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Territorial cohesion and water management in Europe: the spatial perspective

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European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark
Tel.: +45 33 36 71 00
Fax: +45 33 36 71 99
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

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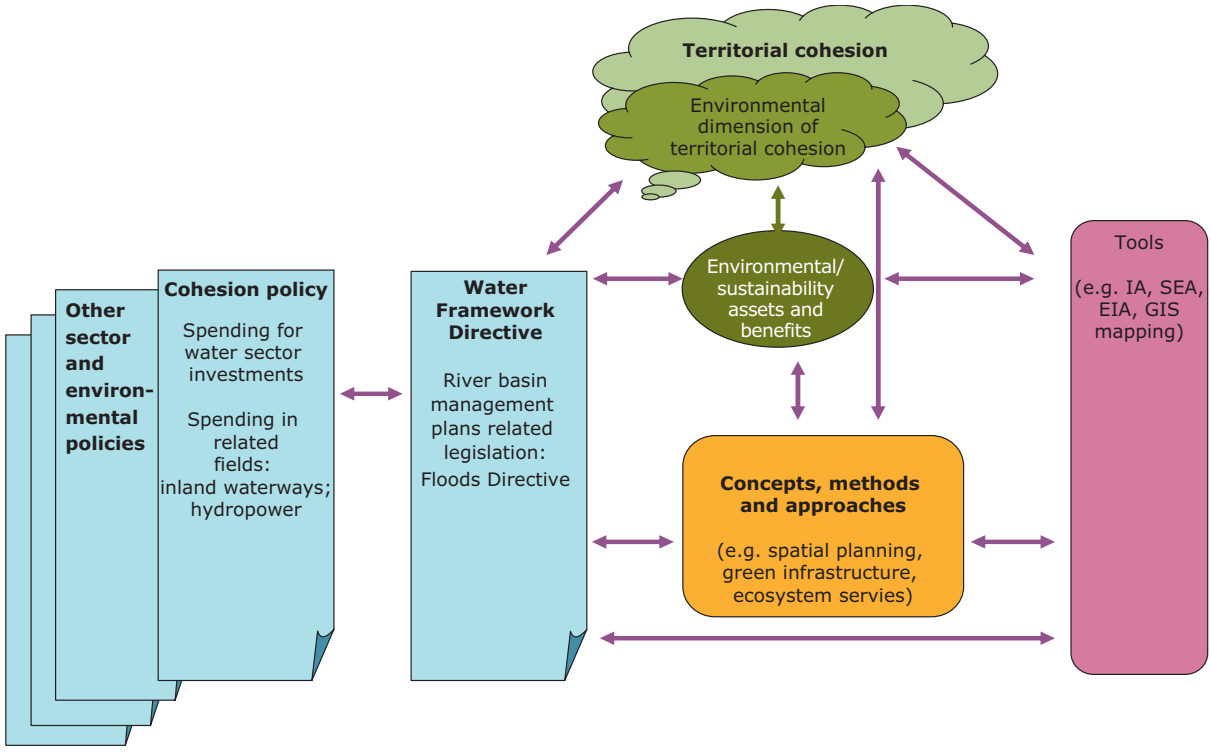
Executive summary

The scope

This report considers the links between water management in the EU — especially the implementation of the Water Framework Directive (WFD) — and territorial cohesion ([1]), in the perspective of spatial analysis ([2]) and spatial planning ([3]). It looks at the role of spatial analysis and planning for the implementation of the Directive as well as related provisions such as the Floods Directive and the development and implementation of River Basin Management Plans (RBMPs). It considers links between Regional Policy ([4]) and water management in the EU, including the lessons from a spatial perspective. It further looks at cross-country cooperation, a key element of both the WFD and territorial cohesion and finally considers future challenges for implementation of the Directive and the development of RBMPs, in particular considering the spatial context.

Figure ES.1 Detailed framework providing an overview of the report



([1]) 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 in Green Paper on Territorial Cohesion). See: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0616:FIN:EN:PDF for more information.
([2]) See http://en.wikipedia.org/wiki/Spatial_analysis for more information.
([3]) See http://glossary.eea.europa.eu/terminology/concept_html?term=spatial%20planning for more information.
([4]) See http://ec.europa.eu/regional_policy/index_en.cfm for more information.

The issue

The spatial dimension is particularly important for water management. The centre piece of EU water legislation, the WFD, has a strong territorial context and it is implemented through river basin districts, which are based on natural geographic catchment areas rather than existing administrative boundaries.

A review of academic literature and initial work to develop RBMPs shows that the links to these plans and spatial analysis and planning are weak in many countries. One reason is that water management and spatial planning have traditionally been carried out by separate structures and follow different traditions. A practical obstacle is that spatial planning usually follows administrative boundaries, while RBMPs, in principal, follow topographic/geographic boundaries.

The governance structures in the countries face differing political, socio-economic and historical contexts which affect the way in which administrative systems are managed. In Italy, for example, regional borders only match those of river basin districts for the two large islands of Sardinia and Sicily. Planning along natural geographic boundaries is a new approach at EU level and in many countries as well. In contrast, spatial planning is often a long-standing process. In some countries, such as the United Kingdom, spatial planning is hierarchical, with national or regional plans providing a framework for those at the local level.

From an environmental perspective, planning for administrative areas that do not match natural geographic boundaries can create externalities: costs can fall on those who do not benefit, as in the case of water pollution from agriculture and industry from one territory ([5]) that flows downstream to others; and benefits may go to those outside the territory who have not paid for them — this can be the case for ecosystem services such as those provided by forests in one territory that regulate floodwaters downstream.

Planning along natural boundaries such as river basins provides a way to address these externalities. In practice, River Basin Districts (RBDs) boundaries co-exist with existing planning administrative areas nonetheless. A study of the application of the Directive in Germany notes that this new approach on top of the existing administrative units such as the Bundesländer, creates overlaps and potential conflicts in the jurisdictions and interests of key actors. While the new system addresses the previous problem of externalities that can occur when water pollution or other problems created in one territory affects the environment in another, it requires a new level of interaction and negotiations among administrative units. The Directive thus creates a new element of complexity. In Germany, these difficulties have been addressed through coordination mechanisms among the Bundesländer that share RBDs.

Another practical issue is that spatial planning and river basin planning follow different timescales in most countries. However, this is related to a broader issue, the lack of a legislative or policy framework at national or regional level to bring the two planning processes together. A further problem that has been identified in recent studies is the lack of shared knowledge and sufficient resources for integration.

In practice it appears that spatial planning has not been strongly linked with the first round of RBMPs, completed in December 2009. A review of six draft RBMPs (2009) found that less than half have strong links with spatial planning. A review of countries in the Baltic Sea region found that spatial planning and water management remained separate systems in most countries; moreover, the implementation of the WFD had not brought stronger integration of the two.

These results show that much more work is needed to link spatial and river basin planning across Europe. At the same time, efforts to strengthen these links are underway at national and regional levels. Several trans-national cooperation projects supported by EU Cohesion Policy funds have brought together EU regions to develop new methods and approaches.

Key findings and potential solutions

Potential synergies between spatial planning and RBMPs can be strengthened. Spatial planning has a series of characteristics and approaches that can support the development and implementation of RBMPs. For example, spatial planning:

([5]) See http://inspire-forum.jrc.ec.europa.eu/pg/pages/view/1810/administrative-units for more information.

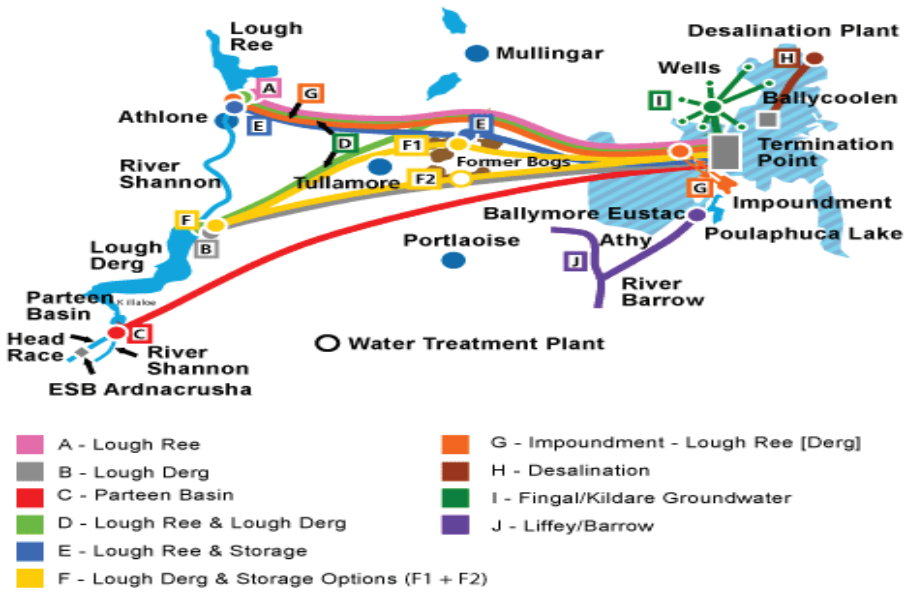
- brings a long-term, strategic focus covering large areas, similar to the perspective of the WFD;
- influences a broad range of economic sectors that affect river basins through water consumption and pollution as well as the modification of water bodies;
- influences the type and location of new polluting activities and thus water status;
- can also be used to translate water management goals — such as measures for more efficient water consumption — into local government action, for example for new housing developments;
- shares a number of key tools with river basin management planning, including Strategic Environmental Assessment (SEA) and public participation;
- is a key tool in addressing flood risks, drought risks and rural development.

The role of spatial analysis is, for example, illustrated in the Dublin metropolitan region that has prepared a plan for a major new water supply system. There are two major spatial issues related to the proposed scheme; the first of which is Greater Dublin's growth over the medium term. In determining the projected water demand the relevant regional plans were analysed to predict the likely increases in population growth and hence water demand. The Dublin City Development Plan 2011–2017 ([6]) forecasts that Dublin's population will continue to grow over the medium term; there is no explicit consideration of efforts to focus population growth in other areas, spatial or otherwise.

The second spatial consequence stems from the footprint and effects of the Greater Dublin Water Supply project; these are considered within the draft plan of the project (2008) and the accompanying SEA (SEA, 2008). The draft plan and SEA consider 10 different options for the provision of water for Dublin: these include greater abstraction of groundwater, desalination of water from the Irish Sea, abstraction from a variety of surface waters and a range of different pipeline and storage options. Figure ES.2 shows the complete list of project options (option F is the final project).

Within the Greater Dublin Water Supply Draft Plan each of these ten options was presented spatially and evaluated to understand the direct economic costs of the measures, with a focus on the costs of infrastructure development. The Strategic Environment Assessment also identified a range of environmental objectives based on the key environmental issues in the likely affected area

Figure ES.2 The Dublin new water supply system



([6]) Dublin City Development Plan 2011–2017. See http://www.dublincitydevelopmentplan.ie for more details.

and used these objectives to appraise each of the project options. The scale and impact of abstraction were considered for each option, including likely impacts on downstream water quality and quantity. However the presentation of the spatial consequences of the various options could be considered to be limited beyond water abstraction.

Efforts have been made to build bridges between land use planning and river basin planning. There are important links between spatial planning and RBMPs. Although the two systems do not appear to be strongly linked at present, case studies have highlighted examples of approaches for integration.

In Scotland, for example, government guidance sets out steps for the integration of the two. The links are also strong in the Netherlands, where spatial planning is used in a new initiative for flood risk management, 'Room for the River'. In the Flanders region of Belgium, as well, spatial planning is a part of the SIGMA Plan to identify flood areas for the Scheldt River (this plan is carried out in cooperation with the Netherlands, as the two countries share the Scheldt estuary). In both the Belgium and the Netherland cases, the flood management approach is strongly compatible with the environmental dimension of territorial cohesion. One important factor throughout sustainable flood management is the restoration of inherent territorial features and the use of their ecosystem services, including floodwater retention. This approach consequently uses environmental means to protect economic values.

The case studies illustrate two key issues. A first element is the growing importance of sustainable approaches to flood risk management, such as the re-opening of flood plains and other actions to give 'room' to rivers. In many cases, such approaches will also expand areas for biodiversity. A second point is that the Floods Directive, with its requirement for the mapping of flood risks and flood hazards, will further strengthen the spatial dimension of EU water legislation and also require greater use of spatial tools. Consequently, there will be a greater need for spatial analysis and for links with spatial planning in the second round of RBMPs, due in 2015, as these are to include flood risk planning and also address further issues, including water scarcity and droughts as well as climate change impacts and adaptation.

One important factor throughout sustainable flood management is the restoration of inherent territorial features and the use of their ecosystem services, including floodwater retention. This approach consequently uses environmental means to protect economic values.

Several approaches can be used to strengthen links between spatial analysis and river basin planning. RBMPs are the central mechanism for the implementation of EU water legislation. These plans, however, need to ensure two levels of integration:

- vertical integration with a range of EU requirements, with planning in other Member States in the same RBD and also with administrations at regional and local levels;
- horizontal integration among participating institutions and with stakeholders.

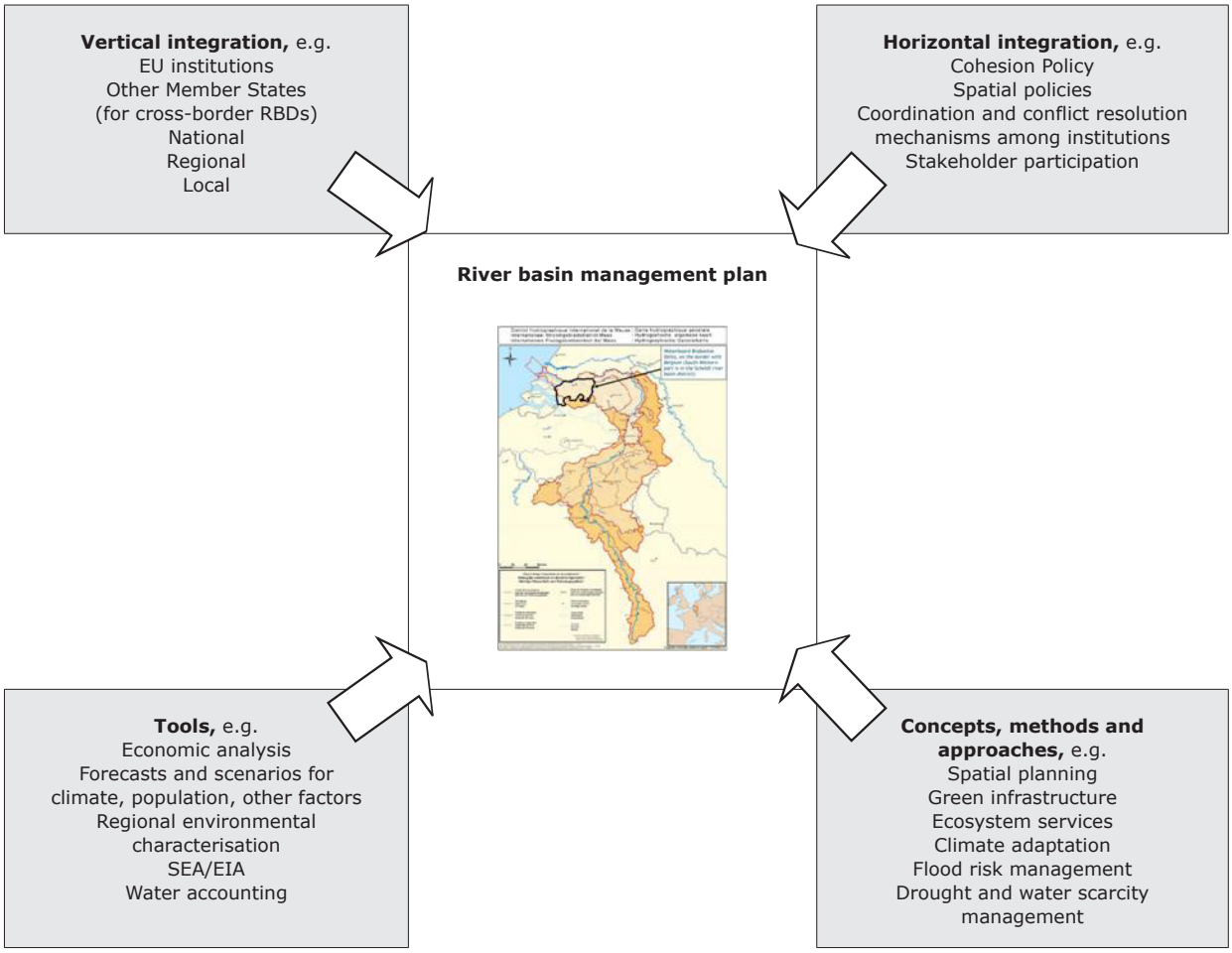
Figure ES.3 illustrates the different elements to be addressed in the preparation of RBMPs.

Moreover, the RBMPs need to bring together a range of methods, including spatial planning, climate change adaptation, flood risk management, and drought and water scarcity management. They can also address concepts such as green infrastructure and ecosystem services. Thus, a broader, more integrative approach is needed for the revision of RBMPs in 2015.

A range of tools can support the task of preparing and implementing RBMPs:

- One instrument is *SEA*, which can be used to ensure that spatial plans address water goals, and that RBMPs incorporate environmental goals in spatial plans; this mechanism can also ensure that related plans, including spatial planning and the operational programmes for Cohesion Policy, are compatible with RBMPs. The environmental impact assessment (EIA) of major projects needs to ensure that these are compatible with RBMPs and will not cause failure for reaching good status of water bodies by 2015. Moreover, new tools, such as territorial impact assessment (TIA) and water impact assessment (WIA) can strengthen SEA and EIA methods.

Figure ES.3 River basin management plans: a framework for integration



- Another approach is to enhance *mechanisms for integration*. This can be done, for example, through voluntary guidance, an approach used at regional scale in France, where for example the authority for the Adour-Garonne RBD has prepared a guidance document for local authorities, for the integration of water management issues in urban planning. A further method is to use a programme or initiative as a mechanism for integration. This is seen in France where the national programme for green infrastructure is to be implemented through the spatial planning system and should in turn be linked to the RBMPs.
- *Regional environmental characterisation (REC)* can provide the information and the tool to assess spatially the environmental impact of European policies at the regional level. Environmental characterisation of territories can potentially provide baseline information about the environmental and natural assets, for example water of a specific region that makes it unique or important and supports territorial identity which would also help inform future policy like the WFD. The major axes of the assessment were atmosphere, water and soil quality.

- With outcomes from *water accounting* along with spatial information, three categories of outputs are now implemented and produce results from prototype to pilot levels of integration: a) Water balances at monthly level at 'statistical unit' level, secondary aggregated at sub-basins levels ('territories of reference'), that are the basis for detailed water use indicators; b) water quality accounts ([7]) at monthly level at 'statistical unit' level, secondary aggregated at sub-basins levels ('territories of reference'), that are the basis for detailed water quality indicators; and c) representative stratified statistics of the relationships and trends category of pressure versus observation, at sub-catchment levels. A category being, for example, the 'intensive agriculture' or 'urban' activities. This last output is not water accounting in a narrow or strict sense but constitutes a closely related side-product of the water accounts implementation. The water accounts support *The Blueprint to Safeguard Europe's Waters* ([8]) and can be used to quantify how much water flows in and out of river basins. This will provide the basic essential information which is largely missing today to optimise water uses at river basin level and look at alternatives, in particular considering the material and virtual water flows between catchments.

The tools discussed here provide an indication of the environmental challenges facing Europe in coming years. Through their approach based on natural geographic areas, the RBMPs under the WFD offer the opportunity to address many of these elements in an integrated approach. The spatial perspective will be increasingly important for the success of RBMPs in coming rounds. The approach of territorial cohesion will also be vital in linking actions for water management closely with those in other policy areas that affect Europe's water environment.

Strengthening the links between spatial planning and river basin planning can nonetheless be a complex process, as successful methods need to be developed within the context of planning systems. The Common Implementation Strategy (CIS) guidance document on RBMP planning makes a distinction between 'rational instrument' planning on the one hand, which is top-down planning, though other authorities and stakeholders have the opportunity to participate in the overall process but not in the decisions. An 'interactive approach' on the other hand, in which participation is much broader: other authorities and stakeholders contribute to the definition of the problem and the identification and implementation of solutions. The document notes that different approaches may be used in separate contexts within the same country.

Cohesion Policy has major influence on water management in EU. Cohesion Policy is a central instrument for territorial cohesion at the EU scale, and the actions it finances will affect river basins and water bodies throughout the EU. A previous European Environment Agency (EEA) study showed that the EU Cohesion Policy funds have played an important role in building wastewater treatment in the poorer regions of two Member States, Spain and Italy, and that in the current spending cycle (2007–2013) the funds have allocated significant resources in this area, in particular in the EU-12 Member States (EEA, 2009).

The spatial dimension of Cohesion Policy is illustrated through a set of case studies. A review of spending on wastewater treatment in Estonia extends the analysis in the 2009 EEA report and shows that river basin planning has played a role in identifying the investments financed through Cohesion Policy.

A case study from Hungary looks at the plan to improve inland navigation along Hungarian stretches of the Danube, highlighting potential impacts on natural values of the river; this example is important as projects are underway or in planning along other stretches of the Danube as well, and inland navigation more generally is promoted at EU level as a freight mode that can reduce greenhouse gas (GHG) emissions in comparison to road transport. The recent agreement calls for a balance between navigation plans and environmental protection along in the Danube river basin; its results will depend in part on the effects in spatial terms.

Two other case studies show how the environmental impacts of projects financed through Cohesion Policy have been reduced through review and

([7]) Quality accounting is an experimental approach of resource accounting. For most uses a quantity is a resource only if its quality allows the uses. For more information see Section 2.2.4, Water accounting.
([8]) See http://ec.europa.eu/environment/water/blueprint/index_en.htm for more details.

discussion. A plan to improve water quality in Lake Balaton was restructured to emphasise positive impacts on the Kis-Balaton wetlands area; in the other study, the Jucar-Vinalopó water transfer project in Spain was modified to reduce effects on water bodies.

Cohesion Policy has also financed a range of cross-border and trans-national projects for water management: several of these have sought to strengthen spatial analysis in RBMPs and in flood risk management.

These various examples have shown the importance of Cohesion Policy on several levels: financing can support the implementation of EU water legislation; at the same time, many projects financed through Cohesion Policy will affect water bodies and their impacts, including their spatial effects, need to be assessed before programmes and projects are approved. While the two policy areas show some level of integration, further efforts are needed to strengthen their coherence; spatial analysis may have an important role to play in such efforts.

Cooperation on water management among countries is essential. The RBDs set up under the WFD cross national boundaries; indeed, 'international' districts cover about 60 % of EU territory. Several major districts, such as the Rhine and the Danube, bring together several European countries. The international RBDs create a new dimension for territorial cohesion among countries and regions, one that emphasises the connections along geographic boundaries and the need for cooperation on shared ecosystems.

The Albufeira Agreement between Spain and Portugal illustrates the cooperation mechanism for river basins shared between these two countries. While this Agreement was reached in 1998, some of the practical steps for its implementation have proceeded slowly, for example with the creation of a joint secretariat only in 2008.

The 2009 Baltic Sea Regional Strategy and the 2010 Danube Strategy are broad-based approaches for cross-country cooperation. These two strategies cover economic, social and environmental dimensions and they are seen as practical measures for the implementation of territorial cohesion. At the same time, they coincide with geographic areas under EU legislation; the Baltic Sea is designated a European marine region under the Marine Strategy Framework Directive (MSFD), while the Danube catchment area is the largest RBD under the WFD. While the strategies are at early stages, they can provide an instrument for strengthening links between Cohesion Policy, water management and other EU policy areas.

What are the future challenges? RBMPs are to be revised every six years, and the first revision in 2015 is to incorporate a range of issues, including flood risk management under the Floods Directive as well as climate change adaptation. These new elements point to the need to introduce longer term planning and horizons into RBMPs and the related spatial analysis.

Among the issues to be addressed are:

- changes in population, as seen in France's fast-growing south-west;
- climate change impacts, such as higher temperatures and reduced precipitation forecast for much of southern Europe;
- changes in the agriculture and energy sectors, such as the rising cultivation of bioenergy crops in Europe as well as plans for new, small hydropower plants.

These changes will need to be addressed through spatial analysis and also via spatial planning. As mentioned previously regarding the Adour-Garonne RBD in south-west France, for example, a recent guidance document discusses approaches to link river basin issues into urban planning, for example to contain sprawl, especially in areas subject to flooding. In Ireland and in the Netherlands, however, major plans to accommodate expected population growth suggest that further efforts are needed to ensure their links with river basin planning.

1 Introduction

This report reviews the links between the WFD and territorial cohesion. Along with the WFD, the report also considers the Floods Directive and refers to other European Union water legislation. The analysis also considers the EU Cohesion Policy. It takes a pragmatic approach, by addressing several areas where territorial cohesion, EU Cohesion Policy and the WFD intersect, with the overall goal of identifying ways that the EU can move forward in terms of putting the environmental dimension of territorial cohesion into practice. Throughout the report, the spatial perspective and spatial planning provide a lens for analysis.

