to which degree transport developments take place. Furthermore, it is interesting to analyse the relation between the increase of the settlement area (or built-up area) as a whole and that of transport area. Land take is one of the major human causes of floods and other hazards and may cause severe damages, where transport infrastructure would be one of its main driving forces. Transport infrastructure is also linked to the first indicator on fragmentation.
(4) Evolution of natural surfaces/areas (NATURA 2000).
(5) Protected areas (European definition).
(6) Municipal waste: the amount of municipal waste collected by a municipality or by order of the municipality within a territory.

the social dimension of territorial cohesion. ESPON has nonetheless identified possible environmental indicators for this topic, and these will be considered further in this section.

5.1.2 SEIS and Inspire: a note on the development of European information systems

In 2008, the European Commission called for the development of a Shared Environmental Information System (SEIS) in Europe ([51]). In setting out the key objectives and principles for this information system, the Commission calls for an approach:

> *… to modernise and simplify the collection, exchange and use of the data and information required for the design and implementation of environmental policy – policy, according to which the current, mostly centralised systems for reporting are progressively replaced by systems based on access, sharing and interoperability ([52]).*

The development of SEIS will thus modernise environmental information systems across Europe. One building block of SEIS is the Inspire Directive ([53]), approved in 2007, which puts in place mechanisms for improving the accessibility, interoperability and use of spatial data.

SEIS and Inspire can be valuable in the development of indicators for territorial cohesion: notably, these initiatives should increase the availability and quality of European data in coming years. It is important to bear this in mind, as in some areas data for territorial indicators, or data on specific geographical scales, may not be available at the present time.

([51]) European Commission (2008d), *Towards a Shared Environmental Information System* (SEIS), COM(2008) 46 final.
([52]) European Commission (2008d), *Towards a Shared Environmental Information System* (SEIS), COM(2008) 46 final.
([53]) European Commission (2007c) Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).

5.1.3 Spatial and territorial indicators: a note on recent OECD work

One important distinction is between territorial indicators and spatial indicators. A 'spatial' indicator describes certain phenomena of interest in their spatial context. This spatial context is the territory. By contrast, territorial indicators provide information based on sub-national data (statistics) and thus, try to reveal a variety of demographic, economic, social and environmental conditions and trends usually hidden behind national average figures. The OECD report on 'Territorial indicators of socio-economic patterns and dynamics' ([54]) provides a background to the concept of territorial indicators: Figure 5.1 shows the framework it presents

Thus, contrary to a simple spatial indicator, a territorial indicator could provide integrated information on different topics, such as economic structures and performance; social well-being and cohesion; demographic patterns and migration; and environmental quality and amenities. The objective is to describe territorial dynamics and disparities. Thus, these indicators have the potential to facilitate better understanding of complex interactions and relationships between economic performance, social characteristics and environmental dimensions.

5.2 Characterisation of territories

5.2.1 Understanding and defining territories

According to the Green Paper on Territorial Cohesion, territorial cohesion is about ensuring the harmonious development of places and making sure that their residents are able to make the most of the inherent features of these territories. As such, it is a means of transforming diversity into an asset that would contribute to sustainable development of the entire EU.

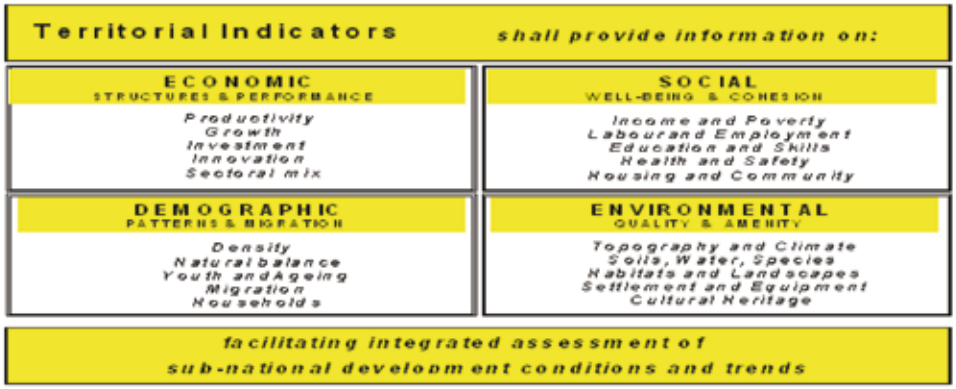
The Green Paper on Territorial Cohesion further expresses the need to coordinate and integrate a set of policy actions at the level of a given territory. This given territory is to prove internal coherence or functionality that would form a logical base for policymakers and stakeholders on which to exploit common territorial capital and tackle common challenges.

As an initial step, therefore, it is essential to understand European territories better. The task includes the need to delineate them and understand which assets and features contribute to their character. Clearly, environmental assets and features are key aspects of defining a territory. Characterisation, e.g. landscape-related and environmental characterisation, is one way of investigating, defining and recording the key assets and inherent features of a territory. (While characterisation indicators may extend to other aspects of territorial cohesion, within the framework elaborated below, they are seen as mainly being related to inherent features).

Drawing on the work on characterisation (see below), the potential objectives of characterisation as part of the territorial cohesion debate could include the following aspects.

(1) Environmental characterisation of European territories provides a scientifically relevant and politically operational description of these territories that could support territorial cohesion.

Figure 5.1 Territorial indicators — concerns and topics



Source: OECD.

([54]) OECD (2002), *Territorial indicators of socio-economic patterns and dynamics*, DT/TDPC(2002)23.

(2) Strengthening of territorial identity — would mean enabling regions to identify their territorial assets within the framework of spatial development policies.
(3) Identification of region-specific natural and environmental assets is also of high importance.
(4) Characterisation would help assess and then monitor the positive and negative impacts of European policies, including the allocation of funding to support existing natural assets and regional sustainable development.

The characterisation of territories can provide baseline information about the environmental 'value' of a specific region, i.e. if the region in question has environmental assets that make it unique or important and that could, therefore, support the development of the region by appropriately and sustainably utilising the asset.

The characterisation of territories can be considered on various scales — European, national, regional, local, etc. — depending on the scale of analysis required. But a key feature is to work within natural, rather than administrative, boundaries to define and describe territories (it is, therefore, useful to work at a grid/raster level, thus being able to aggregate results to different 'reporting units'). A shift to utilising natural units rather than administrative boundaries has some resonance with approaches adopted by the Water Framework Directive (with river basins) and the Habitat Directive (with 'biogeographical') regions. Other natural units include coastal cells, urban and peri-urban areas, etc. ([55]).

Characterisation provides the potential to delineate 'territories' or areas/regions, etc. of relatively homogeneous character. These can then be used as the spatial unit to analyse and map other indicators.

There are many different environmental 'stratifications' of Europe that have been developed within different European projects ([56]) All stratifications have a similar aim of dividing environmental gradients into convenient units and to use these units as areas in which objects and variables might have relatively consistent characteristics ([57]). The stratifications can be used as a basis for upscaling and as a sampling framework. However, as the objectives of the projects are different, the characteristics of the stratifications also tend to be distinct from one another. Some examples include the Environmental Stratification (EnS/EnZ); the Agri-Environmental Zonation (AEnZ); the Spatial Regional Reference Framework (SRRF); the European Landscape Classification (LANMAP); and the FARO typology. These stratifications, albeit prepared for different purposes, using different methods and on different scales/resolutions, serve the need to have a spatial framework that describes systematically the variation in environment and socio-economic issues. Such spatial frameworks are useful in assessing impacts of policies and monitoring changes and, therefore, have potential for inclusion as part of analysis of territorial cohesion.

5.2.2 Approaches to characterising territories

Whilst further consideration can be given to the relevant input data to characterise territories, considerable work has already been done that can be drawn upon. For example, landscape characterisation on various scales has been undertaken across Europe ([58]) and, rather than necessarily creating a new way to delineate 'territories' or areas/regions, etc. of relatively homogeneous character, landscape character areas could provide the units relevant to analysis of territorial cohesion. In order to define landscape character areas, various input data will have been used, for example, ecosystems, land use, land cover, environmental assets and features, etc. Maps of these character areas or similar items (on various scales) are, therefore, available; thus, utilising them to understand and evaluate territorial cohesion would fit well with the definition of landscape and the

([55]) It is useful to note that a key message from a recent ESPON workshop on Approaching New Functional Areas, 5.11. 2009, Luxembourg, Internet: www.espon.eu/mmp/online/website/content/programme/1455/2112/2327/2721/index_EN.html, as reported in a note prepared by EEA/ETC-LUSI, is that most existing work on 'functional area' was work on 'urban' areas with more or less important consideration of the surrounding areas, resulting in urban-centric and economically-driven concepts (paper by Simin Davoudi, Newcastle University, Internet: www.espon.eu/mmp/online/website/content/programme/1455/2112/2327/2721/file_7523/simin-davoudi.pdf).

([56]) Hazeu *et al*. (2009), *European environmental stratifications: an overview*, AgSAP Conference 2009, Egmond aan Zee, the Netherlands. Alterra, 2009.

([57]) Jongman *et al.* (2006), *Landscape Ecology*, Vol. 21, 2006, pp. 409–419.

([58]) Wascher (2005). *European Landscape Character Areas — Typologies, Cartography and Indicators for the Assessment of Sustainable Landscapes*, Final Project Report as deliverable from the EU's Accompanying Measure project *European Landscape Character Assessment Initiative* (ELCAI), funded under the 5th Framework Programme on Energy, Environment and Sustainable Development (4.2.2), x + 150 pp., Internet: www.landscape-europe.net/ELCAI_projectreport_book_amended.pdf.
Wascher *et al.* (2006). *Landscape Character Assessment as a Basis for Planning and Designing Sustainable Land Use in Europe, Alterra, Wageningen*, 12th EC GI&GIS Workshop, Innsbruck, Austria, 21–23.6.2006, Internet: www.ec-gis.org/Workshops/12ec-gis/presentations/Seminar%20room/THU_PEER/THU_PEER/wascher.pdf.

role of landscape in providing a spatial framework for a variety of activities as given in the European Landscape Convention. It would also serve to demonstrate what ecosystem services are provided by regional landscape.

As part of the work on characterisation, an inventory of existing types of landscape characterisations and similar initiatives ([59]) has been prepared. Some of the main types of characterisation identified were as follows.

(i) The Green Background of Europe, an index map that shows ecological potential and the dominant landscape types of Europe. It is produced using spatial modelling based on CLC2000 and CORILIS mapping (both in *Land accounts for Europe 1990–2000 — Towards integrated land and ecosystem accounting*, EEA, 2006).
(ii) *Biogeographical regions and the regional seas of Europe*, EEA, 2002.
(iii) Distribution of High Nature Value farmland.
(iv) Digital Map of European Ecological Regions (DMEER).
(v) Alterra's Environmental Classification of Europe and European Landscape Classification (LANMAP).
(vi) Environmental Classification of Europe (EnC).

Illustrative examples of two of these are included in Maps 5.1 and 5.2.

The EEA/ETC-LUSI continue to develop the principles of characterisation of European territories. This is to support the European Commission Services and ESPON and to contribute to the monitoring and assessment of the environmental dimension of territorial development dynamics in relation to different EU policy objectives (e.g. Cohesion Policy, European Commission (2008) Green Paper on Territorial Cohesion (October 2008), Rural Development Programme for the period of 2007–2013). A summary of current work is provided in Box 5.2.

As part of their efforts to investigate the link between the environment and territorial cohesion, the EEA/ETC-LUSI are considering the potential role of characterisation of the European regions and of different input data. A first proposal illustrating the 'Degree of natural and environmental assets' is shown in Map 5.3 (see also Annex 5).

The range of values in the different input data sets are standardised into five classes. These five classes are assumed to represent a gradient of 'natural and environmental assets' for each grid cell. Class 1 represent the lowest share of environmental assets and class 5 — the highest share. The input data used for the production of this map were:

(1) FARO — EU Rural typologies;
(2) High Nature Value farmlands;
(3) proximity to natural areas (CLC semi-natural classes, N2000, CLC water);
(4) PM_{10} (air quality);
(5) degree of soil sealing.

Further work to develop this approach is under consideration.

5.2.3 Linking territorial characterisation with ecosystems services and environmental assets

As is clear from the section above, efforts are undertaken constantly to develop approaches to territorial characterisation The primary value of such work is in providing possible 'measuring tools' for the 'inherent features' of a territory. Moreover, the work on territorial characterisation could be further linked to other features of the territories, including their ecosystem services/functions and natural assets.

As discussed above, the work undertaken under EURECA may provide results to describe ecosystem services in the future. To some extent, these services will be linked to landscape characteristics, for example, water regulation (including flood prevention measures) will be linked to forests and wetlands within catchment areas.

It may well be useful to consider whether here there are some possible links with a study carried out by Eftec on 'valuing ecosystem benefits'. This study uses a typology based on the Millennium Ecosystem Assessment, since it has links with work under EURECA. The analysis undertaken seeks to link ecosystem services with European biogeographical regions. Figure 5.2 provides an overview of the initial work. It is hoped that it will be possible to take this analysis to a further level of detail, for example by looking at ecosystem services linked to specific habitat types. The utility of linking character areas with services/functions in this way — perhaps using environmental assets as an intermediary stage, as ecosystem benefits are likely to relate directly to assets — could

([59]) EEA/ETC-LUSI (2008), Landscape characterisation based on environmental and natural assets.

Box 5.2 Summary of EEA/ETC-LUSI work on the characterisation of European territories/regions

The appearance of new geographies recognised in the European Commision (2008) Green Paper on Territorial Cohesion demands that future EU Cohesion Policy should play a stronger role in respect of new types of functionally defined territories. The aim of the current work is to develop one such 'new geography' that would support territorial identity through the identification of natural and environmental assets. The characterisation of territories provides baseline information about the environmental 'value' of a specific region, i.e. whether the region owns environmental assets that make it unique and that could, hence, support the development of the region by properly and sustainably exploiting such asset item.

The work carried out at present concentrates on studying territorial dynamics and the shaping of territories using various input sources (e.g. DG REGIO (maps in the annex to the Green Paper on Territorial Cohesion and FP6 FARO-EU rural typology work), with a focus on environmental data. Example of this work include: 'The dominant landscape types of Europe'; Natura2000 and Emerald Network; High Nature Value (HNV) farmlands; areas of land cover change; landscape fragmentation and the degree of soil sealing.

After exclusion of highly correlated input data sets, the spatially explicit data (i.e. not mapped to specific reporting units) were aggregated to a 10 x 10 km grid. For each layer, 'good' or 'bad' regions were identified by analysing the statistical distribution (mean value, standard deviation) of values within a given set. In simple terms: data above the mean were considered 'good', below the average — 'bad'. This degree of natural asset per data set has been scored and the scores added up to a final score across all themes. Based on the resulting scores, grid cells of a similar degree of environmental assets have been grouped to homogeneous regions.

The characterisation will describe the natural assets of the regions of Europe — their 'unique selling point' from the environmental point of view. The spatial characterization of rural areas will be included in this task. The first version of the characterisation is based on the absolute range of actually occurring values and their position relative to the European average. Next steps will be to add additional information to these homogeneous regions with respect to other variables like biogeographic regions, major land cover types, population distribution, GDP, water scarcity at a regional level, conservation status of habitats and species, etc.

Key questions to be addressed by the project include those listed below.

(1) What precisely is the relation of the regional characterisation to territorial cohesion?
(2) How are natural or environmental assets defined? What can be considered as a natural or environmental asset?
(3) What are the most appropriate input parameters and data sets?

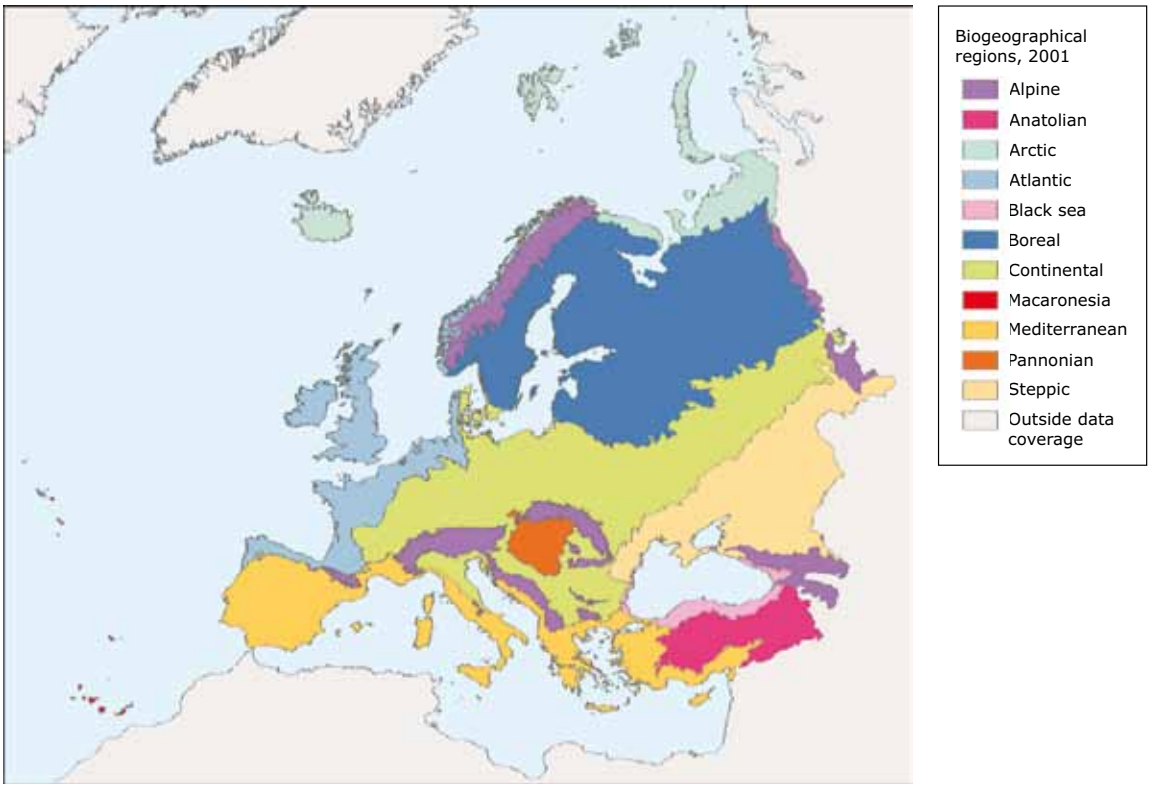
The EC Communication on 'Territorial State and Perspectives of the European Union' identifies a lack of information with respect to the identification and mapping of territorial assets in various parts of Europe that would allow stratify Europe into regions of similar identity (assets) and could be used for strengthening, specialisation and positioning of these regions.

