Institutional change in water management collaboration: implementing the European Water Framework Directive in the German Odra river basin

Claas Meyer\textsuperscript{a} and Andreas Thiel\textsuperscript{b}

\textsuperscript{a}Corresponding author. Leibniz-Centre for Agricultural Landscape Research (ZALF) e.V., Eberswalder Straße 84, D-15374 Müncheberg, Germany. E-mail: claas.meyer@zalf.de

\textsuperscript{b}Humboldt Universität zu Berlin, Department of Agricultural Economics, Division of Resource Economics, Unter den Linden 6, D-10099 Berlin, Germany

Abstract

The Water Framework Directive (WFD) is in the process of restructuring the European water policy towards river basin management (RBM). The transposition of the WFD requires institutional change in order to comply with its substantive and procedural requirements. This paper investigates changes in water management collaboration in a federally organised Member State with regard to the configuration of involved actors and the spatial scale at which issues are considered. Based on qualitative methods, the paper presents a case study of the German Odra river basin and the governance of nutrient pollution whose origins are located all along the river and which specifically impacts coastal zones. We looked at actors most relevant to this management problem, that is, public administrations operating within different administrative boundaries, the agricultural sector and environmental non-governmental organisations (NGOs). In order to capture institutional change, a conceptual framework was constructed to evaluate changes in collaboration on three interrelated levels: formal institutional change, informal institutional change and changes in actors’ mental models. We explain complex institutional change as a product of multiple dynamics, which includes the content of shared mental models and a benefit–cost calculation that takes transaction costs into consideration.

Keywords: Agricultural nutrient pollution; Coordination; Integrated water resource management; Mental models; Participation; River basin management; Transaction costs; Water administration; Water governance

1. Introduction

European water management is undergoing significant changes. The European Water Framework Directive (WFD) was adopted in 2000 and needed to be transposed into the national legislation of


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the European Member States by 2003 (Grabitz & Hilf, 2005). The WFD follows the paradigm of river basin management (RBM) whereupon water resources shall be considered in their integrity and be administered within their hydrological boundaries (CEC, 2000). In this way the WFD is trying to restructure the European water policy top-down towards RBM. The elaboration of the RBM plans is a binding prescription. However, the national and international actors involved operate at different administrative levels and spatial scales regarding river basins (RB). The question of how they cope with these new management requirements therefore emerges.

In the federal state of Germany, the distribution of competencies before and after the introduction of the WFD does not follow hydrological boundaries but administrative State boundaries (Fichtner, 2003). Thus, the implementation of RBM significantly challenged the distribution of competencies, and changes had to take place as more intensive cooperation and coordination between the German authorities was considered necessary (Moss, 2004).

Requirements for water bodies must be achieved within the river basin district (RBD) as the basic planning unit. They must obtain good ecological and chemical status by 2015. A ‘combined approach’, which includes the control of the overall emissions quantity and their concentration in the receiving water body, was introduced. In Germany, this approach is expected especially to address diffuse sources of pollution from agriculture and urban run-off, providing a further reason for broad participation and collaboration of intervening sectors and stakeholders (cf. BMU, 2007). Another aspect is the integration of the ecological goals into sectoral policies (Frederickson et al., 2008).

In the literature, RBM is recognised as a cornerstone of integrated water resource management (IWRM) (Molle, 2009). Nevertheless, Molle (2009) argues that country-specific social and environmental dynamics result in different governance configurations for implementing RBM. There is a vast literature dealing with the implementation of the WFD in Europe and Germany and its implications (e.g. Breuer, 2002; Holzwarth & Bosenius, 2002; Röhring, 2003; Moss, 2004; Solf, 2006; Czychowski & Reinhardt, 2007; Kastens & Newig, 2007; Petry, 2008). Moss’s benchmark publications (2003 and 2004) highlighted several misfits between the German administrative structure and the requirements of the WFD, that is, misfits regarding the coordination of different resource systems and limited integration among the policy sectors concerned (e.g. agricultural and environmental politics). He also argues that participation, consultation and information requirements of the public require change. Louka (2008) acknowledges similar problems when she characterises the WFD as ‘an exercise in horizontal and vertical coordination’. She specifically emphasises power and bargaining as being important for the development of organisations and coordination mechanisms. She identifies key factors affecting the implementation as administrative and political capacity, centralisation issues, coordination between political actors and existing institutional structures and misfits.

Petersen et al. (2009) postulate that the state has to rely on new forms of cooperative governing owing to the extended challenges of the WFD. Research into cooperation in environmental and water management has increased over the years (e.g. Selin & Chavez, 1995; Plummer & FitzGibbon, 2004; Bonnell & Koontz, 2007). Many of the publications focus on either including the public into the decision making process

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1 Within this document we use the term State for the sub-national federal jurisdiction level of German Länder (Brandenburg and Mecklenburg-Vorpommern) and Federal State for the level of German government. The German state consists of one federal government and 16 states. The constitution appoints the issues that fall within the ambit of the Federal State or states.

2 The WFD gives different status categories. They measure the degree of deviation of a water body from its original, natural condition.
(e.g. Koehler & Koontz, 2008; Hardy & Koontz, 2010) or cooperating at the international level (Sadoff & Grey, 2002; Dombrowsky, 2007; Mostert, 2009). Hardy & Koontz (2009) find that the institutional performance of collaborative watershed management is a product of decision makers’ information, the surrounding physical system, any directing institutional rules and local culture. International cooperation in a RB depends on regional economic cooperation, domestic legislation, local interests, activities of nongovernmental organisations (NGOs), growing environmental awareness, and so on (Mostert, 2009). Pahl-Wostl (2009) analyses the shift from end-of-pipe solutions to the broader concept of an integrated, adaptive management paradigm and the necessity of governance regimes that are capable of ‘social and societal learning’ at different levels (Pahl-Wostl, 2009: 358). A collaborative approach has been acknowledged as specifically important for effective integration of water and agricultural management (Ferreyra et al., 2008; Fish et al., 2010). Crucial in this regard is the development of policy platforms at different spatial scales and between actors (Fish et al., 2010).

