



## The potential of using the Ecosystem Approach in the implementation of the EU Water Framework Directive



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### HIGHLIGHTS

- We investigated how the Ecosystem Approach could facilitate WFD implementation.
- A framework linking ecosystem services and water management objectives is proposed.
- The benefits of using the Ecosystem Approach in WFD implementation are identified.
- The Ecosystem Approach can contribute to more holistic water resources management.

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### ABSTRACT

The Ecosystem Approach provides a framework for looking at whole ecosystems in decision making to ensure that society can maintain a healthy and resilient natural environment now and for future generations. Although not explicitly mentioned in the Water Framework Directive, the Ecosystem Approach appears to be a promising concept to help its implementation, on the basis that there is a connection between the aims and objectives of the Directive (including good ecological status) and the provision of ecosystem services. In this paper, methodological linkages between the Ecosystem Approach and the Water Framework Directive have been reviewed and a framework is proposed that links its implementation to the Ecosystem Approach taking into consideration all ecosystem services and water management objectives. Individual River Basin Management Plan objectives are qualitatively assessed as to how strong their link is with individual ecosystem services. The benefits of using this approach to provide a preliminary assessment of how it could support future implementation of the Directive have been identified and discussed. Findings also demonstrate its potential to encourage more systematic and systemic thinking as it can provide a consistent framework for identifying shared aims and evaluating alternative water management scenarios and options in decision making. Allowing for a broad consideration of the benefits, costs and tradeoffs that occur in each case, this approach can further improve the economic case for certain measures, and can also help restore the shift in focus from strict legislative compliance towards a more holistic implementation that can deliver the wider aims and intentions of the Directive.

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### 1. Introduction

The Water Framework Directive (WFD) (2000/60/EC) introduced a legal framework to protect and restore the water environment across Europe and ensure its long-term, sustainable use. It establishes water management based on river basins, the natural geographical and hydrological unit for fresh waters and sets specific deadlines for Member States to protect aquatic ecosystems. The WFD is the most substantial piece of water legislation ever produced by the European Commission,

and is the major driver for achieving sustainable management of water in the UK (Collins et al., 2012). It requires Member States to prevent further deterioration of water resources and to protect and enhance the status of water bodies through programmes of measures. Under article 4(1) of the WFD, Member States are required to improve the overall status of water bodies, in order for both the 'ecological status' and 'chemical status' of surface water bodies to be at least good, with 'good groundwater status' (quality and quantity) for groundwater bodies, all by 2015 (European Parliament and Council, 2000).

The goal of WFD implementation is the sustainable management of water resources by taking due account of environmental, economic and social considerations. In doing so, and following the steps of the Dublin

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Principles (1992), the World Commission on Dams 'strategic priorities' (2000) and Aarhus Convention (1998) requirements, the Directive adopts critical principles for water management, including public participation in planning and economic approaches such as the recovery of the cost of water services. It provides a framework that covers all aspects of management of the water environment, with its programmes of measures also including responses required under related Directives such as the Urban Waste Water Treatment (UWWT) Directive (91/271/EEC), the Bathing Water Directive (76/160/EEC), and the Environmental Impact Assessment Directive (85/337/EEC), among others (Collins et al., 2012).

The WFD's economic requirements, including cost-effectiveness analysis, exemptions and disproportionality of costs, cost recovery and incentive pricing, are a considerable administrative challenge for water management, both methodologically and in terms of data (ESAWADI, 2011). Almost all EU Member States have spent considerable time and resources to develop tools to better assess the condition of the aquatic environment, acquire the required data and prepare river basin management plans. In this context, both the EU and its Member States have funded a large number of research projects, particularly in the areas of ecological assessment and catchment modelling (Hering et al., 2010). During the last decade, a variety of indicators, target values, reference setting approaches, and a diversity of schemes relevant to different types of surface waters have been developed for evaluating ecological status for surface water bodies (Van Hoey et al., 2010), and these are still the focus of much continuing discussion. The implementation of the WFD is greatly increasing knowledge about the ecology of European surface waters, particularly in regions which have rarely been investigated: approximately 3742 papers have resulted from associated research projects (query 'Water Framework Directive' in SCOPUS on 04/09/2013). Many methods to sample and investigate aquatic ecosystems have been developed and large amounts of data are being generated (Hering et al., 2010). Challenging aspects of the implementation include the quantification of complex and dynamic biological communities into concise classification systems, the establishment of ecological

reference conditions and the determination of the uncertainty in the resulting classification (Hering et al., 2010).

