The Geographical Journal, Vol. **173**, No. 4, December 2007, pp. 330–342

Spatial planning, water and the Water Framework Directive: insights from theory and practice

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This paper was accepted for publication in September 2007

Water is fundamental to the health of the biosphere, strong economic growth and human social well-being. Despite its relative scarcity and absolute importance to life on earth, fresh water resources are often used inefficiently or polluted unnecessarily. Policymakers must work towards developing approaches to balance human demands for water with the water requirements of ecosystems. The European Water Framework Directive, which aims to encourage the sustainable management and protection of freshwater resources, brings this agenda into sharp focus in Europe. Land use change and environmental quality are closely related, and the nature and location of development can significantly influence both the generation and resolution of environmental problems. This places spatial planning, which provides a framework for regulating the development and use of land, in a strong position to affect water quantity and quality issues and thus to aid the achievement of the Directive's goals. In particular, spatial planning has an important function in integrating the use and management of land and water more closely than is presently the case. This paper explores the potential and actual role of spatial planning in addressing challenges associated with the water environment. This enables an assessment to be made of the extent to which spatial planning can help to meet the goals of the Water Framework Directive.

KEY WORDS: Europe, spatial planning, case studies, Water Framework Directive, water quality, water quantity

Introduction

Land is a finite resource under strain from various often competing demands. These include social and economic pressures arising from the development of housing estates and transport infrastructure for example, and also the need to protect natural resources and land that provides environmental benefits (e.g. functional floodplains). Spatial planning essentially involves the development and implementation of strategies and procedures to regulate land use and development in an attempt to manage and balance the numerous pressures placed upon land. Spatial planning, therefore, has an important role to play in addressing water issues such as flooding and aquatic pollution which are strongly influenced by the nature and location of development. For example, spatial planning policies can help to protect groundwater sites or floodplains through zoning approaches. Planners can also encourage the conservation of water resources via the promotion of water saving technologies as planning conditions attached to permissions to undertake new development.

The Water Framework Directive (WFD) defines a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater [European Commission (EC) 2000]. It aims to protect and enhance the status of aquatic ecosystems. The WFD also provides for the long-term protection of water resources through promoting sustainable water use and the reduction of groundwater pollution, and aims to mitigate the effects of floods and droughts. Significantly, spatial planning is an established mechanism through which the water management challenges raised within the WFD can be addressed. This paper considers this issue in detail, drawing on case study examples of planning approaches from across Europe. In doing so, it explores the relationship between spatial planning, water and

0016-7398/07/0002-0001/$00.20/0

the WFD in theory and practice. The insights contained in this paper, which strengthen and clarify the conceptual understanding of the position of water issues within spatial planning, will be of interest to policymakers, practitioners and academics. Supplemented by insights from spatial planning practice, this paper has the potential to aid the development of more robust and effective spatial plans and associated planning procedures that are targeted towards the resolution of pressing challenges concerning the water environment.

The discussion continues with a generic introduction to the relationship between spatial planning and environmental quality. The focus then turns to a more detailed analysis of the particular linkages between spatial planning and water. Three key elements of planning systems – spatial plan preparation, development control, and planning approaches and techniques – are highlighted. This precedes a focused discussion of the relationship between spatial planning and the WFD, within which the key requirements of the WFD are described. Drawing on the findings of 10 case studies from across Europe (two of which are described in detail), evidence of the links in practice between spatial planning, water and the WFD are presented and discussed. Finally, a series of conclusions reflect on the role of spatial planning, in theory and practice, in water management and in aiding the achievement of the WFD's goals.

Spatial planning and the environment

In certain strategic locations, for example city centres or around transport corridors, there is considerable pressure on available land. The various demands on land can be broadly divided into three categories. Firstly, land is required to encourage social progress and welfare, through, for example, providing housing or services such as schools and hospitals. Land is also required to promote economic growth. This involves allocating land for developments such as industrial estates and transport infrastructure. Finally, land is required to provide space for the natural environment for reasons including biodiversity conservation and the maintenance of natural floodplains.

Spatial planning regulates the development and use of land and provides a means of maintaining a degree of balance between the numerous and varied demands placed on land resources. As Jacobs (1993, 23) noted in reference to England: 'The current planning system is a mechanism for managing the supply of land to meet a range of demands'. The linkages between spatial planning and the environment are well documented [Owens and Cowell 2002; Royal Commission on Environmental Pollution (RCEP) 2002; Selman 2000]. Environmental problems often stem from the way that land is developed and used. For example, a retail park development has many direct and indirect environmental impacts. These include the use of mineral resources and energy to create the buildings, through to air pollution created by visiting shoppers driving in cars. Therefore, as Owens and Cowell (2002, 5) highlighted: '. . . changes in land use are linked to environmental change through a multiplicity of direct, indirect, sometimes cumulative and often uncertain effects'. Consequently, as Blowers (2000) noted, spatial planning lies at the heart of addressing environmental problems.