The current activities focus on the natural and environmental assets of the regions. The effort is made not to duplicate any existing or on-going work. Here we summarise steps to be taken.

(a) Overview of existing typologies — the review did not focus exclusively on environmental aspects, but also included work done by ESPON and presupposed selection of relevant indicators, i.e. indicators of rurality but not GDP indicators. A first background document has been prepared by EEA/ETC-LUSI at the end of 2008: *Landscape characterisation based on environmental and natural assets* (GeoVille, 2008) .
(b) Proposal for a European typology based on environmental assets (which level — need to distinguish the analysis unit and the reporting unit — the optimum analysis unit will support any kind of reporting unit/ which variables to consider).
(c) Identification of suitable data sources (e.g. major land cover types, elevation breakdown, Natura 2000 and others).
(d) Methodological development — possibly some kind of principal component analysis of the different variables. The output would be a GIS data layer.

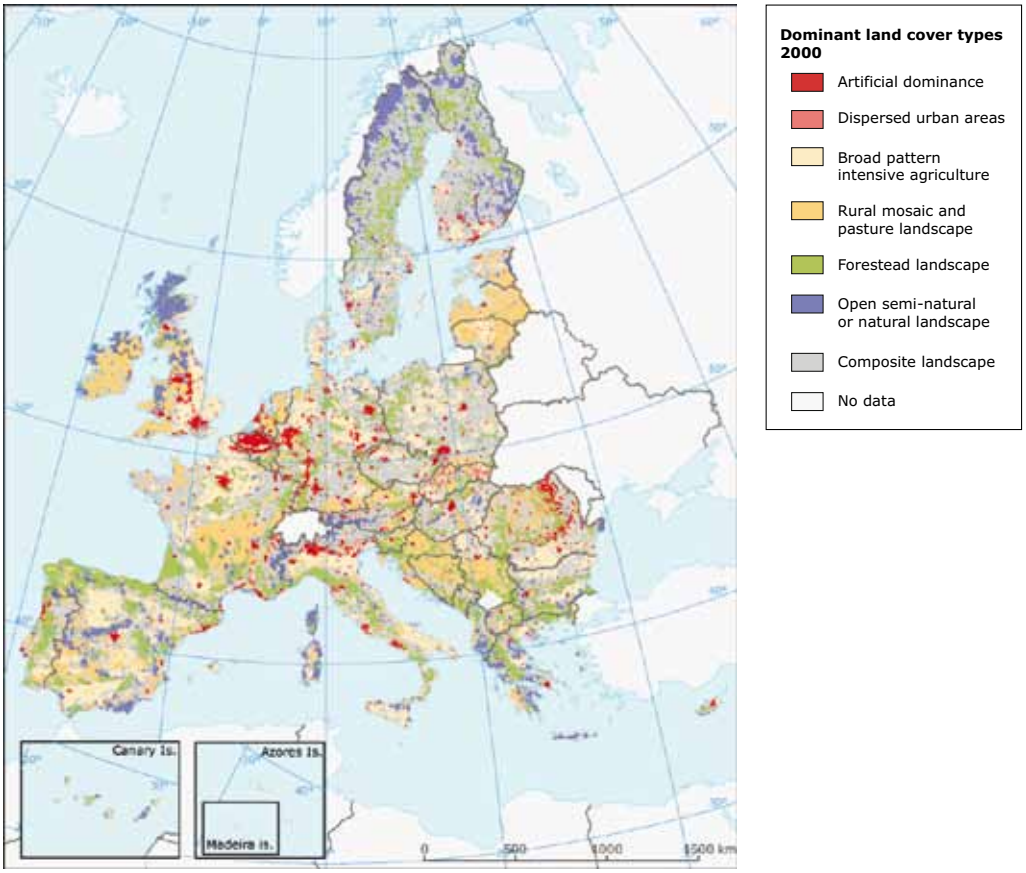
Working in parallel, the EEA/ETC-LUSI are investigating the development of new territorial indicators linked to the concept of collaboration, connection and concentration introduced in the Green Paper on Territorial Cohesion. They aim to work out how to integrate these results into the characterisation of the European regions.

Map 5.1 Biogeographical regions

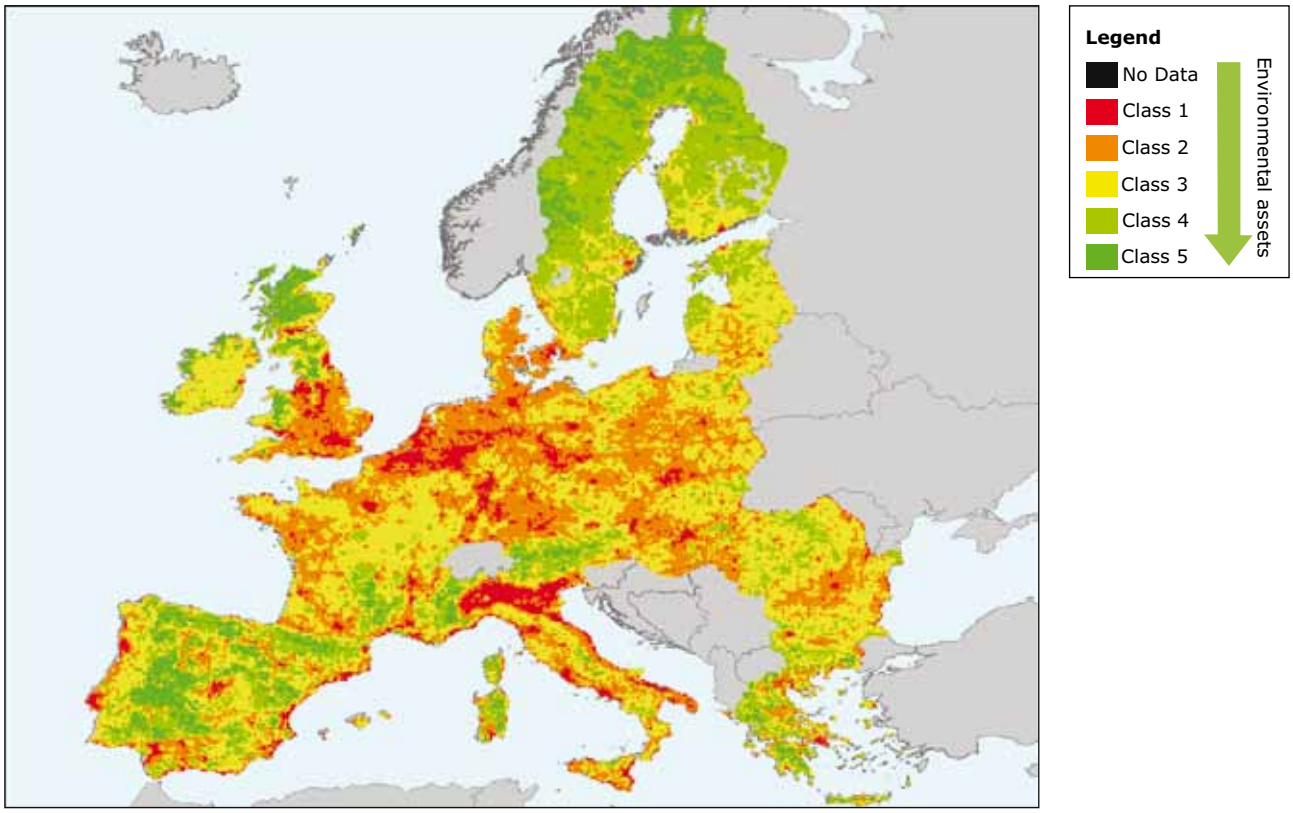


Source: European Environment Agency, http://dataservice.eea.europa.eu/atlas/viewdata/viewpub.asp?id=155.

Map 5.2 Dominant landscape types of Europe



Map 5.3 Map of natural and environmental assets (10 x 10km grid)



Source: EEA/ETC-LUSI, *Characterisation of European Territories.*

be considered as an approach for analysing territorial cohesion.

The concept of ecosystems services is closely related to that of environmental assets. EEA/ETC-LUSI intend to undertake further work aimed at understanding environmental assets as

Box 5.3 Proposed further methodological research aimed at understanding environmental assets as characteristics of landscape regions

(1) Identify environmental issues that play a role in territorial cohesion, i.e. which environmental indicators determine access to water, access to energy, access to food, access to recreation, etc. and analyse at the relevant spatial levels.
(2) Map their 'absolute' diversity (range of values); trends (when possible) and patterns.
(3) Describe the 'relative' diversity of these indicators by calculating the degree of deviation with respect to the median for the EU-27, the national mean or the mean of contiguous regions (spatial analysis).
(4) Analyse how far the values are obtained from sustainability limits (e.g. critical thresholds).
(5) 'Identify links with other territories to ensure that common assets are used in a coordinated and sustainable way' (Green Paper on Territorial Cohesion). How? By producing maps for three kinds of regions: below, equal or above the sustainability limits for each indicator (homogenous regions) and assessing their potential interdependencies to achieve sustainable development and, thus, territorial cohesion. For example, two contiguous spatial units showing a strong difference in water availability (one being below the threshold) will indicate a potential need of cohesion between the two to ensure that the unit below the thresholds reaches it; consequently, the need of a politically operational description to support territorial cohesion, e.g. to provide the structural capacities for improving the access to water.

The analysis could be done by focusing on the specific types of regions that face particular development challenges.

Figure 5.2 Example of linking ecosystem services with biogeographical regions to support a project aimed at valuing ecosystem benefits

Natura2morrow ecosystem services classified according to biogeographical regions where Natura 2000 sites are located

Ecosystem services	Alpine	Atlantic	Continental	Boreal	Mediterranean	Macaronesian	Black sea	Steppic	Panonian
PROVISIONING									
Food	○	○	○	○	●	○	●	○	○
Fibre / materials	○	○	○	○	○	○	○	○	●
Fuel	○	○	○	●	○	○	○	○	○
Water	○	○	○	○	○	○	○	○	○
Natural medicines	○	○	○	○	○	○	○	○	●
Biochemical/pharmaceuticals	○	○	○	○	○	●	○	○	○
Ornamental resources	○	○	○	○	○	○	○	○	○
REGULATING									
Climate / climate change	○	○	○	●	○	○	○	○	○
Air quality	○	○	○	○	○	○	○	○	○
Water regulation (flood prevention and aquifer recharge)	○	●	●	○	○	○	○	○	○
Water purification & waste management	○	○	●	○	○	●	○	○	○
Erosion control	○	●	○	○	○	○	○	○	○
Avalanche control	●	○	○	○	○	○	○	○	○
Storm damage control	●	○	○	○	○	○	○	○	○
Fire	○	○	○	○	•	○	○	○	○
Biological	○	○	●	○	○	○	○	○	○
Pollination	○	○	○	○	○	○	○	●	○
Bioremediation of waste	○	○	○	○	○	○	○	○	○
CULTURAL									
Spiritual, religious, cultural heritage	●	○	○	○	○	○	○	○	○
Recreation & ecotourism	●	○	○	○	○	●	○	○	○
Landscape and amenity	●	○	○	○	○	○	○	○	○
SUPPORTING									
Soil formation and retention									
Nutrient cycling									
Primary production					●				
Water cycling									
Provision of habitat									
Production of atmospheric oxygen									

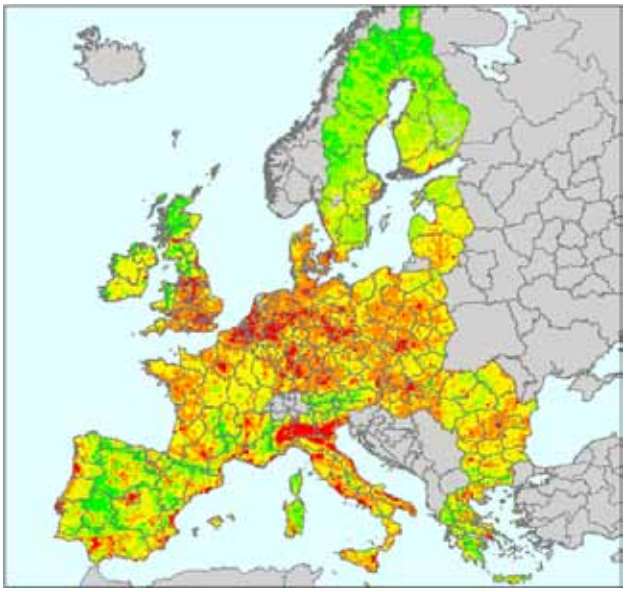
Source: Eftec (2009). *Valuing ecosystem benefits: a scoping study. Deliverable 2b — Typology of ecosystem services and link to human welfare benefits for the two spot meters*, working document for EEA, July 2009.

characteristics of landscape regions/ecosystems that are of a specific natural character, unique in their direct spatial context and capable of being used to serve different functions, e.g. as source and sink, or as an item with an ecosystem service function (recreation, sustainable use, etc.). EEA/ETC-LUSI has proposed a methodology for this and suggested steps required for this approach. The steps are described in Box 5.3.

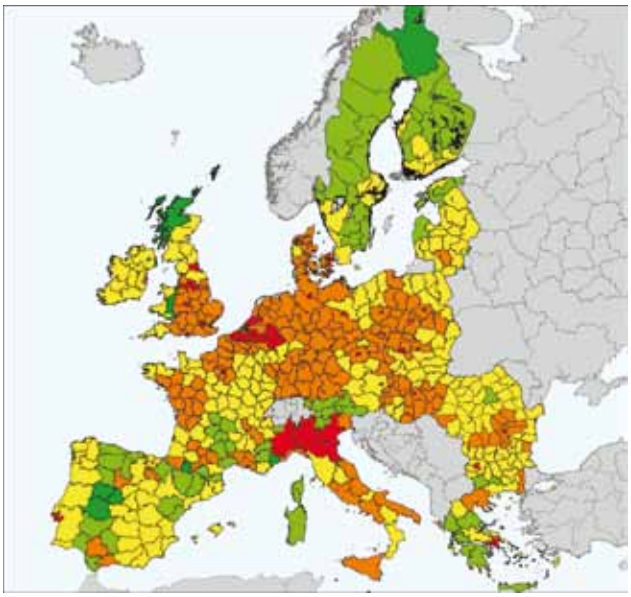
5.2.4 Analysis on different geographical scales

A key issue from the point of view of policy needs, data availability and, more generally, indicator construction, is that of the scale of indicators. Policies will interact at many levels of a geographical scale. For example, an EU energy policy that promotes solar and wind energy, and biomass as an alternative energy source will have territorial impacts that can be assessed at the European level. At the same time, such a policy will have specific impacts on many local areas — for example, coastal zones where wind turbines are constructed or mountain regions where forests are cut down more intensively to supply biomass. Thus, assessments need to be carried out at the EU level, but also at a regional level (for example, concerning regional spending programmes) and, potentially, on other scales.

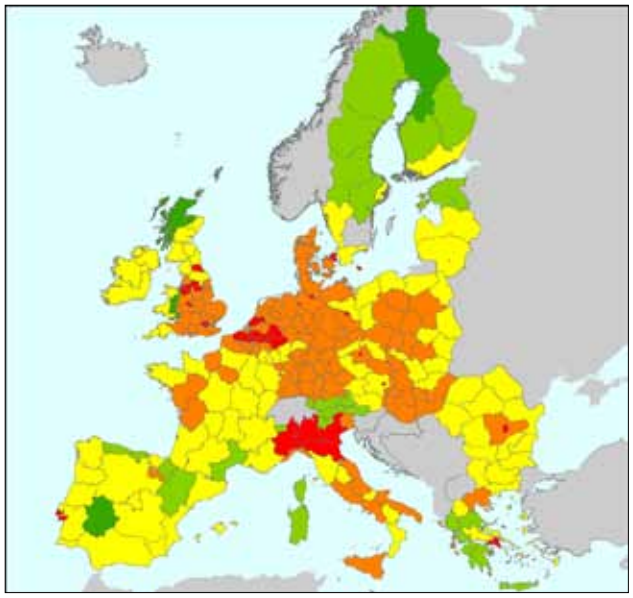
Map 5.4 Aggregation of data to fit administrative boundaries



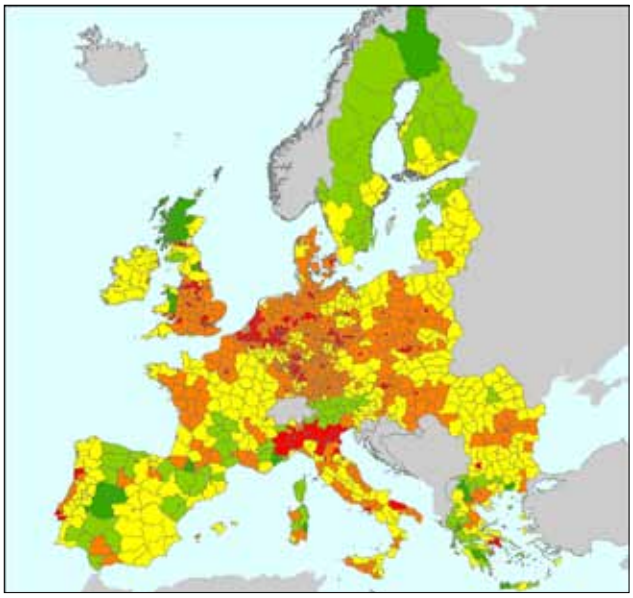
Raw data (10 x 10 km grid) within administrative boundaries



Data aggregated by NUTS 2/3 regions, i.e. classification of NUTS 2/3 regions based on the natural and environmental assets



Data aggregated by NUTS 2 regions, i.e. classification of NUTS 2 regions based on the natural and environmental assets



Data aggregated by NUTS 3 regions, i.e. classification of NUTS 3 regions based on the natural and environmental assets

Source: EEA/ETC-LUSI, *Characterisation of European Territories*, draft paper, 2009.