We can therefore conclude that management collaboration is needed in Germany to cope with the RBM-based requirements of the WFD. However, many obstacles are threatening such tendencies to change, for example, the historical set-up of water management in Germany. A thorough assessment of how collaboration in Germany has developed throughout the implementation of the WFD and how the mentioned obstacles have been addressed is still lacking. This is important in understanding how a federal state copes with the WFD, its potential for solving water management problems like diffuse pollution from agriculture, how it adapts to the requirements of RBM and if such governance systems are capable of learning.

The conclusion of the RB planning phase (2008/09) provided a good opportunity to assess how far collaboration in RBM has come compared to the earlier analysis made, for example, by Moss (2003, 2004). Building on this, we asked if and how water management collaboration has changed for the purposes of the WFD implementation in the Eastern German Odra RB. As an illustrative case, we concentrated on diffuse nutrient pollution from agriculture as specifically significant for the fulfilment of the good status requirements. We mapped the collaboration structures that have emerged up to May 2009. We conceptualised changes in the water management collaboration as a phenomenon of institutional change, i.e. changes in rules that govern human interactions and their interlink to mental models that orient the way people solve such complex problems. Relying on this institutional approach, we will try to explain the changes in and discuss the effectiveness of newly emerging institutions.

The WFD suggests three principles for coordination: (1) the need for water administration to consult with all sectors using water, (2) intra- and inter-state, trans-boundary coordination within the administration, and (3) public participation (cf. Özerol & Newig, 2008). With this in mind and based on an in-depth data gathering strategy, we aimed to answer the overall question regarding the ability of water management in federal states to adhere to RBM through collaborative structures. More specific research questions are as follows:

1. Which formal and informal collaboration rules changed within (i) the water administration in the German states and in international water administration, (ii) between German water administration and the agricultural sector and (iii) between NGOs and the German water administration?
2. What are the reasons for and obstacles to a change in the rules and what role do mental models play?

With regard to collaboration, we are guided by the definition by Gray (1985: 912), ‘the pooling of appreciations and/or tangible resources … by two or more stakeholders to solve a set of problems which neither can solve individually’.
2. Theoretical framework

We view management of interdependent uses in a watershed as a problem of collective action with regard to collaboration (Kerr, 2007). Interaction between participants in action situations is structured by a nested system of regularised rules (institutions) (Ostrom, 2005), which define interrelations between ‘participants’. Changes in water management collaboration would then imply change in institutions. We analysed what were called collective choice rules (Ostrom et al., 1994), which define who is eligible to participate in specific decisions. An institutional setting that implies a specific form of collaboration is a type of governance defined as ‘the establishment, reaffirmation or change of rules to resolve conflicts or to coordinate over environmental resources’ (Paavola, 2007). We specifically addressed formal and informal institutions that structure the governance of the nature-related transaction (Hagedorn, 2008) ‘diffuse pollution of surface and groundwater by farmers’. We considered (i) formal institutions that are backed by codified, often written, externally enforced and inter-subjectively applicable sanction mechanisms, while (ii) informal institutions that do not share such a public good character, are not codified, but are idiosyncratic and are usually only disclosed to the group of people to which they apply (see also Lin, 1989; Pahl-Wostl, 2009: 356).

We also looked at how the implementation of the WFD influences the way in which individuals perceive the spatial extent of the ecosystem that is the origin and destination of diffuse pollution and the way it shapes interactions to address this problem. This perception is what we called mental models. It is important to include them in the analysis as dimensions of social learning of problems faced and collaborative ways to address them. They are interrelated to institutions and institutional change, as they provide the cognitive basis for the way in which the rules are applied. Denzau & North (1994: 1) define them as ‘internal representations that individual cognitive systems create to interpret the environment’.

As drivers of institutional change, we first need to consider the role of the WFD in providing pressure for formal institutional change ‘from above’. Non-transposition of the requirement to elaborate a basin plan is followed by hard sanction, enforced at the supranational level. Second, actors have a genuine motivation to pool resources and collaborate because of the physical setting of spatially and functionally interrelated water uses (collective). Thus, informal institutional change emerges. The substantive objectives of the WFD would otherwise not be achieved and non-compliance with the objectives would result in sanctions.

Third, in the context of the implementation of the WFD, broader social learning processes lead to more subtle changes in individuals’ and collective actors’ approaches to water management (Pahl-Wostl, 2009). This is what we tried to capture through the investigation of mental models. We therefore view collective choice rules used in water management collaboration as the outcome of multiple overlapping processes that lead to institutional change. Schmid (2004: 8) writes that ‘[i]nstitutions change as people interact with each other in the context of changes in population, resources, technology and people’s subjective perception and imagination. These changes cause people to change their behaviour which, when aggregated and regularised, become new informal institutions. Those behaviours, which become conscious, may result in pressure for formal institutional change as well’.