The role of spatial planning in helping to reconcile development pressures with environmental concerns has been recognised by governments in many countries (Owens and Cowell 2002). For example, in England, achieving sustainable development has been made a statutory purpose of the planning system. There are several points that help to further emphasise how spatial planning can, in theory, contribute to the protection and enhancement of environmental resources. These include (Blowers 1993 1997 2000; Healey and Shaw 1993; Kivell *et al.* 1998; Wood 1999):

- Environmental problems and their resolution often must be considered over long time periods and at wide spatial scales. Spatial planning has a long-term and strategic focus with plans covering large areas, sometimes for durations of 10–15 years.
- Environmental goals, for example protecting biodiversity or improving air quality, can be integrated within spatial planning policies encouraging the development and use of land to proceed in a manner that is sensitive to these issues.
- Spatial plans exert an influence over the type and location of development, and are therefore a key influence over the generation of pollutants (to air, water and land) and their subsequent distribution.
- Spatial planning policies can offer protection to sensitive environmental areas such as wetlands or ancient forests.
- As the preparation of spatial plans often involves a range of stakeholders, the process provides an arena within which the conflicting environmental, economic and social land use demands can be discussed and where possible resolved.
- Planning systems are usually organised around a spatial hierarchy of plans, often operating at national, regional and local levels. This enables environmental problems, many of which will cross administrative boundaries, to be addressed at an appropriate spatial scale.
- Spatial planning relates to both the natural environment and human societies. This is significant as many environmental problems are caused by the way that humans relate to the natural environment, a relationship that spatial planning can influence.

- Spatial planning exerts an influence over various sectors including housing, transport and energy generation. It therefore provides a framework for holistic cross-sectoral thinking and policy making, which is ultimately necessary to both understand and address contemporary environmental problems.

With the linkages between spatial planning and environmental issues introduced, the discussion now turns to the specific linkages between planning and water.

Spatial planning and water

In the broadest sense, there is a need for environmental planning to help to protect the resources that humans and the wider biosphere depend upon for their long-term survival. Few resources are more vital than water. Alongside the ecological services that water provides, economic development and social welfare rely upon supplies of fresh water. In Europe there is an abundance of water in absolute terms. Total rainfall is over 10 times the volume of water withdrawn for human activities [European Environment Agency (EEA) 2005]. However, much of this water falls in northern Europe which is generally sparsely populated, whereas the more densely populated south often suffers from water shortages particularly during the summer months. Indeed, as nearly half of the population of Europe lives in water stressed countries, it is apparent that the continent's relative water abundance is more theoretical than real (EEA 2005). As water is essentially a finite resource over large parts of Europe, there are limits to which it can provide for the crucial functions that societies rely upon for their current prosperity and long-term sustainability. Moreover, available water resources are under threat from human activities in the form of, for example, diffuse agricultural and urban pollution and over abstraction of groundwater. Spatial planning procedures are required, amongst a range of other environmental planning and management strategies and techniques (e.g. economic instruments, demand management and pollution prevention and control), to help to address challenges associated with water.

Table 1 includes quotations (from English authors and organizations) that emphasize the linkages between planning and water. It is encouraging that there is broad recognition of the importance of spatial planning in addressing water resources problems. Specific connections between spatial planning and water can be broadly categorised as [Samuels *et al.* 2006; Department for Environment Food and Rural Affairs (DEFRA) 2002]:

- Intensifying or minimising diffuse pollution (urban and agricultural).
- Influencing the demand for water supply and wastewater treatment from industry and households.
- Limiting or exacerbating flood risk.
- Reducing or increasing groundwater recharge rates.
- Protecting or harming aquatic habitats and biodiversity.

Planning authorities have a responsibility to ensure that the implications for water of new developments and proposed changes in land use are considered during spatial plan preparation. Water issues should also be considered when taking decisions concerning the merits of individual planning applications. If planning systems are not able to be proactive in terms of encouraging the sustainable use of water, water resource problems and their associated environmental, economic and social impacts will be likely to restrict development activities and opportunities in the future. Planning has a particularly important role to play where available water supplies are stretched, or where development is proposed in areas at risk of flooding. Southeast England is an important case in point here, where rapid housing development is taking place in floodplains whilst water supply problems are beginning to be experienced.

Table 1 Quotations highlighting the linkages between land use planning and water

'Land use planning policies can significantly affect the demand for water, water use and water quality and need to be recognised more strongly in policy-making' (DEFRA 2002, 17)
'. . . the negative impacts of precipitation [flooding, diffuse pollution etc.] should be regulated by the land use planning system' (Howe and White 2004, 262)
'It is important that good links are made between the land use planning system and water planning' (Environment Agency 2005, 12)
'. . . there needs to be a much stronger emphasis on using spatial planning to integrate decisions on land use and built development with policies for water resources . . .' (Council for the Protection of Rural England undated, 2)
'There is wide recognition that the water environment is increasingly challenged by the effects of development, and since the management of development is the role of the land use planning system, it is important that sufficient connection is made between the water environment and the planning system' (Baker Associates 2005, 20)

Threats associated with climate change, which will impact on the hydrological cycle of different regions in different ways, will act to amplify and intensify water resource challenges in the future.

There are three key mechanisms available to stakeholders working within spatial planning systems that can be utilised to help implement a more sustainable approach to the use and management of water. These include spatial plan preparation, development control and planning approaches and techniques. They are discussed in greater detail below in the context of water.