Chapter 2 looks at the role of spatial analysis and planning for the implementation of the Directive and the development and implementation of RBMPs in more detail. Chapter 3 considers links between Cohesion Policy and water management in the EU, including the lessons from a spatial perspective. Chapter 4 looks at cross-country cooperation, a key element of both the WFD and territorial cohesion. Chapter 5 then considers future challenges for the implementation of the Directive and the development of RBMPs, in particular considering the spatial context.

1.1 The environmental dimension of territorial cohesion

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 EU as identified in the previous EU treaty (Title XVIII). This part of the Treaty mentions the role of structural funds and the cohesion fund, but does not clearly define 'territorial cohesion'. However, the Green Paper on Territorial Cohesion states (p. 3) 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.'

A previous study published by the EEA on territorial cohesion (EEA, 2010c) highlighted that the environmental dimension of territorial cohesion is generally poorly understood and needs to be put 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.

The previous study highlighted that there is no one definition of territorial cohesion and is often used throughout the EU and its Member States with differing shades of meaning. However, the previous work recommended that territorial cohesion should:

- foster a more balanced and harmonious development of the European Union;
- ensure that its citizens were able to use and benefit from the inherent features of their territories;
- encompass the sharing of environmental responsibility and benefits among territories and throughout the EU;
- incorporate 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;
- include the preservation of natural assets and the protection of natural areas as well as protecting the local ability to maximise gains from the territorial capital — implicit in this are the ideas of resource efficiency and ecological balance;
- recognise local–regional–global linkages in considering the environmental facet of territorial cohesion.

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.

Much has been written and discussed about the need for a definition of territorial cohesion, but this has provided an elusive goal given the different perspectives. Perhaps a more pragmatic approach

is to focus on the process of achieving territorial cohesion rather than its definition. As an initial proposal, the previous study identified essential elements of an environment and sustainability base around the elements of territorial cohesion described in the Green Paper:

- harmonious and sustainable development;
- inherent features of territories: natural features are protected for future generations;
- concentration: addressing differences in density and other natural features;
- connecting territories: strengthening positive natural connections and interactions between territories;
- cooperation: overcoming division.

This approach highlights the environmental dimension of territorial cohesion. It builds on previous work, in particular by the European Commission (EC, 2008a), as well as the idea that territorial cohesion represents 'the spatial representation of sustainability' (Camagni, 2007). Throughout all definitions is the idea that territorial cohesion focuses on the spatial dimensions and implications of European policies.

Table 1.1 provides an overview of the environmental dimension of territorial cohesion. Table 1.3 expands on these points and includes potential criteria to evaluate the environmental dimension of territorial cohesion in the light of the WFD and the Floods Directive. Several case studies in the following chapters use the elements of territorial cohesion for analysis.

Table 1.1 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)
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 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 providing 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, 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)

Table 1.1 Potential key elements of the environmental dimension of territorial cohesion (cont.)

Green Paper on Territorial Cohesion key elements of territorial cohesion	Potential key elements of 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 at different scales 3. Recognising/avoiding negative environmental effects from one region to another (e.g. pollution, climate change — flooding, droughts, fires and biodiversity loss) 4. Avoiding the environmental impacts of connectivity (e.g. pollution, habitat loss, landscape intrusion)
Cooperation: overcoming division: 1. Addressing problems of connectivity and concentration through strong cooperation 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, local); learning from different regions; supporting regions to meet common environmental standards. This section 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

1.2 The Water Framework Directive and territorial cohesion

In 2000, the EU adopted the WFD ([9]) which sets up the future frame for regulation and protection of water resources in Europe, comprising lakes, streams, coastal waters and groundwater (Table.1.2). The WFD summarises much of the European experience of pollution, water quality and ecosystem management, and it represents a new and comprehensive way of source-to-sink thinking, where the primary goals are to achieve the desired quality of the water resources, to ensure that there is enough clean water for different uses.

RBMPs must be prepared for each RBD and should bring together an analysis of the characteristics of the water bodies with a programme of measures to address major problems. These measures are to bring the surface water bodies in the district to 'good status' by 2015; good status for surface waters involves both chemical characteristics (good chemical status) and the health of their ecosystems (good ecological status); groundwater bodies should attain good chemical status and good quantitative status (in that abstractions should not exceed natural aquifer recharge). The directive allows only limited possibility for extending the 2015 deadline, achieving a lower standard or allowing deterioration in conditions. For example, a failure to achieve good status is allowed under specific conditions; one is that any modifications are of 'overriding public interest'.

A previous EEA 2010 study on the *Territorial dimension of environmental sustainability* ([10]), which

([9]) 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).

([10]) See http://www.eea.europa.eu/publications/the-territorial-dimension-of-environmental-sustainability for more information.

Table 1.2 Timetable for implementing the Water Framework Directive

Year	Actions
2000	Water Framework Directive comes into force
2001	Common Implementation Strategy published
2003	Transposition into national legislation designation of RBDs and competent authorities
2004	For each river basin: - Analysis of the natural characteristics, pressures and human impacts - Economic analysis of water use - Registration of areas needing special protection
2006	Operational water monitoring programmes
2008	Public consultation on proposed RBMPs
2009	River basin management plans with programmes of measures finalised
2009–2015	Implementation of programmes of measures
2010	Water pricing policies in place to promote sustainable use of water
2015	Achievement of good status for all surface waters and ground waters

reviewed the WFD in terms of the environmental dimension of territorial cohesion, identified a broad range of synergies between the two. These include the following:

- the Directive establishes governance by natural geographical units, river basin districts;
- it calls on Member States to cooperate on cross-boundary RBDs;
- the Directive establishes a planning system at the level of RBDs, and calls for public participation in river basin planning;
- it establishes the principle of the recovery of the costs of water services, 'including environmental and resource costs' — this effectively recognises the value of ecosystem services.

The 2010 study also looked at the EU Floods Directive, which is closely related to the WFD and which itself has strong synergies with territorial cohesion. For example, the Floods Directive calls for mapping and planning to address flood risks to protect human life, the environment, cultural heritage and economic activities. Further details can be found in Table 1.3 which is based on the EEA 2010 study and provides a review of the WFD and the Floods Directive against the key elements of the environmental dimension of territorial cohesion.

Measures proposed by the WFD are explicitly territorial in nature, for example the use of river basins as the key planning unit, and managing groundwater at risk, etc. The WFD also has

Table 1.3 Review of the Water Framework Directive and the Floods Directive against the key elements of environmental dimensions of territorial cohesion

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 Appendix 1 to evaluate the environmental dimension of territorial cohesion.

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

Table 1.3 Review of the Water Framework Directive and the Floods Directive against the key elements of environmental dimensions of territorial cohesion (cont.)

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 its long-term sustainable use'. Article 4(1) of the Directive (Directive 2000/60/EC) includes the target for Member States to achieve good status in all bodies of surface water and groundwater by 2015. 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 which 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 the 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** An 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 RBD 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.	☺

Table 1.3 Review of the Water Framework Directive and the Floods Directive against the key elements of environmental dimensions of territorial cohesion (cont.)

Elements of the environmental dimensions of territorial cohesion	Policy area: Water Framework Directive	Overall assessment
Cooperation	**Potential synergies** The consideration of natural boundaries and areas (in the form of RBDs 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.	☺
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 Member States to assess, map and plan for the management of flood risks in all water courses and coastal areas in their territory. Flood risk assessment includes risks to the environment, together with 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 at a RBD and associated coastal area scale. Coordination is expected with RBMPs, developed under the WFD. Accounting for interdependencies and relationships between territories should be an inherent aspect of environmental management at 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 in individual Member States (and the intention of the directive is that environmental features will be protected).	☺
Concentration	**Potential synergies** The directive explicitly refers to urban floods (paragraph 10). Flood risks associated with higher urban concentration (increased runoff, 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 runoff). **Potential conflicts** None identified.	☺

Table 1.3 Review of the Water Framework Directive and the Floods Directive against the key elements of environmental dimensions of territorial cohesion (cont.)

Elements of the environmental dimensions of territorial cohesion	Policy area: Water Framework Directive	Overall assessment
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 which 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 RBD 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 ([11]). **Potential conflicts** None identified.	☺

significant territorial impacts, through improving environmental quality in rural and urban regions, though agricultural regions will need to reduce pollution and urban areas will require better sewers and water filtration systems.

For example in parts of England, major growth is proposed where water resources and the ability to handle increased volumes of sewage effluent, are already constrained. Future development needs to be planned carefully so that it does not result in further pressure on the water environment and compromise the WFD objectives. Planning bodies and authorities hence need to think about the implications of proposed development and land use change on water, including beyond their local authority boundary. The RBMPs required by the WFD are important new regional strategies that complement other regional strategies such as regional spatial strategies. The three pillars of sustainable development — social, economic and environmental progress — are fundamental to both regional spatial strategies and RBMPs. RBMPs can therefore influence these regional spatial strategies and other development plans, and in turn be influenced by them.

1.3 The role of river basin management plans

The WFD introduces a new water planning cycle with RBMPs published in 2009 and subsequently at six-yearly intervals. The Directive specifies the key elements of the RBMPs (see Box 1.1 for a summary). These management systems are set up where all regions in Europe are divided into hydrologically-based river basins, and for each of these water management plans are to be developed. There is particular focus on the control of emission

([11]) 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). See 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 for more details.

Box 1.1 Key elements of river basin management plans

- mapping of:
  - eco-regions;
  - surface water bodies and groundwater bodies;
  - protected areas;
  - monitoring networks.
- summary of significant pressures and impact of human activity on surface and groundwater bodies;
- environmental objectives;
- economic analysis;
- summary of the programme of measures;
- register of more detailed programmes and management plans;
- summary of public information and consultation measures.

of contaminants from industries, households and agriculture to water bodies, and detailed action plans and monitoring systems should be developed in order to achieve the 2015 goals.

As can be seen from Box 1.1, mapping and thus spatial analysis are an important part of the plans, at least in terms of characterising RBDs. Another is the identification of environmental objectives, an economic analysis, and the development of a programme of measures to achieve the environmental objectives. As indicated in the last bullet point in Box 1.1, public information and consultation are also important elements of the RBMP process.

The level of RBMPs allows a more detailed consideration of the links between the WFD and territorial cohesion. In particular, it is useful to consider this in terms of both the environmental dimensions as well as the economic and social dimensions of this term. Table 1.4 provides a brief analysis (it is based on the definitions of territorial cohesion presented in Table 1.1 of this report). Several key issues and potential conflicts arise, such as:

- the mismatch between river basin and administrative boundaries;
- related to this, the links between spatial planning and river basin planning;
- potential conflicts between inland navigation and ecosystem protection in rivers;
- economic and social demands for water supply.

As noted in Table 1.4, the case studies in the following chapters address some of these potential conflicts; they also consider areas for potential synergy arising from the WFD.

The area of cooperation is particularly important for RBMPs, both within countries as well as among them. About 60 % of EU territory is covered by RBDs that cross at least one EU or international border. Here, Member States are called on to cooperate on water management with the aim of producing a single RBMP. For the Danube and Rhine rivers, common RBMPs have indeed been prepared. For the Danube, Europe's largest river basin, the common RBMP is then articulated by international sub-basin plans as well as national RBMPs.

1.4 Spatial planning in water management

In the European Spatial Development Perspective (ESDP) document ([12]) agreed at the informal Council of Ministers responsible for spatial planning in Potsdam, May 1999, risk of water resources is mentioned as one of the critical spatial development issues in Europe. An integrated spatial development policy both for preventing floods and for combating water shortages is considered important although these two phenomena are of differing hydrological, political and territorial significance.

However, the two phenomena are important in terms of sustainable spatial development as they both represent structural problems resulting from inadequate adaptation of spatial development. For example, as mentioned in the ESDP document, floods have resulted in substantial damage to private property and the economy. High water is caused by a variety of factors, most of which are of man-made rather than natural origin, for example, the straightening of rivers, settlement of natural flood plains and land uses which accelerate water runoff in the rivers' catchment areas.

Even in the drier regions of the EU, where rain occurs episodically but very intensively, there has

([12]) See http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/pdf/sum_en.pdf for more details.

been more frequent flooding in recent years. In Spain, for example, this has caused substantial damage. Integrated, sustainable management of land use and water in the entire catchment area of rivers represents an important response to this problem.

To prevent the damage caused by such incidents, what is required in terms of spatial development policy is that land use in the entire catchment area is aimed at reducing runoff and that, in the potential runoff and flood areas, it is reviewed and changed as necessary. Independent of this, technical flood control measures and disaster control measures by the relevant water management bodies are essential in order to keep the damage to a minimum.

Spatial planning hence plays a key role in addressing water issues. Experience in recent years shows that without the integration of water management measures into the process of land management and management of settlement development, neither a sustainable and efficient use of water nor flood prevention can be achieved. Flood prevention in the major European river catchment areas can only be made effective through the imposition of clear conditions and intervention in land use. Similar comments apply to the reduction of water shortages. Sustainable management of water resources means establishing effective control over the various uses of water through planning and economic instruments. This applies, in particular, to agricultural irrigation and non-wasteful use of water in industry, commerce and private households.

Table 1.4 A preliminary overview of the coherence of RBMPs in terms of the economic, social and environmental dimensions of territorial cohesion

Elements of territorial cohesion	Social and economic dimensions	Environmental dimension
Harmonious and sustainable development	***Potential synergies*** Healthy water bodies can provide an attractive environment for economic development. This issue is considered in Chapter 5. ***Potential conflicts*** While EU guidance calls for the integration of RBMPs with other planning processes, this is not specified in the legislation. The links with spatial planning in particular are described in Chapter 4.	***Potential synergies*** The WFD's central aim is to 'protect and restore clean waters across Europe and ensure its long-term sustainable use.' The directive includes provisions to balance its environmental objectives with economic considerations, e.g. in Article 4(4), and economic analysis is identified as an element of the RBMPs. ***Potential conflicts*** None identified.
Inherent features of territories	***Potential synergies*** Flood protection through natural features can provide a cost-effective mechanism to protect lives and the economic elements. **Potential conflicts** Conflicts may arise in terms of flood protection; here, restoring flood plains and other natural features can be an important strategy, but one that could conflict with existing economic functions. This issue is considered in Chapter 4.	***Potential synergies*** The analysis that underpins the RBMPs should consider the typology of water bodies, within the context of the eco-region ([13]). The designation of water bodies allows both the analysis and the legal mechanisms to address the many potential differences across a river basin, which may extend from mountains to coastal zones. ***Potential conflicts*** None identified.

([13]) An eco-region (ecological region), is an ecologically and geographically defined area that is smaller than an eco-zone and larger than an ecosystem. Eco-regions cover relatively large areas of land or water, and contain characteristic, geographically distinct assemblages of natural communities and species.

Table 1.4 A preliminary overview of the coherence of RBMPs in terms of the economic, social and environmental dimensions of territorial cohesion (cont.)

Elements of territorial cohesion	Social and economic dimensions	Environmental dimension
Concentration	***Potential synergies*** RBMPs provide a mechanism to manage and resolve conflicts over water issues. Potential conflicts Cities require a large water supply, often from distant sources. Industry and agriculture also demand water supply. Several case studies in Chapters 4 and 5 consider these issues.	***Potential synergies*** 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*** River systems are an important element of green infrastructure that connects territories. ***Potential conflicts*** Conflicts may arise between economic uses of rivers for connection — in particular for inland navigation — and the ecosystem connections.	***Potential synergies*** The management of water issues at the river basin scale recognises the inherent 'shared' nature of Europe's freshwater resources. Implementation of the WFD in an international RBD should be coordinated between those Member States in the district; the RBMPs provide a key tool for this cooperation. ***Potential conflicts*** Conflicts may arise due to the focus on the geographic scale of river basins. For example, the WFD does not have a mechanism to address problems in wider geographic areas, such as seas that receive water from several river basins — this issue however links the WFD to the MSFD.
Cooperation	***Potential synergies*** Through the process to develop RBMPs, different actors in a river basin can negotiate on their environment as their economic and social objectives. For international river basins, this process takes place among the Member States (and third countries) that share the territory. ***Potential conflicts*** Conflicts may arise due to the mismatch between the natural boundaries of the river basins and administrative boundaries. This issue is considered in Chapter 4.	***Potential synergies*** Public consultation is intended to be an important element for the development of RBMPs. The coordination among key services as well as with other planning processes is also expected to be an important aspect. Member States and third countries in international river basins are to cooperate on RBMPs. ***Potential conflicts*** Conflicts may arise due to the mismatch between the natural boundaries of the river basins and administrative boundaries. This issue is considered in Chapter 4.

2 Integrating river basin planning and spatial planning

Box 2.1 The place-based approach

A place-based development policy is:

- a long-term development strategy aimed at reducing the underutilisation of resources and social exclusion of specific places, through the production of integrated bundles of public goods and services;
- determined by extracting and aggregating people's knowledge and preferences in these places and turning them into projects;
- exogenously promoted through a system of grants subject to conditionalities and multilevel governance.

What is place?

In a place-based development policy,

- a place is not identified by administrative boundaries,
- nor by any other ex-ante 'functional' criteria (coincidence of residence and activity, density of population, absence of land connections, existence of water or other natural linkages, altitude, proximity to natural areas, etc.),
- rather, a place is endogenous to the policy process, it is a contiguous area within whose boundaries a set of conditions conducive to development apply more than they do across boundaries".

Source: Barca, F., 2009, Presentation given at the OECD/ TDPC Symposium on Regional Policy, Paris, 2 December, 2009 (slide no 8) (http://www.oecd.org/dataoecd/41/37/44305783.pdf), accessed 17 March 2012.

The previous chapter highlighted some of the common aspects that territorial cohesion shares with the water management approach under the EU WFD. In particular, both the concept of territorial cohesion and the mechanisms set up under the WFD bring a place-based perspective for European policy (See Box 2.1 for information on the place-based approach). This perspective suggests spatial analysis is an important tool for the preparation of RBMPs. Moreover, the integration between RBMPs and spatial and land use planning ([14]) can potentially yield strong synergies.

This chapter reviews recent analysis on this topic; in practice, the synergies between river basin planning and spatial planning have by and large not yet been pursued. The chapter goes on to describe several case studies that illustrate good practice, first looking at the links between RBMPs and spatial planning, and then in the area of flood risk management, as spatial planning can be used to provide 'room' for rivers and their floodplains. It thus is a key tool for the implementation of the Floods Directive. Moreover, this sustainable approach to flood risk management can also create and protect natural areas.

The requirement to develop RBMPs creates a number of issues in Member States, including the interaction between this process and existing planning approaches, in particular spatial and land use planning. A guidance document prepared under the CIS calls for integration between river basin planning and land use planning.

Carter (2007) identifies a series of areas where spatial planning can contribute to the implementation of the directive (see Box 2.2).

A 2003 guidance document prepared by the European Commission and EU water directors on the preparation of RBMPs highlights some of these links and states that '... it will be advisable to ensure that the land use and water planning processes support ... each other as far as possible' (EC, 2003).

The links become even stronger under the 2008 Floods Directive, which calls on Member States to

([14]) EEA (2009) draws a distinction between spatial and land use planning, and defines the former as 'the integration of land use planning and sustainable development policies which influence the nature of places and how they function.' It appears from the literature cited here that spatial planning in several EU Member States focuses on economic development and does not have a strong sustainability component.

Box 2.2 Potential synergies between spatial planning and RBMPs

Spatial planning has a series of characteristics and approaches that can support the development and implementation of RBMPs. For example, spatial planning:

- brings a long-term, strategic focus covering large areas, similar to the perspective of the WFD;
- influences a broad range of economic sectors that affect river basins through water consumption and pollution as well as the modification of water bodies;
- influences the type and location of new polluting activities and thus water status;
- can also be used to translate water management goals — such as measures for more efficient water consumption — into local government action, for example for new housing developments;
- shares a number of key tools with RBMP, including, for example, SEA and public participation;
- is a key tool in addressing flood risks.

Source: Based on Carter, 2007.

integrate flood risk management plans with the second round of RBMPs, to be developed in 2015; the flood plans are to be developed on the basis of flood hazard and flood risk management plans.

Moreover, a series of other EU legislation affecting water bodies also require the designation of spatial areas. These include the following provisions:

- under the Bathing Water Directive, Member States are to designate bathing water sites;
- for the Urban Waste Water Treatment Directive, Member States designate sensitive areas that are at risk of eutrophication or are used for drinking water abstraction; treatment plants discharging into these areas are required to meet higher standards;
- under the Nitrates Directive, Member States designate vulnerable zones that drain into water bodies affected or likely to be affected by nitrate pollution.

Spatial analysis and planning are thus important in terms of implementing EU water legislation.

2.1 Potential obstacles to the integration of spatial planning and water management

While calling for greater links between spatial and river basin planning, the European Commission's 2003 guidance document notes several potential obstacles. One is that in many parts of Europe, spatial planning previously set restrictions on water bodies. This is valid for water abstraction used for irrigation, industry and households or by restricting river banks and other engineering interventions. In contrast, the WFD sets requirements for the health of water bodies, and these can limit spatial planning.

A further issue is the difference between administrative and natural geographic areas as outlined by the EC (2003):

> *By creating a spatial unit for water management, based on river basins, it is likely that spatial conflicts will occur with other policy sectors that have a significant impact on water, but are structured along administrative and political boundaries.*

The first issue touches on the broader need for integration, a topic throughout this study. The question of differing boundaries is addressed here.

2.1.1 Natural geographic and administrative boundaries

The WFD is innovative in that it calls for planning within RBDs that follow natural boundaries. In the Member States, however, existing spatial and land use planning typically follows administrative boundaries at national, regional and local levels (Nielsen et al., 2009), which typically follow different boundaries; in Italy, for example, regional borders only match those of RBDs for the two large islands of Sardinia and Sicily. Planning along natural geographic boundaries is a new approach at EU level and in many countries as well. In contrast, spatial planning is often a long-standing process. In some countries, such as the United Kingdom, spatial planning is hierarchical with national or regional plans providing a framework for those at local level (Carter, 2007).

From an environmental perspective, planning for administrative areas that do not match natural

geographic boundaries can create externalities: costs can fall on those who do not benefit, as in the case of water pollution from agriculture and industry from one territory that flows downstream to others (Nielsen et al., 2009 citing Moss, 2004); and benefits may go to those outside the territory who have not paid for them — this can be the case for ecosystem services such as those provided by forests in one territory that regulate floodwaters downstream.

Planning along natural geographic boundaries such as river basins provides a way to address these externalities. In practice, RBD boundaries co-exist with existing planning administrative areas nonetheless. A study of the application of the directive in Germany notes that this new approach on top of the existing administrative units such as the Bundesländer, creates overlaps and potential conflicts in the jurisdictions and interests of key actors. While the new system addresses the previous problem of externalities, it requires new interactions and negotiations among actors (Moss, 2004). The directive thus creates a new element of complexity. In Germany, these difficulties have been addressed through coordination mechanisms among the Bundesländer that share RBDs (Rudzite and Filho, 2009).

2.1.2 Other potential gaps

Another practical issue is that spatial planning and river basin planning follow different timescales in most countries. However, this is related to a broader issue, the lack of a legislative or policy framework at national or regional level to bring the two planning processes together. A further problem that has been identified in recent studies is the lack of shared knowledge and sufficient resources for integration (EnMaR, 2007).

Despite these problems, spatial analysis and planning and river basin planning have been brought together in a number of countries; the following sections describe several examples.

2.1.3 Progress thus far

Despite the strong potential synergies described in Section 2.1, in practice it appears that spatial planning has not been strongly linked with the first round of RBMPs, completed in December 2009. A review of six draft RBMPs (2009) found that less than half have strong links with spatial planning (Dworak et al., 2010). A review of countries in the Baltic Sea region found that spatial planning and water management remained separate systems in most countries; moreover, the implementation of the WFD had not brought stronger integration of the two (Rudzite and Filho, 2009).

These results show that much more work is needed to link spatial and river basin planning across Europe. At the same time, efforts to strengthen these links are underway at national and regional levels. Several trans-national cooperation projects supported by EU Cohesion Policy funds have brought together EU regions to develop new methods and approaches (see Chapter 3).

The following section provides selected examples of approaches to link spatial analysis and river basin planning. Section 2.4 then describes the use of such approaches in the area of flood risk management. (The distinction between the two sections is largely for presentation, as flood risk management is to be integrated into the next cycle of RBMPs, to be prepared in 2015.)

2.2 Approaches that link spatial analysis and river basin planning

Strengthening the links between spatial planning and river basin planning can be a complex process, as successful methods need to be developed within the context of planning systems. The CIS guidance document on river basin management planning makes a distinction between 'rational-instrument' planning, which is top-down planning, though other authorities and stakeholders have the opportunity to participate in the overall process but not in the decisions, and an interactive approach in which participation is much broader: other authorities and stakeholders contribute to definition of the problem and the identification and implementation of solutions. The CIS document notes that different approaches may be used in separate contexts within the same country.

A range of methods can be used to strengthen the links between spatial analysis and river basin planning. These are reflected below.

2.2.1 Strategic Environmental Assessment

One instrument is SEA, which is an environmental planning tool for improving decision making at the strategic level of policies, legislation, strategies, plans and programmes. It can be used to ensure that spatial plans address water goals, and that RBMPs incorporate environmental goals in spatial plans. While SEA is intended to be part of the planning process, in practice it may remain a step towards the end, and this sequence would limit its impact.