The specific outcome of institutional change in collaboration is subject to the consideration of transaction costs (costs of actors informing themselves of options and costs of negotiating, agreeing, monitoring, enforcing and adapting institutions) (Dahlmann, 1979), which vary with the kind of institutions adopted and therefore either inhibit or facilitate collaboration between actors. The path of institutional change is also heavily influenced by the past (Pierson, 2000; Schmid, 2004). Such path-
dependence can be conceptualised against the backdrop of a benefit–cost calculus where transition costs or the costs of shifting from one set of institutions to another determine the path of change (Challen, 2000: 177). They emerge from actual, expected costs of institutional restructuring, political repercussions and possibly, side payments. We understand transition or transaction costs as a loose conceptual framework in the sense of perceived efforts, which are related to perceived returns of various kinds (cf. Dixit, 1997). Figure 1 shows the analytical framework of the various dimensions, illustrating changes in collaboration under the influence of top-down institutional change, the process of implementing the WFD and mutual dependence owing to functional or spatial interdependence.

3. Methods

To answer our research questions, we chose an illustrative case to study a detailed real-life situation. We considered it important for the development of a nuanced view of the reality of change in water management cooperation to explore individuals and organisations (cf. Flyberg, 2006; Baxter & Jack, 2008). It appeared rather fruitful to answer our ‘how’ and ‘why’ questions, cover the contextual conditions relevant for institutional change (Yin, 2003) and generalise (cf. Flyberg, 2006). We followed an ‘information-oriented’ selection approach (cf. Flyberg, 2006).

1. The nature-related ‘transaction’ that was studied needed to be considered unresolved and its treatment for the purpose of WFD required collaboration. Diffuse pollution from agricultural run-off is one of the most important challenges for the successful implementation of the WFD in Germany and extended collaboration from all stakeholders is required.

2. We selected the case of the Odra (see Figure 2) because the RB is heavily influenced by diffuse pollution from agriculture. The Odra allowed the identification of collaborative structures that emerged

Fig. 1. Analytical framework.
specifically as a result of the WFD, as little collaboration existed previously in comparison to other German transboundary rivers, such as the Elbe, the Rhine or the Ems. Furthermore, researching the Odra RBD was manageable as it is shared only by three national states and three states within Germany.

In order to be able to go deeper into the effects of the WFD, we focussed on the interaction between the two neighbouring states, Brandenburg (Bbg) and Mecklenburg-Vorpommern (MV).
This option allows us to cover the source (inland agriculture) and impact areas (coastal wetlands) of diffuse pollution, which are situated in different states. The case additionally allowed some limited insight into the way transnational cooperation was restructured as a result of the WFD. We nevertheless concentrated on the German states’ views, as our main focus was to understand the development of RBM in the federal state system.

3. Finally, actors and interviewees were selected starting from our focal water management problem. We gathered data from the states’ water administrations, the agricultural sector and environmental NGOs, representing regulators, the polluting actors and the actors demanding less pollution. We collected the data using qualitative methods to achieve an in-depth understanding of institutional change covering the period up to May 2009. We analysed documents and undertook ten semi-structured interviews with 12 relevant actors in MV and Bbg. Eight of the 12 interviewees were state actors from different levels of the environmental administration; another two were from the states’ farming associations and the final two were experts from national environmental NGOs (see Table 1). The guiding questions were defined following two pre-test interviews (see Table 2).

The questionnaire was continuously adapted for different interviewees and updated to account for new information. The interviews were transcribed and qualitatively coded following our analytical framework. Owing to methodological difficulties and resource constraints, we inferred data regarding changes in mental models from the interviews and documents reviewed, instead of directly researching them.

4. The setting

In this section, we will briefly explain the constitutional setting, the collective choice rules and the problems of nutrient pollution in the Odra basin. Before the reunification, water resources in the

<table>
<thead>
<tr>
<th>Table 1. Sample characteristics of interviewees and timeframe of interviewsa.</th>
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</thead>
<tbody>
<tr>
<td>Administration: Ministries and subordinated environmental and planning agencies</td>
</tr>
<tr>
<td>3 experts (E1), (E3), (E4); (MULV, LUNG, ARLV); July–October</td>
</tr>
<tr>
<td>Agricultural sector: Farmer associations</td>
</tr>
<tr>
<td>1 expert (E9); October 2008</td>
</tr>
<tr>
<td>Environmental NGOs/Research institutes</td>
</tr>
<tr>
<td>2 experts (E7), (E8); (BUND, EUCC /IOW) September–November 2008</td>
</tr>
</tbody>
</table>

aThere is a limit on information disclosure to protect the anonymity of the participants.
bMinisterium für Umwelt, Landwirtschaft und Verbraucherschutz – Ministry for Agriculture, Environment and Consumer Protection.
cLandesamt für Umwelt, Naturschutz und Geologie – State Agency for Environment, Nature Protection and Geology.
dAmt für Raumordnung und Landesplanung Vorpommer – Office of Regional Planning Western Pommerania.
fBund für Umwelt und Naturschutz – Friends of the Earth, Germany.
gEUCC- Die Küstenunion Deutschland e.V. is: EUCC–The Coastal Union (European Union for Coastal Conservation), German Branch.
hLeibniz Institute for Baltic Sea Research Warnemünde.
German Democratic Republic were managed at the RB level (Apolinarski, 2003); however ecological questions hardly played a role (Bernhardt, 2003). After the reunification, the water management system was adapted to the Western federal regime based on sectoral management. Within the Federal Republic of Germany, the Federal State enacts a legal framework (Wasserhaushaltsgesetz: WHG) and the states’ legislations detail the way water is administered (Breuer, 2002; Czychowski & Reinhardt, 2007). The states legislate as long as no rulings are made by the Federal State. The highest authority at the federal and state levels are the respective ministries (environmental department) supported by specialised agencies. Since 1956 the Federal State and the single states have been cooperating under LAWA\(^3\) (Working Group on water issues of the Federal states and the Federal Government), which is composed of technical committees for various technical and governance aspects of water management (LAWA, 2012).