Spatial plan preparation

Spatial plans set out a policy framework to regulate how land should be developed and used within the area covered by the plan. Plans are often prepared according to a spatial hierarchy, with plans at the national and regional level setting a general guiding framework for plans at the local level. Planning policies provide a guide for planners when taking decisions concerning development within their area of jurisdiction. Spatial plans will usually include policies concerning a range of issues such as transport, housing, recreation, nature conservation and economic development. Planning policies are often accompanied by maps which show how land within the relevant area is currently used and indicate the type of development (for example, housing or industrial uses) that would be permitted on different parcels of land in the future.

Although not universally applied in practice, it is possible to identify several ways in which spatial plans have the potential to affect water issues via the influence that they exert over the nature and location of development. Policies within regional spatial plans can usefully set out a broad strategic framework for considering water at the local planning level. For example, regional planning policies may require local authorities (municipalities) to promote water efficiency and conservation measures within new housing developments. Also at the strategic level, spatial plans (both regional and local) can influence development activities with the potential to pollute water bodies or to pressure water supplies of and wastewater treatment facilities.

Specific planning policies can help to ensure that point source pollution generators, for example chemical plants or manufacturing industries, are located away from water bodies. Conversely, inappropriately sited developments could increase the chance of harmful aquatic pollution. Further, buffer zones can be created around water bodies to reduce aquatic pollution and to protect ecologically diverse riparian habitats or groundwater sites for example. Buffer zones can be expressed on maps within spatial plans or through planning policies stating a minimum distance to be left between a water body and any proposed development or change of land use.

Similarly, planning policies can both lessen and worsen flood risk. They can act to protect natural floodplains and permeable surfaces such as urban green spaces that help to absorb storm water (limiting the scale and intensity of floods) and reduce diffuse pollution created by runoff. However, flooding is only one of numerous considerations when taking planning decisions. Consequently, development is sometimes sanctioned on floodplains worsening flood risk problems. Significantly, policies relating to issues such as flood risk or the location of polluting development can be included within spatial plans to aid the achievement of legislation (national or international) that relates to the water environment. Indeed, each of the examples highlighted above would help to work towards the aims of the WFD.

Development control

Development control is the process through which local planning authorities grant or refuse permission for proposals for new development or land use modifications. Development control reveals the local influence that spatial planning can have on water issues, as the form and location of individual developments can be directly affected. This contrasts with and complements the strategic influence exercised by the preparation of spatial plans and associated policies which can affect regions or even whole countries. In order to be effective, development control at the local level requires an appropriate supportive guiding framework at higher tiers in the planning system.

Development control procedures often offer planning authorities the opportunity to attach planning obligations relating to the proposed development or change in land use when granting planning permission. Development briefs can also be prepared by planning authorities to support allocations of land (for example, to housing development) within local plans. Planning obligations and development briefs include conditions that developers must adhere to when proceeding with a building. The potential exists to attach conditions relating to water management issues (examples of which are discussed below). It is also significant that prior to the submission of a planning application, planning authorities, developers and water companies have an opportunity to discuss the proposed development. At this stage, planning authorities can inform developers of relevant planning policies (relating to issues such as preventing water pollution, for example), reducing the need for subsequent planning conditions to be enforced. Further, water companies can comment on the suitability of a proposed development (for example,

a new housing estate) in terms of available water supplies or the capacity of local wastewater treatment facilities. Their input can help to encourage more sustainable planning decisions. Similarly, planning authorities have a role to play in ensuring that water companies are aware of changes in land use that may influence demand for water resources and therefore private water companies forward planning strategies.

The development control process (including pre-application discussions and the attachment of planning conditions) can clearly help to address water resource challenges where necessary. For example, households and industry are major water users and their demand for water leads to negative environmental impacts associated with the creation of reservoirs and the abstraction of water from lakes, rivers and underground aquifers. For technological and societal reasons, water use is not always efficient and water is often wasted. Solutions such as water efficient appliances, rainwater collection devices, and grey water recycling systems exist that can reduce the demand for water resources. Requirements for the implementation of such solutions can be attached as conditions to planning permissions for new developments.

The problems of flooding and diffuse pollution in urban areas (and downstream from urban areas) are caused in part by the nature of the built environment in towns and cities. Inappropriate development can increase the amount of impermeable surfaces in an area removing the capacity of the land to absorb storm water runoff. This can lead to more frequent flooding and also to the pollution of water bodies from runoff contaminated with substances such as oil and heavy metals. Sustainable drainage systems (SUDSs), such as the use of filter strips or storm water retention basins, provide a means of reducing the severity of these impacts. In principle, SUDS requirements can be attached as conditions to planning permissions for new developments. Further, where development does take place on floodplains, which in many countries is inevitable to some degree, there are techniques available that can be utilised within developments to minimise damage if floods do occur. These include using particular types of flooring and plaster work and installing permeable materials in areas such as driveways and pavements. Again, it is possible that planning permission for new developments could include conditions relating to the use of these flood risk management strategies.

Planning approaches and techniques

There are a range of tools and approaches available to planners that can strengthen the link between planning and water issues. The use of strategic environmental assessment and stakeholder participation procedures are two relevant examples that are discussed below.