2.2.2 *Mechanisms for integration*

Another approach is to promote integration in the development of plans. This can be done, for example, through voluntary guidance, an approach used at the regional scale in France, where for example the authority for the Adour-Garonne RBD has prepared a guidance document for local authorities, for the integration of water management issues in urban planning (see Chapter 5).

A further method is to use a programme or initiative as a mechanism for integration. This is seen in France, where the national programme for green infrastructure is to be implemented through the spatial planning system and should in turn be linked to the RBMPs ([15]). Timing is an issue, as this national programme was launched after the preparation of the first round of RBMPs in 2009. France has addressed this by requiring the 2015 updates of the plans to take on board the green infrastructure approach.

Integration can go further and use a mandatory process; this is seen for example in the Dutch water assessment approach. Water assessment in the Netherlands is not a formal assessment such as SEA, but rather a process in which government bodies working on water issues contribute to the spatial planning process. Indeed, where SEAs are required, the water assessment may take place in parallel.

Since 2003, this process has been mandatory for all spatial plans that are required by law, such as municipal land use plans and provincial spatial policies. It is also used for other spatial documents, such as perspectives and landscape plans.

For each water assessment, the process is designed jointly by the relevant spatial planning authority and water authority; for example, they jointly identify water-related criteria to be used in discussing the spatial plan. Water assessment is a flexible requirement and consequently the process is adapted and developed on a case-by-case basis. Stakeholders, including developers that may be affected by water requirements, can participate in the process.

In terms of formal results, water authorities review and draft spatial plans and provide a 'water recommendation' based on the criteria that were jointly agreed. This recommendation is then incorporated in a 'water paragraph' that is part of the final draft of a spatial plan, which is developed by the spatial planning authority and presented to the appropriate government level (municipality or province) for review and approval. A positive 'water recommendation' is not mandatory: in cases where the water authorities do not provide it and the spatial authorities choose to continue with the plan, they must justify their reasons. (While a legal appeal is not possible in the water assessment process, such disagreements could be cited in the arguments of legal challenges to a spatial plan.)

Experience with the process has brought forward a number of lessons. One is that informal contacts between water and spatial authorities are important, as key planning developments for both water and spatial plans are typically considered informally before being presented in draft plans. Another is the need to 'translate' water criteria into spatial terms ([16]).

In Scotland, a set of government guidelines identify policy areas that should be integrated with the preparation of RBMPs, among which is spatial planning. The analysis in the case study below (see Box 2.3) shows that this approach is compatible with the key elements of territorial cohesion such as harmonious and sustainable development as well as the protection of inherent features of territories.

Integration can go further and identify shared objectives for the two planning systems and use instruments to pursue these; for example, spatial plans could be used to pursue objectives under RBMPs. A further step would be to bring both together into a common system, thus linking planning for both land areas and freshwater bodies. As yet, however, no examples have been identified for these steps in Europe.

2.2.3 *Regional environmental characterisation*

The overall objective of REC is to provide the information and the tool to assess spatially the environmental impact of European policies at the regional level. Characterisation, landscape and environmental characterisation for example, is one way of investigating, defining and recording the key assets and inherent features of a territory. Environmental attributes/natural capital of a

([15]) This programme, La Trame verte et bleue, is described in greater detail in the EEA Technical report No 18/2011 on Green infrastructure and territorial cohesion.

([16]) Sources: van Dyk, 2006; Riza et al., 2004.

Box 2.3 Policy provisions to integrate land use and river basin planning in Scotland

Summary

In 2008, the Scottish Government issued a policy statement titled Implementing the Water Environment and Water Services (Scotland Act) Act 2003 — Promoting an Integrated Approach. The aim of the policy statement is to highlight the Scottish Government's responsibilities in relation to the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act), which is linked to the WFD, and to demonstrate the need for an integrated approach in implementing the obligations set out in the directive.

Photo: Loch Ness

Section 2 of the WEWS Act allows Scottish ministers to specify, by order, any piece of legislation as a WEWS Relevant Enactment if such legislation gives statutory functions to the Scottish Government, including Scotland's Environment Protection Agency (EPA), and where these are relevant to the water environment. Designating legislation as a WEWS Relevant Enactment ensures that Scotland's Government takes into account the social and economic impact of their activities relating to protecting the water environment and also considers sustainable flood management and sustainable development considerations. It also allows for a coordination of functions with government.

Land use planning is among the policy areas which have been designated as a WEWS Relevant Enactment. (Further guidance is in preparation on hydropower and river basin management.)

Role of spatial analysis

A National Planning Framework (NPF) is one the mechanisms introduced by The Planning (Scotland) Act 2006. The NPF plays a strong role in coordinating policies with a spatial dimension. There are also opportunities for coordination between the NPF and the RBMPs. This includes information sharing between the NPF and the RBMPs. For example, in reviewing the NPF, the Scottish Government is to take into account the newly created RBMPs. It is expected that when the NPF is revised in 2012, the two planning systems will be further aligned.

Box 2.3 Policy provisions to integrate land use and river basin planning in Scotland (cont.)

Link to implementation of the Water Framework Directive

The designation of land use planning as a WEWS Relevant Enactment ensures that a coordinated approach is adopted to ensure compliance with the WFD. The RBMP for the Scottish basin district calls for an integrated approach taking into account land management, and that the plan will have to include active involvement from land managers for its implementation. The RBMP also refers to urban land uses in its plan for tackling the principal pressures on the water environment in the Scotland RBD.

Link to the key elements of territorial cohesion, focusing on the environment dimension

Harmonious and sustainable development

The policy statement underlines that an integrated approach to policy development will ensure the sustainable use of Scotland's water resources. The development plans that are prepared through the land use planning system provide a framework for decisions on construction. The goal is to ensure that before these plans are approved, the Scottish ministers have the opportunity to make sure that these are compliant with the WFD.

Inherent features of territories

Areas where land use planning and controls under the WEWS Act should complement each other include the provision of sustainable urban drainage systems, retaining watercourses in their natural state, safeguarding the flood storage capacity of functional flood plains, as well as considering proposals which could enhance the ecological quality of the environment.

Concentration (overcoming differences in density)

The policy statement also refers to the use of Sustainable Urban Drainage Systems (SUDS), which include practices as well as territorial features such as permeable surfaces and wetlands; new developments in Scotland are to utilise these to drain surface water in a sustainable manner. The policy statement also calls for their employment for drainage from roads.

Connecting territories

The policy statement underlines that controls under the WEWS Act and the planning systems should complement each other in supporting the restoration of the water environment, such as through removing disused engineering works and providing effective treatment of mine water discharges, creating fish passes and incorporating habitat improvements.

Cooperation

The policy statement brings together government actors and stakeholders working on a broad range of policy areas.

Further information

The Scottish Government, Implementing the Water Environment and Water Services (Scotland) Act 2003: Promoting an Integrated Approach, A Policy Statement, July 2008.

territory can be explicitly recognised as a legitimate aspect of territorial cohesion in order to ensure that sustainable development lies at the heart of policy design.

Environmental characterisation of territories could potentially provide baseline information about the environmental and natural assets, for example water of a specific region that makes it unique or important and supports territorial identity which would also help inform future policy like the WFD. The aim of developing approaches to REC is to provide a tool to define the environmental character and assets of European regions. These are potentially to be used to contribute to the assessment of the spatial impact of European policies, and in particular territorial cohesion, on the environment and regional level.

The first prototype done, published in 2010, was targeted on the assessment of urban policies; the selection of data was oriented towards indicators and data that could be used for assessment or urban policies. The major axes of the assessment were atmosphere, water and soil quality.

The evaluation of this combined indicator clearly poses the question of relevance of complicated thresholds applied to environmental indicators. The water quality component is systematically good, making the contribution of this component redundant. Compliance value for nitrate, which is a significant indicator of human pressure on the aquatic environment, is only related to health hazards, and the retained concentration, 50 mg NO_3/l, is far beyond natural values or recommended values for many industrial uses. Hence, compliance thresholds are not suited to this purpose; values based on statistical distribution established from natural concentration would be more appropriate.

In parallel, the accuracy of aggregation method should be questioned. The EEA is finalising the implementation of stratified statistics; initial results clearly demonstrate high diversity of situations per natural sub-basin. Once completed and harmonised, these results could serve to populate the combined indicator and make it more discriminating.

This analysis of scope for environmental characterisation is at the source of a fully spatialised approach for continental features and catchments which are stepwise implemented as prequel to the ecosystem accounts implementation. These accounts will yield new indicators and aggregates expressed in physical and monetary units that will be made available to policymakers and analysts to assess the efficiency of natural resource use and the contribution of nature and its use within and outside the market ([17]).

2.2.4 Water accounting

The key understanding of water accounting

The term 'water accounts' covers very different realities. The concept of environmental accounting refers to the modification of the System of National Accounts (SNA) ([18]) to incorporate the depletion of natural assets into the framework of national accounts. The very concept of natural accounts is still evolving and is currently being refined under the auspices of the United Nations Statistical Division (UNSD), through the System of Economic and Environmental Accounts (SEEA) ([19]) revision carried out by the London group of experts.

The SEEA attempts to integrate many of the different methods proposed for environmental accounting into a single organised framework. It proposes a series of versions or 'building blocks' for the construction of the accounts, beginning with physical accounts and disaggregation of data already included in the SNA, and working towards more complex information such as calculation of depletion and estimation of the maintenance costs required for sustainable use of resources. None of the versions of the SEEA goes as far as valuation of non-marketed environmental services.

Many water accounts, for example, are being produced using national level and annual resolution statistics, such as those compiled into the Eurostat/Organisation for Economic Co-operation and Development (OECD) joint questionnaire. However, the current approaches are rather coarse and may provide misleading information by smoothing the problems.

([17]) See http://www.eea.europa.eu/publications/an-experimental-framework-for-ecosystem for more information.
([18]) The SNA is the set of accounts which national governments compile routinely to track the activity of their economies. SNA data are used to calculate major economic indicators including gross domestic product (GDP), gross national product (GNP), savings rates and trade balance figures.
([19]) See http://unstats.un.org/unsd/envaccounting/seea.asp for more details.

When the EEA started implementing water accounts it was decided after analysis to build the accounts by making statistics on the detailed variables to accounts instead of using the simpler approach of making accounts from the existing statistical aggregates. This approach obliged the construction of statistical populations (e.g. water values for elementary catchment and per months) and hence allowed a full capacity of assessment going beyond the compilation of the final accounting tables.

Moreover, the accounting exercise was considered as one of the possible outcomes of spatial data assimilation and not a target per se for which only the ad hoc data would have been collected. This change in concept is based on the recognition that money and water, despite being both described by quantitative variables, don't respond to the same aggregation algebra. Water can be neither loaned nor transported far (in the absence of devices), money can.

However, long-distance water transport occurs in several circumstances: energy production and urban water supply. The conurbation of Athens for example, where more than a third of the population of Greece lives, is supplied by 5 different water sources, the most distant of which is located almost 200 km away (the Mornos reservoir 192 km to the west of Athens with an operational capacity of 670 hm^3 ([20])). Most sources are interconnected and a series of boreholes can provide water in case of emergency.

As a consequence, making relevant water accounts imposed aggregating them at sub-basin level (domain in which water can be exchanged without device) and monthly resolution (time lag during which resource is assumed exploitable in the absence of storage).

Implementing the infrastructures and data sets needed by accurate accounting is a long-lasting task that is very well advanced and which outcomes allow revisiting the problem of REC.

There is an important difference between the water balances as computed with the view of making water accounts on the one hand and integrated water cycle modelling, as for example under development by the European Commission's Joint Research Centre (JRC) on the other hand. The currently computed water balances add together observed or reported data and assess their overall consistency and, if assumed acceptable, their relative weight in the system. Integrated water cycle modelling has more fundamental ambitions but relates lesser on reporting. Some models carry out on gridded systems for high integration of land-water–meteorological data for example; this violates the principles of environmental accounting that are first and foremost to rely on observed data.

Rivers and catchments systems

To analyse, cross check and valorise water data — that is: rainfall, resource, runoff, storage, supplies, uses and returns — a calculable system for both rivers and catchments is needed. The system of rivers allows computing how much water flows between sub-basins and catchments systems allow assessing how much of the primary resource is distributed and used. Catchments apportioning the totality of continental masses can be reallocated to administrative areas and be documented with spatial uses (land, cities, etc.). A calculable system is not a map it is the geometry from the map plus the full relationships between the objects. It comprises geometry and topology.

The EEA uses the source of calculable information released by the JRC (CCM) ([21]) and other sources to develop ECRINS (European Catchments and River Network System), which is disseminated free of charge ([22]).

Since calculable rivers and catchments systems exist, the major computations needed to characterise the environment is feasible:

- Accumulate any value from the catchments and carry it along the river systems and aggregate at larger catchment level: for example, rain, evaporation, population, areas occupied by this or that activity.
- Transfer water along the rivers considering inputs and withdrawal (hydrological modelling) on the one hand and select monitoring systems that are potentially depending on upstream catchment conditions.

([20]) A cubic hectometre (hm^3) is used for volumes equalling 100 m by 100 m by 100 m, i.e. 1 000 000 cubic metres (1 000 000 m^3).
([21]) Catchment Characterisation Modelling, 2008: CCM2 River and catchments database for Europe version 2.1 release note.
([22]) For the time being a draft report, provided with data sets.

Example of water balances

Water balances were previously computed with a complete model, however simplified, with respect to soil and groundwater recharge because the necessary data was missing. Similarly, urban uses were lumped as density uses because no city supplies were identified.

Despite limitations, the computations of monthly discharges per segments and tentative computation of balances at the RBD levels were successful and helped in defining data collection strategy. As a result, a second series of computations are planned from November 2011 onwards.

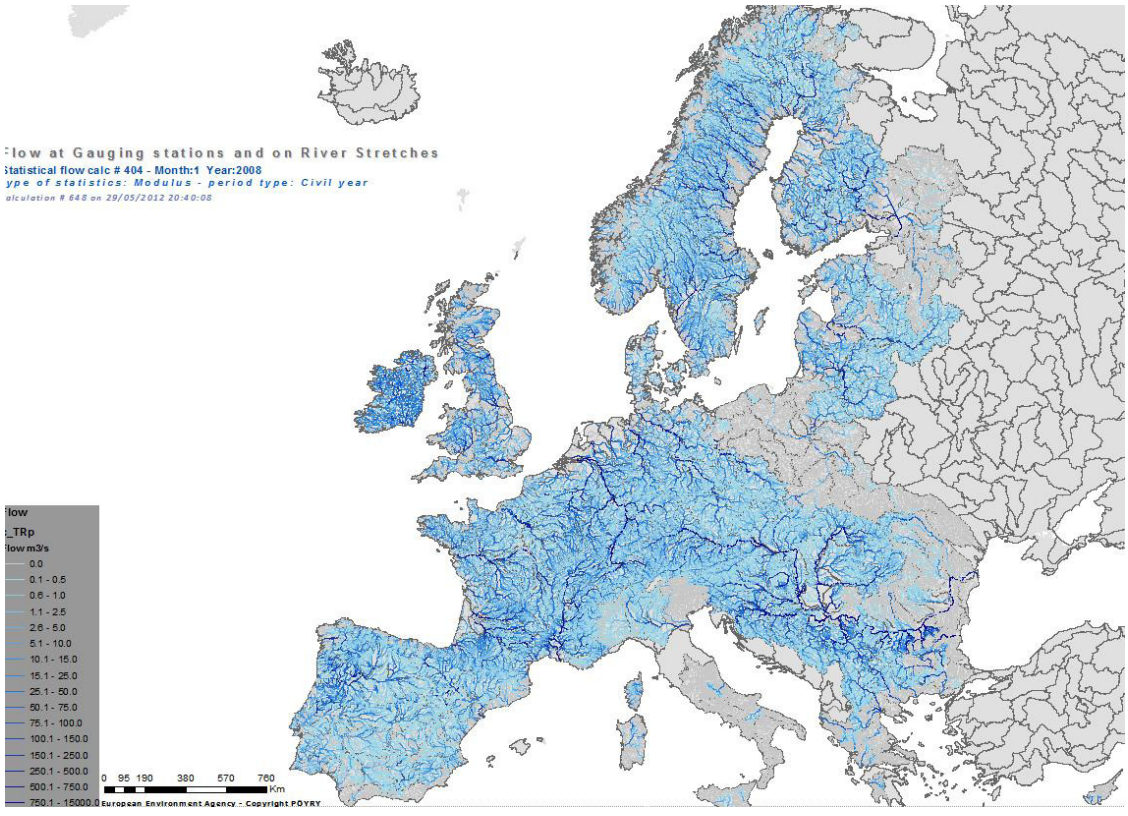
This type of data is of course tabulated and can be processed at administrative levels since ECRINS data sets are populated with the NUTS ([23]) classification. The improved calculations allow producing the Input/Output (I/O) tables that are the core of the resource asset accounts to be presented at regional levels. These tables display 'assets' (SEEAW Table 6.1, e.g. rain to soil, returns to lakes), 'flows between resources' (SEEAW Table 6.2, e.g. groundwater to rivers, lakes to rivers), and SEEAW Table 3.1 that displays both supplies and returns (e.g. lakes supply energy, sewage returns to rivers).

Map 2.1 illustrates the river flow per river segment, averaged as annual discharge in m^3/second. The database contains monthly values per segment from 2004–2009. These computations are currently being expanded to 10 years and will cover the rest of Europe.

Example of quality accounting

Quality accounting is an experimental approach of resource accounting. For most uses a quantity is a resource only if its quality allows the uses. The term 'quality' should be understood in a purely descriptive acceptation. Naturally saline or ferruginous water have unacceptable quality for certain uses.

Map 2.1 Sample map of river discharge values per river segment



Source: EEA/Pöyry computation, 2012.

([23]) Nomenclature of territorial units for statistics. See http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction for more details.

Quality having no unit cannot be counted; hence, quality accounting requires defining a quantity which is counted according to its quality status. The issue has been acceptably solved for rivers and quality in relation with chemical composition by using the 'kmcn' (river length times the discharge) which is a powerful unit describing a river system with an accountable unit. These units are computed on the same entities (river segments) as the assets are, making it possible to flag each and every asset 'statistical unit' with quality.

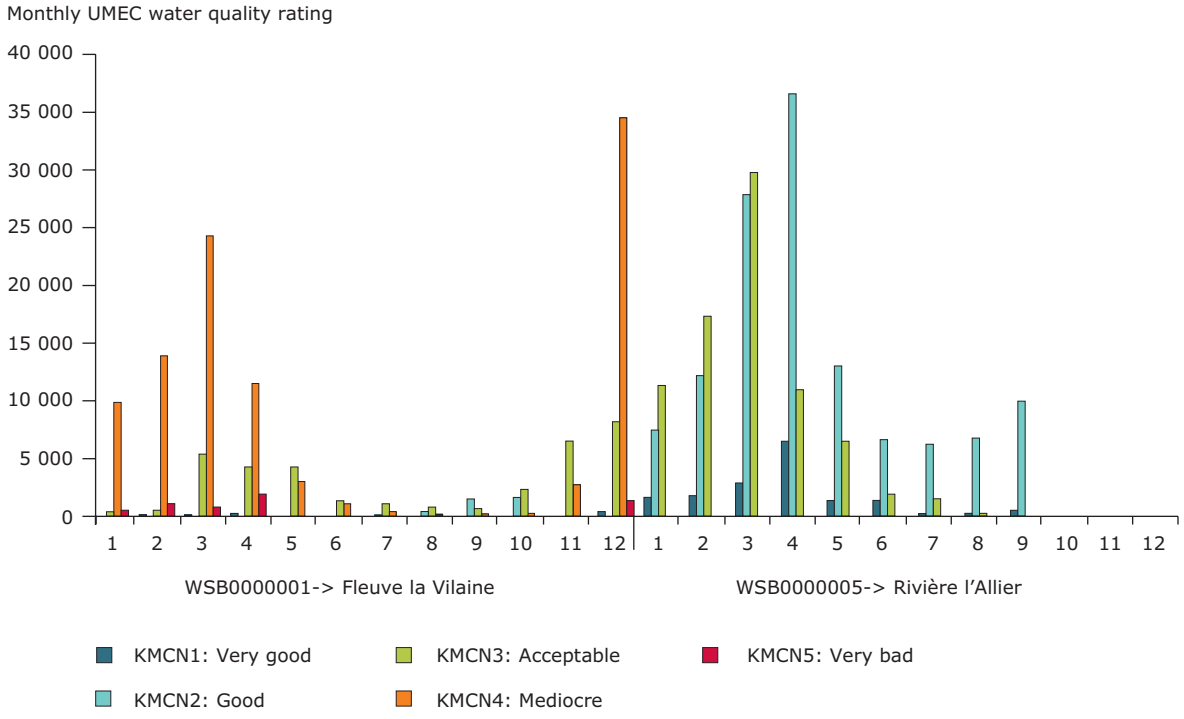
In the System of Environmental and Economic Accounting for Water (SEEAW) manual, the weaknesses of the approach are mentioned. Once having agreed on a scoring method, the most problematic issue is the general assessment of quality at the annual level, based on the worst (or second worst) event recorded. This assessment is antonymic with assets accounting that precisely aims at considering changes and seasonal patterns. Monthly disaggregation allows for annual estimates as well.

The methodology has been adapted to accounting monthly quality accounts, that are indeed more accurate and helpful in addressing the estimation of 'quantity of quality' that is a strong backing to analysing both the resource and effectiveness of expenses.

Figure 2.1 displays the seasonal patterns of quality showing on the left poor quality, occupying a large share of the total river units during high water periods (suggesting major impact of drained contamination from soils), whereas the right display shows a radically different pattern with a more complex pattern in which soil drainage is likely one of the quality issues. The information from quality accounting can be assembled into pattern indicators showing the type of quality issues that are at stake.

Inter-annual assessment is also important to monitor the impact of measures at aggregated level. With quality accounting being based on computation at the elementary segment, it is possible to sort out what is related to change in discharge (component

Figure 2.1 Sample display of quality accounting at monthly level for two river basins in France



Note: The Ecrins code of the catchment (e.g. WSB0000001 -> Fleuve la Vilaine) avoids any possible confusion since the ID is unique and a name can be the same for different river basins: Don FR, Don Russia and Don UK for example).
KMCN stands for 'Kilomètre cours d'eau normalisé' (standard river-kilometer) which is the river quality accounting unit.
UMEC is 'Unité de compte des eaux continentales' since again, the development has been carried out by French experts.

Source: EEA/Pöyry computation, 2010.

of the km × discharge accounting unit) and what relates to substantial improvement in quality.

The right series, for the Seine RBD, suggests a change in total discharge, since the total kmcn decreases, with global improvement of the total index, suggesting at the annual level a strong influence of soil inputs in quality scoring. Such influence can be easily extracted from the data sets since the reference discharge is known.

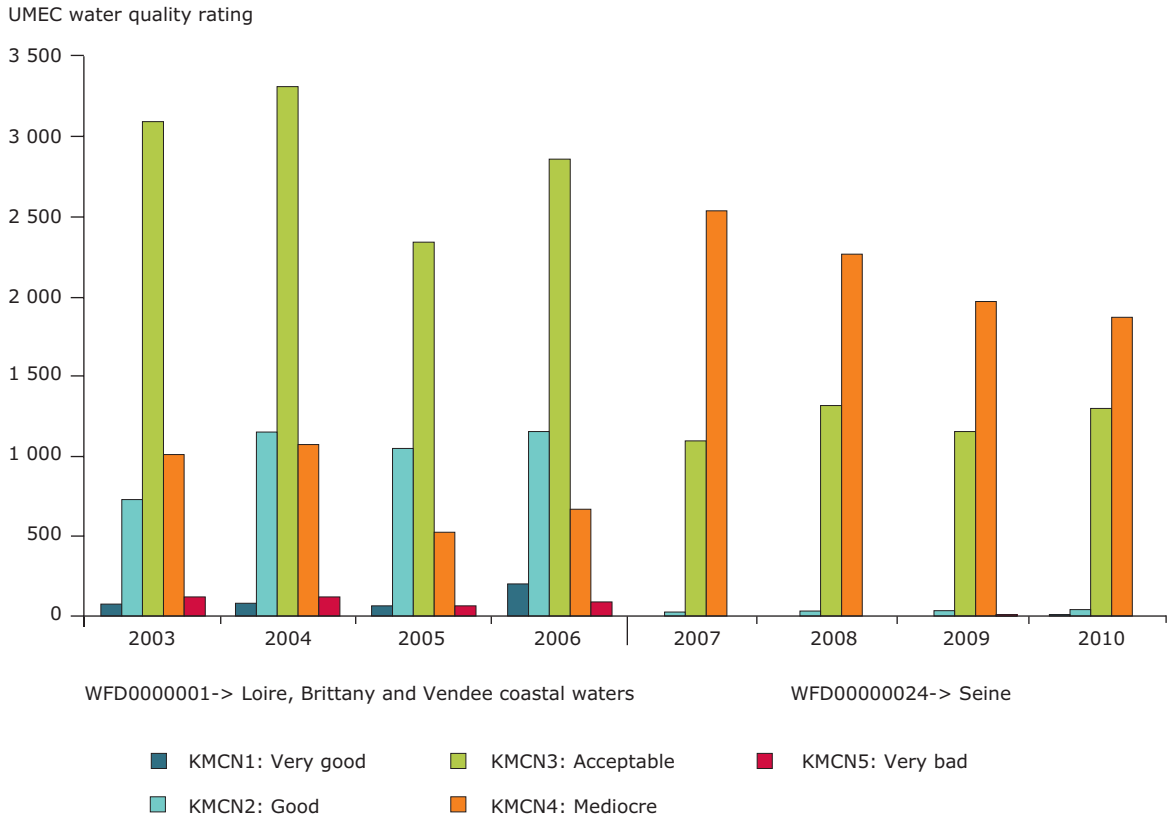
Example of stratified statistics

Quality accounting, as presented above, makes no difference between drivers of the observed quality. The simplest approach to address the relationship between potential causes of quality (e.g. urban activities, pristine catchment, intensive agricultures) and observations is the application of spatialised statistics.