The Odra RBD is situated within three member states of the European Union: Germany, Poland and the Czech Republic and within Germany, the states Sachsen (Saxony), Brandenburg and Mecklenburg-Vorpommern are involved. The total Odra RBD comprises 122,512 km\(^2\), of which 87.6% are situated in Poland, 5.9% in the Czech Republic and 6.5% in Germany. Its delta, the Stettiner Haff, is heavily affected (97%) by the Odra run-off (IKSO, 2004). The RBD is considered near-natural with significant biodiversity and habitats for many species (Köhler & Chojnacki, 1996; Löser & Sekścińska, 2005). More than 16 million people live in the Odra Basin (14.08 million in Poland, 1.55 million in the Czech Republic and 758,000 in Germany) (Löser & Sekścińska, 2005). Agriculture accounts for 3.9% of the GDP but plays a major role in water management (IKSO, 2005). Pollution significantly affects the lagoon responsible for water quality and eutrophication (Löser & Sekścińska, 2005; Löser & Sekścińska, 2005).

\(^3\) Länderarbeitsgruppe für Wasserangelegenheiten.

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### Table 2. Interview guides: main theme and question content.

<table>
<thead>
<tr>
<th>Basic guiding themes (in terms of diffuse nutrient pollution from agriculture)</th>
<th>Questions content (not conclusive)</th>
</tr>
</thead>
</table>
| 1. Understanding the systemic cohesions within a river basin | • Characterisation of nitrate input problem  
• Problems of decentralised solutions  
• Level (international, national, state, regional) |
| 2. Cooperation between water administration entities | • Organisations  
• Rules  
• Participants  
• Change  
• Timeline |
| 3. Cooperation between water administration and agricultural administration entities | • Way of working  
• Functionality  
• Obstacles  
• Information flows  
• Power relations  
• Significant positions of actors  
• Historic influences  
• Capacities  
• Attitudes |
| 4. Cooperation between administrations and agricultural actors | • Change  
• Timeline  
• Way of working  
• Functionality  
• Obstacles  
• Information flows  
• Power relations  
• Significant positions of actors  
• Historic influences  
• Capacities  
• Attitudes |
| 5. Cooperation between administration and environmental NGOs | • Change  
• Timeline  
• Way of working  
• Functionality  
• Obstacles  
• Information flows  
• Power relations  
• Significant positions of actors  
• Historic influences  
• Capacities  
• Attitudes |
| 6. Cooperation between agricultural actors and environmental NGOs | • Change  
• Timeline  
• Way of working  
• Functionality  
• Obstacles  
• Information flows  
• Power relations  
• Significant positions of actors  
• Historic influences  
• Capacities  
• Attitudes |
Schernewski et al. (2005). According to IKSO (2005), the quality goals for the coastal areas of the Odra RBD cannot be fulfilled owing to upstream nutrient charges. Thus, nutrient discharge is one of the crucial challenges for water management. Significant discharges of phosphorous and nitrogen arise from diffuse sources (see Figure 3).

Agriculture is the main water user in the German part of the Odra catchment area (522,300 ha, 2,102 farms, 12,200 employees) and overall diffuse nutrient input (fertiliser input) arises primarily from agricultural production and annual nutrient surplus on farmland (Behrendt et al., 2001; IKSO, 2005), for example, via drainage (see Figure 4). Most farmers are organised under agricultural associations (DBV, 2009). In addition, more than 30 national and international environmental NGOs are active in the area (e.g. WWF, NABU, BUND, Grüne Liga).

In May 2009, the administrations of MV and Bbg were two-tiered, with a ministry for agriculture, environment and consumer protection and subordinate environmental authorities at county and independent city level. The State-level agricultural administrations were integrated with their
environmental counterparts (water administration) into one entity\(^4\). On the subordinate agency level, administrations were kept separate (Solf, 2006).

Two administrative bodies already had interlinked management before the adoption of the WFD. The main international body is the International Commission for Protection of the Oder against Pollution (ICPO). The ICPO member countries, Germany, Poland and the Czech Republic, are represented by respective experts in their administrations. German experts are mainly from the states. Poland and the Czech Republic are unitary and dispatch delegates from their central government. Within Germany, states cooperate within the LAWA on issues that address all German states.

\(^4\) The separation of agricultural and environmental administration in Bbg took place on November 6, 2009. This paper states the conditions in May 2009.
5. Results

Figure 5 presents an overview of all formal institutions and inter-linkages between actors that arose from the WFD implementation with regard to management of diffuse pollution from agriculture. Based on this map, the focus is on (i) formal institutional change, (ii) informal institutional change in water management collaboration of the three actor groups (water administration, agricultural sector, environmental NGOs), and (iii) changes in mental models.

5.1. Water administration

The national implementation of the WFD required adjustments in the laws. In Germany, the WHG transposes the WFD into federal law and identifies the RBDs, including all water bodies and the coastal zone. States such as MV and Bbg issued their own water laws. The new legal framework5 includes the obligations of the water administration (management plan, programme of measures). The implementation of these new formal rules required changes in the interfaces of the actors. In this section we describe institutional change regarding collaboration between different tiers of the water administration between and within the two states and between Germany and Poland. The creation of the plans and programmes is a responsibility of the ministerial level while lower levels implement measures. Subject-related cooperation is undertaken in the ICPO and the LAWA. The reason for this is that it is easier to reconstruct existing administrative structures than to found new ones (E5, E86). Furthermore, formal participation of concerned parties takes place within a range of newly set up bodies. Moreover, an online information platform ‘WasserBLIcK’ was created to make data accessible to the public and administrations. Data collection in Germany and exchange with the EU is organised through this instrument, which neighbouring countries have access to as well (E2, E3). In Table 3 we summarise all the observed changes in collaboration.