Strategic environmental assessment (SEA) A key cause of environmental problems concerns taking planning decisions without considering their potential consequences. SEA (and similar strategic appraisal procedures such as sustainability appraisal) is a decision-aiding process designed to introduce data on potential environmental impacts into key stages of policy, plan and programme development (Jones *et al*. 2005). SEA undertaken during the preparation of spatial plans, an increasingly common process globally (Jones *et al*. 2005), can help to more effectively design spatial plans to address water resource challenges. For example, SEA can encourage the development of planning policies that are more sensitive to the causes and impacts of flooding, something that is beginning to take place in practice in England (Carter 2007a). Further benefits include that the SEA process and its outcomes can help to raise awareness of the relationship between spatial plans and water, and that SEA can facilitate stakeholder participation within the plan-making process.

Stakeholder participation There are numerous stakeholders (from the public, private and voluntary sectors) involved in the planning and management of water. In recent years interest in stakeholder participation has increased in numerous sectors from health and urban regeneration to environmental planning (Splash 2001). The Aarhus Convention, which has been a significant driver behind this development, requires parties to make: 'appropriate practical and/or other provisions for the public to participate during the preparation of plans and programmes relating to the environment' (United Nations Economic Commission for Europe 1998). The preparation of spatial plans clearly falls within this remit.

The potential benefits of undertaking stakeholder participation during the preparation of spatial plans are wide ranging. They include increasing the democratic legitimacy of the authority responsible for preparing the plan, building consensus on the content of the plan and necessary implementation mechanisms, and ultimately strengthening associated decision-making procedures (Department of the Environment, Transport and the Regions 1998). Significantly, the knowledge and expertise of stakeholders which planning authorities may lack can improve the consideration of water issues (and other environmental, social and economic issues) during spatial plan preparation. For example, as discussed above, the involvement of water companies in the

development control process can have significant benefits for planning decision making.

There are a range of opportunities for stakeholders to become involved in the spatial planning process. The extent of these opportunities depends in part on the legal and administrative framework guiding the planning system. In many European countries (e.g. England, Germany, Sweden and Latvia) there is a legislative basis for the involvement of stakeholders during the planning process (Carter 2007b). For example, spatial planning in England has several openings for stakeholder involvement, both during spatial plan preparation and development control. A range of consultees with a responsibility for water issues, including the Environment Agency (the government's environmental regulator) and private sewerage and water companies, must be consulted during the preparation of spatial plans at the regional and local level. These stakeholders can beneficially influence planning policy concerning water issues, particularly if they are involved early in the plan-making process. Moreover, SEA and environmental impact assessment (EIA) incorporate statutory consultation procedures providing a further route for stakeholders to influence spatial plans and some development projects.

Although stakeholder participation has the potential to improve the contribution that spatial planning can make to managing the water environment, relevant institutional and procedural barriers do exist. Procedurally, stakeholder involvement techniques may not be tailored to the planning authority's individual circumstances (level of experience of participation, available financial resources and staff etc.) or the particular initiative to which they are being applied. Also, participation techniques do not always enable stakeholders to become actively involved in planning decision making, and instead may only inform them of or consult them on a particular initiative. Further, stakeholders may become involved at too late a stage in the planning process and sometimes do not have access to sufficient quality information to meaningfully influence the direction of planning decisions. Institutionally, more intractable barriers exist as some authorities find it difficult to cede much influence over planning decision making to external stakeholders. This can render stakeholder participation as a relatively 'tokenistic' exercise. Despite these barriers, stakeholder participation remains a potentially useful means of strengthening the synergies between spatial planning and the water environment.

Spatial planning and the WFD

The WFD is the most significant piece of EU water-related legislation to date. Indeed, due to the significance of water resources to achieving sustainable development and the promotion by the Directive of a natural catchment based approach to water management, it could be argued that the WFD in fact constitutes one of the most groundbreaking pieces of EU environmental legislation. As noted by the World Wildlife Fund (2001, 1): 'If implemented in a complete and timely manner, the WFD has the potential to be the EU's first "sustainable development" Directive'. The key goal of the WFD is to prevent further deterioration and wherever possible to enhance the quality of Europe's waters through achieving good water status (as defined by the Directive) in most of Europe's waters by 2015 (EC 2000). The WFD aims to achieve this ambitious goal through encouraging '. . . the sustainable management and protection of freshwater resources' (EC 2000: preamble 3). The WFD focuses on the ecological and chemical quality of surface waters, but also covers groundwater. The need to consider the relationship between surface and groundwater alongside the development of a combined approach to managing their quality and quantity represents another novel element of the legislation. Additionally, the core EU concepts of the precautionary principle and the polluter pay principle are also advocated by the WFD, and stakeholder participation is a key element of the legislation. The preparation of river basin management plans (RBMPs) (by competent authorities nominated by the member states) covering river basin districts is the key procedural requirement of the Directive.