The assumption that the same causes (e.g. urban activities) exerted upstream result in the same effects downstream has been verified at statistical level. Hence, the monitoring statistics placed in rivers can be ear-marked according to the category of causes that dominated the catchments areas upstream of this position. Using then a stratified approach allows mitigating the rather different rates of sampling (polluted rivers are more densely monitored than pristine ones) that results in strong biases if a non-stratified approach is carried out.

Once the data is analysed from the ear-marked water stations useful results are obtained that depict water quality trends (with known uncertainty) in relation to the main categories of causes (e.g. intensive agriculture, urbanisation). The main difficulties are that: defining strata demands computing relevant characteristics at a very detailed level to appropriately label monitoring stations; and only stations on the main drainage system can be considered. The European Environment Information and Observation Network (Eionet) data flow is not fully satisfactory and computations at the European

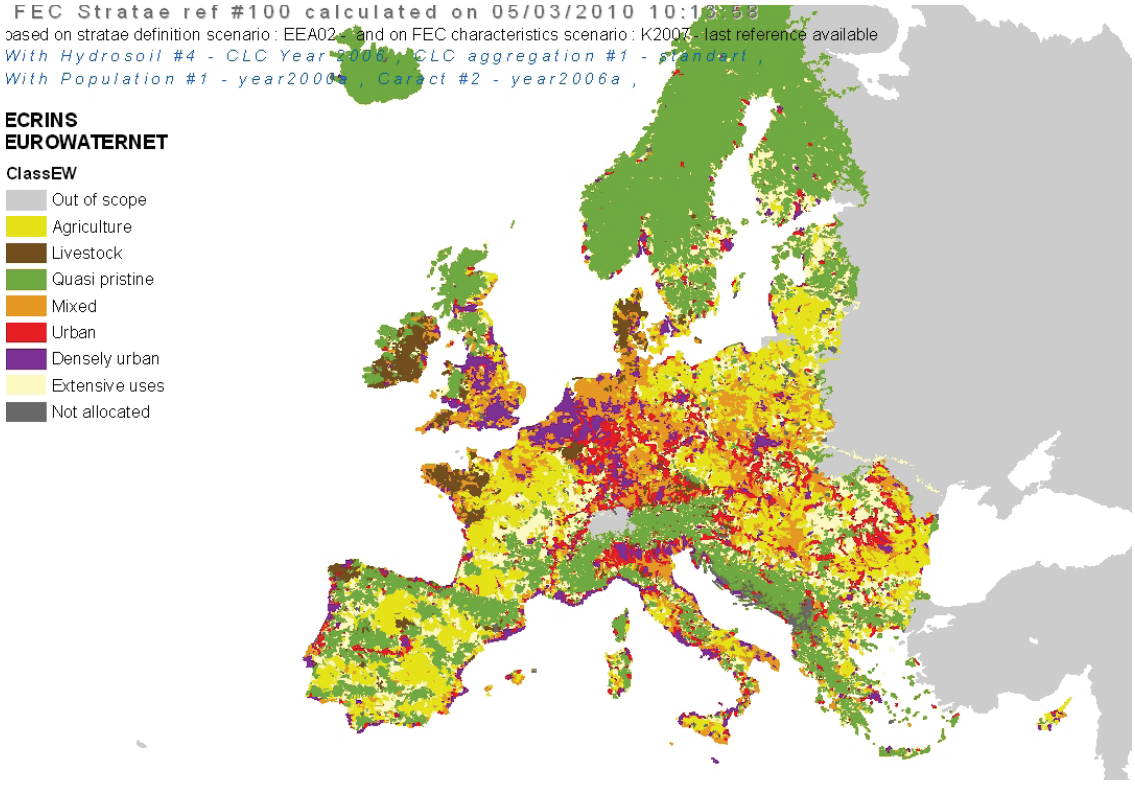
Figure 2.2 Sample display of inter-annual quality accounting in two French river basin districts



Note: The Ecrins code of the catchment (e.g. WSB0000001 -> Fleuve la Vilaine) avoids any possible confusion since the ID is unique and a name can be the same for different river basins: Don FR, Don Russia and Don UK for example).
KMCN stands for 'Kilomètre cours d'eau normalisé' (standard river-kilometer) which is the river quality accounting unit.
UMEC is 'Unité de compte des eaux continentales' since again, the development has been carried out by French experts.

Source: EEA/Pöyry computation, 2010.

Map 2.2 Stratification of European catchments into seven strata



Notes: Computations on Ecrins v0, land use based on Corine 2000. Colours on the map indicate the downstream potential influence of each of the strata of quality causes until the influence is replaced by another.

Source: EEA, 2007.

level have to be redone with enlarged data sets. By contrast, where complete data sets are accessible, the results are very useful, as presented in the EEA Technical report 10/2007, *Assessing water quality in Europe using stratification techniques* (EEA, 2007).

The latest computations define the pattern of strata (spatial distribution of causes) which is displayed in Map 2.2.

Outcomes from water accounting

Along with the spatial information, three categories of outputs are now implemented and produce results from prototype to pilot levels of integration:

- water balances at monthly level at 'statistical unit' level, secondary aggregated at sub-basins levels ('territories of reference'), that are basis for detailed water use indicators;
- water quality accounts at monthly level at 'statistical unit' level, secondary aggregated at sub-basins levels ('territories of reference'), that are basis for detailed water quality indicators ([24]);
- representative stratified statistics of the relationships and trends category of pressure versus observation, at sub-catchment levels. A category being, for example, 'intensive agriculture' or 'urban' activities. This last output is not water accounting *sensu stricto* but constitutes a closely related side-product of the water accounts implementation.

The outcomes from water accounting will feed into *The Blueprint to Safeguard Europe's Waters* ([25]). The Blueprint will tackle water efficiency. At present, we do not know the size of the gap in Europe, in

([24]) Both accounts follow, respectively, the System of Environmental and Economic Accounting for Water (SEEAW) methodology and the prototype methodology of the SEEA.
([25]) See http://ec.europa.eu/environment/water/blueprint/index_en.htm for more details.

2020 or 2050, between water demand and water availability. In this respect the water accounts can be used to quantify how much water flows in and out of river basins. This will provide the basic essential information which is largely missing today to optimise water uses at river basin level and look at alternatives, in particular considering the material and virtual water flows between catchments.

2.3 The role of spatial analysis in flood management

The use of spatial analysis is an inherent element of sustainable flood management ([26]) for a catchment approach. Sustainable flood management is playing a growing role in both national policies as well as individual projects.

This section presents case studies from two neighbouring countries, Belgium and the Netherlands, to discuss how spatial analysis has been linked to flood risk management and in particular to approaches that involve the restoration of flood plain areas. The two countries have been concerned with flood risks for centuries, and this issue became a priority after flooding events in recent decades, including the devastating floods of 1953.

In both countries, current flood risk management approaches seek to provide 'Room for the River', the name of the Dutch programme. This represents a major change from a previous focus on infrastructure as the solution to flood management, as seen for example in the 1977 Sigma Plan in Belgium. Similarly, in the Netherlands, major works in the 20th century created 'polders', land reclamation areas used for farming and housing; more recently, the national spatial planning debate has included a discussion of 'de-poldering', i.e. returning these reclaimed land areas to water.

In both cases, the flood management approach is strongly compatible with the environmental dimension of territorial cohesion. One important factor throughout sustainable flood management is the restoration of inherent territorial features and the use of their ecosystem services, including floodwater retention. This approach consequently uses environmental means to protect economic values.

A range of European national governments have developed programmes and guidelines for the restoration of rivers, including Austria, France, Spain, Switzerland and the United Kingdom (EEA, 2010b).

As shown in the two case studies below (see Box 2.4 and Box 2.5), river restoration often brings the dual benefit of flood risk management as well as habitat restoration.

2.4 The role of spatial analysis in drought and water scarcity management

Land use planning is one of the main drivers of water use. Inadequate water allocation between economic sectors results in imbalances between water needs and existing water resources.
A pragmatic shift is required in order to change policymaking patterns and to move forward effective land use planning at the appropriate levels. Spatial analysis can function as a tool in this process.

Water scarcity and droughts affect many parts of Europe. For example, all Mediterranean EU Member States are already affected, being 130 million inhabitants or nearly 30 % of the EU population. Drought and water scarcity hence have a direct impact on citizens and economic sectors which use and depend on water, such as agriculture, tourism, industry, energy and transport. Across Europe, agriculture is the major cause of water abstraction, but in parts of northern Europe abstraction can be dominated by domestic and manufacturing sectors. Droughts have occurred with increasing frequency over the past 30 years.

While 'drought' means a temporary decrease in water availability due for instance to rainfall deficiency, 'water scarcity' means that water demand exceeds the water resources exploitable under sustainable conditions. At least 11 % of the European population and 17 % of its territory have been affected by water scarcity to date. The European Commission expects further deterioration of the water situation in Europe if temperatures keep rising as a result of climate change. Water is no longer the problem of a few regions, but now concerns all 500 million Europeans.

Policies and actions on drought and scarcity are set up in the EU in order to prevent and to mitigate water scarcity and drought situations, with the priority to move towards a water-efficient and

([26]) See http://ec.europa.eu/environment/water/flood_risk/index.htm for information about the EU Floods Directive.

Box 2.4 The Netherlands: Room for the River (*Planologische Kernbeslissing Ruimte voor de Rivier*)

Short description

During the past centuries, the area available for rivers in the Netherlands has decreased steadily. High dikes have confined rivers, while the land behind the dikes has even often sunk as more people have settled in the areas behind river dikes. Due to climate change, precipitation is increasing, including in extreme events, and rivers must move more water. If the Netherlands is faced with a flood in the current conditions, this can risk the safety of 4 million people. In 1993 and 1995, the water in Dutch rivers reached very high levels; as a result, 250 000 people had to be evacuated in 1995.

In reaction, the government established the 'Room for the River' programme to achieve two interrelated objectives:

- bring flood protection for the river region to the required level;
- contribute to improving the spatial quality of the river region.

To realise these objectives, the government is implementing safety measures for riverine areas in order to better manage future floods. The Room for the River programme will give more room to the rivers at 39 locations. Examples of safety measures are depoldering (*ontpolderen*, see below), lowering of groynes, water storage, building high water channels or dike relocation.

Along with flood management measures, the Room for the River Programme also invests in environmental quality. The aim is to make the river regions more attractive and to offer more room to nature and recreation. The Spatial Policy Document of the Netherlands (*Nota Ruimte*) establishes the objective of safeguarding existing core qualities of the various river branches and developing new ones. The proposed steps include:

- increase the physical diversity between the various river branches;
- maintain and strengthen the openness of the riverine area with its characteristic waterfronts;
- conserve and develop the scenic, ecological, geological, cultural and historic values and improve environmental quality;
- promote use of the main navigable waterways by both professional and recreational craft.

The implementation of the Room for the River programme is carried out by 17 partners, including the provinces and municipalities, water boards and Rijkswaterstaat. The Minister of Transport, Public Works and Water Management has the overall responsibility for the programme.

Role of spatial analysis

The Room for the River flood protection policy is closely related to the national Spatial Policy Document, which is the basis for the improvement of spatial quality in the Netherlands. The riverine areas are an important component in the National Spatial Planning Network (*Ruimtelijke Hoofdstructuur*). As set out in the spatial planning decision, national policy in the context of this decision 'has been used to develop the National Spatial Planning Framework (*Nationaal Ruimtelijk Kader*), which sets out the direction of spatial planning for various parts of the Rivers Region, together with the associated core tasks. The National Spatial Planning Framework views the Rivers Region from the point of view of the National Spatial Planning Network.'

The Spatial Policy Document thus includes spatial requirements necessary for a long-term prevention against floods. Any local planning measures implemented in the short term should not conflict with this long-term perspective. Consequently, the choice of flood protection measures needs to be compatible with the spatial strategy of maintenance, adaptation and renovation. The measures to create more room for the rivers should also be linked to urban development objectives; the enlargement of river beds near urban areas can contribute to a renewal of the waterside frontage or the development of new areas for recreation.

Box 2.4 The Netherlands: Room for the River (*Planologische Kernbeslissing Ruimte voor de Rivier*) (cont.)

Link to implementation of the Water Framework Directive and the Floods Directive

The Floods Directive has a clear interface with the Room for the River programme. The programme determines at which 39 points along the major rivers measures are needed to ensure that water is retained and processed in cases of high levels of water. These measures include dike diversions and construction of secondary channels.

The Floods Directive is mainly transposed through the Water Act and the Water Decree. The Water Act regulates which authorities are competent for dealing with water issues. Chapter four of the Water Act lays down the obligation to develop a national water plan. This plan contains the main elements of the national water policy and relevant aspects of the spatial planning policy. These include the RBMPs for the rivers. Ongoing programmes that are mentioned in the national water plan, such as Room for the River and the Maas Works, thus should support the aims of the Floods Directives and the WFD.

Link to the key elements of territorial cohesion, focusing on the environment dimension

Harmonious development

The programme integrates economic, social and environmental policy goals; it implements safety measures to protect citizens and economic interests. In addition, it aims at improving environmental quality by connecting zones and offering more room to nature and recreation.

Providing more room for the river is perceived as increasing the quality of landscape (including in terms of its cultural and historical value). This is utilised for nature, recreation and housing adjacent to water.

Inherent features of territories

As laid out in the Spatial Policy Document, the objectives include to maintain and reinforce the open character of the Rivers Region, 'with its characteristic frontages along the water as well as to maintain and develop the landscape, ecological, geographical and heritage features, and improve the quality of the environment.' In general, 'future values aim at achieving sustainability, biodiversity, robustness, adaptability, and flexibility over time, both in relation to new types of use and openness to new cultural and economic values.'

Plans and projects included in the programme relate to the development of more natural river-related ecosystems in areas that are currently made up of agricultural land. By restoring original features of rivers, the programme serves to manage potential floods.

Concentration (overcoming differences in density)

Ecosystem services through measures such as overflow areas are recognised. The programme acknowledges the important role that water-related ecosystems play in both climate regulation and in climate change adaptation. Other examples of natural water retention measures are improving the soil's water storage capacity and restoration or rehabilitation of water courses.

Connecting territories

The programme approaches the term connection from the perspective of the relation between infrastructure and ecosystem. The programme also ensures connection between rivers to ensure sufficient retention areas.

Cooperation

In preparing the programme, close cooperation was established with water boards, provinces and municipalities, which continued in the implementation phase. For its implementation, the programme places emphasis on decentralised authorities and partners within its central programme framework.

Box 2.4 The Netherlands: Room for the River (*Planologische Kernbeslissing Ruimte voor de Rivier*) (cont.)

In practice, this means that decentralised authorities and partners are responsible for design choices, risk management, licensing, selection, and control of market and development of local support. Such agreements and conditions are laid down in cooperation agreements with the central government ([27]).

Further information

- Safety for four million Dutch citizens, Room for the River (http://www.ruimtevoorderivier.nl/media/18566/brochureeng.pdf)
- Spatial planning key decision, Room for the River, Explanatory Memorandum (http://www.ruimtevoorderivier.nl)

Box 2.5 Belgium: Sigma Plan, Scheldt River ([28])

Short description

After floods in 1953 and 1976, the Sigma Plan came into force in 1977 with the objective to improve safety against flooding in the Scheldt basin.

The 1977 Sigma Plan placed the focus on dikes and the proposed solutions to decrease the risk of flooding were dike elevations, and the construction of flood areas and flood gates at Oosterweel and the Over-Scheldt. However, after strong opposition as well as several studies (including an SEA) it was decided to cancel the plans on flood gates.

In general, the vision on water management in general and the Scheldt, in particular, evolved. In addition, potential climate change impacts have been increasingly taken into account. After the floods of 1993–1994, a first revision of the Sigma Plan took place. Based on new insights, Flanders and the Netherlands decided to develop a common approach. It was agreed that the best protection against flooding would be the combination of local dike improvements and the development of flood control areas. The plan was presented in 2001 and consists of a long-term vision with a package of measures on safety against flooding (Sigma), accessibility for ships, nature conservation (special protection areas under the Habitats Directive) and general measures (including monitoring and cooperation) ([29]).

The revised Sigma Plan was approved by the Flemish Government in July 2005. The 2010 Development Outline (Ontwikkelingsschets 2010) for the Scheldt estuary was agreed between Belgium and the Netherlands.

The revised Sigma Plan identifies the location of the flood plains and the elevation of local dikes; these elements are to be further developed in projects. The implementation period of projects ends in 2030 and aims at reducing flood risk by 75 % ([30]).

Role of spatial analysis

The Sigma Plan is viewed as an opportunity to combine flood prevention and safety with spatial planning issues, including nature protection and recreation.

([27]) 16th progress report, 1 January–1 June 2010, p. 7.
([28]) See http://www.sigmaplan.be/ online for more details
([29]) See http://www.scheldenet.nl/nl/scheldebeleid/beleid1/sigma/ for more details.
([30]) See Presentation by Debeuckelaere, K. and Goldenman, G. on Climate change, land use planning and the EU Floods Directive: Lessons from the Schelde, 2010.

Box 2.5 Belgium: Sigma Plan, Scheldt River (cont.)

The Spatial Structure Plan for Flanders (Ruimtelijk Structuurplan Vlaanderen) provides the basis for the spatial policy of the Flemish region. It sets out the direction for developing the spatial structure of Flanders as well as which commitments are necessary to achieve these goals, and is the touchstone of the Flemish spatial policy. The Plan has been in place since 1997; a first revision took place in 2003 and the Plan is currently going through its second revision (public consultation ended in May 2010).

Large rivers (including the Scheldt) are considered to be of decisive importance for the Flemish spatial structure. The Spatial Structure Plan has a specific focus on natural areas in river regions (e.g. nature in the estuary, bird migration routes, the gradient of brackish and fresh water in the Scheldt, which is decisive for fish habitats), but also discusses the positioning of housing in relation to the rivers and infrastructure.

Link to implementation of the Floods Directive

The Flemish Region transposed the Floods Directive by integrating its requirements in the Decree on Integrated Water Policy.

On 8 October 2008, the Flemish Government approved the RBMPs for the Scheldt (and the Meuse) and corresponding action programme for Flanders ([31]). The RBMP underlines that a multitude of plans and programmes related to water management and policy and these, including the Sigma Plan, provide input to the process of river basin management planning.

Flanders makes use of the option provided in Article 13(1) of the Floods Directive not to undertake the preliminary flood risk assessment referred to in Article 4. This also relates to the fact that under the Sigma Plan, much detailed data and digital elevation models were already drawn ([32]). Measures are being prepared to integrate flood risk management into the 2015 revision of the RBMPs.

Link to the key elements of territorial cohesion, focusing on the environment dimension

Harmonious and sustainable development

The Spatial Structure Plan states that each ecosystem has four distinct functions that need to be in balance: production, management, culture and support.

Inherent features of territories

Providing room for the river is preferred to infrastructure measures (such as barriers).

Concentration (overcoming differences in density)

The Spatial Structure Plan for Flanders emphasises that Flanders must maintain both 'urban and open' spaces; the last term referring to places where openness and non-built spaces prevail. A coherent set of rivers, stream valleys and natural areas are considered to be the structuring elements of the open space in Flanders. The Sigma Plan includes the protection of urban areas against flooding through specific projects, such as reconstruction of the banks of the Scheldt in Antwerp. On the economic side, an important measure is the deepening of the Scheldt river estuary in order to maintain navigable areas for ships.

Connecting territories

The Spatial Structure Plan in turn acknowledges that fragmentation of open space negatively affects ecosystems and populations, particularly with regard to loss of biodiversity, loss of spatial coherence and the formation of new habitats ([33]).

([31]) See http://www.integraalwaterbeleid.be/stroomgebieddistricten/vlaams/sgbpen/sgbp_schelde_def for more details.
([32]) Advies, Voorontwerp van decreet tot wijziging van het decreet integraal waterbeleid met het oog op de omzetting van de Europese overstromingsrichtlijn, Januari 2010, p. 4.
([33]) Spatial Structure Plan for Flanders (first revision), p. 56.

Box 2.5 Belgium: Sigma Plan, Scheldt River (cont.)

Cooperation

The 2010 Development Outline (Scheldt estuary) was developed in cooperation between the Flanders region and the Netherlands and also brought together officials and stakeholders from different policy areas.

Further information

- Stroomgebiedbeheerplan voor de Schelde (River basin management plan for the Scheldt)
- Ruimtelijk Structuurplan Vlaanderen (Spatial Structure Plan for Flanders) (first revision) (http://rsv.vlaanderen.be/nl/overRsv/Herzieningen/)

water-saving economy. In response, the European Commission presented in 2007 a Communication (COM(2007)414) on Addressing the challenge of water scarcity and droughts in the European Union. Policy options were identified for tackling water scarcity and drought issues:

- putting the right price tag on water;
- allocating water and water-related funding more efficiently;
- improving drought risk management;
- considering additional water supply infrastructures;
- fostering water efficient technologies and practices;
- fostering the emergence of a water-saving culture in Europe;
- improving knowledge and data collection.

Drought and water scarcity management is an essential element of water resource policy and strategies. For example, drought management plans based on the characterisation of possible droughts in a basin, their effect and possible mitigation measures, should be prepared on a river basin scale using spatial analysis tools. Measures to prevent and alleviate the consequences of droughts and water scarcity should aim to establish a drought-resilient society with a focus on reducing the demand for water so that negative impacts of droughts on the status of water bodies are avoided ([34]).

In order to assist EU Member States in the event of a major natural disaster like drought, the enlarged European Union has set up a Solidarity Fund so that it can respond in a rapid, efficient and flexible manner to come to the aid of any Member State. The Fund has an annual budget of EUR 1 billion ([35]).

Box 2.6 below shows the example of Cyprus which experienced a severe drought in 2008 where water reserves were near to depletion, resulting in substantial damaging environmental and socio-economic impact.

Box 2.6 EU Solidarity Fund aids Cyprus following severe drought

The cumulative effect of the drought in Cyprus led to serious consequences for living conditions, the economy and the natural environment. By April 2008, the country's water reserves were near depletion. The government applied for financial assistance from the EU Solidarity Fund to help respond to the crisis, which had associated costs equivalent to an estimated 1.25 % of the country's gross national income (GNI). The European Commission agreed to grant EUR 7.6 million in aid from the EU Solidarity Fund. The aid mainly helped reimburse costs of emergency measures, such as the transport of water from Greece. This was the first time the Solidarity Fund was used to provide financial aid for emergency measures in response to an exceptional drought.

([34]) See http://www.eea.europa.eu/soer/europe/water-resources-quantity-and-flows for more information.
([35]) See http://europa.eu/legislation_summaries/regional_policy/provisions_and_instruments/g24217_en.htm for more information.

3 Cohesion Policy and the Water Framework Directive: the spatial context

The previous chapter considered the links between spatial planning and river basin planning. This section looks at EU Cohesion Policy, which is a key instrument for implementing territorial cohesion, and in particular its links to water management. The chapter discusses the objectives and relevant inter-linkages between Cohesion Policy and EU water policy, specifically the WFD and the Floods Directive, and how they relate to territorial cohesion. It considers a number of specific spending areas where Cohesion Policy can affect water management, including by helping to implement the WFD.

Cohesion Policy is an important tool for the support of European territorial cohesion. The overall objective of the Cohesion Policy, as stated in the Community Strategic Guidelines (CSG) for economic, social and territorial cohesion for 2007–2013 (Decision No 2006/702/EC), is that the 'European territorial cooperation objective has an important role to play in ensuring the balanced and sustainable development of the territory of the Community.'

Cohesion Policy is articulated in three 'objectives':

- convergence: the goal is to promote the conditions for economic growth in least-developed Member States and regions (in general, those whose gross domestic product (GDP) per capita is below 75 % of the EU average);
- competitiveness and employment: to strengthen innovation, training and other factors to help other regions cope with economic change and strengthen their competitiveness;
- European territorial cooperation: support to strengthen 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 first and the third objectives are the most relevant for water management. Under the first, Cohesion Policy provides grants for the construction of infrastructure such as wastewater treatment plants (WWTPs). Under the third, joint initiatives for better water management and governance are supported.

EU Cohesion Policy is mainly implemented through the spending of a series of dedicated funds, including the European Regional Development Fund (ERDF), the Cohesion Fund (CF) and European Social Fund (ESF). Cohesion Policy spending represents 35.7 % of the total EU budget for the period 2007–2013.