5.1.1. Formal institutional change. The ICPO was significantly developed and adjusted to the WFD. Its Steering Group coordinates the WFD implementation (timetable and working groups) (E1, E7). Even though the basic administrative structures in Germany have not changed, the workloads of the water administration have increased and tasks have altered (E2, E5). New procedures are needed to fulfil the new obligations and standards (E2, E3, E8). The implementation of the WFD is carried out within specifically formed working groups of the LAWA.

Mutual visits between representatives of states have intensified (E3). The lower water administration is not involved in the planning of measures but is kept informed, as it will need to implement them (E2, E3). Furthermore, all administrations are involved in participation (E2, E3). In Brandenburg, a working group of agencies secures participation from all public sector entities at federal as well as at State-level. For the purpose of intra-State participation, three regional water forums have been founded, which include all involved administrative entities, in addition

5 §§ 1 Abs. 1; 2 Abs. 1, 3; 106; 110; 130 Abs. 3; 130a LWaG MV (State law Mecklenburg-Vorpommern) and §§ 2 Abs. 2; 2a; 24 Abs. 1; 25 Abs. 1; 103 Abs. 1, 124 Abs. 1, 2; 125 BbgWG (State law Brandenburg).

6 The interviews are cited using E1–E10. The assignment to the single interviews is presented in Table 1.
to all other stakeholders (E2). Reorganisation in MV has worked out in a similar fashion. All public authorities participate alongside other stakeholders in newly set up working groups (E3).

Changes were explained by seeing WFD implementation as a mission of the public administration (E1, E5, E6) and EU monitoring and enforcement (E1, E3, E6). Interviewees reported that the workload of the administration has increased due to more topics, greater complexity of issues (E5), lack of time (E3), information overload (E2, E3) and insufficient staff (E2). Furthermore, the same tasks were carried out many times in different states because of the federal structures (E3).

5.1.2. Informal institutional change. The described formal institutional change brought about some changes in informal modes of collaboration between administrations and stakeholders. Good collaboration and a constructive working atmosphere became more important in the ICPO (E1, E7). The level of collaboration, however, still seems to vary, as illustrated by the example of Poland and Germany. Difficulties in administrative collaboration with Poland have been reported owing to the centralistic character of the Polish state and changing contact persons and leading staff (E1, E2, E4). Among the states, informal cooperation of state agencies has intensified and the number of contacts has increased.

Table 3. New cooperation rules: water administration Mecklenburg-Vorpommern (MV) and Brandenburg (Bbg).

<table>
<thead>
<tr>
<th>INTL cooperation: ICPO</th>
<th>Mode</th>
<th>Changes</th>
<th>Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Convention</td>
<td></td>
<td>Transfer of international cooperation activity to the ICPO, transfer of competencies</td>
<td>Formal</td>
</tr>
<tr>
<td>2. Restructuring: new cooperation rules</td>
<td>‘Subject related’</td>
<td>Steering Group G1 coordinating WFD responsibilities: e.g. timetable for elaboration of RBM plan, strategies for public information, assignment of duties to other working groups. (Art. 10 Rules of Procedure of the ICPO)</td>
<td>Formal</td>
</tr>
<tr>
<td>3. New attitudes in collaboration</td>
<td></td>
<td>ICPO: changed treatment of environmental NGOs Between countries: better information exchange</td>
<td>Informal</td>
</tr>
</tbody>
</table>

National cooperation:
Federal states
1. Processing rules | ‘Subject related’ | New administrative processes | Informal |
2. Mechanisms of cooperation | ‘Subject related’ | Contacts between the administrations more frequent, working visits increasing etc., arrangements within FFG Elbe | Informal |
3. Transfer of cooperation | | Federal collaboration regarding WFD implementations takes place within LAWA | Formal |
4. Coordination within the ICPO | | German members of the ICPO meet before official referendum and enter into agreement for the German part | Informal |

Regional cooperation MV
1. Alliance ‘Environment and Agriculture’ | ‘Subject related’ | Participation of water administrations | Formal |
2. Extended working groups | | Possibility of participation for administration concerned | Informal |

Regional cooperation Bbg
1. Regional water panels | Participatory | Possible inclusion of all administrations concerned | Formal |
2. Working group of the agencies | Participatory | Inclusion of federal and state agencies | Formal |

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(E2, E3, E8) as an outcome of additional working groups within the LAWA. Furthermore, certain issues are informally coordinated within the RB Association Elbe (FFG Elbe)\(^7\) (E2, E3). Also, the intensity of intra-state water agency collaboration at different levels has improved (E2, E3) as working groups are well attended by all administrations (E2, E3).

5.1.3. Changes in mental models. We interpret several comments by interviewees as evidence that mental models have changed. Basically, the water administration identifies with the WFD as a ‘unifying project’ (E1, E3, E5, E6). Interviewees confirmed that their perspective on water management has also changed. The river in its entirety is increasingly viewed for purposes of integrated management (E3, E4, E6).