The scope of the WFD is clearly far-reaching and its implementation will impact on many sectors from agriculture and forestry to water services and spatial planning. The successful achievement of the WFD's goals will ultimately depend on the effective integration of land and water management processes. Planning authorities, therefore, have a key role to play in implementing the WFD through ensuring that the development and use of land is undertaken in a manner that is sensitive to the requirements of the Directive (White and Howe 2003). There are several specific elements of spatial planning that can aid the implementation of the WFD, including its long-term approach and that the planning process provides a forum for stakeholder involvement. These issues are discussed below.

Long-term approach

The resolution of water quality and quantity issues across an entire river catchment will often take many years, requiring actions and strategies stretching over several decades. Indeed, the WFD highlights the importance of taking a long-term approach to the protection of groundwater noting that: 'The task of ensuring good status of groundwater requires

early action and stable long-term planning of protective measures, owing to the natural time lag in its formation and renewal' (EC 2000, 28). In this respect, the long-term and strategic nature of spatial planning makes it ideally suited to meeting the WFD's goals.

Existing links to water

The previous discussion has emphasised the relationship between water and spatial planning. The spatial planning system can therefore link to the WFD through encouraging the development and use of land to more comprehensively consider water issues.

Nature/society connections

Planning relates to both nature and society (Blowers 2000), reflecting the reality of socio-economic influences over environmental issues such as water. Achieving good water status will involve developing more sensitive linkages between human societies and water. The spatial planning system is in a strong position to help advance this agenda.

Holistic approach

The integration of land and water management is central to the successful implementation of the WFD. As noted within the WFD: 'Further integration of the protection and sustainable management of water into other Community policy areas such as energy, transport, agriculture, fisheries, regional policy and tourism is necessary' (EC 2000, 16) Spatial planning is a holistic activity integrating environmental, economic and social considerations across a range of human activities. Spatial plans often include policies on energy, transport and tourism, for example. Planning is therefore an ideal mechanism through which water considerations can be integrated at an early stage into the development of policies guiding the spatial expression of various sectors impacting on the water environment.

Forum for stakeholder involvement

Spatial planning provides a route into the management of the water environment for concerned stakeholders who can help to strengthen the links between planning, water and the WFD. As Abu-Zeid (1998, 16) noted, stakeholders are a necessary addition to policy making: 'The participation of stakeholders in all aspects of water management is crucial . . . This should not be restricted to the influential elite'. Certain stages of plan preparation procedures provide a consultative forum for relevant stakeholders to engage in decision making.

Spatial planning: links to WFD legislation

Spatial planning can make an important contribution to the achievement of the legislative requirements of the WFD. Article 11 of the WFD concerns the preparation of programmes of measures (POMs). These measures must be developed by WFD competent authorities and included within RBMPs in an effort to meet the Directive's environmental objectives within individual river basin districts. Spatial planning procedures can contribute directly to some of the 'basic measures' outlined in Article 11, which are minimum requirements for inclusion within RBMPs. They include measures to (EC 2000):

- Promote an efficient and sustainable water use.
- Safeguard water quality in order to reduce the level of purification treatment required for the production of drinking water.
- Control of point source discharges liable to cause pollution.
- Control of diffuse pollution sources.
- Prohibit direct discharges of pollutants into groundwater.
- Eliminate pollution of surface waters.
- Prevent and/or reduce the impact of accidental pollution incidents, for example as a result of floods.

The previous discussion outlined three ways in which spatial planning can contribute to the sustainable use and management of water: through the preparation of spatial plans, development control, and the application of planning techniques and approaches such as SEA. Via these mechanisms, spatial planning can contribute to the successful implementation of the WFD's 'basic measures' and can consequently help to encourage the sustainable management and protection of freshwater resources.

National governments and other stakeholders responsible for the WFD are increasingly recognising that spatial planning provides an established mechanism that can help them to meet this requirement. In England, for example, the government department with responsibility over the planning system has stated that planning should be utilised to ensure new developments consider the needs of the water environment as identified within RBMPs (Office of the Deputy Prime Minister 2004). Central government has also indicated that regional and local planning bodies should engage in the preparation of RBMPs. Moreover, the Environment Agency (the government's environmental regulator) has stated that the WFD requires an integrated approach linking spatial planning with river basin management planning (Environment Agency 2005). DEFRA (2002) has stated that the WFD will give added impetus to achieving this necessary form of policy integration. Similarly, recognition of the

Table 2 ENMaR project spatial planning case studies

Country	Case study title	Lead organisation(s)
England	City of Salford strategic flood risk assessment	Salford City Council and JBA Consulting
England	River Mersey development plan	Stockport Council
Germany	The use of compensation measures to renaturalise the river Else	Melle Municipality
Germany	Water development plan for the Leine river	District Government of Hanover
Latvia	Planning of nature protection in the town of Cēsis	Cēsis Municipality
Latvia	Designation of water protection belts in the city of Valmiera	Valmiera Muncipality
Spain	Biosphere reserve 'Terras do Miño': Parga-Ladra-Támoga site of community importance	Regional Delegation of Lugo, Government of Galicia, University of Santiago de Compostella
Spain	Guitiriz geographic information system	Guitiriz Municipality
Sweden	Stormwater policy for the Eman catchment	Eman Union and municipalities in the Eman river basin
Sweden	The preparation of the Vetlanda spatial plan	Eman Union and Vetlanda municipality

relationship between planning, water and the WFD has been made in countries across Europe, including Germany, Latvia and Sweden, and has led to changes in planning legislation to incorporate the WFD (Carter 2007b). This provides a platform from which to develop practical spatial planning solutions to assist the achievement of the WFD's requirements.