Chapter 4 has highlighted the tension between natural boundaries — for example, those established by river basins or biogeographic regions — and administrative boundaries for countries, regions and local units. Indicators and mechanisms that can bridge these two types of approaches, natural and administrative, will be quite valuable in analysis.

It is important that indicators can address this variety of ranges of spatial scales. For the ongoing work, EEA/ETC-LUSI propose to develop a landscape characterisation that is based on a two-level approach. It would mean that the macroscale level were integrating the macroscale data sets for a reference characterisation on smaller scales, and a meso- and microscale characterisation were processing large-scale data sets and enabling a detailed assessment of landscape characteristics based on environmental assets. Initial work has aimed at the characterisation using a 10 x 10 km grid (see Map 5.4). For a European

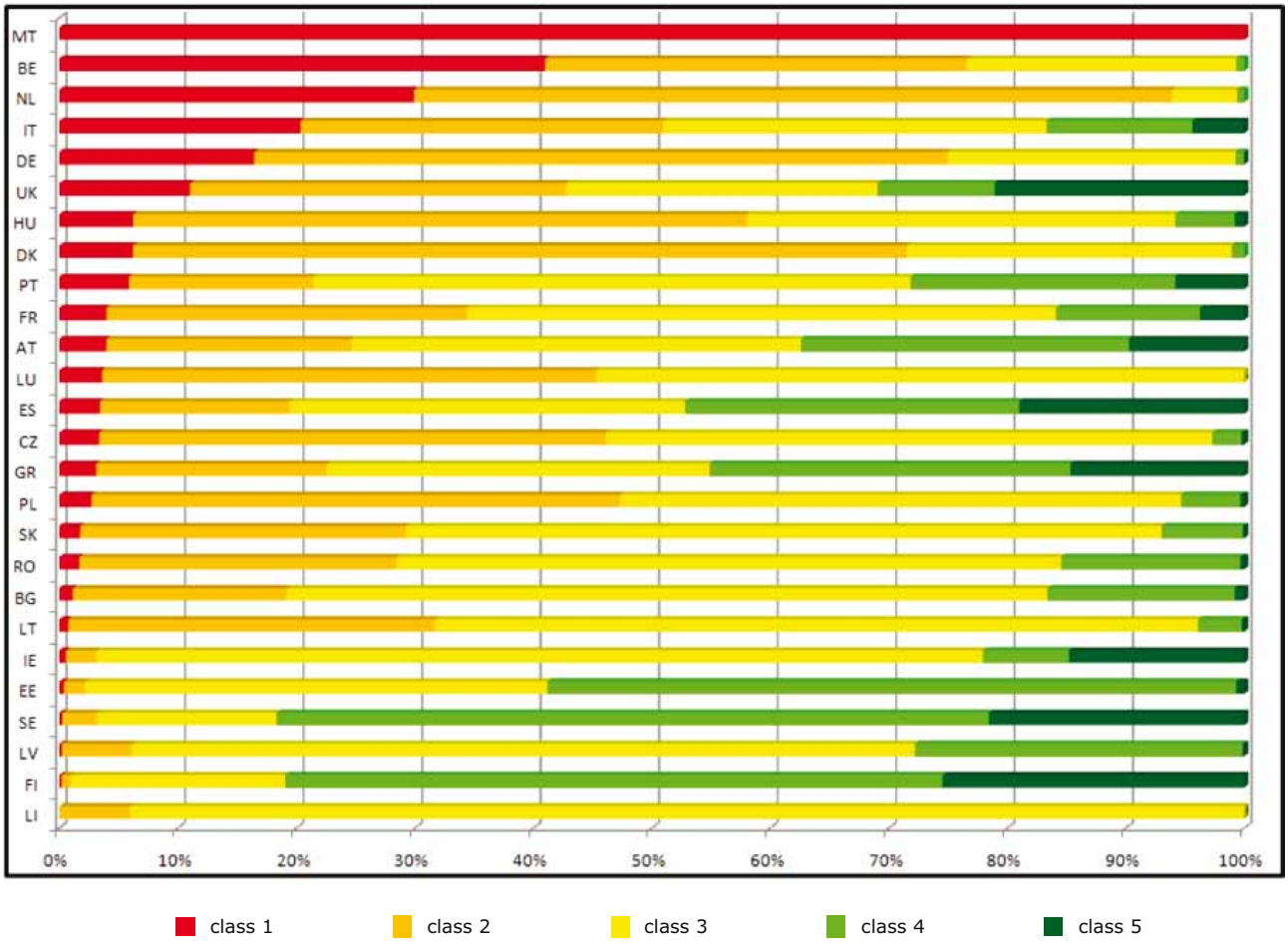
'picture' the 10 x 10 km grid is more useful, as it has less 'noise'. The European 1 x 1 km grid, that is more suitable for subnational assessments, has not been produced yet due to high processing requirements, but will be ready soon.

The map on the top left side uses a 10 x 10 km grid, while the other three link these data to NUTS 2 and NUTS 3 regions. This approach might be applied to other geographical units, for example, to river basin districts or biogeographical regions. This would show how indicators could support analysis on different geographical scales.

In addition to the aggregation of the grid data by a given reporting unit, the grid data themselves can be used to create homogeneous regions directly from the raw data. By eliminating small areas and filtering, the data can be generalised and larger homogeneous regions can be depicted. These homogeneous regions can then be further characterised by adding additional information to the resulting picture of regions. This will then allow, for example, differentiating between similar regions in Spain, Scotland or Scandinavia – based on their dominating land cover types, their biogeographic regions or population density. This attribution of homogeneous status to regions has not been finished yet.

Figure 5.3 shows the proportion of each class per country (from Class 1 with the lowest share of environmental assets to Class 5 with the highest share) and is sorted on the basis on the presence of Class 1. The classes are defined through computing countries' characterisation and are, more or less, relative: the lower the 'values', the lower the share of environmental assets (very low = 1, low = 2, average = 3, high = 4 and very high = 5). Due to the resolution of the grid data (10 x 10 km), Malta is shown as dominated by a low degree of environmental assets and presents an exceptional case. This can be corrected by using the high resolution data (1 x 1 km), which was tested as well but considered too fine for European-level analyses. Countries with a low degree of natural assets are listed first.

Figure 5.3 Countries sorted by their degree of natural and environmental assets



Source: EEA/ETC-LUSI, *Characterisation of European Territories, draft paper, 2009*.

Figure 5.4 DPSIR framework and elements of territorial cohesion

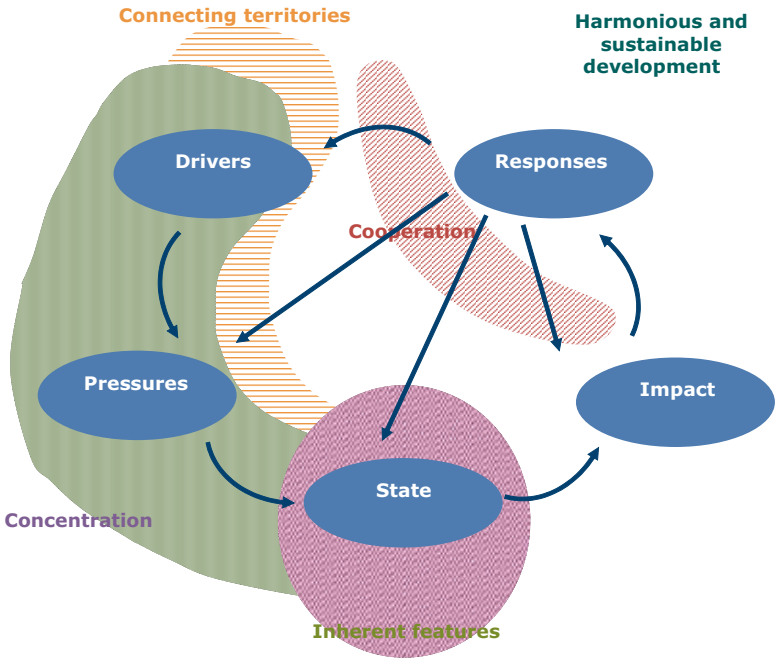


Table 5.1 DPSIR framework and elements of territorial cohesion

Elements of territorial cohesion	Predominant relationships with DPSIR framework				
	Drivers	Pressures	State	Impact	Responses
Harmonious and sustainable development	√	√	√	√	√
Inherent features of territories			√		
Concentration	√	√	√		
Connecting territories	√	√	√		
Cooperation					√

5.2.5 Forward-looking capacity

Chapter 4 highlighted the importance of the impacts that climate change will have on European territories in the coming decades. Moreover, the EU's White Paper on climate change adaptation also underlined potential cumulative effects of climate change and other ongoing processes in Europe, such as sprawl, agricultural reform and habitat fragmentation.

For these reasons, it will be important that territorial indicators also demonstrate a certain capacity to look forward and provide projections of possible developments in the coming decades. This is an important aspect that should be kept in mind when developing indicators.

5.3 Potential indicators of the environmental dimension of territorial cohesion

5.3.1 Potential framework for indicators

In view of the fact that DG Regio and ESPON are seeking to develop a small number of indicators to 'measure' territorial cohesion, and that the currently predominant interpretation of territorial cohesion exists in terms of economic and social development and harmonisation, this section proposes a potential indicator framework to describe elements of the environmental dimension of territorial cohesion.

Developing an appropriate assessment framework for structuring any proposed indicators will provide

an important step for work in the future. Here we propose that such framework for territorial indicators should be linked to the DPSIR (Driving forces, Pressures, States, Impacts and Responses) assessment framework. This approach seeks to link the analysis of the environmental dimensions of territorial cohesion presented in Chapter 3, and in particular the potential key elements of the environmental dimension of territorial cohesion identified in Tables 3.1 and 3.2, with the conceptual framework used by the EEA for analysing the environment (i.e. DPSIR).

Figure 5.4 and Table 5.1 illustrate relationships between the elements of territorial cohesion (i.e. Harmonious and sustainable development, Inherent features of territories, Concentration, Connecting territories and Cooperation) and the DPSIR framework.

Within the DPSIR framework, indicators of harmonious and sustainable development are likely to be cutting across and not fit anywhere specifically within the framework. Indicators of inherent features of territories are likely to be predominately state indicators. By contrast, indicators of concentration — as well as those of connecting territories, are likely to be driver, pressure and state indicators. Indicators of cooperation are likely to be response indicators.

Placing territorial cohesion indicators within the DPSIR framework is an important step, as it will help link this approach with the ongoing work on indicators. The proposals for the approach are preliminary and are meant for discussion. Below are the questions we should strive to find the answers for.

(1) Does this link help present and clarify the idea of territorial indicators?
(2) Does the mapping between elements of territorial cohesion and the DPSIR framework, as presented in the figure and table below, need to be refined?

5.3.2 An overview of potential indicators

The work to identify current data available for territorial cohesion is underway. Approaching this issue from the direction of data needs as opposed to data availability, the analysis included in Chapter 4 indicates initial areas where it would be useful to have data available for monitoring the environmental dimension of territorial cohesion. The results are presented below. Identifying the appropriate scale and utilising reporting units by 'territories' or natural units (e.g. landscape character areas, river basin districts, etc.), rather than administrative units, would be key in developing these indicators.

The proposal below provides an initial overview of potential indicators to evaluate the environmental dimension of territorial cohesion. It is intended as an idea for discussion and further development. While these indicators could be linked to the DPSIR framework (as in the figure above), the text is organised by the key elements of the environmental dimensions of territorial cohesion.

Harmonious and sustainable development:
(1) cross-cutting (and potentially composite) indicators considering broad principles like environmental limits and carrying capacity;
(2) composite approaches to characterise territories would fall into this category;
(3) could include indicators of broad concepts such as quality of life;
(4) the Eurostat indicators for monitoring the sustainable development strategy could be considered for their utility as part of monitoring the environmental dimension of territorial cohesion — in which case consideration would need to be given to their fit into the DPSIR framework; also, what the appropriate scale is and which reporting units to use.

Inherent features of territories:
(1) likely to include, predominately, state indicators and measures that characterise territories in terms of their environmental assets and features;
(2) could include indicators of the current and potential availability of ecosystem services provided by the natural environment within territories;
(3) could include indicators of natural assets and natural capital;
(4) potential indicators could include current status and potential of:
    (a) visual attractiveness of regions
    (b) conservation status of habitats and species
    (c) habitat diversity
    (d) high nature value farmlands
    (e) air quality;
(5) water quality.

Concentration:
(1) likely to include, predominately, indicators of drivers, pressures and state;
(2) could include indicators of trends in the consumption of ecosystem services;
(3) other potential indicators could include:
    (a) extent of/change in green and agricultural land in peri-urban areas and urban sprawl;
    (b) extent of/change in green Infrastructure, especially in urban areas;

(c) extent of/change in types of agricultural use, especially change from less to more intensive uses;
(d) fragmentation of habitats (for example by urban areas, transport and energy network development) — e.g. ESPON fragmentation index;
(e) levels of water and air pollution — intensity by area;
(f) water needs/consumption and water scarcity at a regional or local level;
(g) flood risks;

(4) municipal waste generation.

Connecting territories:

(1) likely to include, predominately, indicators of drivers, pressures and state;
(2) potentially, indicators of resource connections between and within territories (availability and interdependences — net importers/exporters, self sufficiency), for example:
(a) water
(b) materials
(c) energy;
(3) other potential indicators could include:
(a) habitat connectivity (green corridors);
(b) presence of wildlife corridors of wider regional importance.

Cooperation:

(1) likely to include, predominately, response indictors;
(2) one potential new indicator is being prepared by ETC-LUSI: this would measure administrative cooperation and governance; collaboration over projects and developments in river basins;
(3) could include indicators on public participation at different territorial levels;
(4) indicators of EU cooperation, including:
(a) funding for environmental projects and actions;
(5) integration of environmental concerns into spending in other sectors (e.g. funding on the basis of a 'win/win' approach; and compensation actions for projects and programmes that are potentially harmful to the environment).

6 Conclusions and recommendations

6.1 Analysis of the integration of environmental objectives into territorial Cohesion Policy

Chapter 4 of this report reviewed key EU policies in terms of the environmental dimensions of territorial cohesion. The approach adopted, being largely experimental and presenting only a brief review, proved useful and provided some interesting results. However, it is recommended that further development of this methodology, together with more in-depth analysis of specific policy areas, could play a key role in terms of assessing and promoting integration of environmental objectives into territorial Cohesion Policy.

As suggested previously, territorial cohesion can be seen as the 'spatial representation of sustainability': from this viewpoint, assessing policies in terms of the environmental dimensions of territorial cohesion could become an important step towards the better integration of environment and sustainability.

Indeed, the results from the brief review presented in Chapter 4 indicate that the environmental dimensions of territorial cohesion need to be integrated more comprehensively — as part of the development of key EU policies, such as cohesion, agriculture, energy and transport. While the review has highlighted positive elements, conflicts remain and the mechanisms to address these (e.g. the impact assessment and the SEA processes) have not always been effective.

In terms of environmental policy, the review showed that both the Water Framework Directive and the Habitats Directive clearly put in place some of the environmental dimensions of territorial cohesion. For example, both pieces of legislation focus on natural geographic units. For both pieces of legislation, however, a number of problems are seen in terms of their full implementation.

Looking into the future, the analysis highlighted the importance of the territorial dimension of policies to enable us to adapt to climate change. These policies and the actions they put in place need to be of a cross-cutting nature, covering areas from flood risk management to agriculture and to biodiversity protection. It could be valuable to use territorial cohesion, incorporating its environmental dimensions, as a viewpoint for developing and assessing policies and programmes in this area: this approach could help identify more effective and more sustainable adaptation strategies and actions.

6.2 Analysis of potential indicators

Chapter 5 considered the potential of regional or territorial characterisation and territorial cohesion indicators to support the analysis of the environmental dimensions of territorial cohesion. This raised questions and identified challenges regarding data availability; furthermore, it highlights the need to define the type of potential analysis that would support identification of potential key elements of the environmental dimension of territorial cohesion. This section aimed at providing a structure within which further work can be undertaken in this area, the work that would also include data analysis and development of potential indicators. Chapter 5 also proposes a framework for discussion on territorial indicators and their possible use in future studies.

It is important to recognise that efforts to develop approaches and methodologies for identifying indicators constitute a key element in further integrating the environment into territorial cohesion; however, this should not necessarily lead to an increased volume of reporting or some other administrative burden related to the collection or dissemination of the information to be faced by the Member States, regions or management authorities. Therefore, the focus should be on looking for synergies with those sets of indicators that are already in existance.