On the transnational level, problem solving approaches differ significantly between Germany and Poland (E2, E7). Similarly, within Germany, states insist on their own approaches (E6). Such differences could be of specific relevance to nutrient loads. Furthermore, the awareness of the interdependence between the coastal zones and inland nutrient input is much stronger in coastal Mecklenburg than in the interior Bbg (E2, E3, E4). Interviewees from MV stressed that this interconnection was always addressed by the administration, not least because of the requirements of the Helsinki Commission (HELCOM) and the Baltic Sea Action Plan (E3). In Bbg, awareness of the corresponding issues seems to be much lower. Its administration did not consider quality requirements set out in the Action Plan in its first management plan in 2009 and may only consider them in the second or even third RBM plan (E2).

5.2. Agricultural sector

The WFD requires new objectives to be achieved in water management\(^8\), which were adopted in Bbg and MV\(^9\). Achievement of ‘good ecological and chemical status’ in the Odra demands a reduction in nutrient input from agriculture (E1, E3, E6, E7). In the following section we will focus on the way that the agricultural sector engages with the water sectors. We considered (i) the agriculture administration (State ministries for agriculture, agencies, lower authorities), (ii) farmer associations (lobby groups), and (iii) individual farmers. Owing to WFD implementation, the agricultural sector has been affected by several institutional changes in water management collaboration, presented in Table 4.

5.2.1. Formal institutional change. States need to establish management plans that also address diffuse water pollution. These formal rules influence interaction between agricultural actors and the water administration. In MV, an ‘Alliance Environment and Agriculture’ was founded to improve cooperation between actor groups. One working group of the alliance is specifically dedicated to diffuse nutrient inputs from agriculture. It coordinates the reduction of inputs with respect to problem areas and

\(^7\) For better coordination of the WFD implementation some states that share a basin even founded new bodies for collaboration through administrative agreements, e.g. the River Basin Community Elbe (FFG Elbe). German abutters of the Odra River did not sign a separate administrative agreement for the Odra RB, but they are all members of the FFG Elbe.

\(^8\) On the federal level they were declared by the following formal rules: §§ 25a Abs. 1–3, 25b Abs. 2–3, 33a Abs. 1–3 WHG. § 36 b Abs. 2 WHG.

\(^9\) §§ 1 Abs.1, 24 Abs. 2, 25 Abs. 1, § 26 BbgWG and §§ 130a Abs. 1, 130a, § 130b, 130c LWaG MV.
necesary measures. Its members are the concerned agencies, an agricultural consultancy, the federal state institute for agriculture and fisheries, and farmer and nature conservation associations. All stakeholders additionally participate in newly founded working groups (E3).

In Bbg, collaboration is organised in the working group ‘Agriculture’ with representatives from the LUA (Landesumweltamt; the State Agency for the Environment) and the LVLF\(^{10}\) working on diffuse nutrient input and determining problem areas, measures and their efficiency. This type of collaboration is to facilitate the integration of management plans and agricultural subsidy programmes, which have been described as entirely new (E2, E5). On the participatory level, the whole agricultural sector is represented in three regional ‘panels’. Moreover, all administrations involved at the federal as well as the individual state level, have the possibility to attend the working group of the agencies (E2).

The cooperation focuses on the integration of the Common Agricultural Policy (CAP)\(^{11}\) and programmes as well as measures (E2, E3). This will provide leverage to the administration because the agricultural sector is highly dependent on subsidies (E4). Therefore it has been acknowledged as important that farmers as well as environmental NGOs accept the respective measures (E3). A stricter regulatory law has been considered unlikely (E4, E5). Enhanced cooperation with the agricultural sector is seen as the only possibility for fulfilling the requirements of the WFD (E2, E3, E7). Some of the problems faced are the complex network of actors in charge that require intense communication and the funding of measures that require changes in farmers’ behaviour (E5).

\(^{10}\) Landesamt für Verbrackerschutz, Landwirtschaft und Flurneuordnung Brandenburg.

\(^{11}\) CAP is Europe’s agricultural policy, including a system of subsidies and programmes. http://ec.europa.eu/agriculture/capexplained/index_en.htm
5.2.2. *Informal institutional change*. As a result of the WFD implementation and new consultative and participatory bodies, some modes of informal collaboration between agricultural and water administrations are noted. In MV, contacts between the different agencies already exist and have intensified (E3). In addition, agricultural associations now play a more significant role in the working groups on water, and farmer associations have been attending the working groups regularly (E3, E4).

In Bbg, the collaboration of the expert agencies is new. Discussions have been depicted as constructive (E2). Agricultural actors are represented within regional panels and could arrange individual meetings with the administration (E2). Nevertheless, significant change in collaboration has thus far not been observed (E10). Despite inter-sectoral collaboration, consultative and participatory bodies’ agreement on targets and ways to reduce nutrient inputs have not been achieved. However, interviewees from various sectors agree that this could be possible in the future (E3, E9). The costs of measures in relation to the expectation of insufficient benefits are an important barrier to the active involvement of agricultural actors (E2, E3, E6, E7, E10).

5.2.3. *Changes in mental models*. The agricultural sector has meanwhile accepted that the Odra is to be managed at the scale of the entire basin and awareness of the WFD among farmers seems to be high (E3). Still, obstacles to collaboration, such as misunderstandings emerging from different professional backgrounds and associated mental models (E3), as well as the fact that the agricultural administration acts as the representative of farmers (E3, E7), have been identified.

However, we found differences in the perceptions of the interrelationship between the quality of coastal waters and farming inland. This is well accepted in MV while much less so in Bbg (E3, E10). In contrast, all administrators interviewed share the idea that diffuse nutrient pollution is among the principal problems the WFD needs to address and the important role of agriculture is understood (E2, E3, E5, E9). Nevertheless there are differences in the perception of the gravity of nutrient inputs due to doubts about the methods of modelling the influences, which are viewed as too academic and complicated (E5, E9). While farmer associations in both states agree that a solution must be found, they stress that society should compensate them (E9, E10). They argue that agriculture provides food for society and that they should not be the only ones liable for negative externalities (E9, E10).