Spatial planning, water and the WFD: progress in practice across Europe

The European Network of Municipalities and Rivers (ENMaR) is an INTERREG IIIC funded project (running between 2005 and 2007) involving seven partners from five European countries, namely England, Germany, Latvia, Spain and Sweden. Acknowledging the catchment based approach to the WFD, the project is organised around five river basins – the Mersey (England), the Weser (Germany), the Gauja (Latvia), the Mino (Spain) and the Eman (Sweden). Recognising the impact of the WFD at the local level, ENMaR aims to strengthen the contribution of municipalities (who are responsible for spatial planning at the local level) to the Directive.

The project involves exploring the relationship between the WFD and four interlinked components – tourism, agriculture and forestry, spatial planning and water services. Central to the spatial planning component (on which this paper is based) has been the exploration of 10 good practice case studies, two from each of the partner countries. These case studies provide a timely insight into the practical utilisation of spatial planning to deliver improvements in the water environment. Table 2 provides details of the 10 case studies examined during the project. Two of these are then discussed in greater detail, after which a series of broader conclusions are presented drawing on the findings of the 10 case studies examined.

Case study 1: water development plan for the Leine river (Germany)

Severe floods in 1946, 1986 and 1989 in the Lower Saxony region of Germany stimulated the state government to develop measures to help address this problem. This paved the way for the preparation of a 'water development plan' for the Leine river. This planning document aimed to address flooding and other challenges concerning the water environment along a section of the river Leine flowing through Lower Saxony. Water development plans are non-statutory, but are nevertheless used across Germany to promote the renaturalisation of rivers and their floodplains. The Leine water development plan was led by the district government of Hanover with the support of local municipalities. Other stakeholders involved in the plan-making process included representatives from sectors including water services, agriculture, nature conservation, fisheries, hydro power and raw material exploitation.

Preparation of the plan initially involved the characterisation of the river Leine catchment and its surrounding floodplain. Issues such as hydromorphology, habitat types, land use, and water quality were considered. A series of objectives were then developed that focused on renaturalising the river and opening up the natural floodplains. The spatial plan for the municipality of Gronau was modified to incorporate these objectives, which has placed legislative weight behind their achievement. Implementation measures were developed to help achieve these objectives, including creating stormwater holding facilities, naturalising alluvial

morphology, creating fish bypasses and a salmon breeding station, and instigating a river Leine community action day. The municipality of Gronau took important steps to ensure the achievement of the implementation measures, for example by providing land to develop the salmon breeding station and removing obstacles that impede fish migration.

The river Leine water development plan demonstrates that spatial planning approaches can help to address water issues in a positive way, which bodes well for meeting the requirements of the WFD in Lower Saxony and beyond. The water development plan has generated benefits in terms of water quality and biodiversity, and has also improved public access to and interest in the river. Several lessons can be learnt from this example. Reaching agreement on implementation measures relating to the achievement of the objectives of the water development plan was one of the key challenges faced during this process. However, participation procedures were developed (which involved the use of mediators) between the district government of Hanover, local municipalities and relevant stakeholder groups. These proved to be successful in resolving conflicting interests between these parties. The Leine water development plan highlights the value that investing time and money into stakeholder participation approaches can have for the successful implementation of spatial planning initiatives. The Leine case study also shows that although the water development plan was a non-statutory document, it nevertheless positively influenced planning procedures (by stimulating modifications to the local municipal spatial plan), generated beneficial impacts on the ground, and gained the support of a wide range of local stakeholders. Municipalities should be encouraged by initiatives such as this which indicate that it is possible to look beyond legislated spatial planning procedures in their efforts to improve local water environments.

Case study 2: designation of water protection belts in the city of Valmiera (Latvia)

In 2005, Valmiera City Council developed a new spatial plan. National planning legislation and regulations require municipal level spatial plans to designate 10 m water protection belts around all water bodies (including rivers, lakes, groundwater bodies, and artificial water bodies) to protect and enhance aquatic environments. Where land close to water bodies already contains existing development, this requirement does not apply. Valmiera City Council defined water protection belts using topographic data and information on the hydrological regime of local water courses. The protection belts were subsequently included within the city's spatial plan and planning policies were developed that specify permitted activities and land uses within the protection belts.

Although the initiative is in its early stages, the water protection belts designated in Valmiera should help to lessen the negative impact of pollution to water bodies, restrain the river bank erosion process, limit development on floodplains thereby reducing future flood risk, and protect and enhance the landscape character of the local area. Whilst the national legislation concerning protection belts was not developed as a direct response to the WFD, water protection belts such as those in Valmiera will doubtless have a beneficial impact on the WFD's goals in the future.