6.2.1 Existing indicators

There already exists a considerable body of current data and indicator sets available, while some are being developed to support territorial indicators.

Some of these include work on possible indicators for territorial cohesion. For example, the ESPON programme has undertaken work in this area including development of possible environmental indicators; however, ESPON has focused more on the social dimension of territorial cohesion.

The Eurostat indicators for monitoring the sustainable development strategy could also be considered suitable for monitoring the environmental dimension of territorial cohesion. At present, however, these indicators appear to focus more on what happens on the national scale.

Further work is in progress that concentrates on reviewing the available data — relevant to potential territorial cohesion indicators. Relevant data are also likely to become available through some other ongoing initiatives, for example EURECA will provide information on stocks, flows and the value of selected ecosystem goods and services at a European level. In addition, SEIS and the INSPIRE Directive (putting in place EU-wide geo-referenced data by harmonising datasets and access across national boundaries) will be valuable in expanding the availability of data to support the analysis of territorial cohesion. This is important to bear in mind, as in some areas, the data for territorial indicators, especially on specific geographical scales, may not be available at the present time.

Many existing indicators have potential utility as indicators of the environmental dimension of territorial cohesion, however, they would need to be analysed on the appropriate geographical scale to provide the territorial dimension. Analysis should be carried out at the level of administrative units (e.g. NUTS 2 and NUTS 3 regions) as well as other geographical units such as sub-basin, water river basin districts, landscape character areas or biogeographical regions.

6.2.2 Territorial characterisation

The need to define and gain a better understanding of European territories, and the environmental assets and features they currently provide, or could potentially provide, is a key conclusion from this study.

Chapter 5 provides an overview of recent work on landscape- and environmental characterisation of territories that can provide baseline information about the environmental assets of a specific region that make it unique or important.

The aim of the current characterisation work is to develop a 'new geography' that would support territorial identity through the identification of natural and environmental assets. The characterisation of territories, thus developed, provides baseline information about the environmental 'value' of a specific region, i.e. whether the region owns environmental assets that make it unique and that could, hence, support the development of the region by exploiting the asset item in a proper and sustainable fashion. It also underpins the methodological approach based on geospatial analysis of different input data sets (indicators) that are combined with each other and jointly analysed.

In developing this approach to environmental characterisation, it is recommended that existing environmental 'stratifications' of Europe, e.g. landscape character types, biogeographical regions, etc., are also utilised as spatial frameworks: this should further our understanding of environmental issues within the territorial context. These 'natural' spatial frameworks would be useful in assessing impacts of policies and, therefore, have potential for enhancing the analysis of territorial cohesion. They can be employed as spatial units to map and analyse other indicators.

6.2.3 Potential indicators

Chapter 5 proposes a framework for development of territorial indicators. It seeks to link the analysis of the environmental dimensions of territorial cohesion reviewed in Chapter 3, and in particular the potential key elements of the environmental dimension of territorial cohesion identified in Table 3.1, with the DSPIR model applied to some environmental indicators. An important step is to place territorial cohesion indicators within the DPSIR framework, as it will help to link this approach with the ongoing work on developing indicators. This approach is preliminary and is intended to stimulate discussion: e.g. does this link help present and clarify the idea of territorial indicators?

It would also be useful to study how environmental accounting, i.e. at a catchment level, as well as carbon accounts and ecosystem accounts can be used at a regional level. Finally, it is recommended that an important aspect to keep in mind when developing territorial indicators is whether such indicators possess a forward-looking capacity, that is whether they provide projections of possible developments in the coming decades. This will be of value in many policy areas — including work on climate change adaptation, where strategies and actions need to look ahead into the coming decades.

Annex 1 Analysis

The tables below use the following scoring system for the 'overall assessment' against each of the five elements of the environmental dimensions of territorial cohesion. This is based on a subjective assessment of the degree to which the policy, etc. is considered synergistic or conflicting with the potential criteria listed in Table 3.1 to evaluate the environmental dimension of territorial cohesion.

☺	Overall potentially synergistic
😐	Overall potentially neutral
☹	Overall potentially conflicting

Elements of the environmental dimensions of territorial cohesion	Policy area: Cohesion Policy	Overall assessment
Harmonious and sustainable development	***Potential synergies*** One of the key objectives of Cohesion Policy is European territorial cohesion. The ERDF is the main funding mechanism for reaching this objective. The ERDF includes funds aimed at improving environmental conditions in applicant countries. Environment and climate change form one of the 'themes' of EU Cohesion Policy. It recognises that regional development policies should be sustainable. This theme notes that the environment can be a source of economic growth. ***Potential conflicts*** **Although Cohesion Policy explicitly recognises the importance of environmental issues, these are not identified in the context of shaping the type of economic growth.** The central aim of majority of Cohesion Policy funds and instruments is economic and social development and growth. This could conflict with environmental and sustainability goals.	😐
Inherent features of territories	***Potential synergies*** The climate change and environment theme seeks to encourage regional development that respects the environment. Funds to support tourism include those specifically aimed at the protection and development of natural heritage and natural assets. ***Potential conflicts*** Limited explicit recognition of the inherent environmental features of different territories, as the central aim of Cohesion Policy is economic and social development. Where programmes/funds are aimed at environment, these are in the context of issues such as energy efficiency, developing transport networks, etc. and not related to environmental features *per se*.	😐
Concentration	***Potential synergies*** The ERDF Urban II programme is aimed explicitly at promoting sustainable urban development, although the key focus is on economic and social regeneration in depressed urban areas. The Cohesion Fund seeks to support projects related to energy and transport, which may help address environmental issues associated with higher concentrations of development. ***Potential conflicts*** Funds to support trans-European transport networks (Cohesion Fund) and to support competiveness and economic development (all funds) may increase pressure on urban areas due to increased mobility and exacerbate environmental issues associated.	😐
Connecting territories	***Potential synergies*** None identified. ***Potential conflicts*** The Cohesion Fund states that it can support projects related to energy and transport 'as long as they clearly present a benefit to environment'. However there is no explicit consideration of territorial dimension of the environment. No explicit recognition of inter-regional/trans-national connections in relation to environmental and natural resources.	☹
Cooperation	***Potential synergies*** One of the key objectives of Cohesion Policy is European territorial cohesion. This objective is intended to promote cross-border cooperation through joint local and regional initiatives, trans-national cooperation aiming at integrated territorial development, and interregional cooperation and exchange of experience. The Interreg initiative aims to stimulate interregional cooperation, and while the main aim is social and economic cohesion, the environment is explicitly represented. ERDF funding for transport and the environment in the applicant countries is intended to address issues such as water and air pollution and waste management in these areas. ***Potential conflicts*** Cooperation is aimed primarily at enhancing economic and social development and cooperation to promote environmental standards and transboundary environmental effects are not specifically included. No explicit recognition of natural boundaries/areas as appropriate management units for environmental assets.	😐

Review of agricultural and rural development policy against the key elements of the environmental dimensions of territorial cohesion

Elements of the environmental dimensions of territorial cohesion	Policy area: Agriculture and rural development	Overall assessment
Harmonious and sustainable development	***Potential synergies*** The CAP explicitly promotes a sustainable agriculture, particularly through agri-environment schemes. The provision of environmental goods through better farm management is identified as an opportunity and an environmental 'win-win' option, by protecting the environment and forming the basis for growth and jobs provided through tourism and rural amenities ([60]). One of the three thematic-axes of rural development policy is 'improving the environment and the countryside' (European Commission, 2005) Council Regulation (EC) No 1698/2005). Regulation (EC) No 1698/2005 also supports land management/land use that preserve the natural environment and landscape and protect and improve natural resources (European Commission, 2005). The regulations state that (paragraph 31) 'key issues to be addressed include biodiversity, Natura 2000 site management, the protection of water and soil, climate change mitigation including the reduction of greenhouse gas emissions, the reduction of ammonia emissions and the sustainable use of pesticides'. Agri-environmental payments seek to play a role in the sustainable development of rural areas, recognising and responding to 'societies increasing demand for environmental services'. ***Potential conflicts*** Policy aimed at improving the competitiveness of the agricultural and forestry sector, and creating/improving single market conditions for agricultural produce may enhance economic conditions for agriculture, but are also likely to support large-scale single crop farming and long-distance transportation of food, which may undermine environmental goals. Direct support to farmers, however, makes up about 75 % of the CAP budget (see Chapter 2).	😐
Inherent features of territories	***Potential synergies*** Agri-environment payments are intended to encourage farmers and other land managers to apply agricultural methods compatible with the protection and improvement of the environment, the landscape and its features, natural resources, the soil and genetic diversity. Article 11 of Regulation (EC) No 1698/2005 states that the core objectives at the Community level relating to agriculture and forestry competiveness, land management and environment, quality of life and diversification should take into account the diversity of situations, ranging from remote rural areas to peri-urban areas under increasing pressure from urban centres (European Commission, 2005). Article 57 of Regulation (EC) No 1698/2005 supports the development of protection and management plans relating to Natura 2000 sites and other places of high natural value (European Commission, 2005). ***Potential conflicts*** See Harmonious and sustainable development.	😐
Concentration	***Potential synergies*** Rural development policy does seek to promote sustainable development in peri-urban areas under increasing pressure from urban centres. ***Potential conflicts*** Direct support to farmers can promote intensive agriculture, leading to a concentration of production as well as related environmental impacts.	😐
Connecting territories	***Potential synergies*** Agri-environmental measures seek to protect environmental and landscape features, including areas of natural value, such as Natura 2000 sites, etc. However the connections among protected areas (within or between regions and Member States) are not explicitly recognised by policy. ***Potential conflicts*** CAP support does not discourage long-distance transport of agricultural products from one part of the EU to another.	😐
Cooperation	**Potential synergies** Article 65 of Regulation (EC) No 1698/2005 explicitly supports inter-territorial cooperation (within a Member State) and transnational cooperation (between territories in several Member States and with third countries). However, transboundary environmental effects and the consideration of natural boundaries/areas as appropriate units for the management of environmental assets are not explicitly recognised. ***Potential conflicts*** None identified.	😐

([60]) The CAP and the Lisbon Strategy, Internet: http://ec.Europa.Eu/agriculture/lisbon/index_en.Htm (European Commission, 2010a).

Review of energy policy against the key elements of the environmental dimensions of territorial cohesion

Elements of the environmental dimensions of territorial cohesion	Policy area: Energy	Overall assessment
Harmonious and sustainable development	***Potential synergies*** EU energy policy explicitly recognises the need to reduce emissions, increase efficiency and promote renewables. At the heart of this is recognition of energy generation and use as contributing to climate change. No explicit recognition of environmental limits and carrying capacity, or protection of high-quality environments as a valuable goods or service. ***Potential conflicts*** Central aim of EU energy policy is to support economic growth and ensure a competitive Europe. Meeting this aim may conflict with sustainable development if raising gross energy use to support economic growth outweighs increases in efficiency and generation by renewables. A relative increase in the share of renewables does not necessarily mean that overall non-renewable energy generation will fall.	
Inherent features of territories	***Potential synergies*** The viability of renewable energy projects and technologies (e.g. wind, solar and hydro-electric) will depend fundamentally on suitable territorial characteristics. Energy policy also explicitly seeks to consider interdependencies and interrelationships between territories. Policy aims to improve efficiency and increase the volume of renewables generation. It recognises the need for mitigation measures designed to cope with the future challenge of climate change. Central aim of EU energy policy is to reduce dependency on imported energy, which will promote self-sufficiency. ***Potential conflicts*** Central aim of energy policy is to support economic growth and ensure a competitive Europe. This may undermine efforts to respect and promote inherent environmental features of territories. The example include the promotion of hydro-electric schemes that may affect river basin management objectives by requiring the creation of man-made reservoirs and associated infrastructure, or wind-generation schemes impacting upon protected areas and habitats.	
Concentration	***Potential synergies*** Sustainable energy policies, renewables policy, technology and energy efficiency policies are likely to help address environmental problems and promote efficiencies associated with higher concentrations of development. For example, the Covenant of mayors under sustainable energy policies aims to bring together mayors of the most pioneering cities in Europe to exchange and apply examples of good practice, improve energy efficiency and promote low-carbon development. ***Potential conflicts*** No explicit recognition of the value of territories to social and economic wellbeing and success.	
Connecting territories	***Potential synergies*** Key aspect of EU energy policy is establishment of trans-European energy networks (TEN-E). Article 3(d) of Decision No 1364/2006/EC laying down guidelines for trans-European energy networks states that they should contribute to sustainable development and protection of the environment, 'inter alia by involving renewable energies and reducing the environmental risks associated with the transportation and transmission of energy' (European Commission, 2006b). ***Potential conflicts*** Unclear if inter-regional and trans-national environmental and natural resource connections are recognised and reflected in EU Energy policy.	
Cooperation	***Potential synergies*** Energy network development may enhance interdependencies and encourage cooperation and awareness of the need to address transboundary environmental issues collectively. Cross-border networks and the establishment of an effective internal energy market may provide alternatives to potentially damaging energy projects. Energy policy also explicitly seeks to share good practice and technologies within the EU (e.g. the Covenant of mayors, European Commission, Energy, Internet: www.eumayors.eu). ***Potential conflicts*** None identified	

Review of transport policy against the key elements of the environmental dimensions of territorial cohesion

Elements of the environmental dimensions of territorial cohesion	Policy area: Transport	Overall assessment
Harmonious and sustainable development	***Potential synergies*** Transport policy aims to 'disconnect mobility from its adverse effects', 'ensure the sustainability of our transport networks into the future' and to promote sustainable development ([61]). This is intended to be achieved by technical innovation and a shift to the least polluting and most energy-efficient modes of transport, especially for long-distance and urban travel. The greening transport package seeks to ensure that prices for transport better reflect their real costs to society in terms of environmental damage and congestion. As part of this package, Com(2008) 435 final represents a Strategy for the internalisation of external costs (European Commission, 2008e) ***Potential conflicts*** Key aim of EU transport policy is to establish trans-European networks and arteries to enable Europe to 'fulfil its economic and social potential' ([62]). This, may be in direct conflict with environmental and sustainability aims, for example, road construction is likely to encourage an increased travel need, and expanded river navigation may conflict with WFD goals of good ecological status of water bodies. Promoting air transport is also in conflict with environmental and sustainability goals. No explicit recognition of carrying capacity as a potential constraint to economic growth	☹
Inherent features of territories	***Potential synergies*** Limited synergies — no explicit policy activity in relation to inherent features of territories. The inherent features of territories will influence the options available for transport infrastructure. ***Potential conflicts*** The establishment and construction of trans-European transport networks, which is a central aim of EU transport policy, is a key issue in relation to environmental impacts. Depending on their location, transport corridors can lead to the fragmentation of habitats and migration routes, cause damage to protected areas and species, etc.	😐
Concentration	***Potential synergies*** Clean urban transport programme and the Green Paper on urban mobility aim to promote clean and energy-efficient urban transport systems/vehicles, with the goal of sustainable urban mobility. As noted under harmonious and sustainable development, the greening transport package seeks to ensure that prices for transport better reflect their real costs to society in terms of environmental damage and congestion. ***Potential conflicts*** The establishment of trans-European transport networks, increased mobility and efficiency may encourage inter- and intra-urban travel, and thus, increase congestion and potentially offset the environmental benefits achieved through efficiency and cleaner transport technologies. These objectives may also encourage commuting and urban sprawl.	😐
Connecting territories	***Potential synergies*** Key aim of EU transport policy is the establishment of an efficient trans-European transport network (TEN-T). This aim is intended to integrate environmental protection requirements. ***Potential conflicts*** Increased transport infrastructure development and increased mobility may further fragment habitats and sever wildlife corridors, green infrastructure and migratory routes for animals and birds. Any increase in transport infrastructure and travel is likely to increase pressure on environmental assets, habitats and species.	☹
Cooperation	***Potential synergies*** Key aim of transport policy is a coordinated and cooperative approach to transport management and infrastructure provision, and sharing of knowledge, experience and technologies to improve efficiency and reduce environmental impacts of travel. ***Potential conflicts*** Ever greater connectivity and mobility and pan-European transport networks may blur recognition of historic and natural areas and boundaries and reduce awareness and consideration of appropriate territorial units for the management of environmental assets.	😐

([61]) (European Commission, 2010b), Internet: http://ec.europa.eu/transport/sustainable/index_en.htm.
([62]) (European Commission, 2010c), Internet: http://ec.europa.eu/transport/infrastructure/index_en.htm.