5.3. *Environmental NGOs*

Environmental NGOs have, for a long time, requested a reduction in nutrient inputs from agriculture for the benefit of coastal waters. They represent a particular downstream interest in the improvement of water quality in the lagoon and appreciate water management within hydrological boundaries. The WFD led to institutional change concerning the role and participation of environmental NGOs. Germany and the states introduced participative measures in their water laws\textsuperscript{12}. The multitude of environmental NGOs relevant in the case study area act at all political levels. Institutional changes concerning the

\textsuperscript{12} § 36b Abs. 2 WHG, § 130b LWaG MV, § 26 BbgWG.
collaboration of NGOs in water management have been summarised in Table 5. They have clearly gained in importance.

5.3.1. Formal institutional change. Even before the introduction of the WFD, environmental NGOs had the right to file complaints with the European Commission in cases where Member State authorities did not comply with European legislation. Furthermore, they have obtained a seat as observers in the ICPO. Over time and throughout the WFD implementation, their influence has grown (E2, E7). In MV they participate in the working groups and in the ‘Alliance’ (E3). In Bbg they participate in the regional water forums (E2).

5.3.2. Informal institutional change. Formal institutional changes have led to changes in informal institutions such as the emergence of new networks of collaboration (E4). For example, representatives within the ICPO reported that Czech and Polish administrations initially had to get used to environmental NGOs in the international committees. Gradually, as civil servants in these committees changed, environmental NGOs were also taken more seriously, not least as a result of the WFD. Pressure on the implementing authorities increased and nature protection associations sometimes supported monitoring effectively (E7). At the national and sub-national levels, environmental NGOs also have an enhanced, indirect role in the emerging networks of exchange on water management issues (E7), indicating increasing acceptance of environmental NGOs at this level as well. Today, they participate in meetings on the implementation of the WFD regularly. Nonetheless, voluntary local environmental associations, particularly, have difficulties participating because they lack time and human resources (E5, E7).

6. Discussion and conclusion

Our discussion is structured based on the above-cited WFD principles for coordination within the RB, which we applied to our case of diffuse pollution from agriculture: (1) coordination within the water administration, (2) consultation with the agricultural sector, and (3) environmental NGO participation. We will illustrate generalisations as well as unexpected results and relate them to other findings, and give some theoretical and practical implications and short conclusions.
6.1. Coordination within the water administration

Our results show that owing to the threat of legal and financial sanctions that back any European legislation, changes in water management were inevitable. However, changes need to be understood against the backdrop of the federal structure of Germany, which implies the impossibility of changing the spatial scale of water management authorities to follow hydrographic boundaries. Changes are marked by a great degree of path dependence because of insurmountable political transition costs to change territorially based water administrations. Hence, owing to functional and spatial inter-linkages that must be addressed in planning and coordinating measures, existing institutions have been complemented by new institutions (also see Fichtner, 2003) to secure the much needed cross-sectoral, cross-level and cross-boundary collaboration. Thus, in a federal state, it seems to be cheaper from a transaction cost perspective, to establish rules for continuous collaboration rather than relying on ad hoc initiatives.

Our findings may at first sight contradict Louka (2008: 124), who stated that the ease and extent with which a directive is adopted ‘...depends on the ‘institutional fit’ between the prescriptions of the directive and the institutional structure that is already in place...’. For the German federal case, although misfit with RBM is obvious, RBPs were successfully concluded on time with collaboration structures in place. But structures still seem to go together with increasing workloads and great complexity. Thus, misfits re-emerged throughout the phase of operating the German coordination structure. Attempts have been made to lower the high coordination costs, for example through the internet platform ‘WasserBLICK’. However, we found that further improvements are necessary, not least against the backdrop of administrators’ complaints regarding coordination overload. Also, we argue that there are greater limits to optimising water management in a federal structure that cannot be overcome owing to transaction costs of coordination for pooled resources, which are usually administered more cheaply in a hierarchical fashion. Given the lack of an institutionally fixed decision making structure between states, we argue that collaboration among the water administrations of different states does not go beyond coordination of separately developed programmes. On the other hand, within the water administrations of the states, collaboration leads to jointly legitimised programmes because of mutual dependence and the overarching decision making structures of the State governments.

Similarly, on the transnational level, states’ actors perceive mutual benefit from collaboration in the ICPO, facilitated by easily accessible information and increasing network building, both of which lower transaction costs and enhance common understanding. Some difficulties in the administrative cooperation with Poland (owing to different political structures) emerge because German state actors have to deal with Polish national state actors. They can be explained by the transaction costs of finding the right negotiation partner (cf. Dombrowsky, 2007). We interpret them as institutional roadblocks (cf. Louka, 2008). In the end, the effects of the overall WFD implementation process could not overcome many substantial institutional misfits among European Member States. Great degrees of path dependence and high transition costs, as well as differences in historical and cultural background associated with mental models, provide an explanation (cf. Galaz, 2005). Thus, we would argue that between the member states, coordination easily results in solutions that correspond to the lowest common denominator. Owing to the constellation of sovereign states, collaboration on RB plans often does not go beyond open-ended exchange.

