



Research article

Impacts of the water framework directive on learning and knowledge practices in a Swedish catchment

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ABSTRACT

Catchments are complex social-ecological systems involving multiple, and often competing, interests. Water governance and management regimes are increasingly embracing pluralistic, participatory, and holistic norms as a means to engage with issues of complexity, uncertainty, and value-conflicts. Integrated, participatory approaches are theoretically linked to improved learning amongst stakeholders across sectors and decision-making that is grounded in shared knowledge, experiences and scientific evidence. However, few studies have empirically examined the impacts of an integrated approach to learning and knowledge practices related to water resources. Here, a Swedish sub-catchment that has adopted such an approach in association with implementation of the European Water Framework Directive (WFD) is examined. Interview-based analyses show that WFD implementation has both helped and hindered learning and knowledge practices surrounding both water planning and spatial planning. Whilst communities of practice have developed in the study area, a number of important challenges remain. These include the rigid goal-orientation of the WFD, the fragmentation of knowledge caused by an over-reliance on external consultants, as well as a lack of resources to synthesise information from multiple sources. Present results raise questions regarding the efficacy of the WFD to sufficiently enable the development of learning and knowledge practices capable of handling the complexity, uncertainties and value-conflicts facing catchments in Sweden and elsewhere.

1. Introduction

Recent decades have seen a growing recognition among scientists and policy makers that sustainable water governance requires a transition from a technocratic exercise towards a more integrated and adaptive approach (Biswas, 2004; Destouni et al., 2015, 2010; Jager et al., 2016; Macleod et al., 2007; Mostert, 2003; Pahl-Wostl et al., 2007; Wietske Medema, 2008). This ambition requires a commitment to recognise, and engage with, the inherent complexity and uncertainties associated with catchments. Such uncertainties arise, amongst other things, due to inadequate observation data (Beven and Alcock, 2012), multiple contaminant sources (Edwards and Withers, 2008), impacts of humans/society (Ison et al., 2007), non-equilibrium processes and dynamic effects (Hamilton, 2012; Meals et al., 2010), complex and overlapping effects of hydrological and biogeochemical processes (Persson et al., 2011), and large-scale land-water interactions (Stålnacke et al., 1999). It also requires the adoption of pluralistic, participatory processes in order to integrate a diversity of local, scientific and bureaucratic knowledge. The accommodation of – often

competing – values and perspectives of multiple actors and stakeholders is similarly important (Edelenbos et al., 2011; Hunt and Shackley, 1999; Von Korff et al., 2010). The adequate development and management of learning and knowledge practices thus represent vital aspects when implementing legislation aimed at improving the sustainability of water resources.

An integrated approach to water resource management is said to promote social equity, economic efficiency and ecological sustainability by developing collaborative processes to address trade-offs between human and non-human water needs at multiple scales (Hammer et al., 2011; WSSD, 2002). Integration in this sense refers primarily to the cross-sectoral coordination of water planning and management across user sectors. Both the Dublin Statement (ICWE, 1992) and the Hague Declaration on Water Security (Anon., 2000), for example, advocate the use of an integrated, participatory approach to water management in order to address the interests of all stakeholders. They also support enhanced efficacy of management by improving knowledge generation, dissemination and sharing amongst stakeholders and decision-makers.

The European Water Framework Directive (WFD) establishes an

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important framework for water-related policy development and implementation in the European Union. The WFD responds to a need for actions aiming at the sustainable management and protection of water (European Parliament and Council of the European Union, 2000). The WFD encourages the active involvement of all interested parties in the implementation of the directive. However, the participation of non-experts/non-decision-makers is largely limited to public information and consultation processes (European Parliament and Council of the European Union, 2000). Decision-making processes grounded in shared knowledge, experiences and scientific evidence, and the promotion of social learning amongst those involved are identified as key mechanisms to this end (European Commission, 2003).

Sweden is often perceived as a country with well-developed participatory mechanisms in planning and policy implementation (Busck et al., 2008; Elbakidze et al., 2015; Maier, 2001). The Swedish Parliament adopted the WFD in December 2000. The transition from a water governance delimited by political boundaries to the present river basin management approach, with legally binding environmental quality standards (EQS), represents one of the largest WFD-related institutional shifts among the EU member states (Jager et al., 2016). Swedish implementation of the WFD includes an explicit focus on developing a collaborative approach with stakeholders (NV/HAV, 2006). For this reason, Sweden has encouraged the formation of Water Councils consisting of stakeholders related to specific river basins. Sweden's five river basin district authorities report that 98 such water councils have formed in the regions thus far. In some regions, such as in the Skagerrak and Kattegat river basin district, the different water councils cover most of the river basins of the district. In other districts, such as the Northern Baltic Sea river basin district, the area coverage is less than 50%. The role of these councils is to create an informal cross-sectoral platform, based on common understanding, for integrated water management to facilitate the inclusion of local knowledge. This is to the benefit of e.g. river basin district management plans and the identification of water quality problems and solutions for potential consideration in programmes of measures (Franzén et al., 2015). It remains unclear, however, whether novel WFD-related operational modes have had any discernible impact on existing administrative routines (e.g. Andersson et al., 2012). This holds particularly at local levels, which are important for knowledge sharing and stakeholder interactions. In addition, there remains an urgent need for empirical studies to more closely examine how integrated, participatory learning and knowledge practices are actually implemented on the ground (Franzén et al., 2015; Hedelin and Lindh, 2008).