3.1 Interactions between Cohesion Policy and the Water Framework Directive

Spending under the Cohesion Policy funds is governed by a set of regulations as well as the CSG. An analysis of these documents shows that:

- the Cohesion Policy regulations for 2007–2013 do not specifically mention the WFD, despite several calls to do so by non-governmental organisations (NGOs) and some Member State environmental authorities at the time of their drafting (ENEA, 2006);
- while the CSG refer to investments to support water management, they do not specifically state that water transport, water management and risk prevention measures must be compatible with the WFD to be eligible for funding;
- at the same time, the WFD does specifically require that Member States shall not allow other development projects to interfere with various aspects of water quantity and quality and other functions (Articles 4.7, 4.8 and 4.9);
- the CSG do refer to the cross-border and trans-national context of water management, and indicate water management as one of the important areas for funding within cross-border and trans-national programmes. Within trans-national cooperation, water management at river basin level is specifically referenced (CSG, Article 2.5).

An important dimension of Cohesion Policy for territorial cohesion is its investment programming process. This has required authorities to plan water investments in coordination with national and regional development programmes, taking into consideration a wide range of developmental factors, including current and future economic and environmental objectives across the country. Cohesion Policy investment programmes should be prepared on the basis on national strategic frameworks, and relevant environmental and sectoral policies, including RBMPs.

The European Network of Environmental Authorities (ENEA) has noted several areas where the WFD follows a similar programming process (ENEA, 2006):

- it establishes a clear, cross-sectoral planning framework;
- it calls for participation by stakeholders and the broader public;
- it calls for the cost effectiveness of investments in the water sector;
- the Directive promotes cooperation between different institutions and sectors, often across regional and national borders.

Several types of water-related activities can be supported by the Cohesion Policy funds in the current spending cycle, which runs from 2007 to 2013. These types of activities are listed in Table 3.1. The largest in terms of funding amounts are of course investments in infrastructure. The funds can also support management activities, including capacity building for river basin authorities (RBAs), as well as monitoring, which can support the development of RBMPs.

The following sections examine some of the specific interactions between Cohesion Policy and the WFD, and discuss synergies and contradictions that emerge. They cover major spending areas:

- spending for water supply and wastewater treatment infrastructure directly supports the implementation of the Directive;
- water body modifications, such as water transfers, may lead to either improvements or reductions in water quality;
- investments for inland navigation are a specific type of water body modifications and an area of potential conflict in terms of territorial cohesion; investments to support economic connections between territories can damage the inherent features of territories;
- finally, examples of the smaller territorial cooperation projects are also reviewed, focusing on initiatives to support implementation of the WFD and the Floods Directive.

3.2 Key spending areas: water supply and wastewater treatment

Financial support for the construction of water supply systems and WWTPs has been a major area of spending for Cohesion Policy.

In the 2000–2006 funding period for Cohesion Policy, water supply and wastewater treatment together represented the most important area of environmental expenditures: 40 % of ERDF environmental expenditures were allocated for that purpose (ADE, 2009), with further support from the Cohesion Fund ([36]). In this period, the ERDF alone provided nearly EUR 4 billion for WWTPs with total investment costs of EUR 6.3 billion.

Spending is even higher in the current period (2007–2013): nearly EUR 14 billion for wastewater treatment and just over EUR 8 billion for water supply (these figures include both Structural Funds and the Cohesion Fund (Directorate-General Regional Policy (DG Regio) data)). Together, investments for wastewater treatment and water supply account for 6.4 % of overall Cohesion Policy allocations for the period, and 44.2 % of the amount for environmental infrastructure. Figure 3.1 shows funding allocations across the Member States. The largest amounts of funding have been allocated in the EU-12, where the infrastructure needs are greatest.

As mentioned above, the guidelines for the current Cohesion Policy (2007–2013) refer to the use of the funds for the provision of clean water supply and wastewater treatment infrastructure where needed. In this regard, considerable funding for water supply and wastewater treatment has been supplied through Cohesion Policy funds, from past and ongoing projects, resulting in marked improvements in these services across the EU. The scope of water protection was expanded by the WFD in 2000, through the requirement of 'good status'

([36]) Funding for water infrastructure from the Cohesion Fund is greater than that from the ERDF, but exact data on CF spending and the outcomes will not be available until 2011, when the ex post evaluation is completed. Figures from the ERDF are indicative, however, of the overall priority given to the water sector, particularly wastewater treatment, within environmental infrastructure spending by Member States.

Table 3.1 Types of activities under the WFD that can be funded via Cohesion Policy and the Structural Funds

Cost item	Funding options		
	ERDF ([37])	ESF ([38])	Cohesion fund
Framework for management and administration			
Administration of River Basin Authorities (RBAs)			
Strengthening of RBAs	X	X	
Technical capacity building for RBAs	X	X	
Support and capacity building of stakeholders/interested parties by RBAs	X	X	
Setting up a stakeholder network and managing the participatory processes by RBAs		X	
Scientific studies inventories, mapping	X	X	
Awareness-raising campaigns		X	
Operation and monitoring			
Monitoring systems and risk analyses	X		
Flood risk management	X		
Erosion control	X		
Water-saving solutions for agriculture			
Vegetation restoration			
Water-saving solutions for industry	X		
Pollution control			
Infrastructure			
Adapting existing water infrastructure	X		
New infrastructure for the management of water resources	X		X
Improvement of water networks	X		X
Wetland restoration	X		
Equipment acquisition	X		

Source: WWF, 2005.

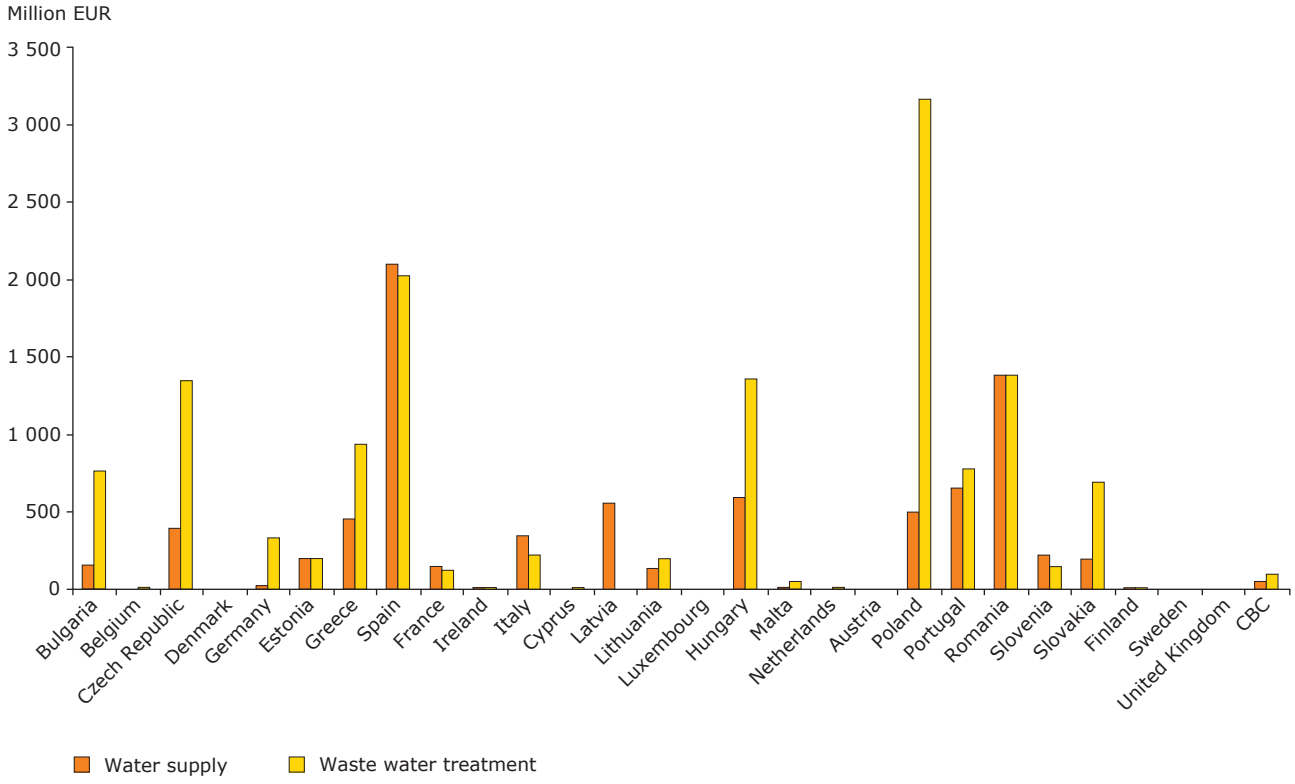
for all waters by 2015. Cohesion Policy spending on wastewater treatment infrastructure has been and will continue to be one of the major steps taken towards this environmental objective of the WFD.

Cohesion Policy spending is intended to assist Member States meet the requirements under the Drinking Water Directive (98/83 EC) and the Urban Wastewater Treatment (UWWT) Directive (91/271/EEC). Spending in the current period is in particular intended to support EU-12 Member States in complying with deadlines for implementation of these EU directives. For example, the UWWT Directive required full implementation by 2005 for the EU-15; new members have negotiated transition periods for full implementation from 2007 (Malta) to 2018 (Romania) in their accession treaties; most will need to complete implementation by 2015. In this sense, there is a clear synergy between Cohesion Policy and water policy, as Cohesion Policy spending enables Member States to accelerate their timetables for the construction of the infrastructure needed. (Funding for wastewater treatment nevertheless continues in Greece, Italy and Spain, three 'old' Member States, even though the UWWT Directive has passed.)

Despite the role of Cohesion Policy spending in assisting EU-12 Member States to implement wastewater treatment and drinking water directives, governments have faced several problems in using the money effectively ([39]).

([37]) European Regional Development Fund (ERDF).
([38]) European Social Fund (ESF).
([39]) See http://www.eea.europa.eu/publications/eea_report_2005_2 for more details.

Figure 3.1 Funding allocations for water supply and wastewater treatment for all Cohesion Policy funds, 2007–2013 by Member State



Note: CBC = Cross border cooperation.

Source: DG Regio data.

One area of problems is related to 'absorption capacity' where a lack of capacity for financial analysis and project management has caused delays. The role of local authorities is particularly important. At the same time, the pressure to use available money and move forward with investment plans has resulted in some poorly planned investments going forward, without proper attention given to EIA and business planning, including water pricing and cost recovery. This contradicts the WFD in several ways; most notably the principle of cost recovery for the provision, collection and treatment of water and wastewater. Box 3.1 presents some of these difficulties in Estonia.

3.3 Key spending areas: inland water way transport ([40])

The Cohesion Policy funds have allocated over EUR 876 million for inland transport projects in the 2007–2013 cycle. Romania is the Member State that has received the largest allocation, almost EUR 200 million, followed by Bulgaria, Germany and Hungary.

The work for inland waterways can include the creation or enlargement of artificial water bodies, such as barge canals, as well as modifications to existing rivers and other natural water bodies. Along rivers, a range of environmental impacts can occur ([41]):

([40]) This sub-section provides information related to point 2.2.2 of the Technical annex.
([41]) International Commission on the Protection of the Danube River, web pages on navigation. See http://www.icpdr.org/icpdr-pages/navigation.htm for more details.

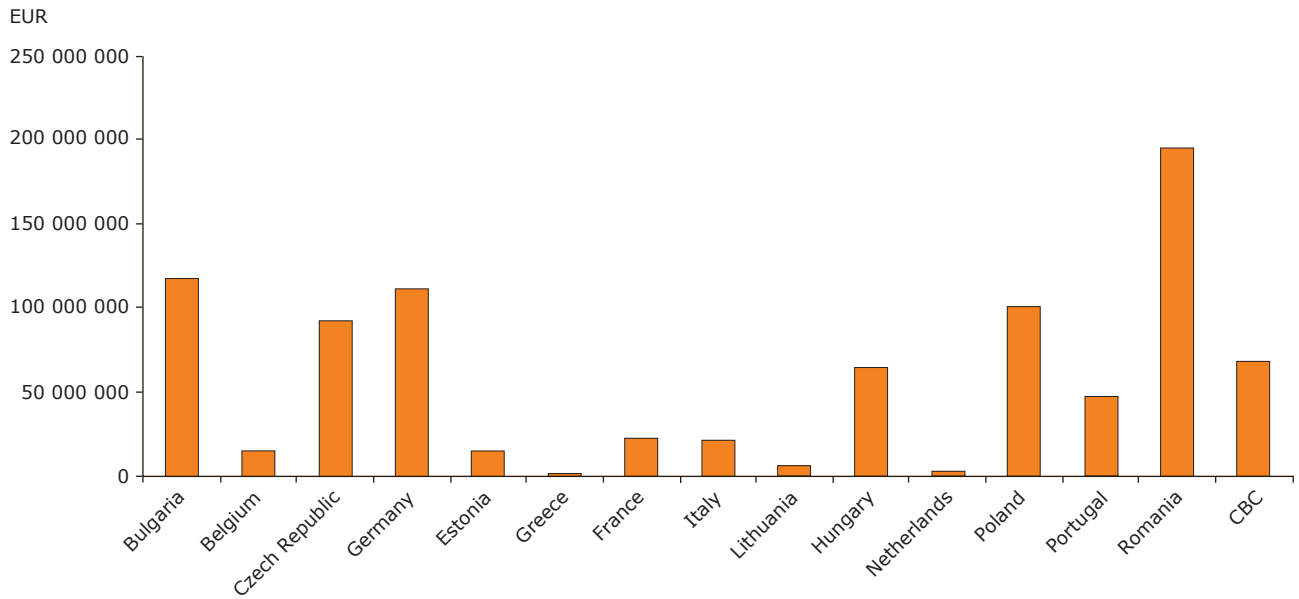
- change of the natural river structure;
- changes to river courses, such as the blocking of connections to separate channels, tributaries and wetlands;
- disruption of natural flow patterns by hydromorphological alterations;
- hindering fish migration due to sluices and associated dykes/weirs;
- engineering works designed to remove sediments and clear channels;
- accidental pollution involving oil or hazardous substances;
- pollution by discharged bilge water, wastewater from tank washings and sewage from passenger boats;
- inadvertent introduction of invasive species.

A large number of projects are slated for sections of the Danube river, which is designated as part of a European priority 'axis' for transport that stretches from Rotterdam to the Black Sea. Box 3.2 presents one of the proposed projects, in Hungary, in detail. Other projects have been proposed for EU financing in Bulgaria and Romania.

The Danube is one of Europe's greatest landscapes and its stretches in these countries contain wetland areas and floodplain forests; long stretches of the river as well as many wetlands and other ecosystems that depend on it are protected as Natura 2000 sites. NGOs have warned that the river navigation projects are a potential threat to these sites and to the river's ecosystem as a whole. For example, it is claimed that the navigation projects in Hungary could endanger the river landscape, wetland areas and floodplain forests. New infrastructure might also undermine other functions of the river, ranging from drinking water and flood management to fishing, tourism and recreation ([42]).

To address the conflicts between inland navigation and environmental protection on the Danube, three international organisations in the Danube basin presented in 2007 a joint statement on this topic ([43]). The three organisations are the International Commission for the Protection of the Danube river (ICPDR), which works on environmental protection and prepared the overall Danube RBMP; the Danube Commission (DC), responsible for navigation on the river; and the International Sava River Basin Commission (SRBC), which coordinates both navigation and water management in this sub-basin of the Danube.

Figure 3.3 Spending in inland transport



([42]) See http://bankwatch.org/billions/index.php for more details.
([43]) ICPDR, DC and SRBC, *Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin*, October 2007.

Box 3.1 Water supply and wastewater treatment in Estonia

Estonia is a small lowland country with many lakes and two large islands. The entire territory lies within the Baltic Sea catchment area and drains, in part, into the Gulf of Finland and the Gulf of Riga, both of which are vulnerable and quite polluted. The country has three RBDs. With regard to the UWWT Directive, Estonia has designated its entire territory as a sensitive area, thus requiring a higher level of treatment. Estonia has obtained a transitional period for compliance with this Directive, with a deadline at the end of 2010. Historically, Estonia has been at the forefront in municipal sewage treatment, as plants were installed in 40 % of towns during the Soviet period, and significant upgrading took place from the 1990s onward, so that about 70 % of all households were connected to municipal sewage treatment by 2005 (EEA, 2005). Nevertheless, full compliance with the UWWT Directive remains a serious financial challenge, as the quality of treatment processes must be upgraded in most areas and there is significant reconstruction of old sewer pipelines to be carried out.

Map 3.1 Rivers of Estonia

Source: UNEP GRID-Arendal, 1997.

Recent estimates show that nearly EUR 2 billion from the Cohesion Policy (and the Instrument for Structural Policy for Pre-Accession (ISPA), a pre-cursor to Cohesion Policy funds for large infrastructure investments in Candidate Countries) has been spent or allocated for water supply and wastewater treatment in Estonia since 2000, as detailed in Table 3.2.

For the most part, WWTPs in larger settlements (over 100 000 PE ([44]); a total of 6 in the country) have been renovated and are in good condition. Many medium-size plants (PE 2 000–100 000) are in need of renovation, especially surplus sludge treatment technology. Sewer systems in these communities are also in need of extension and renovation. (Aqua Consult Baltic, 2010). Costs for this work as of 2007 have been estimated at EUR 867 million, which is more than twice the amount that has been allocated from the Cohesion Policy funds for 2007–2013, meaning that considerable financing will have to come from national and local governments as well as other sources, including loans.

([44]) Population equivalent or unit per capita loading, (PE), in wastewater treatment is the number expressing the ratio of the sum of the pollution load produced over 24 hours by industrial facilities and services to the individual pollution load in household sewage produced by one person in the same time frame.

Box 3.1 Water supply and wastewater treatment in Estonia (cont.)

Table 3.2 Cohesion Policy and ISPA spending and allocations for water supply and wastewater in Estonia, 2000–2013

Type of fund	Funding (million EUR)
ISPA (2000–2004)	769 886 640
CF (2004–2006)	170 841 843
ERDF (2004–2006)	599 044 797
Total (2000–2006)	***1 539 773 280***
Structural and Cohesion funds (2007–2013)	407 756 320
Total	**1 947 529 600**

Note: All data from DG Regio. Data for ISPA and CF are estimates based on reported projects; final figures to be issued in 2011 through ex post evaluation. Actual allocations may be slightly higher as some water projects may receive contribution from funding in other categories, basic infrastructure for example.

The Cohesion Policy planning process has encouraged a more coordinated planning of the water sector in Estonia: water infrastructure investments in Estonia for the current Cohesion Policy funds are being prepared on the basis of the management plans for the country's eight river sub-basins (Republic of Estonia, 2007). Consequently, river basin planning has helped to shape planning for Cohesion Policy investments.

Cohesion Policy funding is also available to address contaminated sites that threaten water quality, including oil shale dumps, old asphalt concrete factories, and waste oil disposal sites, many of which are the responsibility of the state to remediate (Republic of Estonia, 2007).

Despite the positive role of Cohesion Policy, both in terms of financial support as well as planning, a number of problems have arisen. These complications have resulted in delays in programme implementation that will most likely render Estonia unable to ensure sufficient wastewater treatment in all settlements over 2 000 PE by the 2010 UWWT Directive deadline, and may threaten the capacity of the country's water and wastewater service operators to maintain the infrastructure in good working order in the coming years.

According to the Estonian Government audit office, many wastewater treatment projects in rural areas are unsustainable as not all costs have been taken into account when determining the price of water and sewerage services. As a result, the revenue the rates generate will not be sufficient to cover the operation and maintenance of the infrastructure. In addition to putting the investments at risk, these problems run counter to the cost recovery provisions in Article 9 of the WFD, which state that water management companies should aim to recover from users all the costs of providing, collecting and treating water.

Shortcomings in financial and environmental impact analysis of projects are often a result of the pressure to meet the demanding timeframe of the EU budgetary process and a lack of the necessary preliminary studies (Tarmo, 2007). These shortcomings have led to project implementation delays which ultimately place greater costs on the national government. Down the line, if poorly planned projects cannot be maintained, this burden will also fall to the state, requiring further public expenditure.

Governance within the system of public administration has been a persistent problem. The Ministry of Environment is responsible for the implementation of environmental legislation and overseeing CF spending on environmental infrastructure. But it is the local authorities who are responsible for the construction and operation of water infrastructure in their territories, and are the owners and implementers of the investments. If a local authority does not wish to partake in an investment project, or lacks the ability to co-finance the project due to restrictions on its ability to take loans, the Ministry of Environment does not have the authority to force the municipal government to participate. Furthermore, some local authorities are poorly prepared for their involvement in projects, lacking, among other things, a public water supply and sewerage system development plan.

The situation in Estonia is not unique in the EU, particularly in the EU-12, as all countries face a pressure to absorb funds within short deadlines. Weak institutions, particularly at the local and regional levels, are often a problem; so are difficulties in charging users the full costs of water services. While the intent of Cohesion Policy is to improve territorial cohesion and work in synergy with the WFD, in some cases complex implementation realities result in contradictions, as seen in the case of Estonia.

The joint statement supports both growth in freight traffic on the Danube as a means to reduce road transport as well as environmental protection, including the respect of EU legislation for water bodies and nature conservation. It calls for the use of an integrated planning approach, with the goal of 'multi-use riverine landscapes' that support inland navigation as well as habitats, flood protection, fisheries and tourism. The East of Vienna river navigation project (supported by EU Trans-European Network for Transport (TEN-T) funds) is seen as an example of good practice in this regard.

The case study from Hungary shows that debate between inland navigation and natural ecosystems can be analysed in terms of the key themes of territorial cohesion. The modifications for inland navigation will affect the inherent features of this territory. Moreover, while the Danube is a transport connection between territories, it also is an ecological connection and is possibly Europe's largest and most important element of green infrastructure. The projects create dilemmas in terms of the harmonious and sustainable development of the river landscape.

The joint statement provides a way forward for addressing these dilemmas. In principle, tools such as SEA and EIA can be used to provide the assessments of proposals and their alternatives in order to take appropriate decisions (the WIAs piloted in the Neth erlands may provide useful components). Here, however, there are important questions about the appropriate scale for assessments. It will be important for such assessments to consider the role of the Danube as a whole. Indeed, the inland navigation projects are part of a long transport axis that considers the Danube as a whole, along with other river systems, notably the Rhine. On the environmental side, assessments will need to consider at least the scale of the Danube river basin, in addition to the scale of individual interventions at bottlenecks as well as the middle-scale, in this case that of navigation projects across Hungary.

3.4 Examples of other investment projects that modify water bodies

Many other investment projects supported by the Cohesion Policy, in addition to inland navigation, will modify water bodies. This sub-section looks at two examples. The first is a water transfer project in Spain, and the second is a project in Hungary that aims to improve water quality and also expand a wetlands area.

Both projects illustrate potential conflicts with the WFD, whose provisions would prevent modifications that reduce the status of water bodies in either chemical or ecological terms. In both cases, the legal situation was complex. In Spain, construction of the Jucar-Vinalopó water transfer (Box 3.3) started before the Directive entered into force, and in Hungary the Kis-Balaton project (Box 3.4) aimed at improving water quality in Lake Balaton but questions were raised about its impact on wetlands. In both cases, the projects were significantly modified following protests and reviews.

For the Jucar-Vinalopó project, the final decision appears a compromise with a lower level of water quantities transferred, a solution accepted by farmers in the Jucar basin (and by some environmental groups), but provides less for farmers in the Vinalopó basin. For the Kis-Balaton project, the final project appears to support both the original goal of improving water quality in Lake Balaton while also expanding a wetlands area.

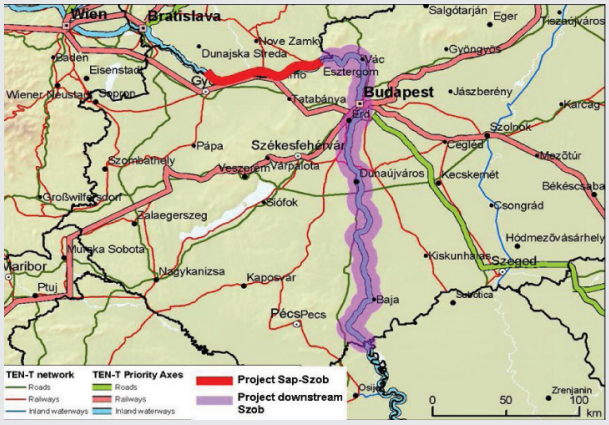
Both projects raise interesting questions about the definition of inherent features of territories, and both touch on issues related to agriculture. In the case of the Kis-Balaton project, the project is restoring a wetland area to its historical dimensions. In a similar fashion, the river restoration initiatives described in Chapter 2 restore natural features that were removed several decades ago. A key issue is how to define the inherent features of territories that have been used and modified by human activity for centuries.

The wetlands restored in the Kis-Balaton project will play a role in retaining nutrients from agricultural activities. Should a wider-scale project also consider and possibly modify the agricultural activities in a territory? Agriculture in most parts of Europe has become more intensive in recent decades, thus generating greater nutrient runoff. Indeed, some traditional, extensive agricultural systems maintain high nature values (EEA, 2010a). Moreover, agriculture has shaped Europe's landscape for centuries: to what extent should traditional agriculture be considered part of the inherent features of a territory?