There is an inherent difficulty associated with assessing the value of environmental quality and therefore the benefits of water management measures aimed at improving water body status. This is because the value of environmental quality, the ways in which the natural environment supports human well-being, is often not fully understood or measured, to the extent that support for WFD implementation is often regarded by some as an altruistic task (Everard, 2012). Therefore there is a great need for better demonstration and communication of the benefits of WFD implementation and the impact they have on people's lives (ability to fish or swim in rivers or lakes, the costs of treatment and availability of water for abstraction to public supply, etc.). Taking into account the importance of public participation and involvement as an essential component of WFD implementation, this becomes a very important and challenging task that will require appropriate strategies, often a time-consuming but essential component of policy implementation (e.g. Article 14 of WFD).

Ecosystem services, i.e. the benefits people obtain from ecosystems, have received a lot of attention in recent years, for instance through the UN Millennium Ecosystem Assessment (MEA, 2005) or *The Economics of Ecosystems and Biodiversity* (TEEB, 2010) initiative of the European Commission (through the European Environment Agency). The Ecosystem Approach originated from the Convention on Biological Diversity (CBD) and sets a socio-economic context into which a consideration of ecosystems and their multiple services in decision making can be integrated. Ecosystem services therefore form part of the wider Ecosystem Approach.

Unlike the International Guidance for Integrated Water Resources Management (IWRM) (Global Water Partnership, 2000) which embraced the language of ecosystem services at a very early stage, the WFD stayed away from the terminology during the first round of river basin management planning. Though ecosystem services are not explicitly mentioned in the WFD, the Directive is nonetheless ecosystem-focused and has the purpose of protecting future human uses of the

**Table 1**  
Links between WFD principles and the Ecosystem Approach.

WFD	Ecosystem Approach
<p><b>Article 1 Purpose</b> Prevents deterioration and enhances status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems To promote the sustainable consumption of water To reduce pollution of waters from priority substances Ensures progressive reduction in pollution of groundwater and prevents further pollution Contribute to mitigating the effects of floods and droughts</p>	<p><i>Ecosystem services supported:</i> Freshwater, food, genetic resources, provision of habitat, water regulation, natural hazard regulation, disease regulation, erosion regulation, water purification and waste treatment, all cultural services. <i>CBD:</i> (3) Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems; (5) Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the Ecosystem Approach.</p>
<p><b>Article 3 Coordination of administrative arrangements within river basin districts</b> <b>Article 4 Environmental objectives</b> <i>Surface waters:</i> Good ecological status, Good ecological potential, No deterioration in status, Good chemical status <i>Groundwater:</i> Prevent and limit inputs of pollutants, Good quantitative status, Good chemical status, No deterioration, Reverse trends <i>Protected areas:</i> Drinking water protected areas, Freshwater fish and shellfish, Bathing Waters, UWWTD, SACs, SPAs</p>	<p><i>CBD:</i> (2) Management should be decentralised to the lowest appropriate level <i>Ecosystem Services supported:</i> Most provisioning, supporting, regulatory, and cultural services. <i>CBD:</i> (5) As above; (6) Ecosystems must be managed within the limits of their functioning; (9) Management must recognise that change is inevitable</p>
<p><b>Article 5 Characteristics of the river basin district, review of the impact of human activity and economic analysis of water use</b></p>	<p><i>CBD:</i> (4) Recognising potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context; (5) As above; (6) ecosystems must be managed within the limits of their functioning; (9) as above <i>Ecosystem services supported:</i> Freshwater, disease regulation, water purification and waste treatment <i>CBD:</i> (4) As above</p>
<p><b>Article 7 Waters used for the abstraction of drinking water</b> Reduce level of purification of drinking water, water treatment regime</p>	
<p><b>Article 9 Recovery of costs for water services</b> Take account of the principle of the costs of water services, including environmental and resources costs</p>	
<p><b>Article 14: Public participation and consultation</b> Encourage the active involvement of all interested parties in the implementation of the Directive, in particular in the production, review and updating of the river basin management plans</p>	<p><i>CBD:</i> (1) The objectives of management of land, water and living resources are a matter of societal choices; (11) the Ecosystem Approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices; (12) the Ecosystem Approach should involve all relevant sectors of society and scientific disciplines</p>

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