Review of the Water Framework Directive against the key elements of the environmental dimensions of territorial cohesion

Elements of the environmental dimensions of territorial cohesion	Policy area: Water Framework Directive	Overall assessment
Harmonious and sustainable development	***Potential synergies*** The central aim of the WFD is to 'protect and restore clean waters across Europe and ensure their long-term sustainable use'. Article 4(1) of the directive (Directive 2000/60/EC) includes the target whereby Member States are called upon to achieve a good status in all bodies of surface water and groundwater by 2015 (European Commission, 2000). A key aspect of the directive is the aim for water services (clean drinking water, irrigation, hydropower, wastewater treatment, etc.) to be charged at a price that fully reflects the services provided. This explicitly recognises the value of clean, sustainably managed water resources as a valuable good/service. By seeking to charge the real cost (including externalities) of water use, the WFD implicitly recognises the environmental limits of water resource exploitation. ***Potential conflicts*** None identified.	☺
Inherent features of territories	***Potential synergies*** Fundamental to the WFD is the identification of 'water bodies' by Member States. The designation of water bodies should consider the location, physical characteristics and differences as well as pressures such as extraction, pollution, etc. Inherent in the river basin-scale management approach is the consideration of interdependencies and relationships between territories. The WFD proposal of inter-calibration of water ecosystem status across Europe has the stated intention of enabling a common understanding of ecological status given different nature of water bodies between Member States and regions (e.g. mountain lake compared to a tidal river). ***Potential conflicts*** None identified.	☺
Concentration	***Potential synergies*** The WFD requires Member States to designate artificial and heavily modified water bodies, in which good ecological potential will need to be met (differs from good ecological status targeted in other water bodies). Many of these are likely to be within urban areas. The incorporation of economic principles and water pricing in line with environmental services provided is likely to help address some of the water- related environmental pressures associated with higher concentrated development, particularly water pollution, water resource scarcity, etc. ***Potential conflicts*** None identified.	☺
Connecting territories	***Potential synergies*** Explicit and key aspect of the WFD is the management of water issues at the river basin scale. This recognises the inherent 'shared' nature of Europe's water resources, rivers, lakes and seas. Implementation of the WFD in relation to an international river basin district should be coordinated between those Member States in the district. Understanding and managing inter-regional and trans-national water pollution/extraction will be an important aspect of this cooperative approach. ***Potential conflicts*** None identified.	☺
Cooperation	***Potential synergies*** The consideration of natural boundaries and areas (in the form of river basin districts and water bodies) is a cornerstone of the WFD. A cooperative approach to implementation is also a fundamental aspect of implementation of the WFD. ***Potential conflicts*** None identified.	☺

Review of the Habitats Directive against the key elements of the environmental dimensions of territorial cohesion

Elements of the environmental dimensions of territorial cohesion	Policy area: Habitats Directive	Overall assessment
Harmonious and sustainable development	***Potential synergies*** The purpose of Habitats Directive (Directive 92/43/EEC) is to promote the conservation of natural habitats and of wild fauna and flora (European Commission, 1992). Central to this is the establishment of a coherent European network of special areas of conservation (SACs). These sites, together with special protection areas (SPAs) founded under the Birds Directive, Directive 79/409/EEC, (European Commission, 1979), form the Natura 2000 network. Vigorous protection of sites forming the Natura 2000 network implicitly recognises the need to constrain economic development in order to protect certain species and habitats. Ecosystems services are recognised, however, in Natura 2000 documentation. ***Potential conflicts*** Article 6(4) of the Habitats Directive states that development resulting in 'negative implications' for a Natura 2000 site can still be carried out in the absence of 'alternative solutions' and for 'imperative reasons of overriding public interest, including those of a social or economic nature'.	☺
Inherent features of territories	***Potential synergies*** Habitats Directive sites are protected according to nine biogeographical regions. These regions are identified with an intention to make it easier to conserve species and habitat types existing under similar natural conditions across national boundaries, irrespective of political and administrative boundaries. These biogeographical regions are designated on a geographical basis, but also with account of the inherent biodiversity/habitat features those regions posses. Article 10 of the directive seeks to ensure that Member States endeavour, through land-use planning and development policies, to encourage a more ecologically sound management of features of the landscape that are of major importance for wild fauna and flora. ***Potential conflicts*** None identified.	☺
Concentration	***Potential synergies*** None identified. No explicit relevance to urban areas. ***Potential conflicts*** None identified. No explicit relevance to urban areas.	😐
Connecting territories	***Potential synergies*** See inherent features of territories. ***Potential conflicts*** None identified.	☺
Cooperation	***Potential synergies*** Article 18(2) of the Directive regarding research indicates the need to encourage transboundary cooperative research among Member States . ***Potential conflicts*** None identified.	☺

Review of the Floods Directive against the key elements of the environmental dimensions of territorial cohesion

Elements of the environmental dimensions of territorial cohesion	Policy area: Floods Directive	Overall assessment
Harmonious and sustainable development	***Potential synergies*** The Floods Directive (Directive 2007/60/EC) requires that Member States should assess, map and plan the management of flood risks in all water courses and coastal areas on their territory (European Commission, 2007d). Flood risk assessment includes risks to the environment as well as to human health, cultural heritage and economic activity. Flood risk management plans (to be development by 2015) should focus on prevention, protection and preparedness. ***Potential conflicts*** None identified.	☺
Inherent features of territories	***Potential synergies*** Flood risk assessment under the directive is required to be undertaken on a scale of river basin districts and associated coastal areas. It is expected that there should be some coordination with river basin management plans developed under the WFD. Accounting for interdependencies and relationships between territories should constitute an inherent aspect of environmental management on this scale. The directive calls for flood risk management plans to be periodically reviewed, and, if necessary, updated to take account of the impacts of climate change on the occurrence of floods (e.g. paragraph 14, Article 4(2), Article 14(4), Article 16). ***Potential conflicts*** In some cases, flood risk management protection infrastructure may impact upon protected areas/inherent features of territories, although this will depend on implementation (and the intention of the directive is that environmental features should be protected) in individual Member States.	☺
Concentration	***Potential synergies*** The directive explicitly refers to urban floods (paragraph 10). Flood risks associated with higher urban concentration (increased run-off, reduced attenuation, etc.) are a significant issue in many urban areas. Reducing flood risks may also address other environmental problems associated with urban areas, such as water pollution (by reducing run-off). ***Potential conflicts*** None identified	☺
Connecting territories	***Potential synergies*** See entry under *Inherent features of territories.* Paragraph 13 of the Directive explicitly recognises the territorial connections in relation to flooding (e.g. river corridors, coastal areas, international lakes). It states that 'Member States should refrain from taking measures or engaging in actions that significantly increase the risk of flooding in other Member States, unless these measures have been coordinated and an agreed solution has been found among the Member States concerned'. ***Potential conflicts*** None identified.	☺
Cooperation	***Potential synergies*** As noted, flood risk assessment and management is required to be at the river basin district and coastal zone level, and the directive explicitly promotes/requires coordinated activity between and within Member States. For example paragraph 6 of the Directive requires coordination between Member States (and cooperation with third countries) in recognition of the UN Convention on the protection and use of transboundary water courses and international lakes. Flood risk management information exchange is a key aspect of the strategy to support implementation ([63]). ***Potential conflicts*** None identified.	☺

([63]) See, for example, *Promoting early action, Work programme and mandate 2008-2009*, Working group F on Floods (as agreed by the water directors, 29–30 November 2007), Internet: http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/floods_programme/wg_f_floods/workprogramme_2008-9/_EN_1.0_&a=d.

Review of the Climate Change Adaptation White Paper against the key elements of the environmental dimensions of territorial cohesion

Elements of the environmental dimensions of territorial cohesion	Policy area: Climate Change Adaptation White Paper	Overall assessment
Harmonious and sustainable development	***Potential synergies*** The objective of the EU's adaptation framework, as set out in the White Paper ([64]), is to improve resilience to the impacts of climate change and support sustainable development in the EU. Phase 1 (2009-2012) of the implementation includes (pillar 2) the intention to integrate adaptation in EU key policy areas. Section 2.1 of the White Paper on the impact of a changing climate states that 'evidence suggests that working with nature's capacity to absorb or control impact in urban and rural areas can be a more efficient way of adapting than simply focusing on physical infrastructure'. This section also recognised the role of Green Infrastructure in providing essential social and economic resources under extreme climatic conditions. A discussion paper has been developed in relation to climate change adaption, and agriculture and rural development ([65]). There has also been developed a policy paper in relation to adaptation and water, coasts and marine issues ([66]). The White Paper calls for a more strategic and long-term approach to spatial planning, including the planning in relation to regional development. ***Potential conflicts*** None identified.	☺
Inherent features of territories	***Potential synergies*** The White Paper explicitly recognises that some regions and sectors will be more vulnerable and that the impacts of climate change will vary by region. In particular, Southern Europe, the Mediterranean, Outermost regions and the Arctic as well as mountain areas, islands, coastal and urban areas, and densely populated floodplains are all recognised as facing particular problems (Section 2.1). Section 3.2.2 of the White Paper notes, in relation to resilience of agriculture and forests, that the applicability of measures on a territorial scale beyond the farm level 'could be examined'. ***Potential conflicts*** None identified.	☺
Concentration	***Potential synergies*** The relative vulnerability and problems faced by urban areas (and densely populated floodplains) are explicitly recognised in the White Paper. The promotion of Green Infrastructure (see entry under *Harmonious and sustainable development*) can also play an important role in addressing climate change impacts and vulnerabilities associated with higher densities of development. ***Potential conflicts*** None identified.	☺
Connecting territories	***Potential synergies*** The White Paper (Section 2.3) states that the EU 'has a particularly strong role when the impact of climate change transcends the boundaries of individual countries (e.g. river and sea basins, and bio-geographic regions)'. Regarding habitats, the White Paper (Section 3.2.3) proposes that the impacts of climate change be factored into the management of Natura 2000 to ensure the diversity and connectivity between natural areas, and to allow for species migration. At the same time, the possible future need for a 'permeable' landscape to enhance the interconnectivity of natural areas is also recognised. Green Infrastructure which is promoted in the White Paper is defined (in the White Paper) as 'the interconnected network of natural areas including some agricultural land, such as greenways, wetlands, parks, forest preserves and native plant communities, and marine areas that naturally regulate storm flows, temperatures, flooding risk, and water, air and ecosystem quality'. ***Potential conflicts*** None identified.	☺
Cooperation	***Potential synergies*** The White Paper states that in order for phase 1 (laying the groundwork for preparing a comprehensive EU adaptation strategy) to be a success, EU, national, regional and local authorities must cooperate closely. The White Paper (Section 5) proposes the establishment of an Impact and Adaptation Steering Group (IASG) that would be composed of Member State representatives. The group would be also consulting with representatives from civil society and the scientific community. ***Potential conflicts*** None identified.	☺

([64]) Adapting to climate change: *Towards a European framework for action*, White Paper COM(2009) 147 final, April 2009 (European Commission, 2009a).
([65]) *Adapting to climate change: the challenge for European agriculture and rural areas*, European Commission staff working document accompanying the White Paper, SEC(2009) 417 (European Commission, 2009f).
([66]) *Climate change and water, coasts and marine issues*, European Commission staff working document accompanying the White Paper, SEC(2009) 386 (European Commission, 2009g).

Annex 2 Concepts and definitions

Why territorial cohesion is considered important?

Clearly it is fundamental to understand what is meant by the term territorial cohesion as a starting point, however territorial cohesion is a term already in use and a concept underpinning policy and as such can be considered an important principle.

The Lisbon Treaty states that the Union will pursue actions to strengthen 'economic, social and territorial cohesion' (Title XVIII). This part of the Treaty mentions the role of the structural funds and the cohesion fund, but does not really define 'territorial cohesion'.

One potential danger is that territorial cohesion is seen only in terms of the spending of funds to support Cohesion Policy: in this restricted vision, the funds implement territorial cohesion and territorial cohesion is what the funds do. This circular approach would leave out the territorial dimensions of other European policies (agriculture and rural development in particular).

Another potential danger of a narrow interpretation is that environment is seen as a peripheral or at most a sectoral part of territorial cohesion — for example, that in terms of Cohesion Policy, spending on environmental infrastructure such as wastewater treatment is seen as satisfying the environmental dimension.

The Treaty's reference to territorial cohesion could be interpreted in the light of its call for sustainable development:

> *[The Union] shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. (Art. 3)*

To ensure that sustainable development is pursued throughout Europe, the concept of territorial cohesion needs to incorporate this concept. In other words, the environmental and sustainability dimensions of territorial cohesion need to be enunciated.

Clarifying concepts and definitions

EU Cohesion Policy focuses on economic, social and territorial cohesion. However, the term territorial cohesion lacks a clear definition and is often used throughout the EU and its Member States, and between different disciples and interests, with differing shades of meaning. This section highlights ways in which territorial cohesion, and related terms, is commonly used and suggests a possible working definition to use as part of this study.

Territorial cohesion involves creating a more balanced and harmonious development of the European Union. Moreover, it should ensure that citizens are able to use and benefit from the inherent features of their territories ([67]), but there is no one agreed definition.

The Green Paper on Territorial Cohesion (European Commission, 2008) states that:

Territorial cohesion is about ensuring the harmonious development of all these places and about making sure that their citizens are able to make the most of inherent features of these territories. As such, it is a means of transforming diversity into an asset that contributes to sustainable development of the entire EU.

More balanced and sustainable development, implicit in the notion of territorial cohesion, would achieve a more even and sustainable use of assets, bringing economic gains from less congestion and reduced pressure on costs, with benefits for both the environment and the quality of life.

([67]) Green Paper on Territorial Cohesion (European Commission, 2008).

The Green Paper on Territorial Cohesion goes on to state that to address the challenges of economic and social development, policy responses may be required on three fronts:

(1) ***Concentration*** — overcoming differences in density;
(2) ***Connecting territories*** — overcoming distance; and
(3) ***Co operation*** — overcoming division.

In addition, it states that certain regions have geographical features which may pose particular challenges with regard to territorial cohesion (i.e. mountain regions, island regions and sparsely populated regions).

However, the Green Paper on Territorial Cohesion does not include a formal definition of territorial cohesion and in fact includes the following question for consultees: 'What is the most appropriate definition of territorial cohesion?' The contributions to the consultation are available on the website of DG Regional Policy ([68]). These results, when available, may provide further clarification of the European Commission's perspective on a potential definition of territorial cohesion.

The European Commission's cohesion reports provide some further context to territorial cohesion. The **Third Report on Economic and Social Cohesion** (European Commission, 2004), states that:

> *the concept of territorial cohesion extends beyond the notion of economic and social cohesion by both adding to this and reinforcing it. In policy terms, the objective is to help achieve a more balanced development by reducing existing disparities, avoiding territorial imbalances and by making both sectoral policies which have a spatial impact and regional policy more coherent. The concern is also to improve territorial integration and encourage cooperation between regions.*

The Third Report on Economic and Social Cohesion presented territorial cohesion as a synonym of balanced development and avoiding territorial imbalances, avoiding growth solely in the pentagon area, emphasising metropolitan and hinterland functionality, counteracting social exclusion, urban sprawl and other geographical handicaps (European Commission, 2004).

The European Commission's ***Fifth progress report on economic and social cohesion*** (European Commission, 2008c) states that:

> *The inclusion of territorial cohesion in the Lisbon Treaty is generally welcomed. Some contributions however urge the Commission to develop a definition of territorial cohesion and indicators for better understanding this concept. At the same time, several national governments consider that territorial cohesion is already integrated within Cohesion Policy, and that the economic, social and territorial dimensions of cohesion cannot be separated.*
>
> *Territorial cohesion is seen, notably by regional and local actors, as an opportunity to strengthen the role of regional and local authorities and other actors in the implementation of the policy. Several contributions stress the role of urban areas and their interdependence with rural areas as important dimensions of economic, social and territorial cohesion. Cities are often identified as places characterised by significant social exclusion, poverty and unbalanced development. Existing mechanisms in favour of some specific areas such as the outermost regions or the northern sparsely populated areas are not questioned.*
>
> *Many are also confident that the notion of territorial cohesion will help to better integrate a territorial dimension in the design and implementation of European sectoral policies. A consensus seems to emerge in favour of more flexibility under territorial cooperation so that regions can cooperate with regions other than neighbour regions or regions belonging to the same geographical area. Cooperation with regions and countries neighbouring the EU is also considered essential.*

It is interesting to note that the issue of the DG Regio magazine focussing on the Green Paper on Territorial Cohesion ([69]) includes the following observation ([70]) which recognises the lack of a formal definition and highlights that the concept did include sustainability at its start — as well as good governance which is a key element for environmental policy (and of course also other policy areas):

> *As with economic and social cohesion which equally elude simple definitions, territorial cohesion is an umbrella concept. Michel Barnier who, as the*

([68]) Internet: http://ec.europa.eu/regional_policy/consultation/terco/contrib_en.htm; as of mid-November 2009, however, the European Commission had not made available a document to sum up or take forward the discussion.
([69]) Inforegio — Panorama, No 28, December 2008, p. 10 (European Commission, 2008f).
([70]) Andreas Faludi, Professor of Spatial Policy Systems in Europe at the OTB Research Institute for Housing, Urban and Mobility Studies, University of Delft, Honorary Member of the Royal Town Planning Institute (RTPI, UK) and the Association of European Schools of Planning (AESOP).

> *Commissioner for Regional Policy in 2000–2004 was responsible for introducing territorial cohesion into the debate, identified several elements to it:* ***equity concerns*** *(i.e. where people live should not crucially determine their opportunities nor their quality of life);* ***competitiveness*** *(regions and localities each in their own way play a crucial role in growth and job creation);* ***sustainability*** *and* ***good governance****. These represent different, and potentially contradictory, concerns that need to be specified, and hopefully reconciled, from case to case.*

One might assume that whilst territorial cohesion might be an invitation to a dance, it is not the dance itself. However, here the importance of both sustainability and good governance are noted as key elements.

From the literature, other observations on what territorial cohesion means can be identified, just one of which are included below.

Roberto Camagni (2005) suggests that it is possible to envisage three main components of the definition of territorial cohesion, namely:

(1) **Territorial quality:** the quality of the living and working environment; comparable living standards across territories; similar access to services of general interest and to knowledge;
(2) **Territorial efficiency:** resource efficiency with respect to energy, land and natural resources; competitiveness of the economic fabric and attractiveness of the local territory; internal and external accessibility; and
(3) **Territorial identity:** 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.

This definition thus incorporates the quality of the environment and resource efficiency but not a broader vision of sustainability or environmental protection.

There are several other terms, in addition to territorial cohesion, which potentially overlap and/or interact with it which it is worth also clarifying in terms of definitions, including: territorial policy; territorial development policy; territorial cohesion policy; spatial planning; and territorial capital.