In Spain, irrigation and water transfers for agriculture also have a long history. In coming decades, climate change is expected to reduce water availability in southern Spain and other parts of the Mediterranean, and a key territorial question is the extent to which water transfers should continue and even increase and the extent to which current agricultural patterns need to change.

Box 3.2 Navigation projects in Hungary

Map 3.2 Navigation Projects in Hungary ([45])



The entire course of the Danube river through Hungary (except for the urban area of Budapest) is designated as a Natura 2000 area. At the same time, the navigable channel of the Danube (or 'fairway') through Hungary does not meet the United Nations Economic Commission for Europe (UNECE) parameters ([46]) concerning depth or breadth at about 50 points for about half of the year.

The Danube, together with the Rhine, Meuse and Main rivers, forms a priority axis for development under the TEN-T. As part of TEN Priority Project No 18, a series of studies are preparing projects to improve inland navigation along the Danube ([47]).

One study, prepared by VITUKI ([48]) in 2007, identified options to provide a minimum of 2.7 m navigation depth through the Danube in Hungary for almost the whole year. In May 2009, the Hungarian Ministry of Transport ([49]) opened a public tender to prepare a set of studies related to the project:

- a SEA;
- study on the impacts of navigation on Natura 2000 sites;
- a study related to Article 4 of the WFD (which inter alia allows the extension of the Directive's requirements or the adoption of less stringent environmental objectives under specific conditions).

Link to Cohesion Policy

TEN-T projects are financed by national, European Investment Bank (EIB) and EU resources; EU funds include both Cohesion Policy funds and a dedicated TEN-T budget. The total amount of financial resources allocated for the elaboration of the studies relating to navigation on the Hungarian sketch of the Danube is EUR 8 million, of which the EU is providing 50 % through the TEN-T budget.

If the project is approved, engineering and other works may be financed through the Cohesion Policy: Hungary's Operational Programme for Transport (2007–2013) notes that further projects on the development of the navigability of the Danube may be initiated in a later phase of the programming period, after 2010 ([50]).

Photo: Vessel on the River Danube ([51])

([45]) See http://assets.panda.org/downloads/hungary_factsheet_18_jan_2010.pdf for more details.
([46]) UNECE VI B and C parameters.
([47]) See http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/hungary/2007-hu-18090-s.htm for more details.
([48]) Website of VITUKI relating to navigation on the Danube.
See http://www.vituki.hu/index.php?option=com_content&task=view&id=68&Itemid=83 for more details.
([49]) Currently Ministry of National Development.
([50]) Transport Operational Programme. See http://www.nfu.hu/umft_operativ_programok for more details.
([51]) Sustainable development of inland waterways transport. See http://www.danubecommission.org/uploads/doc/72/seminar/013.ppt for more details.

Box 3.2 Navigation projects in Hungary (cont.)

Link to the Water Framework Directive

The RBMP of Hungary lists infrastructure projects to be implemented by 2015. The current list consists of 112 future projects, among which 64 (57 %) relates to navigation. The plan states that most of the projects are still under planning (57); however, in 22 cases the projects are in the phase of implementation.

The RBMP states that in line with the WFD (Article 4) water bodies subject to navigation can be designated as artificial or heavily modified where the environmental aim is to achieve good ecological status. The plan does not further elaborate on this topic ([52]).

Link to the key elements of territorial cohesion, focusing on the environment dimension

Harmonious and sustainable development
The improvements in river navigation are intended to strengthen the competitiveness of the Hungarian economy. The VITUKI study refers to an environmentally sound, safe and economic navigation system. However, the project has been criticised by NGOs as endangering natural areas along the Danube including Natura 2000 sites ([53]).

Inherent features of territories
The navigation work is likely to affect the functioning of Hungary's Danube Natura 2000 site, together with national parks (e.g. Danube-Ipoly National Park and Duna-Drava National Park) and Ramsar sites. Here, it will be important to see if the SEA and other studies launched in 2009 provide potential solutions.

Concentration
The Danube provides an important transport link through several EU Member States as well as neighbouring countries.

Connecting territories
The navigation projects are part of the TEN-T Priority Project No 18 ([54]) (waterway axis Rhine/Meuse–Main–Danube), which crosses Europe transversally from the North Sea at Rotterdam to the Black Sea in Romania. At the same time, the Danube river basin is linked through a common Management Plan whose goal is to protect and enhance all water bodies to the level of good status (ecological, chemical and quantitative) by 2015 ([55]).

Cooperation
Danube countries are committed to cooperate through the implementation of the TEN-T Priority Project and the Danube RBMP.

([52]) River Basin Management Plan of Hungary. See http://www.vizeink.hu/files2/100505/Orszagos_VGT0516.pdf for more details.
([53]) Bankwatch, *Mapping controversial anti-crisis paths for EU and EIB funding in central and eastern Europe*. See http://www.bankwatch.org/billions/index.php for more details.
([54]) There are 9 ongoing national level projects listed under the TEN-T Priority Project No 18. See http://tentea.ec.europa.eu/en/ten-t_projects/30_priority_projects/priority_project_18/priority_project_18.htm for more details.
([55]) See http://www.icpdr.org/participate/danube_river_basin_management_plan for more details.

Box 3.3 The Jucar-Vinalopó water transfer project

Summary

The idea of a Jucar-Vinalopó transfer dates back to 1420; it was the first water transfer project of its kind to be recorded, though the work at that time was not completed ([56]). More recently, it was an element of proposals for massive freshwater transfer projects in Spain in the 20th century.

This transfer was again proposed in the Jucar Basin Plan of 1998, for the purpose of reducing aquifer overexploitation in the Vinalopó-Alacanti area as well as an urban water deficit in Marina Baja. Construction started in 2002 and went through successive interruptions and changes in design due to opposition from environmental organisations as well as traditional farmers in the lower Jucar basin. The former feared severe negative impacts on the Jucar River and Albufera wetlands, and argued that the project contravened several European directives including the WFD and the Directive on Natural Habitats (92/43/EEC). In turn, farmers in the Jucar basin contended that the project would result in reduced water intakes for them.

In August 2004, a consultation process was initiated by the Spanish Ministry of Environment to re-examine the project; this allowed opponents of the transfer an opportunity to present and discuss their concerns. A Group of Study was created including representatives of the Ministry, Jucar Basin Authority, Valencia Regional Government, water users in source and receptor basins, environmental NGOs and independent experts. The outcome of the Group of Study's work was presented to a broader public including representatives of the European Commission in 2005.

This process resulted in a revised project that would run through 2.7 km of protected areas, compared to 41 km in the original design. This new version also modified the intake of the transfer and restricted the use of transferred water to irrigation purposes, while future urban water deficits in Marina Baja were to be covered by desalination plants. Reactions to the revised plan ranged from more or less explicit agreement (e.g. World Wildlife Fund (WWF)) to firm opposition (e.g. the Vinalopó Water Users Committee, which represents farmers who would receive the project's water).

Link to Cohesion Policy

On 12 December 2006, the European Commission ([57]) decided to co-fund the revised version of the project with EUR 120 million, on the condition that a series of environmental conditions were met. This funding is allocated through the ERDF within the framework of the Comunidad Valenciana OP for the 2000–2006 period, under heading 3.1 'Water supply for the population and economic activities'.

Link to the Water Framework Directive

This case touches on legal questions regarding timing. For example, whereas the construction of the project started in 2002, the WFD only entered into force in December 2003. More recently, the Spanish Ministry of Environment has announced that it would postpone the presentation of the new Jucar RBMP until 2012, or three years in excess of the 2009 deadline set off in the WFD.

The Commission's move to fund the project nonetheless incorporates provisions related to the directive; for example, it makes disbursements conditional upon progress observed on issues such as aquifer preservation and restoration, water quality and other environmental conditions.

([56]) According to Lasserre (2005), major public works took place in Spain during the Enlightment and, especially, in the late 1890s and early 1900s, as the Regenerationist movement considered hydrological stress in a number of regions as a main factor of the country's relative underdevelopment.

([57]) Decision C(2006)6739 of 12 December 2006.

Box 3.4 Kis-Balaton Water Protection System (Hungary)

Summary

The Kis-Balaton Water Protection System (KBWPS) project aims at improving the water quality of Lake Balaton, and in doing so also expand a wetlands area. The project will raise the water level of the Kis-Balaton marshland areas, a Natura 2000 area and a Ramsar site, expanding it into adjacent parts of the lower Zala-valley. The larger wetlands are expected to retain and utilise nutrients from agriculture and rural settlements transported by the Zala river before they reach the lake ([58]). The larger wetlands would be a natural-like environment that seeks to recreate the conditions existing approximately 200 years ago ([59]).

The first phase of the KBWPS took place in the 1980s with an aim of retaining the nutrients from the lake. The KBWPS reconstructed the former marshland in the area of the lower part of the main inflow, the Zala river. The first phase of the System, the Hidvegi Pond, was created in 1985.

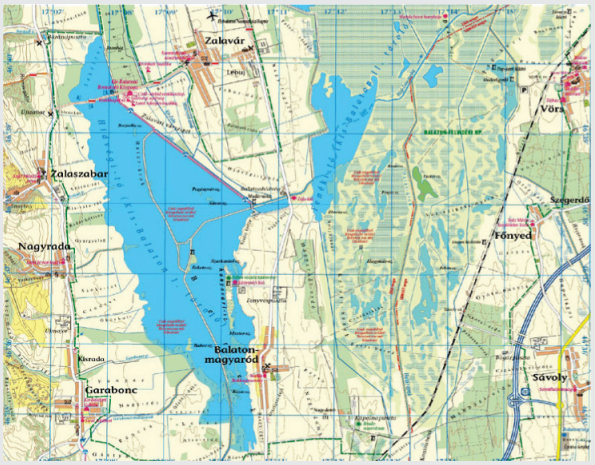
The current project is thus the second phase; it takes place in the area of the Feneki Pond ([60]). This phase aims at:

- protecting the water quality of Lake Balaton;
- protecting and increasing the natural and ecological values;
- decreasing of the risk of floods.

The original plans for this phase focused on the first point, and were modified following criticisms that the project as first conceived would damage the wetlands, though questions about the project may remain ([61]).

Photo: By Koroknai, Péter ([62])

Map 3.3 Map of the Hidvegi Pond and the Feneki Pond ([63])



Link to Cohesion Policy

The KBWPS is listed as one of the projects in Hungary's 'Environment and Energy Operation' programme (EEOP), which is part of the Development Plan ([64]) for the EU budget cycle from 2007–2013.

([58]) In the 18th century, the Kis-Balaton area was a natural filter of water reaching the Lake. In the 19th century, the water level of Lake Balaton was lowered after the opening of the Sio sluice which caused the higher areas of the Kis-Balaton basin to dry out. In consequence of the regulations, the area lost its function of protecting the water quality of Lake Balaton.
([59]) See http://www.kisbalaton.hu/kis_balaton_water_protection_system.html for more details.
([60]) See http://www.kisbalaton.hu/kbvrprojekt.html for more details.
([61]) See http://www.bankwatch.org/billions/index.php for more details.
([62]) See http://kisbalaton.hu/kis_balaton_fotopalyazat_2008_dijak.html#19 for more details.
([63]) See http://www.map.hu/galeria/orig/1383_balaton_kisbal_minta_60e.jpg for more details.
([64]) National Strategic Reference Framework (NSRF) in EU terminology.

Box 3.4 Kis-Balaton Water Protection System (Hungary) (cont.)

The estimated total cost of the project is HUF 6 billion (EUR 26 million). The project is co-financed by EU resources (European CF) and the national budget. The project was approved at national level and is now in the process of public procurement. The implementation of the second phase of the project is projected to end in 2012/2013 ([65]).

Map 3.4 Map of river basin sub-units in Hungary ([66])

Link to the Water Framework Directive

Hungary has a single RBMP for national territory, articulated in sub-basins and sub-units. The Kis-Balaton area is part of the Zala sub-unit of the Balaton sub-river basin. In Hungary's 2009 RBMP ([67]), the KBWPS is listed as one of the high priorities in the RBMP for this sub-river basin ([68]).

The RBMP includes a number of measures to achieve good status of water bodies by 2015; among these are landscape actions such as the restoration and improvement of filtering meadows, reservoirs and alluvial deposit catchers ([69]).

Link to the key elements of territorial cohesion, focusing on the environment dimension

Harmonious and sustainable development

The Balaton area relies heavily on tourism, and thus the water quality of the lake is seen as a factor in local development. At the same time, the project seeks to expand a wetland area ([70]).

Inherent features of territories

Kis-Balaton is one of the last sizeable wetland areas in Central Europe and it is protected by the Ramsar Convention and as a Natura 2000 site. The area has a rich fauna (about 32 species of fish, frogs, water-salamanders, avifauna of 232 species, etc.) and flora (29 protected and 1 highly protected species). Therefore, it is of particular importance to find a balance between the aims of improving the water quality and protection of the ecosystem.

([65]) See http://kisbalaton.hu/letoltesek/sajtoanyag_20090210.pdf for more details.
([66]) See http://www.kvvm.hu/cimg/documents/Implementing_the_Water_Framework_Directive_in_Hungary_June_2010.pdf for more details.
([67]) River Basin Management Plan of Hungary. See http://www.vizeink.hu/files2/100505/Orszagos_VGT0516.pdf for more details. River Basin Management Plan for the Balaton sub-river basin. See www.vizeink.hu/functions/get_file.php?f=files/vizeink.hu for more details.
([68]) River Basin Management Plan for the Zala sub-unit. See http://www.vizeink.hu/files/vizeink.hu_0407_4-1_Alegyseg_Zala.pdf for more details.
([69]) Environment and Energy Operational Programme. See http://www.nfu.hu/umft_operativ_programok for more details.
([70]) See http://www.grid.unep.ch/activities/sustainable/balaton/index.php for more details.

Box 3.4 Kis-Balaton Water Protection System (Hungary) (cont.)

Concentration

One of the reasons why the Kis-Balaton lost its function of protecting the water quality of Balaton was the opening of the Sio Sluice, which connected it to Lake Balaton. This led to a decrease in the lake's water level and the area dried up. Runoff from settlements, agricultural chemicals and increasing tourism all contributed to the deterioration of water quality in Lake Balaton. Thus, the project helps to address problems arising from concentration.

Connecting territories

The project also aims to restore the fish population in Lake Balaton by creating a natural link between the Balaton and the Kis-Balaton.

Cooperation

No information available.

Sources:

- River Basin Management Plan of Hungary (http://www.vizeink.hu/files2/100505/Orszagos_VGT0516.pdf), River Basin Management Plan for the Balaton sub-river basin and the Zala sub-unit (http://www.vizeink.hu/functions/get_file.php?f=files/vizeink.hu, http://www.vizeink.hu/files/vizeink.hu_0407_4-1_Alegyseg_Zala.pdf)
- Environment and Energy Operational programme 2007–2013 (http://www.nfu.hu/umft_operativ_programok)
- Government decree No 2 317/2004 (XII. 11.)
- EU and EIB funding in central and eastern Europe (http://www.bankwatch.org/billions/index.php)
- Website of the project (http://kisbalaton.hu/index.html)

3.5 Cross-border and trans-national cooperation

There are 52 cross-border cooperation programmes across the EU; these programmes carry out joint activities in neighbouring Member States. Their projects can include the joint management of natural resources and the development of common infrastructure. One example is the ongoing cross-border Operational Programme (OP) 'Romania-Bulgaria', which is undertaking joint flood prevention work along the Danube river between these two Member States. Another is the 'Latvia-Lithuania' OP, which is carrying out work to improve water quality in small settlements.

There are 13 trans-national cooperation programmes across the EU, set up by region. Under these programmes, a large number of projects have been set up to address water management issues, developing new tools and methods. Many of the projects have addressed flood management. Several examples are provided below:

- FLAPP (Flood Awareness & Prevention Policy in border areas) ran from 2005 to 2007 and brought together 35 partners in 12 countries to work on flood forecasting and information as well as management during floods. The project also analysed spatial measures for flood prevention, including sustainable flood management that supports areas rich in biodiversity, and it sought to strengthen cross-border cooperation on flood management ([71]).
- Flood Wise (Interreg IVC) will run from 2010 to 2012 and will also focus on flood risk management in cross-border river basins. The project brings together water managers and experts from 6 international river basins that cover 10 European countries ([72]).

([71]) See http://www.flapp.org for more details.
([72]) See http://www.floodwise.eu for more details.

- The SAWA (Strategic Alliance for integrated Water Management Actions) Programmes seek to strengthen implementation of the Floods Directive. Its actions have included the development of pilot flood risk management plans, as well as pilot work to integrate flood planning into RBMPs ([73]) (Germany, the Netherlands, Norway, United Kingdom).
- The MEDMANN project ran from 2006 to 2008. It sought to develop tools for integrated water resources management, in particular to address drought and water scarcity ([74]).
- The Scaldit programme (comprising Belgium, France, and the Netherlands under Interreg IIIB) ran from 2002 to 2005, and developed and tested guidance documents for a common approach to the characterisation of the Scheldt river basin, which runs from France through Belgium to the Netherlands. The work supported the preparation of the 2005 'Article 5' report for river basin characterisation under the WFD ([75]).
- ELLA (Elbe-Labe Austria, Czech Republic, Germany, Hungary, Portugal) ran from 2003 to 2006 and was financed via CADSES. It brought together spatial planning, water management and agriculture authorities in the countries involved to prepare spatial planning strategies for flood risk management. A key result was the development of flood hazard maps for the Elbe River; the project thus provided a pilot test of a key step required under the Floods Directive ([76]).

The trans-national projects in particular have thus played a role in supporting the implementation of EU water legislation and in strengthening capacities and methods for governance.

([73]) See http://www.sawa-project.eu/index.php for more details.
([74]) See http://www.meddman.org/ for more details.
([75]) Flemish Environment Agency, Scheldt River Basin District — France, Belgium, The Netherlands: SCALDIT, undated.
([76]) Based on http://www.cadses.net/projects/apprpro.html?projectId=1511&topic=projects/apprpro — see for more details.

4 Building cooperation across borders and in 'macro-regions'

The WFD calls for cooperation among countries with shared river basins — leading to, where possible, the development of common RBMPs. In several shared RBDs — including the Danube ([77]), the Rhine ([78]) and the Scheldt ([79]) — common RBMPs have been prepared. For the Danube, an articulated planning has been used: in addition to the basin-wide plan, more detailed plans have been prepared for major sub-basins such as the Tisza River, a Danube tributary. Below these are national and regional RBMPs.

This section reviews cooperation at two different scales. Many river basins are shared between two countries, and this section first reviews the cooperation between two EU Member States, Spain and Portugal, for their shared rivers. The other example looks at one of Europe's 'macro-regions', the Baltic Sea Region. The 2009 strategy for this region is intended to provide a practical approach for the implementation of territorial cohesion. Moreover, this strategy is closely linked to implementation of the MSFD, which extends the WFD's approach to the EU's regional seas.

4.1 Shared river basins: the Albufeira Agreement

The case study below describes current cooperation between Spain and Portugal, which share several river basins. These countries reached an agreement on water management in 1998, before the WFD was concluded, and they have used this framework for joint work related to the Directive. As yet, however, the two countries have produced separate RBMPs.

Box 4.1 The Albufeira Convention between Spain and Portugal

Short description

The Convention on Cooperation for the Protection and Sustainable Use of Water in Shared Rivers (or Albufeira Agreement) was signed on 30 November 1998 and entered into force on 17 January 2000. It aims at strengthening cooperation between Spain and Portugal to encourage the sustainable use of shared water courses (Tajo, Mio, Limia, Duero and Guadiana Rivers ([80])), as well as maintaining and improving the ecological status of shared water bodies.

The Albufeira Agreement provides a framework for cooperation between Spanish and Portuguese authorities in a number of fields related to shared watercourses, including sustainable resource utilisation, EIA and risk prevention. The implementation of the Albufeira Agreement is coordinated by an intergovernmental technical body, the Commission for the Application and Development of the Convention (CADC), which is in turn divided into five working groups. A major step toward more integrated territorial governance was seen in the creation of a Joint Technical Secretariat at the 2nd Conference of the Parties in 2008.

([77]) See http://www.icpdr.org/icpdr-pages/drpc.htm for more details about the Danube River Protection Convention.
([78]) See http://europa.eu/legislation_summaries/environment/water_protection_management/l28115_en.htm for more details about the Convention for the Protection of the Rhine.
([79]) See http://www.minbuza.nl/en/key-topics/treaties/search-the-treaty-database/2002/12/010581.html for more information on the Scheldt Treaty.
([80]) The Spanish names of the rivers concerned are used in this report.

Box 4.1 The Albufeira Convention between Spain and Portugal (cont.)

Role of spatial analysis

To some extent, the Albufeira Agreement combines river basin-oriented and spatial planning approaches. If fully implemented, this convergence can have far-reaching environmental as well as socio-economic implications as shared river basins account for 46 % of the continental Iberian surface. The three main river basins are the Duero, Tajo and Guadiana.

Planning aspects are articulated along the following lines of action:

- a protocol (2008) for carrying out SEAs on a cross-boundary basis, focusing on the environmental impacts of water projects (e.g. Alqueva Dam);
- permanent information exchange of data on: water flows, water quality, storage levels, river basin planning processes, national water resources plans and hydraulic schemes;
- contingency planning on, and management of, extreme situations (e.g. droughts, floods), especially in the Tajo and Guadiana river basins;
- definition of minimal flows of the cross-boundary rivers at the Spanish-Portuguese border;
- focus on accountability and on participation by civil society in the activities under the Agreement (e.g. the working group on information exchange) via public consultations, awareness-raising campaigns and the dissemination of relevant information.

Link to implementation of the Water Framework Directive

The Albufeira Agreement serves the implementation of the EU WFD at two different levels.

First, even though the Albufeira Agreement was signed prior to the adoption of the WFD, it and the CADC supports one of the key provisions of the latter, which is contained in Article 13.2: 'In the case of an international river basin district falling entirely within the Community, Member States shall ensure coordination with the aim of producing a single international river basin management plan [...].'

As yet, however, single RBMPs have not been produced for the shared rivers.

Second, the Albufeira Agreement and the CADC explicitly acknowledge EU law with regard to water quality. Moreover, a working group was created on the 'WFD and Water Quality'. The main tasks of this working group with regard to the implementation of the WFD are as follows:

- coordination of joint technical initiatives and definition of priority actions toward the implementation of the WFD (including studies for RBMPs);
- monitoring and information sharing on water quality assessment in cross-border areas;
- ongoing assessment of compliance with the WFD and related EU directives;
- studies for better appraisal of the technical conditions of water in the Guadiana Delta.

Link to the key elements of territorial cohesion, focusing on the environment dimension

Harmonious and sustainable development

The Albufeira Agreement signals a paradigm shift in a long history of Spanish-Portuguese cooperation on water-related issues. Traditionally considered as a mere resource for production (either for agricultural irrigation or hydropower), freshwater and related habitats are being increasingly acknowledged for their ecological values.

Inherent features of territories

The previous short-term focus on the exploitation of freshwater resources from the shared river basins has resulted in severe degradation of the water quality and the regional flora and fauna in and around the rivers. The WFD calls for the attainment of good status, including good ecological status, in all European water bodies, pointing to the need to restore and preserve the natural capital of the river basins. The Albufeira Agreement supports this, for example through its specification of minimum water flows.

Box 4.1 The Albufeira Convention between Spain and Portugal (cont.)

Concentration and connections between territories

The links of the Agreement with the concentration- and connection-related dimensions of territorial cohesion can be seen in the Duero river basin, particularly regarding water supply needs. A joint working group is preparing guidance to modulate the intensity of hydropower production to support ecological functions in the river basin. This is of great importance given that both Spain and, especially, Portugal rely heavily on large-scale dams in the Duero basin for their electricity production, with new dams in planning or under construction: a total of, respectively, 55 dams in Spain and 17 in Portugal are projected for 2020 compared to 32 and 12 in 1998 ([81]). It is possible, however, that the WFD's requirements for good status, including good ecological status, may come into conflict with these national hydropower plans; moreover, this potential conflict may arise within the two countries more than between them. For example, in 2008, a number of Portuguese NGOs sent a joint letter to European Commission President Barroso to request the suspension of the Portuguese Dam Plan (PDP) on the grounds that it was contrary to WFD provisions and that its economic benefits and potential environmental impacts remained unclear ([82]).

Cooperation

The Albufeira Agreement provides an example of cooperation among EU Member States on shared river basins. The joint secretariat created in 2008 will provide coordination in the collection, analysis and dissemination of technical information on issues including environmental risks and sustainability.

Sources:

- *Convenio sobre cooperación para la protección y el aprovechamiento sostenible de las aguas de las cuencas hidrográficas hispano-portuguesas*. Signed in Albufeira (Portugal), 30 November 1998.
- Comisión para la Aplicación y Desarrollo del Convenio sobre Cooperación para la Protección y el Aprovechamiento Sostenible de las Aguas de las Cuencas Hidrográficas Hispano — Portuguesas, official Internet site: http://www.cadc-albufeira.org
- Dominguez, D., Manser, R. and Ort, C., 2005, No problems on Río Duero (Spain) — Rio Douro (Portugal)?, *The Science and Politics of International Freshwater Management*, Lecture notes and case studies, Swiss Federal Institute of Technology, Zurich.
- Maia, R., 2000, Sharing the Waters of the Iberian Peninsula (http://www.iwra.siu.edu/pdf/Maia.pdf) accessed 17 March 2012.