This case study highlights several important points regarding the relationship between spatial planning and water management. The availability of good data was important, without which it would have been difficult for Valmiera City Council to identify the most important locations for water protection belts. The success of similar zoning approaches undertaken by other municipalities (to protect groundwater supplies or aquatic habitats for example) will also benefit from the availability of good quality data. Further, incorporating the protection belts within Valmiera's spatial plan and creating policies to support their implementation demonstrates the importance of providing a means through which spatial planning initiatives can be enforced. The development of protection belts in Valmiera demonstrates that spatial planning can positively influence the water environment, and hence can contribute to the achievement of the WFD's goals.

Spatial planning, water and the WFD: insights from the ENMaR case studies

The ENMaR case studies provide a practical insight into the application of spatial planning to address challenges related to the water environment, and it is apparent that progress is being made across the continent of Europe in this respect. However, it is important to acknowledge that the WFD was not the main driver behind any of the spatial planning case studies explored during the ENMaR project. As the WFD is a relatively new piece of legislation, this is perhaps not surprising. Nevertheless, spatial planning legislation, guidance and policy are evolving to incorporate the WFD (Carter 2007b). For example, amendments to the German Federal Water Act (the key piece of national legislation guiding water issues in Germany) now provide a legislative framework for meeting the WFD's goals at the regional and municipal level. Accordingly, federal state (regional scale) decrees have been developed across Germany in order to implement

the WFD. Similarly, the regional spatial plan for north-west England now includes a policy targeted at aiding the achievement of the WFD through integrated water management (North West Regional Assembly 2006).

Despite the lack of direct links between spatial planning practice and the WFD, the ENMaR case studies do show that addressing water issues via spatial planning is common across Europe. The two case studies explored above demonstrate that the theoretical linkages between planning and the WFD do express themselves in planning practice. Spatial planning is already making an important contribution to meeting the WFD's key goal of achieving good water status, yet it is not the WFD itself that is driving this activity. Instead, planners in countries such as England and Germany are carrying forward a long tradition of addressing environmental issues through the planning system.

Spatial plans often already include policies concerning the sustainable use and management of water relating to, for example, green river corridors, flood risk management, sustainable drainage systems, and the protection of aquatic biodiversity. In this respect, planners are not starting from scratch as existing policies will often provide a framework to enhance their role in contributing to the WFD's agenda. Established planning approaches and techniques such as stakeholder involvement (an important determinant of the success of several of the ENMaR case studies including the water development plan for the Leine river) and SEA are likely to prove valuable in taking this framework forwards. Further, the case studies highlight that emerging approaches and techniques such as flood risk assessment and geographic information systems can be added to the list of tools available to planners.

The case studies also demonstrate that spatial planning is often a low-cost option for safeguarding and enhancing the water environment, particularly in comparison to the provision of infrastructure such as water treatment plants or structural flood defences for example. In the case of both the water development plan for the Leine river and the designation of water protection belts in the city of Valmiera, the principal cost was the time of the individuals involved in the process. Planners and relevant stakeholders should also be encouraged by the multifunctional benefits generated by the spatial planning initiatives explored during the case studies. In each situation, the benefits associated with the successful implementation of the planning approaches extended beyond the water environment. For example, as a result of the river Mersey development plan (England), there is now a large proportion of the river Mersey flowing through the town of Stockport that has been improved and is accessible to the public by footpath networks and a canoe trail. This has helped to raise public awareness of the river. The river is now also cleaned on a regular basis with clear environmental benefits. The river Mersey development plan has changed people's perceptions of the river in Stockport and has helped to generate a perspective amongst local stakeholders that the river should be valued as a key asset where for many years people have turned their back on it. Ultimately, the 'spirit' of the WFD goes beyond the achievement of good water status and requires an evolution in the relationship between human societies and the water environment, something that this case study demonstrates that spatial planning processes have the potential to help stimulate.

Spatial planning, water and the WFD: concluding remarks

It is clear that there are strong links between spatial planning, water and the WFD in theory and practice. Nevertheless, there are considerable challenges faced by planning systems in reconciling conflicts between economic development, social progress and the sustainable use and management of water environments. Not least, as spatial planning influences the nature and extent of the use of land, the process is intensely political. The contents of land use plans, therefore, tend to reflect political, social and economic priorities (Carter 2001; Cullingworth and Nadin 2002). It is important to acknowledge that many factors affect planning decisions aside from concerns for the water environment. This is likely to lead to some planning decisions being taken that run counter to achieving the goals of the WFD, or that do not take opportunities to link more strongly with water issues. For example, planning authorities may sanction development on floodplains, provide for new housing in water-stressed locations, or not promote the use of water efficiency technologies within their planning policies. Ultimately, for the requirements of the WFD to be implemented successfully and effectively, political commitment to achieving the goals of the Directive is crucial. Raising awareness of the multifunctional benefits of improving the water environment amongst stakeholders and decision makers would be a first step towards encouraging this change in mindset.