At the level of the individual our case emphasises that institutional change, as the outcome of the WFD, changed mental models of water managers but did not create one overarching common mental
model concerning spatial interrelations of water management. Unexpectedly, overall basin management was generally accepted although actors consider the specificities of spatial and functional interdependence predominantly from the perspective of the impacts on their jurisdiction. Accordingly, water managers in coastal MV clearly identify diffuse pollution from agriculture as a problem for the coast, whereas in inland Bbg this interdependence is considered of much less importance because, we presume, it does not carry the costs of diffuse pollution. Thus, appreciations of the effects on coastal waters depend on the distance of actors to the coast (see also de Jonge et al., 2006).

To sum up, we stress that within a federal state, adaptation to RBM is possible if there are sufficient incentives for change. Nevertheless, this goes hand in hand with great coordination requirements and associated transaction costs. In this regard, we need to emphasise that Germany is a country that is relatively well-prepared for complex administrative procedures. In contrast, where administrative capacities are lower or where resource management requires even more complex cross-scale and cross-sectoral inter-linkages, such models that rely on voluntary collaboration may be doomed to fail (cf. Kerr, 2007). Moreover, this question needs to be revisited regarding such outcomes as improvement of substantive water quality standards. Currently, German states are in the process of implementing concrete measures in this regard. We argue that this will entail even greater challenges for coordination and collaboration. Success will need to be cross-evaluated with other cases in Europe. For example, in Spain plans have been greatly delayed despite the existence of strong RB authorities.

6.2. Consultation with the agricultural sector

Our findings indicate that in federal Germany, institutional improvement in basin-wide, cross-sectoral collaboration was seen as being unavoidable in order to address the problem of diffuse pollution. The likelihood of top-down sanctions is further heightened by monitoring programmes and use of the complaint procedure by environmental NGOs. In consequence, attempts have been made to bridge the misfits that Moss (2003) observed and we see the beginning of an enhanced ‘inter-organisational (and inter-sectoral) collaboration’ as also acknowledged by Ferreyra et al. (2008) and Fish et al. (2010). The development of policy platforms has advanced significantly (cf. Fish et al., 2010).

Both the collaboration between agriculture and water administration and the introduction of several forums were primarily initiated to avoid the political and financial costs of non-implementation and save the transaction costs of cooperation. Nevertheless, similar to Louka (2008), we observed the limiting key factors as being ‘administrative and political capacity’. In the federal system, transaction costs, especially communication costs, are increasing through complex decision structures. Bargaining as opposition is often created by the different perspectives, which again result in elevated transaction costs. Further, we would argue that in the context of interdependence of water management and agriculture across state boundaries, better results could be achieved if problematic inter-organisational collaboration above the level of states was improved. Thus, we remain sceptical that institutions that are in place for collaboration will be sufficient to overcome the problem of diffuse pollution.

Nevertheless, the attitudes of farmers and their associations do seem to change gradually. The reasons for this are general societal complaints about the influence of diffuse nutrient input, the desire to save money and to use nutrients as efficiently as possible and the expectation of compensation in return for less nutrient use. Farmers are included in participatory bodies to improve the basis of information, acceptance and to reduce the transaction costs of implementing measures that require collaboration. Among other things, farmers participate to obtain information about possible support. Realistically,
we have to assume that greater financial incentives will be necessary to change behaviour. Similar to our study, Kastens & Newig (2007) found that agricultural stakeholders are increasingly aware of their responsibility. Yet their historical role in food security plays an important role in their attitudes.

We conclude that differences in mental models between the farming sector and the water administration will persist. To illustrate this, we quote what a representative of the water administration stated: ‘They are always telling us: “We all want to eat something” and we answer: “We all want to drink something”.’ However, regarding observations by Moss (2003) on misfits in terms of the coordination of different resource systems, we can summarise that inter-organisational collaboration for the joint development of plans and measures has been achieved at state level but is quite difficult although desperately needed. It is questionable if this type of collaboration will be able to redress diffuse pollution effectively at the level of the overall basin, where the institutional structure shows limited potential for collaboration beyond coordination. Instead a top-down approach may be necessary.

6.3. Participation of environmental NGOs

Similar to the starting point of our study, Kastens & Newig (2007) found that success in WFD implementation will depend upon representation of different sectors, including environmental NGOs (see also Borowski et al., 2008). Moss (2003, 2004) argues that these public participation requirements had previously not been followed sufficiently.

In Kastens & Newig (2007), as well as in our case, the involvement of actors is improving and mutual appreciation seems to emerge as an outcome of formal requirements for collaboration. Regarding the role of participatory processes, we can confirm the findings of Mostert et al. (2007): actors view them as a way to improve understanding of and support for RBM and to enhance trust and relations among stakeholders (cf. Blackstock & Richards, 2007). The administration aimed for greater inclusion of environmental NGOs in order to fulfil the requirements of the WFD but also to exploit NGOs as a valuable source of information and useful counterpart to the agricultural sector. Furthermore, policy is supposed to gain greater legitimacy in this way. Similarly, NGOs reduce transaction costs such as monitoring and information costs for the European Commission.

NGOs are interested in better access to participation, in order to facilitate their role. Nevertheless, they are often overburdened with resource and knowledge requirements. Furthermore, NGOs are only consulted and their intervention can easily be turned down as they have no voting right on RB plans or measures. Thus, in agreement with Özerol & Newig (2008), we cannot speak of environmental NGOs’ participation on an equal footing with other actors or users. We conclude that similar to the phenomenon occurring within the administration, the federal structure of Germany multiplies forums for participation, making meaningful participation more difficult. From an institutional perspective, the problem is that the NGOs have no formal vote in RB planning, which provides little incentive for the administration to collaborate beyond open exchange.

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