4.2 The Baltic Sea Regional Strategy: territorial cohesion in a macro-region ([83])

4.2.1 Overview

The European Commission considers the Baltic Sea Region Strategy (BSRS) 'an ideal case for the application of a territorial cohesion approach' (EC, 2009a). It is part of a broader effort to implement territorial cohesion via 'macro-regions' that cover several Member States; the ambition is to provide a coordination mechanism for policies with territorial impact (EP, 2010). As the first macro-regional strategy, the BSRS is a model for other regional efforts including the EU Strategy for the Danube Region, adopted by the European Commission in December 2010.

The case study considers the interface between the BSRS, the WFD and the MSFD, in particular in light of the issue of nutrient pollution in the Baltic Sea, a key issue for the Baltic Sea — nutrients and the resulting eutrophication — are specifically addressed under the BSRS. Most nutrients flow into the Baltic Sea from rivers; a key source is the runoff of agricultural chemicals (Håkansson and Bryhn, 2008).

([81]) Iberaqua (2002), quoted in Dominguez et al. (2005).

([82]) For an overview of the main arguments of opponents to the PDP, please refer to http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/implementation_conventio/2009_conference/presentations_speeches/hydromorphology/session_v-4-chainhopdf/_EN_1.0_&a=d as well as the official website of the Nueva Cultura del Agua Foundation: http://www.unizar.es/fnca/index3.php?id=3&pag=11 for more information.

([83]) The retrieval of documents and the interpretation is shaped by emerging insights from the EU Interreg-funded project Baltic COMPASS ('Comprehensive Policy Actions and Investments in Sustainable Solutions in Agriculture in the Baltic Sea Region').

The 2008 MSFD 'extends EU water legislation to the marine environment' ([84]). The MFSD is closely connected with the WFD on several levels. There is a spatial overlap as the WFD extends to coastal waters and specifically to waters within one nautical mile from the coast line. The MFSD uses a similar planning framework, on the basis of marine regions where the WFD uses RBDs. Under the MSFD, Member States are to undertake a series of key steps, including the following:

- produce a comprehensive assessment of the marine environment by 2012;
- characterise the standard of 'Good Environmental Status';
- establish monitoring programmes;
- develop a marine strategy for own waters reflecting the overall perspective of the marine region.

The Baltic Sea is designated as a marine region under this Directive. The MSFD cites the Convention on the Protection of the Baltic Sea, and is expected to provide a framework for the Directive's implementation in the Baltic region; the Helsinki Commission, which coordinates implementation of the Convention and the 2007 Baltic Sea Action Plan developed through this Committee are expected to provide a key role for implementation.

4.2.2 The Baltic Sea Regional Strategy

The implementation of the Strategy is organised in terms of four pillars; the first pillar focuses on environmental sustainability. The pillars are then divided into priority areas (Table 4.1). For each priority area, a set of flagship projects have been identified; by their titles, however, these may contribute to several priority areas.

Eutrophication is addressed specifically under priority area 1, coordinated by Finland's Ministry of Environment. However, many linkages exist with other priority areas, including priority area 9 on agriculture, forestry and fisheries.

Table 4.1 Organisation of the implementation of the strategy

Pillars	Priority areas
Pillar 1: To Make The Baltic Sea Region An Environmentally Sustainable Place	1. To reduce nutrient inputs to the sea to acceptable levels
	2. To preserve natural zones and biodiversity, including fisheries
	3. To reduce the use and impact of hazardous substances
	4. To become a model region for clean shipping
	5. To mitigate and adapt to climate
Pillar 2: To Make The Baltic Sea Region A Prosperous Place	6. To remove hindrances to the internal market in the Baltic Sea Region including to improve cooperation in the customs and tax area
	7. To exploit the full potential of the region in research and innovation
	8. Implementing the Small Business Act: to promote entrepreneurship, strengthen SMEs and increase the efficient use of human resources
	9. To reinforce sustainability of agriculture, forestry and fisheries
Pillar 3: To Make The Baltic Sea Region An Accessible And Attractive Place	10. To improve the access to, and the efficiency and security of the energy markets
	11. To improve internal and external transport links
	12. To maintain and reinforce attractiveness of the Baltic Sea Region in particular through education, tourism and health
Pillar 4: To Make The Baltic Sea Region A Safe And Secure Place	13. To become a leading region in maritime safety and security
	14. To reinforce protection from major emergencies at sea and on land
	15. To decrease the volume of, and harm done by, cross-border crime

Source: EC, 2009b (see also this document for list of flagship projects as of 2009).

([84]) European Commission, Water Note 11. From the rivers to the sea: Linking with the new Marine Strategy Framework Directive, December 2008.

The European Commission (Directorate-General Regional Policy (DG REGIO)) is the main coordinating body for the BSRS, operating with support from a high level group of representatives from all 27 Member States. Actual implementation responsibility lies with Member State governments, through use of existing institutional structures and an expected enhanced coordination and collaboration across existing policies (EP, 2010). As environmental issues in the Baltic Sea Region often involve third party states, cooperation with the Russian Federation is coordinated under the Northern Dimension Policy Framework (NDPF), which provides the basis for external aspects of cooperation in the Baltic Sea region.

In addition to the priority areas, the BSRS also has a set of horizontal actions. These include initiatives for spatial planning of the region's land and of sea areas as well as support for the implementation of the MSFD (EC, 2009b). Further, the attention to the environmental degradation in the Baltic Sea Region may be reflected in the fact that the 'environmental pillar' has received the highest number of priority areas.

The Strategy did not come with specific budget lines attached as it was launched in the middle of the EU budget/programming period 2007–2013 (EP, 2010). However, EUR 20 million have been allocated, predominantly from Cohesion Policy funds. The Flagship Projects will be mainly financed by these funds.

Interreg (now trans-national) projects play a key role, and the Baltic Region has a high number of Interreg projects supporting regional cooperation in relation to agriculture and environment (SEI, 2010).

4.2.3 Involving agriculture

Addressing agricultural practices and their pollution will be a key issue for the implementation of the BSRS. While the Strategy itself can play a key role in achieving progress in this area, developments in agriculture and agricultural policy will also be important. This suggests that the challenges go beyond the areas of environmental and cohesion policy, as the Common Agricultural Policy (CAP) is an important element.

Within the region, Helcom has recently created a Baltic Agriculture and Environment Forum, which could play a role in terms of bringing this policy sector into the Strategy.

5 Addressing future challenges

The RBMPs under the WFD are to be renewed every six years. This provides an opportunity to address new issues that arise. In this context, however, it is valuable to also track longer term trends and challenges. Adaptation to climate change is an issue of growing importance for the EU. Other key questions include changes in agriculture and changes in population.

5.1 Adapting to climate change

Climate change is expected to have major impacts on water bodies across Europe. In southern Europe, higher levels of rainfall are expected (and indeed have been seen in recent years). As a result, flooding may increase.

In southern Europe, summer rainfall is forecast to decrease and summer temperatures to increase. According to an estimate by the Intergovernmental Panel on Climate Change (IPCC), summer temperatures in Spain and Portugal could rise by 7 degrees by 2070. In the Alps and some other mountain ranges, glaciers may continue to recede; this factor too will reduce summer water flows. As a result, water scarcity could become more widespread and droughts more frequent. Reduced water flows could increase eutrophication problems in rivers, lakes and coastal waters (EC, 2008b).

In a 2009 Communication on climate change adaptation, the European Commission called for the 2015 round of RBMPs to be 'climate proofed', and climate change impacts should be integrated into actions to implement the Floods Directive (EC, 2009c).

Many European countries have already started to address climate change impacts in their water policies; an example is the 'Room for the River' programme in the Netherlands, described in Chapter 2.

Climate change impacts may affect water consumption and other practices in a range of economic sectors, from agriculture to households, and these impacts may in turn affect river basins.

5.2 Land cover changes: agriculture

Several case studies in previous sections have noted the importance of agriculture in terms of river basin management, territorial cohesion and also spatial planning. Two of the projects supported by Cohesion Policy funds described in Chapter 3 are related to agriculture: the Jucar-Vinalopó water transfer in Spain provides irrigation water, and the restored Kis-Balaton wetlands in Hungary are intended to absorb nutrients from farming. For the Baltic Sea, perhaps the most important common environmental problem to be addressed under the regional strategy is eutrophication, which is closely linked to agricultural runoff.

One ongoing agricultural trend in Europe is the loss of extensive farmland, in particular high-nature value farmland that supports biodiversity ([85]). In many countries and regions, this farmland is a historical landscape, and the abandonment of this land means the reduction of an inherent feature of the territory, along with potential biodiversity and habitat losses.

The decline in extensive farmland is matched by an intensification of agricultural practices in many other areas, together with a loss of farmland to urban sprawl, transport networks and other artificial surfaces. Farmland is lost especially in densely populated regions, such as the Po Valley in northern Italy. In northern Italy and other areas, urban sprawl takes over rich agricultural soils. While many of these are used intensively, the conversion from agricultural to urban uses may, however, lead to higher pollution burdens on water bodies.

([85]) Many of the habitat types listed in the EU Habitats Directive — 55 of the 231 — depend on or benefit from extensive agricultural practices (EEA, 2010a).

A range of factors will influence the evolution of agricultural land in Europe in coming decades, together with the resulting effects in terms of landscape and water bodies. Three areas are key: the EU's CAP; EU energy policy, in particular in terms of biofuels; and global food demand.

In November 2010, the European Commission presented its proposal for the future CAP (EC, 2010), which identifies three main objectives:

- food production;
- sustainable management of natural resources and climate action;
- balanced territorial development.

The proposal is notable in the role it gives the management of natural resources, including water and biodiversity, climate mitigation and adaptation and also the territorial dimension. The debate on the shape of the CAP after 2014 is only starting; a key issue will be the translation of policy objectives into instruments.

The EU's Climate Action and Renewable Energy (CARE) package, a set of legislations adopted in April 2009, includes the target that 10 % of EU transport fuel come from renewable sources by 2020. Biofuels from crops are seen as a key path to meeting this target, and their production has increased rapidly: approximately four-fold between 2004 and 2008 ([86]). Current biofuels are grown through intensive agriculture, and their ongoing expansion could increase the impacts on water bodies across Europe.

Global demand for food in coming decades will also affect Europe's agriculture. Over the next 20 years, the global population is expected to increase by almost 30 % — however, incomes are currently forecast to increase much faster, over 80 %, with much of this growth expected in emerging economies, especially in Asia. These forecasts suggest that agricultural production in the world will need to double, as rising incomes will increase demand for meat and other products that require high inputs (EEA, 2010b). These trends may lead to an increase in demand for agricultural exports from Europe, though this result is uncertain as it will depend on the extent to which agricultural productivity and land area increase in other parts of the world. If demand for EU food exports does increase, this is likely to fuel further intensification of agriculture, and thus increased runoff to water bodies — and possibly further demands for irrigation.

5.3 Population shifts

While Europe's population overall is expected to remain quite stable in coming decades, several countries and regions will see a growth in inhabitants and others will see a decline.

In France, for example, the overall population is expected to grow by 11 % between 2010 and 2040, with the south-west regions of the country showing higher population growth, 16 %. This trend is not new, as the south-west has been the fastest growing region of France over the past 10 years.

As a result of the growing population, the south-west is expected to experience further development on the periphery of cities such as Toulouse, replacing agricultural land. This growing urban development will affect water resources. Without good planning approaches, land pressure could increase in zones that are easily flooded. A growing population also implies growing water consumption, together with higher levels of wastewater to be treated.

To address these issues, the Water Agency for the Adour-Garonne RBD in the south-west of France has prepared a guidance document for local authorities and stakeholders on issues to address in local urban planning documents (PLU and SCOT) to ensure their integration with the RBMPs and to support good management of water resources (Agence de l'Eau Adour-Garonne, 2010).

While these guidelines provide an approach for better integration, population growth can still pose important dilemmas for spatial development and water management, as seen in the following two case studies.

In the Netherlands, the 'Randstad', the country's core urban area that includes Amsterdam and Rotterdam, is expected to continue growing. The Netherlands has traditionally lived close to the

([86]) Directorate-General Agriculture and Rural Development (DG AGRI), based on data from eBio, EBB, EurObserv'ER.

water, and the case study of the IJmeer Vision (Appendix 2) shows how existing water bodies and their natural values are seen as an asset for future development. This approach is, however, contested by groups that wish instead to retain the undeveloped landscape of the IJmeer as a value within a crowded region.

This vision is part of a national effort in the Netherlands to consider long-term planning needs and approaches. Provinces, municipalities and water boards across the country have prepared river basin visions (stroomgebiedvisies) that look to 2050. These visions identify room for water retention measures and other practical measures, such as restoration of streams ([87]). The time frame allows the consideration of possible climate change impacts. The regional visions have been used in the National Water Agreement (Nationale Water Akkoord) ([88]). Moreover, they are relevant for other planning documents, such as the provincial structural concepts, the provincial water management plans and regional plans.

Another example is the Dublin water supply project (Appendix 3) where the Dublin metropolitan region has prepared a plan to build a new water transfer from western Ireland to the city, to meet the needs of a population that is projected to increase in coming decades. This project includes the creation of a new park as part of the water transfer system. Here too, water is seen an asset for development. The project raises questions, however, about impacts on the Shannon River, the planned source for the water, as well as broader issues in terms of spatial development.

([87]) See http://www.waterland.net/index.cfm/site/Nederland%20Waterland/pageid/EAC0DE42-FEA8-FE97-DCDE7080052912F8/index.cfm for more details.

([88]) To manage the effects of climate change to water in the Netherlands, central government, the Inter Provincial Consultation, the Water Boards and the Association of Dutch Municipalities concluded an Agreement on Water Management for the 21st Century in February 2001.

6 Conclusions

RBMPs play a central role in the implementation of the WFD. In many parts of the EU, however, stronger links are needed between the RBMPs and other planning and programming processes, such as spatial planning as well as Cohesion Fund OPs; strong links would help to address potential conflicts with these other policy areas and build synergies with them.

The demands on river basin management planning will grow in the next cycle of plans, for 2015; EU requirements and policy recommendations call on RBMPs to bring together a broad and growing array of elements, including:

- flood risk management;
- drought and water scarcity;
- climate change adaptation.

The revision of RBMPs in 2015 consequently will need to bring together a broad range of issues. At the same time, the plans can be a locus for integration across administrative boundaries and across policy areas. They can do so by bringing together a range of concepts, such as green infrastructure and ecosystem services, as well as analytical tools.

The framework (Figure 6.1) illustrates the different elements to be addressed in the preparation of RBMPs.

- Vertical integration will mainly involve coordination with administrative areas. Some may be contained within the RBMP, and others will overlap partially as they are based on administrative and political boundaries rather than natural geographic areas.
- Horizontal integration brings together policy areas and interests; this will require a participative process, possibly a shared planning approach as described in Chapter 2.
- The framework identifies a range of concepts and methods that can support river basin planning, such as spatial planning and flood risk management. These are in addition to the monitoring and characterisation requirements set out in the WFD. The overall planning concept will need to bring together these different elements.
- Finally, a set of tools that can support this work. These can include SEA as well as REC. The WFD calls for economic analysis, for example of cost recovery and also of projects that may delay or run counter to the objective of good water status set out in the directive.

Bringing together these different elements will be a major challenge. Two perspectives can play an important role in providing a unifying element. One is that of preparing for the future, and thus preparing approaches that are 'climate proof' in the face of existing forecasts for climate impacts. The other unifying element is the spatial perspective.

For both themes, it would be useful to bring together existing knowledge and approaches, such as those developed under trans-national projects as well as current good practices in EU Member States and RBDs.

The review and case studies in this analysis have shown that Cohesion Policy financing has strong interactions with the WFD and other EU water legislation. Cohesion Policy can support Member States by financing infrastructure to meet legislative requirements, in particular in high-cost areas such wastewater treatment. In other areas, such as inland navigation, infrastructure investments can bring economic benefits, including in a territorial context, but threaten the inherent features of territories; in this case, water bodies as well as habitats and ecosystems linked to rivers. Cohesion Policy can also support projects that bring together regions to develop tools and methods for the implementation of EU water legislation.

The support, conflicts and potential synergies illustrated in this analysis affect the spatial dimension of water management, and thus also the environmental dimension of territorial cohesion. These cases show the need for stronger links between Cohesion Policy and EU water legislation. A key step would be to refer to the WFD and its objectives in future regulations governing

the Cohesion Policy funds. The objectives and requirements of EU water legislation should also be explicitly considered in the SEAs for Cohesion Policy documents, such as future OPs.

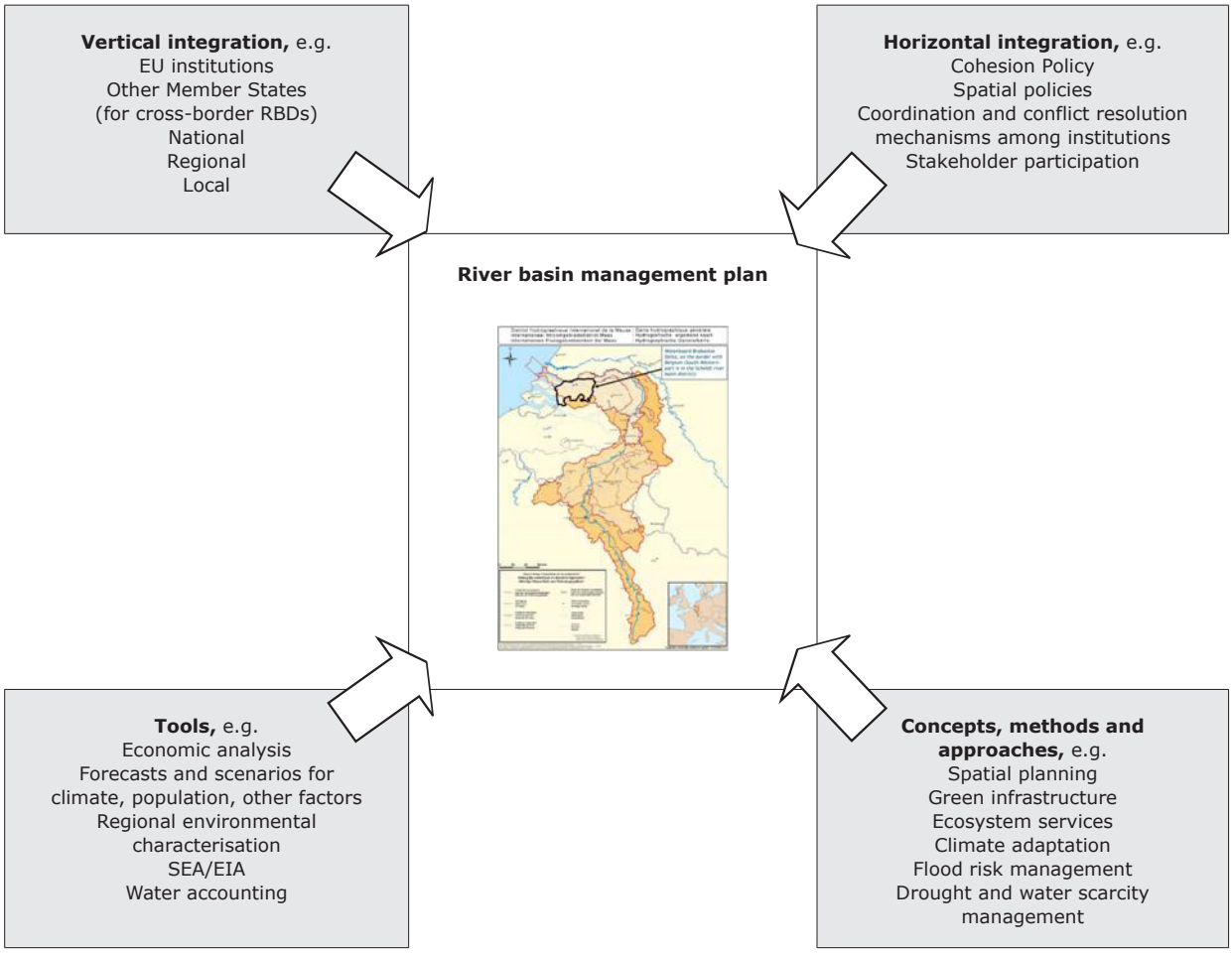
It will be useful to consider approaches to link Cohesion Policy spending to the implementation of RBMPs, including measures to tackle floods and droughts, instead of allocating them on a project-by-project basis. For example, OPs could be linked to the programme of measures in RBMPs. This method would face a timing mismatch, as the next spending cycle is due to start in 2014, while the revised RBMPs will be made in late 2015. Finding a solution, for example through a bridge between current and future RBMPs, for the gap years could be valuable in ensuring that Cohesion Policy spending for water protection is more effective.

To some extent, the new 'macro-regions' such as the Baltic Sea and the Danube provide a link between natural geographic areas and Cohesion Policy priorities. These initiatives have only begun, and thus it is early to judge their results; moreover, many key project impacts are best considered at a lower scale, such as the river basins flowing into the Baltic and the sub-basins of the Danube.

The case studies of the Jucar-Vinalopó water transfer and the Kis-Balaton project show the importance of public participation and environment assessment and reviewing and modifying potentially damaging investments. Their results suggest several areas for action:

- strengthening public participation in Cohesion Policy, particularly in the process of designing OPs;

Figure 6.1 River basin management plans: a framework for integration



Source: Adapted from Nielsen et al., 2009.

- improving the use of SEA and other methods, and in particular strengthening spatial analysis of programme and project impacts;
- strengthening the European Commission's oversight of large-scale investment projects that could affect water bodies negatively.

Finally, the analysis has presented a few examples of trans-national and cross-border cooperation projects that support water management. Many of the projects have developed tools and approaches for implementation of the WFD, Floods Directive and other legislation. It will be useful to ensure wider dissemination of their results and products, to draw lessons across different projects and to highlight key issues to be addressed in the future, such as climate change adaptation and green infrastructure.

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Appendix 1 Potential key elements of the environmental dimension of territorial cohesion

Green Paper 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 • Building bridges between economic effectiveness, social cohesion and ecological balance • Putting sustainable development at the heart of policy design	**Harmonious and sustainable development** • Achieving sustainable development, and thus integrating economic, social and environmental policy goals and actions • Environmental limits and carrying capacity (as a constraint on economic growth) • Utilising a high quality environment as a good and service (e.g. recreation, agriculture, tourism)	• *Does the policy seek to integrate environmental limits and carrying capacity, as a potential constraint on economic growth?* • *Does the policy seek to utilise a high quality environment as a valuable good/service?*
Inherent features of territories: citizens able to use the inherent features of their territories • Transforming diversity into an asset • 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 • Maintaining/improving natural capital — maintaining local features and environmental quality • Maintaining and enhancing current ecosystem services and recognising future needs • Recognising vulnerability to environmental risks	• *Does the policy seek to promote/ utilise/respect the inherent environmental features and assets of different territories?* • *Does the policy consider current and future environmental vulnerabilities and challenges?* • *Does the policy promote concepts such as self sufficiency and eco-efficiency in the management of natural resources?*
Concentration: overcoming differences in density • Avoiding excessive concentrations of growth • Facilitating access to the increasing returns of agglomeration in all territories • 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 • 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 • Addressing environmental problems related to concentration (e.g. pollution, water needs), including negative effects within and among regions • Recognising environmental/ ecosystem services	• *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, as well as promote/recognise the environment efficiencies of high concentration (e.g. provision of environmental infrastructure such as water treatment, certain forms of energy (CHP, etc.), public transport, recycling)?* • *Does the policy recognise and seek to promote or protect the value of territories to social and economic well-being and success, including such factors as carbon sinks, flood risk attenuation, health and quality of life (exercise and visual amenity)?*

Green Paper 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 • Ensuring good intermodal transport connections • 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 • Understanding environmental connections between and within regions, e.g. water, materials, energy, and making these connections more sustainable • Recognising inputs and outputs (interdependences) of environmental (and ecosystem) services within and between regions at different scales • Recognising/avoiding negative environmental effects from one region to another (e.g. pollution, climate change — flooding, droughts, fires — biodiversity loss) • Avoiding the environmental impacts of connectivity (e.g. pollution, habitat loss, landscape intrusion)	• *Does the policy consider the interdependences and relationships between territories?* • *Does the policy seek to understand and consider the inter-regional/trans-national connections in relation to environmental and natural resources, for example provided by wildlife corridors, bird migration routes, river corridors?* • *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)?* • *Are inter-regional and trans-national environmental and natural resource connections reflected in policy and does policy seek to ensure that outcomes are sustainable and equitable?* • *Does the policy recognise and seek to avoid new and reduce existing inter-regional and trans-national environmental impacts arising from connectivity, such as water pollution, losses to habitats and species?*
Cooperation: overcoming division • Addressing problems of connectivity and concentration through strong cooperation at different levels • Ensuring policy responses on variable geographical scales (e.g. neighbouring local authorities in different countries and between neighbouring countries) • Addressing environmental problems which do not respect borders and require cooperation (e.g. problems associated with climate change) • Governance plays a major role in ensuring territorial cohesion	**Cooperation:** overcoming division • Cooperation on implementing EU environmental laws and policy at all levels (national, regional, local); learning from different regions; supporting regions to meet common environmental standards — this section might encompass the 'traditional' view of environment in territorial cohesion and cohesion policy • Recognising the importance of natural as well as just administrative boundaries in territorial governance	• *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?* • *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?*

Source: EEA, 2010.