Success in applying spatial planning approaches to the resolution of environmental problems such as water quality has in some cases been limited. As noted by Evans (1997), planning has been found to be lacking in tackling the complex environmental problems characterising today's society, whilst Bennett (1995) believes that planning's effort to

balance the needs of economic development and environmental protection has failed. Worryingly, Owens and Cowell (2002, 24) identified that '. . . authorities [in the UK] that have tried to embrace a wider environmental or social agenda have been brought rather sharply back into line'. As RCEP (2002, 55) stated: 'Despite the good intentions, there cannot be much confidence that many environmental objectives expressed in plans produced by local authorities and other bodies [in the UK] will be realised in practice'. RCEP, an influential body responsible for guiding the UK government on environmental matters, note that what is necessary is a return to an environmentally focused approach to spatial planning (RCEP 2002). If governments were to embrace this agenda, meeting the requirements of the WFD via spatial planning would undoubtedly be given a major boost. At present, however, planning lack of success in addressing complex environmental problems may hinder its potential role in the context of the WFD.

Particular features of the WFD also present challenges to spatial planning systems. The WFD is novel in terms of its spatial approach to water resource management. The Directive effectively recognises that water bodies cannot be valued and managed as economically productive goods, and must instead be regarded as natural ecosystems. This represents a move away from water resource management based around administrative and political boundaries towards an appreciation of the geophysical context within which water exists. This has implications for the governance of water resources. Principally, there is a need to acknowledge that administrative boundaries may hinder the development of a holistic ecologically focussed approach to water resource management based around natural river catchments as promoted by the WFD. However, it is of concern that there is often a lack of coordination between municipalities (and higher level planning authorities at the regional level) in terms of the management of water issues. Planning authorities sometimes act in isolation in shared river basins, which is not conducive to effectively dealing with challenges concerning the water environment which do not fall neatly within administrative boundaries.

Another procedural barrier is that the process of preparing the key delivery agent of the WFD, the RBMP, is not taking place in tandem with spatial plan preparation. For example, in England municipal level spatial plans follow an approximate 5-year review cycle and are currently (in 2007) being prepared across the country. RBMPs will not be released until 2009 and therefore are not available for planners to consult whilst they are preparing their spatial plans. New working practices and stakeholder relationships will be needed to avoid problems associated with the current spatial and temporal mismatch between the planning of land and water existing in some European countries.

The WFD calls for the integration of land and water management. However, there is a history of sectoral fragmentation in respect of the use and management of water. As noted by Abu-Zeid (1998, 12): 'International and national management of water resources have been conducted in a fragmented way, based on immediate needs and interests, without adequate regard to the finite nature and interdependence of the elements of the natural water cycle. Contradictory policies, plans and actions are rampant'. One of the biggest hurdles for effective implementation of the WFD is the integration of water within other sectors, including spatial planning activities (European Environment Bureau 2001).

The scale of the challenges faced in reducing this institutional fragmentation are evident looking at the UK where sectors such as agriculture, forestry and spatial planning are poorly integrated. A barrier therefore exists in promoting a holistic approach to land and water management as major polluters of the water environment are managed separately from the spatial planning system. In contract, the Swedish 'municipal planning monopoly' means that municipalities have a key role in the planning and management of land and water (including issues such as agriculture and forestry) in their area. However, this integrated environmental management approach is now at threat as 'water authorities' have now been developed and designated as competent authorities with responsibility for preparing RBMPs and implementing the WFD. As municipalities retain some control over water at the local level, there is a risk that a dual system of water management may develop. Unless effective cooperation between water authorities and municipalities is achieved, this could be detrimental to sustainable water management in Sweden.

Several other barriers exist that limit the potential contribution of spatial planning to water management, and hence the WFD. National legislative frameworks linking spatial planning and the WFD are not adequately developed and need to be strengthened. At present, municipalities and organizations that support them are lacking a solid framework to build upon and to act as an incentive to stimulate activity in this area. There is also a lack of knowledge and experience amongst planners concerning the water environment and of measures to address challenges such as flooding and groundwater protection. This problem is exacerbated by a lack of data. For example, in Galicia a complete inventory of water bodies in the region does not exist. Limited guidance in some countries acts to further compound

these knowledge gaps. However, tools such as SEA can be usefully applied to raise awareness of the impacts of spatial plans on water. Also, competent authorities should be encouraged to support municipalities by acting as a focal point for data on the water environment. Further, there is a lack of resources (including time, money and staff) available to some municipalities to undertake their spatial planning duties. Faced with limited resources, concern for the water environment may sometimes be marginalized in favour of issues such as economic development and housing.

This study has identified that direct links between the WFD and municipal level spatial planning approaches are rare, and that the challenges faced by planners when attempting to take genuine steps towards promoting sustainable water management are great. Nevertheless, in all the countries studied within the ENMaR project there is experience, much of it grounded in many years of planning practice, of using spatial planning to manage the water environment. Initiatives such as water protection zones in Latvia, the management of storm water through spatial planning in Sweden, and the use of geographical information systems in Spain provide reassuring evidence that a platform exists to work towards the WFD's goals through spatial planning in the future. It is important that this good practice is shared and built upon, and that spatial planning is recognised as an established process that can help to address water management challenges. Ongoing changes across Europe to incorporate the WFD within spatial planning legislation and guidance indicate that it is only a matter of time until spatial planning approaches targeted at meeting the Directive's goals begin to emerge more regularly.

Acknowledgements

I would like to express my thanks to all the partners in the ENMaR project for their time and efforts in developing the case studies referred to in this paper, and also to INTERREG IIIC and the University of Manchester for providing the funding to undertake this research.

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