This paper therefore aims to empirically examine the impacts of WFD implementation on learning and knowledge practices in Swedish water governance and management systems. A case study approach is adopted, focusing on Oxunda sub-catchment, (henceforth: Oxunda), which has adopted an integrated approach and seen close collaboration around water issues since 1998. The main research questions are:

- (a) How are learning and knowledge practices impacted by the WFD? (see results sect. 4.1)
- (b) How are learning and knowledge collaborations around water issues organised? (sect. 4.2)
- (c) How is knowledge on water-related issues generated and integrated in Oxunda? (sect. 4.3)
- (d) How are uncertainties and value conflicts managed? (sect. 4.4)

Results are then discussed in relation to current theories on learning and knowledge practices for sustainable water governance. By examining the practical experiences from Oxunda we aim to contribute to the broader scientific understanding of the challenges and opportunities for achieving sustainable water governance.

2. Background

2.1. Water framework directive

The WFD was developed in the 1990's in an open consultation process, recognising the need to address the then prevailing fragmentation in European water policy. It aims at a streamlined legislation with a holistic view on Europe's water resources, including groundwater, surface water and coastal waters. The primary goal is the achievement and maintenance of good water quality status, given the wide-spread pollution in Europe's water systems. A central concept in achieving this objective is the integration of a broad spectrum of phenomena including all relevant environmental objectives, legislation, expertise, water uses, functions and values, management and ecological aspects, and stakeholder perspectives (European Commission, 2003). The main innovative aspects of the WFD, compared to previous regulation, include a shift of focus from traditional administrative and political boundaries to the natural boundaries of river basins, and the introduction of a series of prescriptive measures, including EQS and status classification schemes for aquatic environments and biota. The WFD process is characterized by six year management cycles, throughout which the participation of the public and stakeholders is envisioned as a key component to improve knowledge generation and sharing, decision transparency, management plans, and capacity building (European Commission, 2003).

When WFD implementation started in 2000, some countries including Estonia, Finland, Norway, Germany, and Sweden opted for a regional organisation model, whereas others including Denmark, Latvia, Lithuania and Poland adopted a model where the main actor operates at the national level. Regardless of model, it has become clear that the goals and management plans set for the two first management cycles ending in 2021 were overly ambitious and will not be fulfilled in any member state (Andersson et al., 2012; Hering et al., 2010). The main reasons include time-lags, mismatches, misunderstandings and conflicts associated with WFD-related re-organisation of water management in the different member states. A stronger emphasis on supra-national water planning, for instance, has had some negative impacts on local and regional land-use and water planning (Andersson et al., 2012). A number of scientific studies have shown the focus on quickly reaching good status in all European waters to be unrealistic (e.g. Hering et al., 2010). Challenges associated with necessary assessment systems and monitoring programmes seem to have been underestimated. In summary, although the WFD has brought European water planning into sharp focus many challenges remain. Improved management decision support requires that large and diverse sets of WFD-related monitoring data be made more accessible and understandable, e.g. through additional data processing and coordination efforts. Further research is clearly needed to assess the efficacy of WFD-institutions and WFD-related procedures in delivering legislative aims concerning good water status; increasing amounts of data on complex processes suggest that much could be learned from concrete case study examples on WFD implementation processes and impacts (Jager et al., 2016).

2.1.1. WFD in Sweden

In Sweden, several steps were already taken in the 1990s to abate pollution and improve the aquatic environment – 6 of 16 national environmental quality objectives directly target water quality and management (Environmental Objectives Council, 2004). Counties and municipalities in Sweden are responsible for water protection and spatial planning, and are thus urged to translate these goals into regional and local objectives, policies, plans and measures. Prior to WFD implementation, Sweden belonged to a group of member states – also including Austria, Denmark, Germany, and Scotland – that did not manage water resources according to river basins. However, during the 1990's Sweden experienced an intensification in voluntary, pre-WFD river basin collaborations on water-related issues, e.g. the Oxunda

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