Appendix 2 Planning new development: the IJmeeer Vision in the Netherlands

The Markermeer ([89]) and the IJmeer ([90]) are two freshwater lakes that were created when the Netherlands closed the Zuiderzee, an extensive saltwater bay, from the North Sea. These two lakes provide the Randstad ([91]) area, the country's core urban areas whose population will soon reach more than 1.5 million, with access to 80 000 hectares of water and shores. The lakes provide conservation functions, as the open waters are an important part of the international routes of migratory birds, as well as recreation.

For decades, the Netherlands planned to eventually turn the Markermeer, which is located near Amsterdam, into a polder area (i.e. reclaimed land) to be called the Markerwaard. A turning point in this way of thinking came when the country's 2006 Spatial Planning Policy Document stated that the Markermeer should no longer be considered an area for land reclamation ([92]).

Urban development places high demands on the surroundings of the two lakes. At the same time, their open landscape is a key distinguishing feature of the Randstad area in comparison to many other European metropolitan areas.

The Future Vision for the Markermeer and IJmeer proposes to use this landscape characteristic as an element in development that seeks to improve the international competitiveness of the Randstad.

The provinces of Flevoland and Noord-Holland were requested to develop an Integrated Development Perspective project for the Markermeer-IJmeer, including a long-term perspective on the lakes. Questions to be addressed include how the area should be developed; should housing be allowed or should the area only be used for nature conservation?; how can a safe water level be maintained; are there options to build a bridge or tunnel to provide better transport links with Amsterdam? ([93]). The two provinces cooperated with partners including the central government, the Royal Dutch Organisation for Recreation (ANWB), Natuurmonumenten (nature conservation), Staatsbosbeheer (States' nature resources management) and the water boards to prepare an Integrated Development Perspective for the Markermeer-IJmeer region. This was further developed in the Future Vision for Markermeer-IJmeer, which was presented to the government in September 2009 ([94]).

The Ijmeer and Markmeer

Source: http://www.markermeer.nl.

([89]) One of the reasons it remains a lake is the acknowledgement of its ecological value, mainly as part of the migration route for birds.
([90]) The IJmeer is also an important habitat for birds.
([91]) The Randstad area is a conurbation in the Netherlands, consisting of several cities, including the four largest cities of the Netherlands (Amsterdam, Rotterdam, The Hague and Utrecht), and their surrounding areas.
([92]) See http://www.markermeerijmeer.nl/homedownloads/Engels/default.aspx for more details.
([93]) See http://www.noord-holland.nl/web/Actueel/Nieuws/Artikel/Flevoland-en-NoordHolland-maken-visie-op-IJmeer-en-Markermeer.htm for more details.
([94]) See http://www.markermeerijmeer.nl/hometext1/default.aspx for more details.

In November 2009, the Cabinet endorsed the Future Vision for Markermeer-IJmeer and in particular the realisation of the Future-proof Ecological System (TBES), discussed in the Future Vision. The TBES aims to improve the resilience of the ecosystem of the Markermeer and IJmeer, in order for the area to better adapt to climate change. The development perspective identified the following changes to be necessary ([95]):

- areas with clear water along the North Sea Coast;
- a gradual transition from clear to waters with sediment (a 'slibgradiënt');
- transition zones between land and water, supported by a seasonal water-level management;
- improvement of natural areas both inside and outside the dikes, while providing connections between them.

In cooperation with the region, the national authorities are currently studying ways in which the plan's various components can be realised.

Table A.2.1 below provides an analysis of the plan using territorial cohesion as a lens. It reviews both the economic and environmental dimensions of territorial cohesion and compares them in terms of synergies and conflicts. It should be noted that this is based on the information gathered for this case study, and mainly on the Vision itself.

The Vision foresees the following ecosystem benefits from the project ([96]):

- a flexible and coherent ecological system capable of absorbing changes (human as well as natural);
- increase in biodiversity;
- accessible and enjoyable;
- freshwater provisions for the existing supply area;
- sufficient protection against flooding;
- landscapes, cultural-historical elements and ground and soil factors are of a high standard;
- space for economic activities (fishing, shipping, sand extraction);
- space for urban and recreational development.

Not all stakeholders, however, agree with the plan; it has met with considerable opposition from environmental groups and nearby municipalities concerned about potential impacts on nature and biodiversity. In February 2010, the Markermeer-IJmeer area was designated as a Natura 2000 site by the Minister of Agriculture. One opposing position is that no urban expansion should take place in or near this protected area. Moreover, the plans are considered a threat to the open space and free horizon at the lakes, qualities that are scarce in the Randstad area. A specific issue is that there is still sufficient space within the dikes of Almere to expand the city. Another topic of debate was the proposed link between Amsterdam and Almere by either bridge or tunnel. Opponents argue that the construction of housing on the shoreline of the IJmeer and a bridge over it would negatively affect the unique and open nature area.

The Future Vision on IJmeer and Markermeer states that some of its measures contribute to the WFD, including for fish stock management and the development of fish passages. In addition, one of the objectives of the IJmeer plan is that it should sufficiently protect against flooding, and thus would contribute to implementation of the Floods Directive.

In contrast, the RBMP for the Netherlands Rhine basin district does not appear to mention the Future Vision, though it does refer to plans for biodiversity protection, including the Natura 2000 designation of the two lakes.

It should also be noted that provinces, municipalities and water boards in the Netherlands have all prepared long-term river basin visions (stroomgebiedvisies) that look to 2050. These visions identify room for water retention measures and other practical measures, such as restoration of streams ([97]). The regional visions are the foundations for the National Water Agreement (Nationale Water Akkoord) ([98]). Moreover, they are relevant for the provincial structural concepts, the provincial water management plan and regional plan.

([95]) Deltares (2009), Naar een Toekomstbestendig Ecologisch Systeem in het Markermeer en IJmeer, Kwantificering van het effect van de voorgestelde maatregelen met HABITAT, p. 1.
([96]) See http://www.markermeerijmeer.nl/homedownloads/Engels/Ecosystem/default.aspx for more details.
([97]) See http://www.waterland.net/index.cfm/site/Nederland%20Waterland/pageid/EAC0DE42-FEA8-FE97-DCDE7080052912F8/index.cfm for more details.
([98]) To manage the effects of climate change on water in the Netherlands, central government, the Inter Provincial Consultation, the water boards and the Association of Dutch Municipalities concluded an Agreement on Water Management for the 21st Century in February 2001.

Table A.2.1 Matrix for territorial cohesion analysis ([99])

Key elements	Economic dimension	Environmental dimension	Key synergies and conflicts
Harmonious/ sustainable development	• The Markermeer and IJmeer are being developed into a unique conservation area in the Randstad. The European Commission referred to this plan as an 'excellent and innovative example that integrates the enhancement of nature and the development of recreation and urban areas in a single project' ([100]). • The Markermeer and IJmeer will be given Natura 2000 status. This will enhance the area's quality of life as well as the Randstad's position as an internationally competitive region.	• To achieve the goals set in the Future vision, more work in ecological terms is needed to maintain the conservation levels set out in Natura 2000. In addition to the Natura 2000 requirements, the Future Vision aims at developing an ecological system that is less vulnerable to natural phenomena, such as climatic change.	• As a result, the system approach of the Integrated Development Perspective leads to a robust ecosystem from which nature, economy and society benefit.
Inherent features of territories	• The implementation of conservation measures creates employment. It will also provide a basis for further urban development and tourism/recreational projects (such as the future-proof ecological system).	• The Future Vision for Markermeer-IJmeer aims at gradually establishing the vitality and resilience of the area (and its ecosystem).	• Inherent features of the ecosystem (such as bird migration routes and water management) cannot always be combined with recreation and spatial development.
Concentration	• To avoid a concentration of growth in Amsterdam, the plan aims at a controlled growth of Almere (to 400 000 hectares). In addition, infrastructure is improved and areas for recreation are spread to avoid concentration on certain parts of the ecosystems.	• According to the Integrated Development Perspective project, current ecological decline can be reversed by implementing a systematic approach. The objective of such an approach is to create an ecological system that is flexible enough to absorb future changes without a substantial loss of quality of ecosystem (services).	• The Randstad has a high concentration of housing, population and economic activities. By including the Markermeer-IJmeer area in the spatial planning, the risk exists that in doing so, this will gradually be absorbed in the 'concentrated area'.
Connecting territories		• The area is considered as one ecosystem in which connections between conservation areas are considered a priority.	• The IJmeer area has a strategic position in the proposed 'wet axis of the Netherlands', a chain of wetlands that aims to connect Zeeland (south Netherlands) with the Waddenzee in the north.
Cooperation	• The development of the Future Vision plan has been developed through cooperation at different levels, tackling environmental issues occurring beyond the local level, such as climate change.	• The development of the Future Vision plan has taken place through cooperation at different levels, tackling environmental issues occurring beyond the local level, such as climate change.	

([99]) Mainly based on the 'Future Vision on the Markermeer and IJmeer'.
([100]) Investing in Markermeer and Ijmeer. See http://www.markermeerijmeer.nl/homedownloads/default.aspx for more details.

Appendix 3 Planning for future water consumption needs: the Dublin Water Supply Project

The Dublin metropolitan region has prepared a plan for a major new water supply system. One element of the proposal is the creation of new water bodies, to be used for recreational parks. This is seen as a source of economic development. Another key element is that water supply is seen as a resource for continued urban expansion.

The proposal to build new water supply infrastructure for the city of Dublin illustrates potential synergies as well as conflicts between spatial planning and river basin planning approaches. In terms of potential conflicts, the issue of timing is important; the proposal was presented in 2010, the year following the RBMPs — and these do not mention the upcoming infrastructure proposal. At the same time, the SEA process for the infrastructure considered issues related to the WFD — and thus provides a mechanism to review compliance and also consider synergies.

The proposal nonetheless has met opposition. One key question that was raised by some observers but not addressed in the planning process is whether a key assumption — rising population in the Dublin metropolitan area — is desirable from a sustainability perspective. Indeed, the expected growth of Ireland's capital and main metropolitan area appears to run counter to the goal of the Territorial Agenda, which promotes polycentric growth.

Box A3.1 Greater Dublin water supply project

Summary

The population of the Greater Dublin region of the Republic of Ireland is forecast to grow over the medium term and with it there is a projected increase in demand for water supply, growing from 550 million litres per annum in 2010 to around 800 million litres by the period 2030–2040. A range of demand scenarios were developed to understand the likely timing of supply requirements from a new source of water. This involved the consideration of the planned growth objectives in the Dublin & Mid East Regions (Greater Dublin Area) as envisaged in the (2010–2022) Regional Planning Guidelines as well as the Ireland National Spatial Strategy, to forecast the scale of water supply which is likely to be required in order to sustain the economic growth targets of the region. This analysis identified the need for a significant new source of water supply by 2022. On this basis, the Greater Dublin Water Supply Project was prepared and its implementation planned for 2010.

Alongside this process a wide range of technical options for the provision, supply, storage and treatment of the water were considered through a SEA. This involved extensive public and expert consultation; the process sought to reduce environmental impacts of the options as well as to identify a solution with a range of economic and non-economic benefits for the region as a whole, i.e. beyond the immediate Greater Dublin area.

The final project plan calls for the abstraction of water during high flow and flooding periods from Lough Derg in the Shannon River Basin, its transfer via pumping stations into large-scale storage lakes in Garryhinch Bog (Bord Na Mona) and the subsequent treatment and supply of water via pipeline to the Greater Dublin, Mid East & Midland Regions. This is to be accompanied by increased water conservation efforts within the Greater Dublin region to improve efficiency and reduce wastage.

Box A3.1 Greater Dublin water supply project (cont.)

The planned work at Garryhinch Bog will serve two purposes: as a storage facility for the surface water abstracted from Lough Derg and as a 500-acre–based park with facilities for water-based sports, walking, cycling and fishing. The intention is to create a high quality recreational resource to provide job and economic benefits to the Midland region (this approach is based on Anglian Water's Rutland Water and Eco-park ([101])).

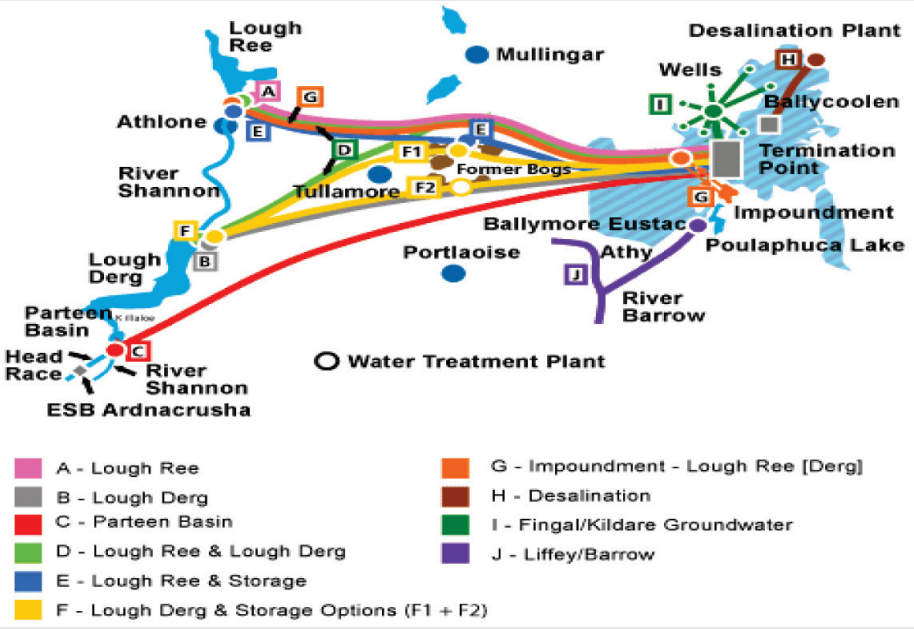
Role of spatial analysis

There are two major spatial issues related to the proposed scheme, the first of which is Greater Dublin's growth over the medium term. In determining the projected water demand the relevant regional plans were analysed to predict the likely increases in population growth and hence waster demand. The Dublin City Development Plan 2011-2017 ([102]) forecasts that Dublin's population will continue to grow over the medium term; there is no explicit consideration of efforts to focus population growth in other areas, spatial or otherwise.

The second spatial consequence stems from the footprint and effects of the Greater Dublin Water Supply Project; these are considered within the draft plan of the project (2008) and the accompanying SEA (2008). The draft plan and SEA consider 10 different options for the provision of water for Dublin; these included greater abstraction of groundwater, desalination of water from the Irish Sea, abstraction from a variety of surface waters and a range of different pipeline and storage options. The figure below shows the complete list of project options (option F is the final project).

Within the Greater Dublin Water Supply Draft Plan each of these 10 options was presented spatially and evaluated to understand the direct economic costs of the measures, with a focus on the costs of infrastructure development. The SEA also identified a range of environmental objectives based on the key environmental issues in the likely affected area and used these objectives to appraise each of the project options. The scale and impact of abstraction were considered for each option, including likely impacts on downstream water quality and quantity. However, the presentation of the spatial consequences of the various options could be considered to be limited beyond water abstraction.

Project options summary



Source: Water Supply Project – the options ([103])

([101]) Anglian Water's Rutland Water and Eco-park. See http://www.rutlandwater.org.uk/index.html for more details.
([102]) Dublin City Development Plan 2011-2017. See http://www.dublincitydevelopmentplan.ie/ for more details.
([103]) Water Supply Project – the options. See http://www.watersupplyproject-dublinregion.ie/index.php?page=the-options for more details.

Box A3.1 Greater Dublin water supply project (cont.)

Link to implementation of the Water Framework Directive

Four relevant documents were analysed for interactions with the WFD: the draft plan of the project (2008), SEA of the Greater Dublin Water Supply Draft Plan (2006 and 2008 versions), the Shannon ([104]) and Eastern RBMPs ([105]) (RBMPs) and Dublin's City Development Plan 2011-2017.

The timing of the project is such that it was not considered during the first iteration of Ireland's RBMPs; therefore there is no reference to the project or to any likely related predicted impacts in the Shannon (2010) and Eastern (2009) RBMPs, the project is also not considered in the relevant Water Management Unit Action Plans. For instance, Lough Derg, which is the source of the water in the plan, the Water Management Unit Action plan includes no reference to the project at all, despite there being a specific Future Pressures and Development section in the action plan and the project having being under consideration during the production of the plan ([106]).

The Dublin City Development Plan refers to a need for increased capacity in water supply infrastructure after 2016 but sets no clear view as to how this is likely to be obtained. In regards to the WFD, the Development Plan sets the achievement of good ecological status under the WFD as a policy of Dublin City Council. In addition the Development Plan sets two objectives in relation to the WFD: 1) the implementation of the Eastern RBMP (of which Dublin is a part) and any associated programme of measures, and 2) the need to consider the findings of the Eastern RBMP within any new development proposals.

The 2008 SEA of the Greater Dublin Water Supply Draft Plan suggests that the Draft Plan will consider the limits set on abstraction as per the RBMPs but takes the view (based on modelling work) that this abstraction will not impact upon the WFD objectives of the Shannon International River Basin (IRB) as the abstraction will only occur when the water level is at a high level.

Within the SEA appraisal one of the 14 objectives is to 'Ensure that there is no adverse impact on achieving the objectives of the Water Framework Directive' (p. 15) ([107]). To support this, two targets are set 'avoiding deterioration in existing status of water bodies concerned' and 'avoid conflicts with the WFD objective for water bodies to achieve 'good status' by 2015'. This objective is used to appraise the 10 options for the projects and includes an analysis of hydrological changes resulting from each of the options and the likely effect of this on the relevant water bodies' 'risk' of not achieving good status as indicated by the relevant RBMP characterisation reports. The impact of the various options on this objective is generally considered to be not significant.

Within the 2008 Draft Plan for the Greater Dublin Water Supply Project there is no reference to the WFD though the draft report does consider the findings of the SEA.

The incorporation of WFD objectives in the development plan and SEA was identified as an opportunity for integration in work undertaken on behalf of Ireland's Environmental Protection Agency ([108]). However, a number of other opportunities highlighted in this report, namely the integration of RBMP processes with SEA and relevant development plans in general and in relation to consultation specifically, have not been implemented to date and may therefore represent a missed opportunity.

This could be considered to indicate one-way integration between the SEA of the Draft Greater Dublin Water Supply Projectand the RBMPs, with the SEAs taking account of the available aspects of the relevant RBMPs whilst the RBMPs fail explicitly to consider the impact of the Greater Dublin Water Supply Project or its SEA. This may have been partly a consequence of the late timing of the SEAs of the RBMPs.

([104]) Shannon IRB RBMP. See http://www.shannonrbd.com/index.htm for more details.
([105]) Eastern RBMP. See http://www.erbd.ie/index.html for more details.
([106]) Lough Derg WMU Action Plan. See http://www.wfdireland.ie for more details.
([107]) SEA Environmental report. See http://www.watersupplyproject-dublinregion.ie/uploads/files/Updated%20Publications/Environmental%20Report%20%28cd%20version%29.pdf for more details.
([108]) Sheate, W.R and Bennett, S., 2007, The Water Framework Directive, Assessment, Participation and Protected Areas: What are the Relationships? (WAPPA), ERTDI Report No. 67. See http://www.epa.ie/downloads/pubs/research/water/name,23575,en.html for more details.

Box A3.1 Greater Dublin water supply project (cont.)

Concerns and criticism

Despite general support for the project, based primarily on the economic benefits, a number of concerns have been voiced by various stakeholders, predominantly relating to the likely impacts of the project on the Shannon IRB ([109]):

- There are concerns that despite not being directly located within the Shannon river basin, the project will give Dublin Council a role in the management of the Shannon and thus detract from local legitimacy and ownership.
- The Shannon Protection Alliance may seek to make a complaint to the European Commission through the requirements of the WFD and the Habitats or Birds Directives to stop what they view as perceived 'adverse effects' stemming from the project.
- Through the SEA of the Draft Plan a number of bodies voiced concerns that the quantity of water may lead to increased concentrations of pollutants and siltation in the Shannon River and thus negatively impact upon the recreational use of the water course, specifically upon angling and navigational use for small boats. These were considered within the assessment.
- There have been some concerns related to promoting continued expansion of the Greater Dublin region and the potential negative effects this may have in terms of sustainability ([110]).

Link to the key elements of territorial cohesion, focusing on the environment dimension

Harmonious and sustainable development

The project seeks the opportunity to enhance an area (Garryhinch) by highlighting the multifunctionality of an environmental resource (in this case the creation of the Midland's Water Eco-Park). This presents the opportunity to utilise a high quality environment as a good or service and in doing so deliver a range of social, economic and environmental benefits to contribute to sustainable development in the region. In addition, the project seeks to maintain the economic welfare of the Greater Dublin Region and therefore has a strong link to this element of territorial cohesion. The project does not, however, question the sustainability of continued population growth in the Dublin area

Inherent features of territories

The SEA of the project considers there to be minimal impact upon the WFD objectives as a result of the proposed abstraction from Lough Derg, this includes the consideration of the current diffuse and point sources of pollution on the quality of these waters. In addition it seeks to restore and enhance the Garryhinch cutaway bog area. The aim is therefore to make best use of territorial assets whilst minimising harm to the natural environment in general and watercourse in particular. At the same time, major criticisms have been raised concerning the impact of the project.

Concentration (overcoming differences in density)

The project does not seek to overcome differences in density; in fact it seeks to enable the continued population growth of the most densely populated area of the territory. As such it does not have a positive link to this element of territorial cohesion.

Connecting territories

The project seeks to better connect regions within the territory, however this is a largely one way dynamic with the Greater Dublin Region abstracting resources (water) from Lough Derg. There is therefore minimal link to this element of territorial cohesion.

([109]) Irish Times (2010) Would Dublin drink the Shannon dry? See http://www.irishtimes.com/newspaper/weekend/2010/0724/1224275368134.html for more details.

([110]) William, B. and Shiel, P (2002) The expansion of Dublin and policy implications of dispersal. Journal of Irish urban studies, 1(1), 1–21.

Box A3.1 Greater Dublin water supply project (cont.)

Cooperation

There is a reasonable degree of cooperation of implementing the EU's environmental laws. In particular it is clear that the SEA has had some influence upon the formulation of the project's draft plan and has considered, where the findings were available, the WFD. That the Midland's Water Eco-Park is based in the Anglian Water's Rutland Water and Eco-park demonstrates some learning from different regions and therefore some linkage to this element of territorial cohesion.

Further information

- SEA Environmental report. See http://www.watersupplyproject-dublinregion.ie/uploads/files/Updated%20Publications/Environmental%20Report%20%28cd%20version%29.pdf for more information.
- Water Supply Project – the options. See http://www.watersupplyproject-dublinregion.ie/index.php?page=the-options for more information.
- Shannon IRB RBMP. See http://www.shannonrbd.com/index.htm for more information.
- Eastern RBMP. See http://www.erbd.ie/index.html for more information.
- Lough Derg WMU Action Plan. See http://www.wfdireland.ie/docs/1_River%20Basin%20Management%20Plans%202009%20-%202015/ShIRBD%20RBMP%202010/Water%20Management%20Unit%20Action%20Plans/Lough%20Derg%20WMU.pdf for more information.

Appendix 4 Abbreviations

BSAP	Baltic Sea Action Plan
BSR	Baltic Sea Region
BSRG	Baltic Sea Regional Strategy
CCM	Catchment Characterisation Modelling
CF	Cohesion Fund
CIS	Common Implementation Strategy
CSG	Community Strategy Guidelines
DC	Danube Commission
EC	European Commission
ECRINS	European Catchments and River Network System
EEA	European Environment Agency
EIA	Environmental impact assessment
Eionet	European Environment Information and Observation Network
ERDF	European Regional Development Fund
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
EUROSTAT	Eurostat is the statistical office of the European Union
Helcom	Helsinki Commission for the Baltic Sea Convention
ICPDR	International Commission for the Protection of the Danube River
JRC	Joint Research Centre
MSFD	Marine Strategy Framework Directive
NUTS	Nomenclature of territorial units for statistics
OECD	Organisation for Economic Co-operation and Development
PE	Population equivalent or unit per capita loading
PEBLDS	Pan-European Biological and Landscape Diversity Strategy
PEEN	Pan-European Ecological Network
RBD	River basin district
RBMP	River basin management plan
RBD	River basin district
REC	Regional environmental characterisation
SEA	Strategic environmental assessment
SRBC	International Sava River Basin Commission
TEN-T	Trans-European Networks – Transport
WIA	Water impact assessment
WFD	Water Framework Directive
UWWT	Urban wastewater treatment

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European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel.: +45 33 36 71 00
Fax: +45 33 36 71 99

Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

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European Environment Agency