Territorial policy

First, it is important to understand the principles of a ***territorial policy***? The Eionet glossary ([71]) defines a territorial policy as:

> *... a course of action adopted and pursued by government, business or some other organisation, which determines the present and future use of each parcel of land in an area.*

This definition is literal in that it assumes a definition of territory in line with 'any tract of land; a district' ([72]), it can also refer to a region, the land and waters under the jurisdiction of a government, a political subdivision of a country or a geographic region. The term has its origins in the Latin words *terra* meaning land and *territorium*, which refers to the land surrounding a town.

This later root is perhaps of particular significance given the importance of understanding and accounting for the interdependencies and relationships between urban and rural areas in the EU through territorial policy.

In the Spatial Development Glossary: European Conference of Ministers responsible for Spatial and Regional Planning (CEMAT) ([73]) territorial development is a comprehensive concept also used as an objective of public policies ('territorial development policy'). This comprehensive character results from the fact that it does not only aim at economic growth in the respective regions, but also at sustainability in its economic, social, environmental and cultural aspects. Territorial development has therefore a highly qualitative dimension requiring substantial amounts of coherence in the conception and implementation of public policies.

However, the understanding of the notion of 'territorial' differs widely over Europe, although there is widespread consensus about possible elements of territorial, including places and geographical context, thus;

(1) policies should be differentiated according to the territorial context;
(2) thematic integration of different sectoral policies with impact on certain places (whatever the level) would be desirable — but is obviously difficult to achieve;

([71]) Internet: www.eionet.europa.eu/gemet/concept?langcode=en&cp=8398.
([72]) Collins Concise English Dictionary 3rd Edition, Harper Collins, 2002.
([73]) Internet: www.coe.int/t/dg4/cultureheritage/heritage/cemat/VersionGlossaire/Bilingue-en-fr.pdf.

(3) the involvement of actors from subnational levels (regions, municipalities) is crucial for the success of strategies and for the translation into the 'regional language of people' ([74]).

Present day territorial policy in the context of the EU and its member states is interpreted to encompass more than simply actions which determine the present and future use of parcels of land. It, in principle, must address broader issues associated with spatial, socio-economic and environmental difference, both within and between member states and regions.

Many (and perhaps most) environmental assets, constraints and impacts do not adhere to or respect political or administrative boundaries. Thus a territorial policy must go further than dictating the use of individual parcels of land to also address interrelationships between parcels of land and the inherent and imposed characteristics these contain and have an impact upon, directly and indirectly, over a potentially much wider area.

In addition, given the demographic characteristics of the EU, and the fundamental connection between natural and man-made land uses and the health, wealth and wellbeing of the EU citizens, a territorial policy should also seek to understand and reflect the important role environmental characteristics and services play in supporting our society, culture and economy both now and in the future.

Territorial policy is in essence seeking to promote territorial cohesion. However, any territorial policy is unlikely to be developed or implemented in isolation, rather, as part of broader initiatives relation to social and economic cohesion.

The work on regional and landscape characterisation is relevant here as it seeks to provide a baseline description of areas, or territories, of relatively homogeneous character in relation their fundamental environmental assets and features. The potential provides for a unit of planning and/or monitoring of change at different scales. This is discussed further in Chapter 5.

Territorial capital

Regional resources that are best suited to that area because they potentially use its assets effectively, and thus generate a higher return for specific kinds of investments ([75]). The concept is consistent with the Four Capitals Model of sustainable development (manufactured, natural, social, human capital) and would apply to the model at a regional level ([76]). These include:

(1) a localised set of common goods, producing non-divisible collective assets that cannot be privately owned;
(2) immovable, place-specific goods that are almost impossible to find elsewhere with the same features;
(3) heritage goods that are stocked and sediment over a long period and cannot be produced easily in a short time ([77]).

Territorial development policy

Territorial development policy is an approach that seeks to capitalise on regional diversity and ensures that citizens are able to make the most of the inherent features of these territories. Once territorial capital is maximized, integration and the movement of goods and services will be better achieved through territorial cohesion policy.

Territorial cohesion policy

Territorial cohesion policy is an approach that focuses on the integration of diverse regions while seeking to strengthen synergy and coherence among the various sectors and geographic regions and ensure equal access to services and infrastructure throughout the EU ([78]). It should be encapsulated in a concrete plan for implementation with a focus on territorial cooperation, facilitation of connectivity and territorial integration.

Spatial planning

Involves the integration of land use planning and sustainable development policies which influence

([74]) European Commission, 2005. *The Territorial State and Perspectives of the European Union: Towards a Stronger European Territorial Cohesion in Light of the Lisbon and Gothenburg Ambitions.* Draft (as of 18 Sept. 2006), based on Scoping Document discussed at the Informal Ministerial Meeting, Luxembourg, May 2006.
([75]) European Commission, 2005. *The Territorial State and Perspectives of the European Union*: Towards a Stronger European Territorial Cohesion in Light of the Lisbon and Gothenburg Ambitions. Based on Scoping Document discussed at the Informal Ministerial Meeting, Luxembourg, May 2005.
([76]) Internet: www.srdtools.info/summary.htm; Luxembourg meeting, 2005.
([77]) European Commission, 2007. *Shaping EU Regional Policy: Economic, Social and Political Pressures* (European Centre for the Development of Vocational Training, 2007).
([78]) 'Growing regions, growing Europe', *Fifth progress report on economic and social cohesion* (European Commission, 2008c).

the nature of places and how they function. Spatial planning should ensure fair access to infrastructure and services, policy at state and local level ([79]).

It should be noted that the EU has no formal authority for spatial planning, however in 1999 the European Spatial Development Perspective (ESDP) was signed by the ministers responsible for regional planning in the EU member states. Although the ESDP has no binding status it has influenced spatial planning policy in European regions and member states, and placed the coordination of EU sectoral policies on the political agenda.

At the European level, the term 'territorial cohesion' is becoming more widely used than spatial planning, however the use of terminology and practice in territorial and spatial planning policy varies considerably between Member States with different traditions and approaches in this area.

The European Spatial Planning Observation Network (ESPON) is a European applied research network which observes the spatial development of the European Union. It intends to provide policy makers on the European, national and regional level with information on territorial trends and impacts of spatial policies. In relation to territorial cohesion, it has be elaborated further using empirical data from the ESPON programme in The Territorial State and Perspectives of the European Union.

([79]) Comments from Norway on Territorial Cohesion. Available online from: www.regjeringen.no/en/dep/krd/documents/other-documents/letters/selected-letters/2009/the-public-consultation-on-the-green-pap.html?id=547525.

Annex 3 Territorial aspects already addressed in Impact Assessment

Table A3.1 Economic impacts

ECONOMIC IMPACTS	KEY QUESTIONS
Functioning of the internal market and competition	– What impact (positive or negative) does the option have on the free movement of goods, services, capital and workers? — Will it lead to a reduction in consumer choice, higher prices due to less competition, the creation of barriers for new suppliers and service providers, the facilitation of anti-competitive behaviour or emergence of monopolies, market segmentation, etc?
Competitiveness, trade and investment flows	– What impact does the option have on the global competitive position of EU firms? Does it impact productivity — What impact does the option have on trade barriers? — Does it provoke cross-border investment flows (including relocation of economic activity)?
Operating costs and conduct of business/Small and Medium Enterprises	– Will it impose additional adjustment, compliance or transaction costs on businesses? – How does the option affect the cost or availability of essential inputs (raw materials, machinery, labour, energy, etc.)? — Does it affect access to finance? — Does it impact on the investment cycle? — Will it entail the withdrawal of certain products from the market? Is the marketing of products limited or prohibited? — Will it entail stricter regulation of the conduct of a particular business? — Will it lead to new or the closing down of businesses? — Are some products or businesses treated differently from others in a comparable situation?
Administrative burdens on businesses	– Does it affect the nature of information obligations placed on businesses (for example, the type of data required, reporting frequency, the complexity of submission process)? — What is the impact of these burdens on SMEs in particular?
Public authorities	– Does the option have budgetary consequences for public authorities at different levels of government (national, regional, local), both immediately and in the long run? — Does it bring additional governmental administrative burden? — Does the option require the creation of new or restructuring of existing public authorities?
Property rights	– Are property rights affected (land, movable property, tangible/intangible assets)? Is acquisition, sale or use of property rights limited? Or will there be a complete loss of property?
Innovation and research	– Does the option stimulate or hinder research and development? — Does it facilitate the introduction and dissemination of new production methods, technologies and products? — Does it affect intellectual property rights (patents, trademarks, copyright, other know-how rights)? — Does it promote or limit academic or industrial research? — Does it promote greater productivity/ resource efficiency?
Consumers and households	– Does the option affect the prices consumers pay? – Does it impact on consumers' ability to benefit from the internal market? – Does it have an impact on the quality and availability of the goods/services they buy, on consumer choice and confidence? (cf. in particular non-existing and incomplete markets — see Annex 8) — Does it affect consumer information and protection? — Does it have significant consequences for the financial situation of individuals/households, both immediately and in the long run? — Does it affect the economic protection of the family and of children?
Specific regions or sectors	– Does the option have significant effects on certain sectors? — Will it have a specific impact on certain regions, for instance in terms of jobs created or lost? — Is there a single Member State, region or sector which is disproportionately affected (so-called 'outlier' impact)?
Third countries and international relations	– How does the option affect trade or investment flows between the EU and third countries? How does it affect EU trade policy and its international obligations, including in the WTO? — Does the option affect specific groups (foreign and domestic businesses and consumers) and if so in what way? — Does the option concern an area in which international standards, common regulatory approaches or international regulatory dialogues exist? — Does it affect EU foreign policy and EU/EC development policy? — What are the impacts on third countries with which the EU has preferential trade arrangements? — Does it affect developing countries at different stages of development (least developed and other low-income and middle income countries) in a different manner? — Does the option impose adjustment costs on developing countries? — Does the option affect goods or services that are produced or consumed by developing countries?
Macroeconomic environment	– Does it have overall consequences of the option for economic growth and employment? -How does the option contribute to improving the conditions for investment and the proper functioning of markets? — Does the option have direct impacts on macro-economic stabilisation?

Table A3. 2 Social impacts

SOCIAL IMPACTS	KEY QUESTIONS
Employment and labour markets	– Does the option facilitate new job creation? — Does it lead directly or indirectly to a loss of jobs? — Does it have specific negative consequences for particular professions, groups of workers, or self-employed persons? — Does it affect particular age groups? — Does it affect the demand for labour? — Does it have an impact on the functioning of the labour market? — Does it have an impact on the reconciliation between private, family and professional life?
Standards and rights related to job quality	– Does the option impact on job quality? – Does the option affect the access of workers or job-seekers to vocational or continuous training? — Will it affect workers' health, safety and dignity? — Does the option directly or indirectly affect workers' existing rights and obligations, in particular as regards information and consultation within their undertaking and protection against dismissal? — Does it affect the protection of young people at work? — Does it directly or indirectly affect employers' existing rights and obligations? — Does it bring about minimum employment standards across the EU? — Does the option facilitate or restrict restructuring, adaptation to change and the use of technological innovations in the workplace?
Social inclusion and protection of particular groups	– Does the option affect access to the labour market or transitions into/out of the labour market? — Does it lead directly or indirectly to greater equality or inequality? — Does it affect equal access to services and goods? — Does it affect access to placement services or to services of general economic interest? — Does the option make the public better informed about a particular issue? — Does the option affect specific groups of individuals (for example the most vulnerable or the most at risk of poverty, children, women, elderly, the disabled, unemployed or ethnic, linguistic and religious minorities, asylum seekers), firms or other organisations (for example churches) or localities more than others? — Does the option significantly affect third country nationals?
Gender equality, equality treatment and opportunities, non discrimination	– Does the option affect the principle of non-discrimination, equal treatment and equal opportunities for all? – Does the option have a different impact on women and men? — Does the option promote equality between women and men? — Does the option entail any different treatment of groups or individuals directly on grounds of sex, racial or ethnic origin, religion or belief, disability, age, and sexual orientation? Or could it lead to indirect discrimination?
Individuals, private and family life, personal data	– Does the option impose additional administrative requirements on individuals or increase administrative complexity? — Does the option affect the privacy, of individuals (including their home and communications)? -Does it affect the right to liberty of individuals? — Does it affect their right to move freely within the EU? — Does it affect family life or the legal, economic or social protection of the family? — Does it affect the rights of the child? — Does the option involve the processing of personal data or the concerned individual's right of access to personal data?
Governance, participation, good administration, access to justice, media and ethics	– Does the option affect the involvement of stakeholders in issues of governance as provided for in the Treaty and the new governance approach? - Are all actors and stakeholders treated on an equal footing, with due respect for their diversity? Does the option impact on cultural and linguistic diversity? — Does it affect the autonomy of the social partners in the areas for which they are competent? Does it, for example, affect the right of collective bargaining at any level or the right to take collective action? — Does the implementation of the proposed measures affect public institutions and administrations, for example in regard to their responsibilities? — Will the option affect the individual's rights and relations with the public administration? — Does it affect the individual's access to justice? — Does it foresee the right to an effective remedy before a tribunal? — Does the option make the public better informed about a particular issue? Does it affect the public's access to information? — Does the option affect political parties or civic organisations? — Does the option affect the media, media pluralism and freedom of expression? — Does the option raise (bio) ethical issues (cloning, use of human body or its parts for financial gain, genetic research/testing, use of genetic information)?
Public health and safety	– Does the option affect the health and safety of individuals/populations, including life expectancy, mortality and morbidity, through impacts on the socio-economic environment (working environment, income, education, occupation, nutrition)? — Does the option increase or decrease the likelihood of health risks due to substances harmful to the natural environment? — Does it affect health due to changes in the amount of noise, air, water or soil quality? — Will it affect health due to changes energy use and/or waste disposal? — Does the option affect lifestyle-related determinants of health such as diet, physical activity or use of tobacco, alcohol, or drugs? — Are there specific effects on particular risk groups (determined by age, gender, disability, social group, mobility, region, etc.)?
Crime, Terrorism and Security	– Does the option improve or hinder security, crime or terrorism? — Does the option affect the criminal's chances of detection or his/her potential gain from the crime? — Is the option likely to increase the number of criminal acts? — Does it affect law enforcement capacity? — Will it have an impact on secur– ty interests? — Will it have an impact on the right to liberty and security, right to fair trial and the right of defence? — Does it affect the rights of victims of crime and witnesses?
Access to and effects on social protection, health and educational systems	– Does the option have an impact on services in terms of quality/access for all? – Does it have an effect on the education and mobility of workers (health, education, etc.)? — Does the option affect the access of individuals to public/private education or vocational and continuing training? — Does it affect the cross-border provision of services, referrals across borders and co-operation in border regions? — Does the option affect the financing/organisation/ access to social, health and care services? — Does it affect universities and academic freedom/ self-governance?

Culture	– Does the proposal have an impact on the preservation of cultural heritage? — Does the proposal have an impact on cultural diversity? — Does the proposal have an impact on citizens' participation in cultural manifestations, or their access to cultural resources?
Social impacts in third countries	– Does the option have a social impact on third countries that would be relevant for overarching EU policies, such as development policy? — Does it affect international obligations and commitments of the EU arising from e.g. the ACP-EC Partnership Agreement or the Millennium Development Goals? — Does it increase poverty in developing countries or have an impact on income of the poorest populations?

Table A3. 3 Environmental impacts

ENVIRONMENTAL IMPACTS	KEY QUESTIONS
The climate	– Does the option affect the emission of greenhouse gases (e.g. carbon dioxide, methane etc) into the atmosphere? — Does the option affect the emission of ozone-depleting substances (CFCs, HCFCs etc)? — Does the option affect our ability to adapt to climate change?
Transport and the use of energy	– Does the option affect the energy intensity of the economy? — Does the option affect the fuel mix (between coal, gas, nuclear, renewables etc) used in energy production? — Will it increase or decrease the demand for transport (passenger or freight), or influence its modal split? — Does it increase or decrease vehicle emissions? — Will the option increase/decrease energy and fuel needs/consumption?
Air quality	– Does the option have an effect on emissions of acidifying, eutrophic, photochemical or harmful air pollutants that might affect human health, damage crops or buildings or lead to deterioration in the environment (soil or rivers, etc.)?
Biodiversity, flora, fauna	– Does the option reduce the number of species/varieties/races in any area
and landscapes	(i.e. reduce biological diversity) or increase the range of species (e.g. by promoting conservation)? — Does it affect protected or endangered species or their habitats or ecologically sensitive areas? — Does it split the landscape into smaller areas or in other ways affect migration routes, ecological corridors or buffer zones? — Does the option affect the scenic value of protected landscape?
Water quality and	– Does the option decrease or increase the quality or quantity of freshwater
resources	and groundwater? — Does it raise or lower the quality of waters in coastal and marine areas (e.g. through discharges of sewage, nutrients, oil, heavy metals, and other pollutants)? — Does it affect drinking water resources?
Soil quality or resources	– Does the option affect the acidification, contamination or salinity of soil, and soil erosion rates? — Does it lead to loss of available soil (e.g. through building or construction works) or increase the amount of usable soil (e.g. through land decontamination)?
Land use	– Does the option have the effect of bringing new areas of land ('greenfields') into use for the first time? — Does it affect land designated as sensitive for ecological reasons? Does it lead to a change in land use (for example, the divide between rural and urban, or change in type of agriculture)?
Renewable or non renewable resources	– Does the option affect the use of renewable resources (fish etc) and lead to their use being faster than they can regenerate? — Does it reduce or increase use of non-renewable resources (groundwater, minerals, etc.)?
The environmental consequences of firms and consumers	– Does the option lead to more sustainable production and consumption? — Does the option change the relative prices of environmental friendly and unfriendly products? — Does the option promote or restrict environmentally un/friendly goods and services through changes in the rules on capital investments, loans, insurance services etc? — Will it lead to businesses becoming more or less polluting through changes in the way in which they operate?
Waste production/ generation/recycling	– Does the option affect waste production (solid, urban, agricultural, industrial, mining, radioactive or toxic waste) or how waste is treated, disposed of or recycled?
The likelihood or scale of environmental risks	– Does the option affect the likelihood or prevention of fire, explosions, breakdowns, accidents and accidental emissions? — Does it affect the risk of unauthorised or unintentional dissemination of environmentally alien or genetically modified organisms?
Animal welfare	– Does the option have an impact on health of animals? — Does the option affect animal welfare (i.e. humane treatment of animals)? — Does the option affect the safety of food and feed?
International environmental impacts	– Does the option have an impact on the environment in third countries that would be relevant for overarching EU policies, such as development policy?

Source: European Commission (2009b), Impact Assessment Guidelines 15 January 2009, SEC(2009)92), pp. 32–37.

Annex 4 Abbreviations

AEnZ	Agri-Environmental Zonation
CAP	Common Agricultural Policy
CARDS	Community Assistance for Reconstruction, Development and Stabilisation
CLC	Corine Land Cover
DG	Directorate General
DMEER	Digital Map of European Ecological Regions
DPSIR	Driving forces, Pressures, States, Impacts, Responses
EC	European Commission
ECCP	European Climate Change Programme
EEA	European Environment Agency
Eionet	European Environment Information and Observation Network
EnC	Environmental Classification of Europe
ENEA	European Network of Environmental Authorities
EnS/EnZ	Environmental Stratification of Europe (EnS) consists of 84 strata, which have been aggregated into 13 Environmental Zones (EnZ)
E-PRTR	European pollutant release and transfer register
ERDF	European Regional Development Fund
ERPG	European Regional Policy Group
ESPACE	European Spatial Planning: Adapting to Climate Events
ESDP	European Spatial Development Perspective
ESF	European Social Fund
ESPON	European Spatial Planning Observation Network
ETC-LUSI	European Topic Centre on Land Use and Spatial Information
EU	European Union
EURECA	European Ecosystem Assessment

GDP	Gross Domestic Product
GIS	Geographic information system
HNV	High Nature Value
IKSMS	International Commission for the Protection of Mosel and Saar
INSPIRE	Infrastructure for Spatial Information in Europe
ISPA	Instrument for Structural Policies for Pre-Accession
LANMAP	Environmental Classification of Europe and European Landscape Classification
MS	Member State
NAP	National Action Programme
OECD	Organisation for Economic Co-operation and Development
PHARE	Poland and Hungary: Assistance for Restructuring their Economies
SAC	Special Areas of Conservation
Sapard	Special accession programme for agriculture and rural development
SDS	Sustainable Development Strategy
SEA	Strategic Environmental Assessment
SEIS	Shared environment information system
SME	Small and medium enterprises
SOER2010	(EEA) State of the Environment Report 2010
SPA	Special Protection Area
SRRF	Spatial Regional Reference Framework
TEN	Trans-European Networks
UNCCD	United Nations Convention to Combat Desertification
WFD	Water Framework Directive

Annex 5 Characterisation of European territories

Background

According to the Green paper on Territorial Cohesion (European Commission, 2008a) territorial cohesion is about ensuring the harmonious development of places and about making sure that their citizens are able to make the most of inherent features of these territories. As such, it is a means of transforming diversity into an asset that contributes to sustainable development of the entire EU.

The Green paper further expresses the need to coordinate and integrate a set of policy actions at the level of a given territory. This given territory is to prove **internal coherence or functionality** that forms a logic base for policymakers and stakeholders **to exploit common territorial capital and to tackle common challenges**.

The appearance of **new geographies** which is recognised in the Green Paper on Territorial Cohesion demands a stronger role for future EU Cohesion Policy for new types of functionally defined territories.

The aim of the current work was to develop one such 'new geography' which supports their territorial identity through the identification of natural and environmental assets. The characterisation of territories provides baseline information about the environmental 'value' of a specific region, i.e. if the region owns environmental assets that make it unique and that hence could support the development of the region by properly and sustainably exploiting the asset item.

The methodological approach is based on geospatial analysis of different input data sets (indicators) which are combined with each other and jointly analysed.

Input data

As input data sets mostly data of 'environmental' or 'natural' concerns sets were chosen. As the objective of the characterisation was to differentiate regions in Europe based on environmental assets, we deliberately excluded socio-economic data from the analysis as much as possible. These data can be integrated with the results at a later stage.

Already in 1999, the Final Report, Chapter 1.6, of the EC Study Programme on European Spatial Planning has described the criterion 'natural assets' as 'characteristics of ecosystems and other natural areas — their relative importance, sensitivity, size or rarity. It can supply a basis for the assessment of related functions of different natural assets across Europe and the habitat of different species. It may also supply the basis for a certain division of tasks regarding the development of specific types of nature. It is, therefore, a conception strictly focused towards a sectorial vision: the assessment of the territories according to importance, sensitivity, size or the rarity of its natural elements.'

In our study we suggest the need to understand environmental assets as characteristics of landscape regions/ecosystems that are of a natural character, unique in their direct spatial context and useable for different functions, e.g. as source and sink, or as item with service function (recreation, sustainable use, etc.).

The following data sets were considered at the start of the classification.

Data sets on 'rural' typologies from the FARO-EU project were not available at the start of the project therefore the 'urban-rural' typology from the Green Paper was used instead.

Data processing

Cell size

All input data sets were resampled to 10x10 km grid cells to enable efficient processing and to allow later aggregation of the results into different reporting units (e.g. administrative regions, watersheds …). The majority class was assigned to the new output cell.

Table A5.1 Potential input data sets

Title	Description	Source
Proximity natural areas	Proximity to natural areas (N2000, CLC semi-natural classes, water)	Annex to green Paper (REGIO GIS)
Urban rural typology	Regional population living at more than 45 minutes driving time from city centres (> 50 000 inhab.)	Annex to green Paper (REGIO GIS)
Air quality	PM_{10} emissions	EMEP data
High nature value farmlands	Presence of HNV farmlands	JRC
Degree of soil sealing	Percentage of sealed (artificial) area per grid cell	EEA
Effective meshsize	Fragmentation by urban areas and transport infrastructure; size of unfragmented areas	ETC LUSI, EEA
Diversity of Habitats	Number of habitats per grid cell	ETC BD, EEA
Dynamic areas (negative impact)	LEAC flows with negative impact on the environment (urban sprawl, intensification of agriculture)	EEA
Dynamic areas (extension of forest)	LEAC flows (extension of forest)	EEA
Dominant landscape types	Based on neighbourhood	EEA
Rural typologies	Accessibility & GDP	FARO-EU

All input data were available in a grid version as were the data from the Green Paper which had been aggregated to NUTS regions only for the purpose of map making. The original input data was raster data.

Class definition

The range of values in the different input data sets was standardised to five classes. These five classes were assumed to represent a gradient of 'natural and environmental assets' for each grid cell.

The distribution of input data values to the five output classes were based on the median of the original data and their standard deviation. Scores are attributed to each class.

For each input data set class specific thresholds were defined based on the actually occurring data values. Table A5.3 provides an overview of the class boundaries used in the characterisation.

For the following data sets the rule for threshold definition was changed:

(i) rural typologies: data are already in 4 categories, an 'average environmental asset' class was not assigned;
(ii) HNV farmlands: the existing classification thresholds were kept;
(iii) dominant landscape types: the categorical data were assigned according to class name (landscape type).

Processing

Only regions where all input data are present are considered for processing.

Each grid cell contains a score according to each of the individual input data sets. The scores in each grid cell are summed up to calculate an overall score. The results of the data processing are classified in a similar way as the input data sets based on median and standard deviation.

Table A5.2 Definition of class boundaries

Class name	Definition	Score
Very low natural assets	Average > – 1.5 standard deviations	1
Low natural assets	Average – 0.5 to – 1.5 standard deviations	3
Average natural assets	Average +/– 0.5 standard deviations	6
High natural assets	Average + 0.5 to + 1.5 standard deviations	10
Very high natural assets	Average > + 1.5 standard deviations	15

Table A5.3 Thresholds of class definition

		Very low env. assets	Low env. assets	Average env. assets	High env. assets	Very high env. assets
	Assessment	1	3	6	10	15
ID	Name	Class 1	Class 2	Class 3	Class 4	Class 5
1	Habitats	x	x	x	x	x
2	Urban-Rural	1	21	22	31	32
21	Rural typologies	1	2	x	4	5
3	High nature value Farmlands	0	0-25	25-50	50-75	75-100
4	Fragmentation (Meff)	0-10	11-96	97-301	302-947	948-44638
5	Proximity to nature area	0-4	4-34	34-65	65-95	95-100
6	PM 10	>56	50-64	30-49	20-29	0-19
8.1	Land Cover Flow - negative	40-100	19-39	6-18	1-5	0
8.2	Land Cover Flow - forest	x	x	x	26-50	51-100
9	Soil Sealing	51-100	37-51	23-37	9-23	0-9
10	Dominant Landscape Types	1	2/3	4/7	x	5/6

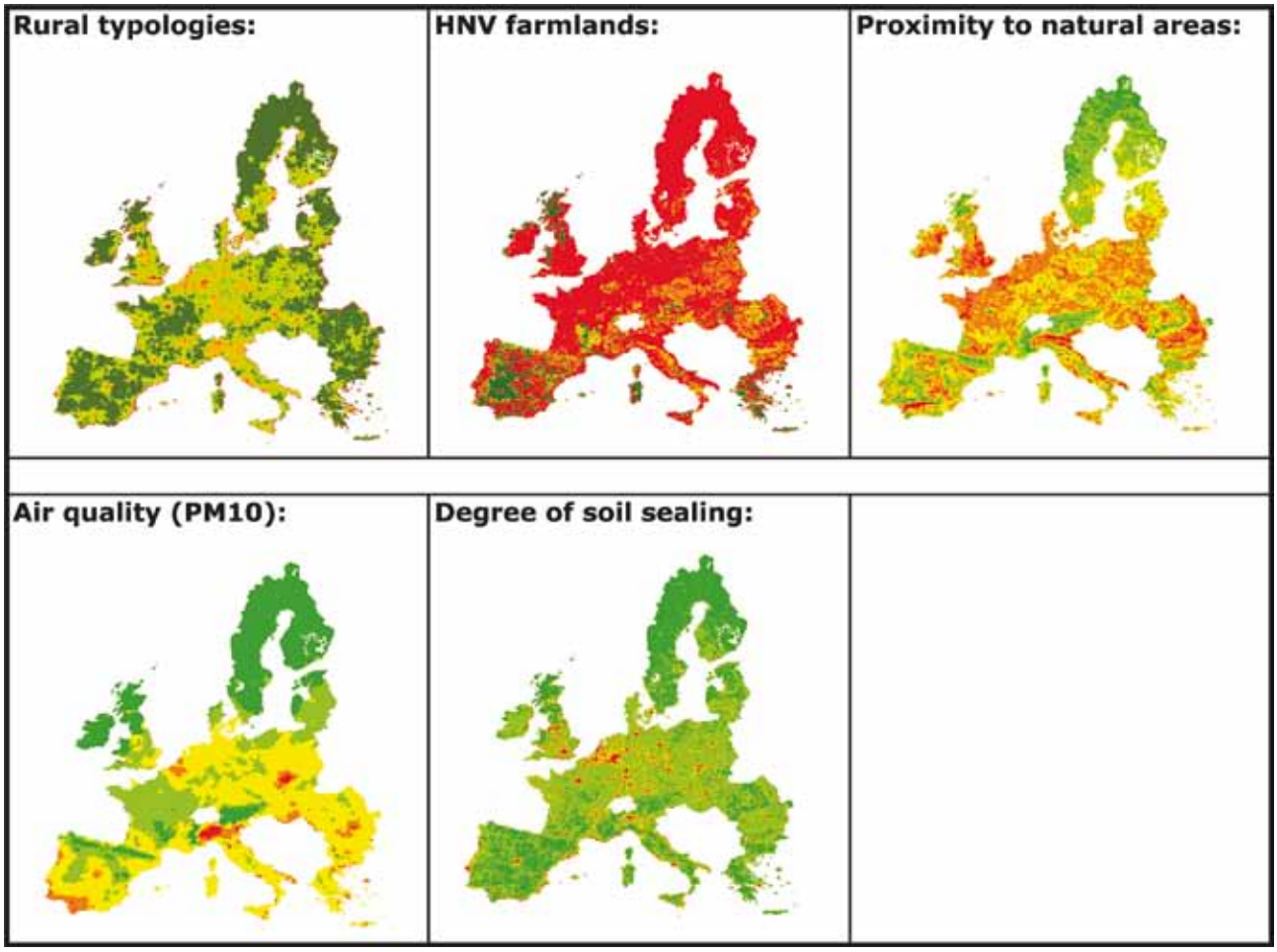
Data reduction

After a first trial with all input data sets, we analysed the correlation between the different input data sets and removed those which had a correlation factor (r) above 0.75.

Table A5.4 Correlation matrix between input data sets

Correlation [%]	02 Urbun Rural	03 HNV	04 Fragmenatition	05 Proxymity	06 PM10	081 CLC Urban	082 CLC Forest	09 Soil	10 Dom LandType
02 Urbun Rural	1.000	0.239	0.244	0.255	0.211	0.223	0.064	0.328	0.183
03 HNV		1.000	0.501	0.450	0.160	0.348	0.210	0.407	0.368
04 Fragmenatition			1.000	0.415	0.201	0.277	0.081	0.510	0.268
05 Proxymity				1.000	0.255	0.419	0.277	0.462	0.519
06 PM10					1.000	0.494	0.359	0.626	0.435
081 CLC Urban						1.000	0.793	0.510	0.817
082 CLC Forest							1.000	0.286	0.820
09 Soil								1.000	0.478
10 Dom LandType									1.000

Map A5.1 Illustration of input data sets



The input data used for the second and final classification were:

Urban — rural typologies/Rural typologies ([80]);

High nature value farmlands;

Proximity to natural areas (CLC semi-natural classes, N2000, CLC water);

Air quality (PM_{10});

Degree of soil sealing.

Other layers were not considered in the final output (MapA5.2) of the analysis as they are either highly correlated to each other or do not contribute to the message of the assessment.

The input data are classified based on their inherent differences, without a subjective rating what is good or bad, i.e. areas in Northern Scandinavia with a low amount of total farmland consequently score also low in the presence of high nature value farmlands which does not mean that these regions have little natural areas as can be seen in the representation of 'proximity to natural areas'.

([80]) After reception of the FARO-EU rural typology data, it was used to replace the urban-rural typology from the Green Paper.

Calculation

The degree of 'natural and environmental assets' is calculated from the sum of the individual layers.

The range of values is between 5 (= 5 x 1) and 75 (= 5 x 15). The class boundaries for assigning the regions are again based on average and standard deviation:

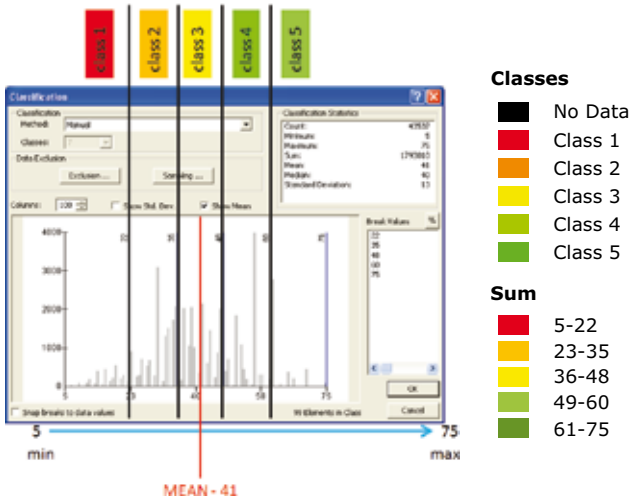


Table A5.5 Class assignment for characterisation of regions

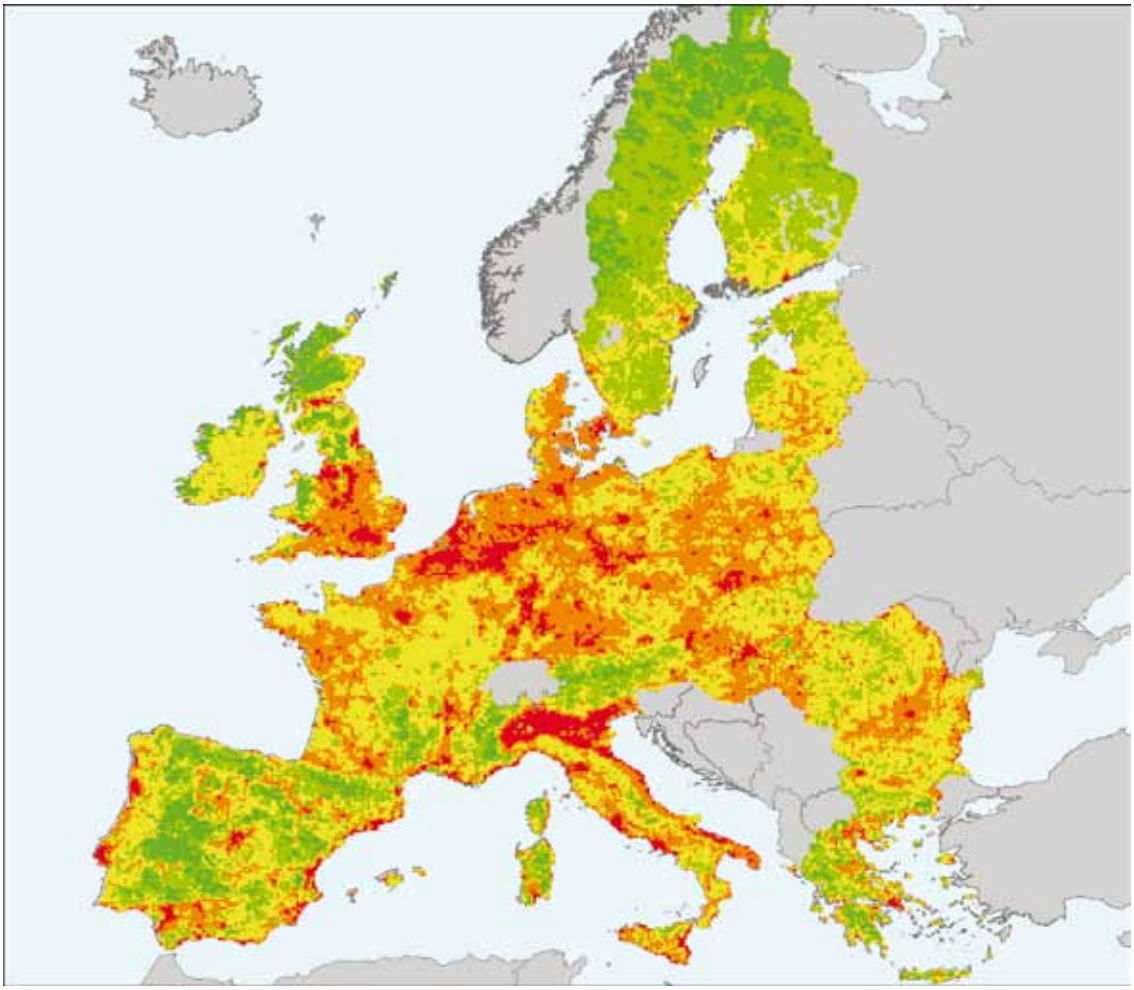
Class name	Definition	Surface
Very low natural assets	5–22 points	268 600
Low natural assets	23–35 points	1 147 000
Average natural assets	36–48 points	1 597 500
High natural assets	49–60 points	929 000
Very high natural assets	61–75 points	411 600

Results

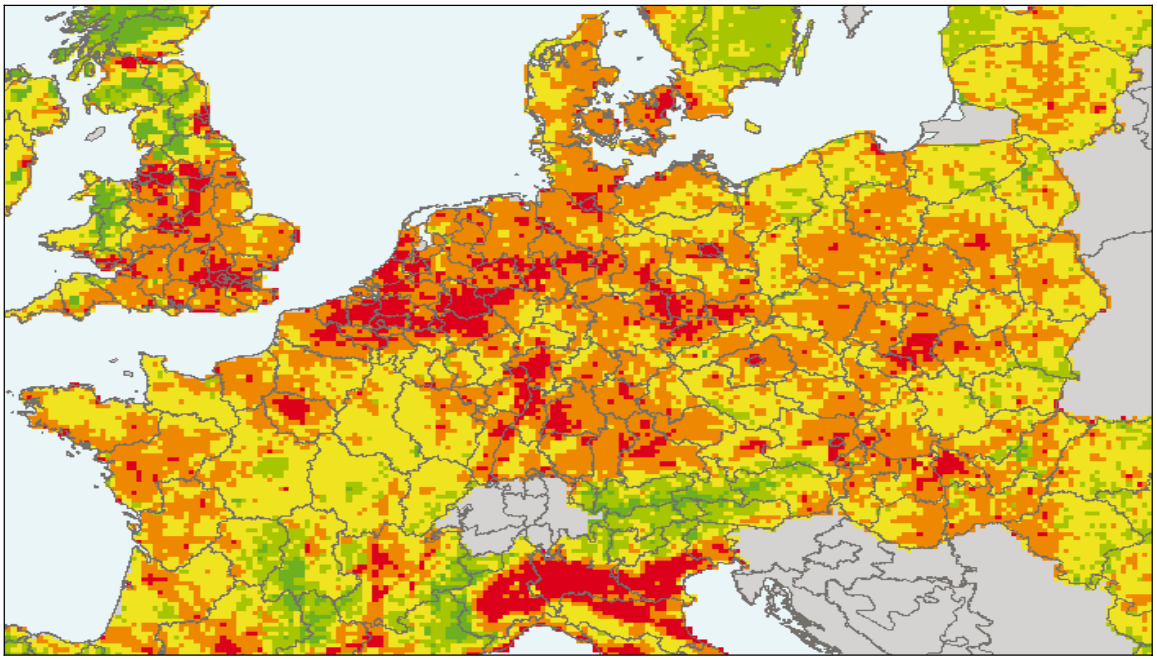
The characterisation of European regions according to their degree of environmental and natural assets is based on a classification of grid cell of 10 x 10 km.

Figure A5.1 Legend for 'degree of natural and environmental assets'

Map A5.2 Regional characterisation (raw data, 10 x 10 km grid)

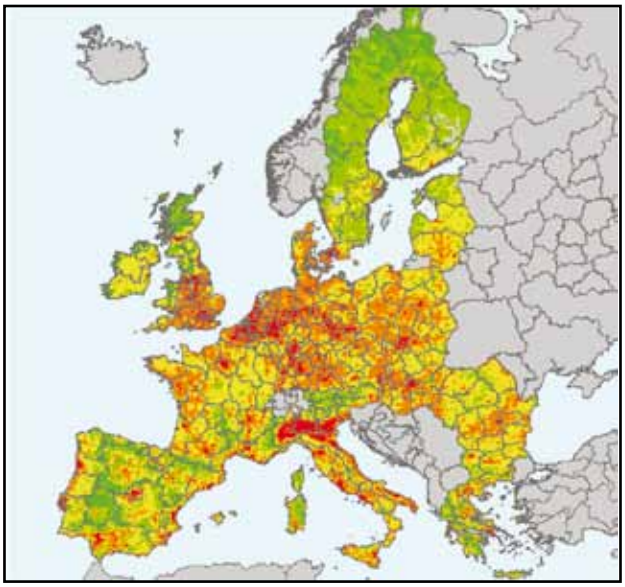


Map A5.3 Zoom on Central and Western Europe

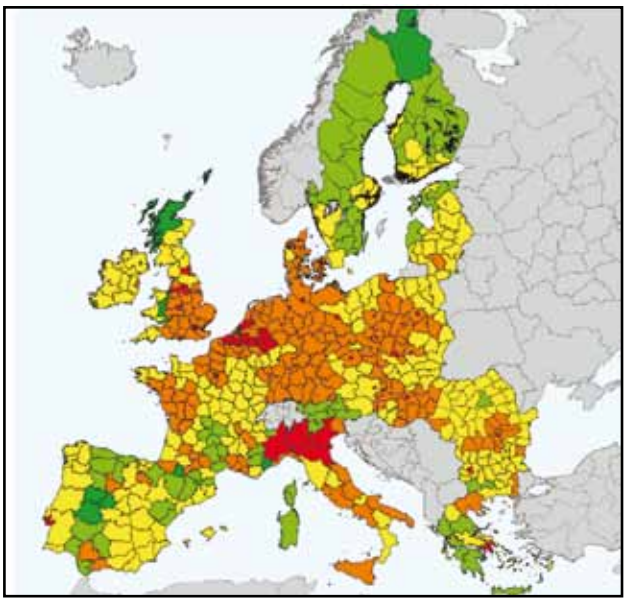


The results can be displayed and aggregated in various ways:

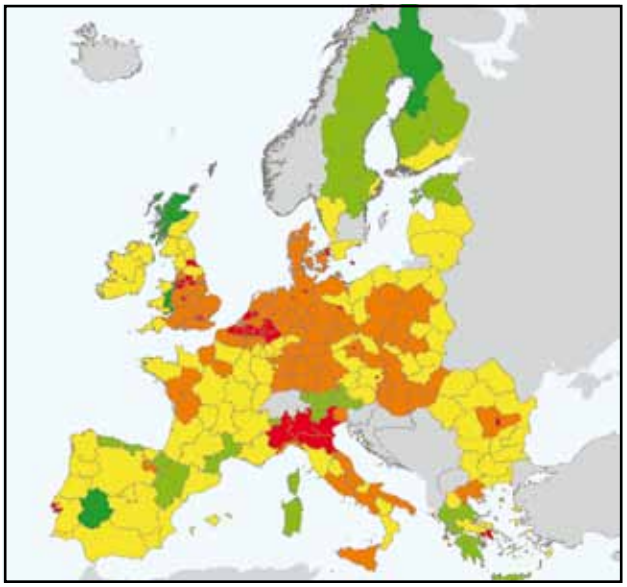
Map A5.4 Aggregation of data to administrative boundaries



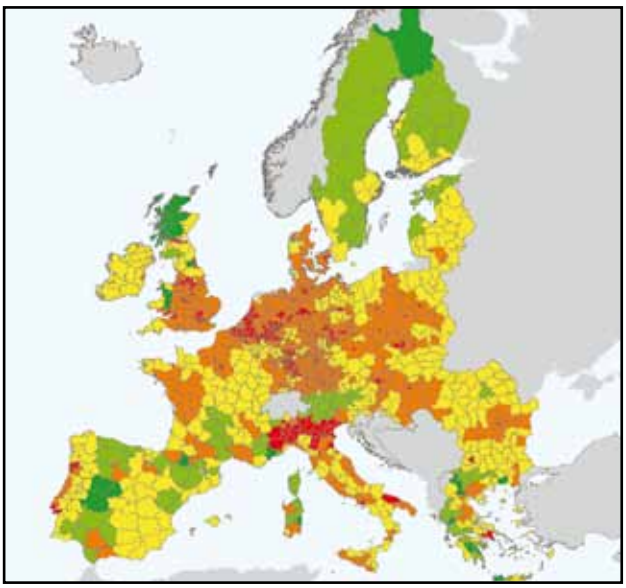
Raw data (10 x 10 km grid) with administrative boundaries



Data aggregated to NUTS 2/3 regions, i.e. classification of NUTS 2/3 regions based on the natural and environmental assets



Data aggregated to NUTS 2 regions, i.e. classification of NUTS 2 regions based on the natural and environment assets



Data aggregated to NUTS 3 regions, i.e. classification of NUTS 3 regions based on the natural and environment assets

Creation of homogeneous regions

In addition to the aggregation of the grid data to a given reporting unit, like NUTS regions, the grid data itself can be used to create homogeneous regions directly from the raw data.

By eliminating small areas and filtering the data can be generalised and larger homogeneous regions can be derived (Map A5.5).

These homogeneous regions can then be further characterised by adding additional information

to the resulting regions. This will then allow differentiating for example similar (dark green) regions in Spain, Scotland or Scandinavia based on their dominating land cover types, their biogeographic regions or population density.

This attribution of the homogeneous regions has not yet been finished.

Figure A5.2 shows the list of countries sorted by their degree of natural and environmental assets. Countries with a low degree of natural assets are listed first. Due to the resolution of the grid data (10 x 10 km) Malta was dominated by a low degree of environmental assets. This can be corrected by using the high resolution data (1 x 1 km) which was tested as well, but considered too fine for European level analyses.

Map A5.5 Homogeneous regions of environmental assets

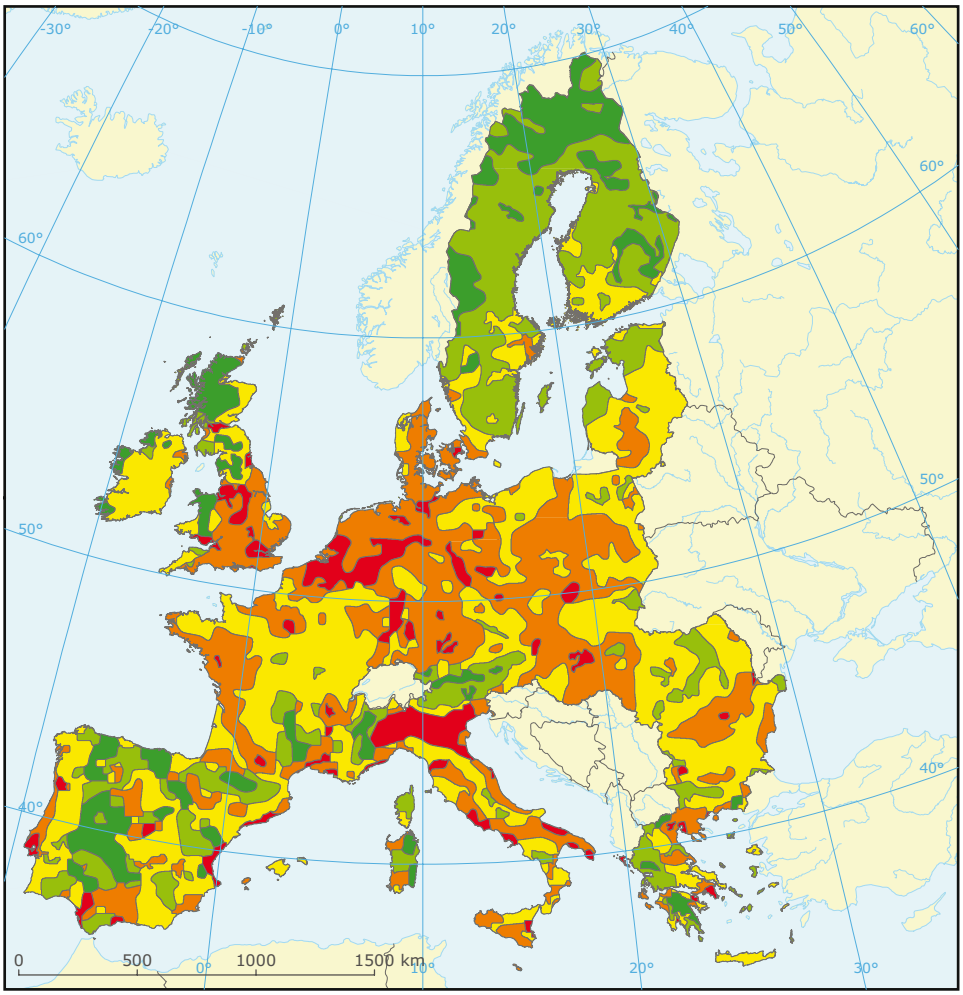
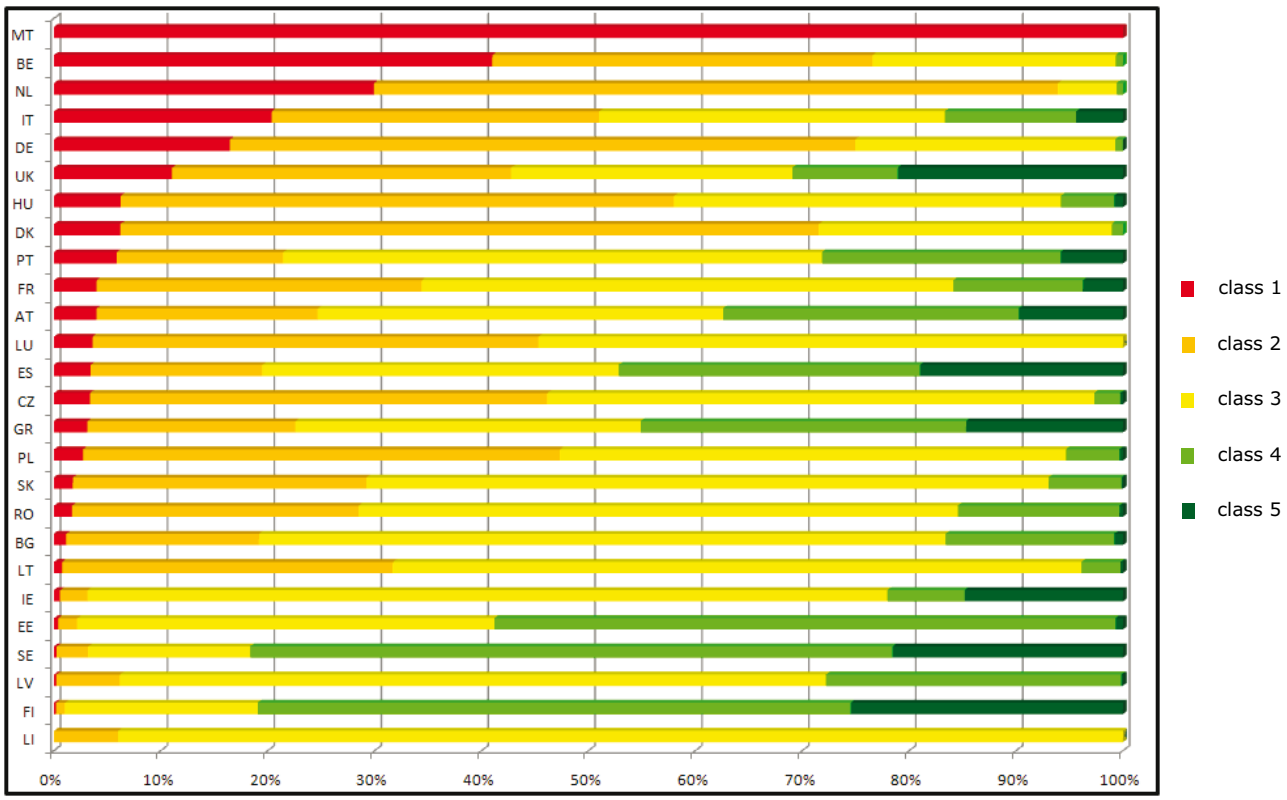


Figure A5.2 Country statistics



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