TOPIC 1/Paper 3

Local-Regional Governance Approaches for more Effective TBA Management

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Abstract

Worldwide countries face challenges to restore and preserve water resources in accordance with UN Sustainable Development Goal (SDG) 6. These challenges relate to the ecological, hydrological and hydrogeological domain, societal and policy context, and the role of legal frameworks. Transboundary aquifers (TBAs) and dependent ecosystems present yet another challenge in attaining SDG 6 due to issues related to a lack of coherence of legal and policy frameworks between neighbouring countries.

In Europe, the Water Framework Directive (WFD, 2000/60/EC) offers an overarching framework to secure Europe's waters for future generations. As it uses a river basin approach, it holds a strong potential for effective transboundary management. The requirements set in the WFD regarding international cooperation show a strong resemblance to the target set for transboundary water management in SDG 6.

Although the European Commission flagged the WFD as effective in terms of cooperation (2019), water quality improvement seems to have been impeded to date. The studies conducted so far often focus on effectiveness at the scale of river basins. Here, we have studied how governance approaches at the local-regional level support the attainment of water quality ambitions, using scientific literature and empirical material on water quality governance approaches in the Netherlands.

Because of the hydrogeological nature of the Netherlands, substantial parts of the country's aquifers are transboundary. Several of the cases studied are directly influenced by transboundary challenges. In general, our analysis identifies five areas for improvement of water quality governance approaches that are relevant and should be considered in the context of transboundary aquifers.

These areas for improvement affect policy responses to drivers, pressures and the state of river basins and related aquifers. This means that the linkages between governance approaches, water system characteristics and the driving forces from other sectors that lead to water quality improvement are much more complex than described in the literature so far and require a joint approach from different sectors and knowledge domains, e.g. hydrology, ecology, law, sociology and economy.

Keywords: governance conditions; connectivity; social-legal ecology.

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Introduction

What is needed to restore and preserve healthy and sustainable freshwater transboundary aquifers (TBAs) and related ecosystems in accordance with UN SDG 6 (UN 2018)? Overexploitation of groundwater aquifers and pollution caused by industry and land use are the main areas of concern regarding these ambitions.

With 468 transboundary aquifers identified worldwide, countries on all continents face the challenge of meeting this objective in the transboundary context (IGRAC 2021, Sindico 2016). Integrated Water Resources Management (IWRM) could be considered as the means to do so, as IWRM calls for integration between water resources management and the management of other environmental and social-economic activities that may have an impact on water resources.

In its report on the progress made on SDG 6, the UN noted the complexity of the implementation of IWRM, with limited progress so far and great variations between countries regardless of their economic status (UN 2018). Moreover, it remains unclear what conditions IWRM needs to meet to contribute to water quality improvement. In this paper, we aim to contribute to this knowledge gap by analysing governance approaches at the local-regional level in the Netherlands (Europe) and possible implications for the transboundary context. Governance conditions cover both technical, legal and social-economic aspects, e.g. understanding of the water system, stakeholder involvement and trade-offs, institutional settings and legal frameworks (Wuijts, 2020).

European context

In the European context, the challenges to achieving SDG 6 can be identified in 226 transboundary 'groundwater bodies' (IGRAC and UNESCO-IHP 2015). A groundwater body is defined as a distinct volume of groundwater within an aquifer or aquifers under the EU Water Framework Directive (2000/60/EC, WFD, Article 2).

The WFD and related Directives, such as the Groundwater Directive (2006/118/EC), the Nitrates Directive (91/676/EEC) and the Habitat Directive (92/43/EEC), offer an overarching framework to secure Europe's waters for future generations. The WFD's objectives could be regarded as an obligation of results (see e.g. ECJ C-559/19). As it uses a river basin approach, it holds a strong potential for effective transboundary management in line with SDG 6.

With the WFD, Europe has also introduced governance as a means to attain WFD objectives. Governance approaches, with the involvement of multiple actors at multiple levels, are often considered more effective in dealing with complex water quality challenges than conventional legal frameworks with top-down central steering mechanisms (Howarth 2017). Governance approaches could be considered a follow up to IWRM, including the process of setting objectives (Wuijts, 2020).

The WFD has been effective in encouraging cooperation and setting up governance approaches (EC 2019), yet the achievement of its objectives has been significantly delayed. Good chemical status has been reported for only 74% of the EU's groundwater bodies and 40% of surface water bodies (EC, 2019). Several

Member States report significant problems with the quantitative status of groundwater bodies due to overexploitation.

Water quality management in the Netherlands

The challenges to achieving WFD ambitions also manifest themselves in the Netherlands. Half of all drinking water resources and 40 to 70% of regional surface waters are at risk of not meeting WFD objectives by 2027 (Van Gaalen, Osté and Van Boekel 2020), due to agricultural and industrial pressures on surface water and groundwater.

The country encompasses the delta of four international river basins: Meuse, Scheldt, Rhine and Ems. The groundwater bodies in this region are part of transboundary aquifers. For drinking water resources, smaller, transboundary catchment areas have been identified (Figure 1). These catchments also have groundwater interactions with smaller regional brooks.

Figure 1.
Groundwater bodies and drinking water resources in the Netherlands

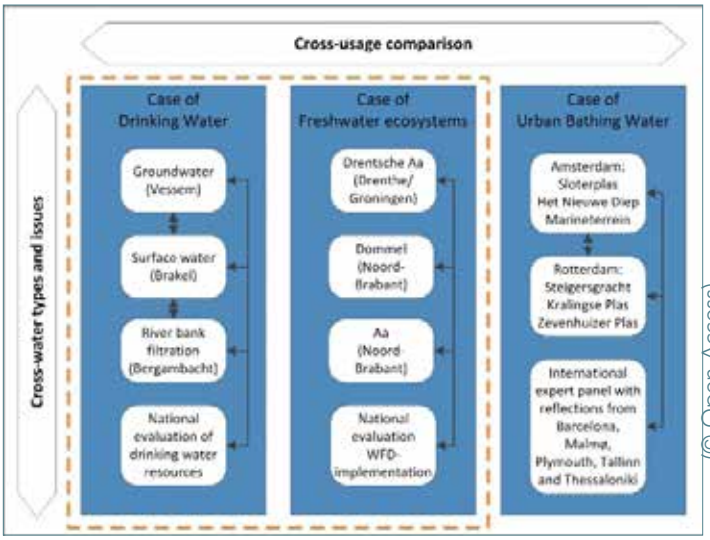
Methods

For this study, a systematic literature review was carried out regarding the effectiveness of governance approaches. The results were used to identify knowledge gaps and to develop the focal points of the empirical research.

The cases focused on different water usages (drinking water, freshwater ecology and bathing water), but all under the regulatory framework of the WFD. Cases comprised both surface water bodies and groundwater bodies, 6 of which encompass transboundary aspects (Figure 2) (Wuijts 2020).

Cases were studied by means of interviews, water quality data and both scientific and grey literature, and the research results were reflected on in the national and international context. To avoid any bias in the results caused by differences in the mode of implementation, the empirical research was restricted to the Netherlands.

Figure 2.
Case study design (Wuijts 2020). In orange: cases presented in this paper



Results

Literature review

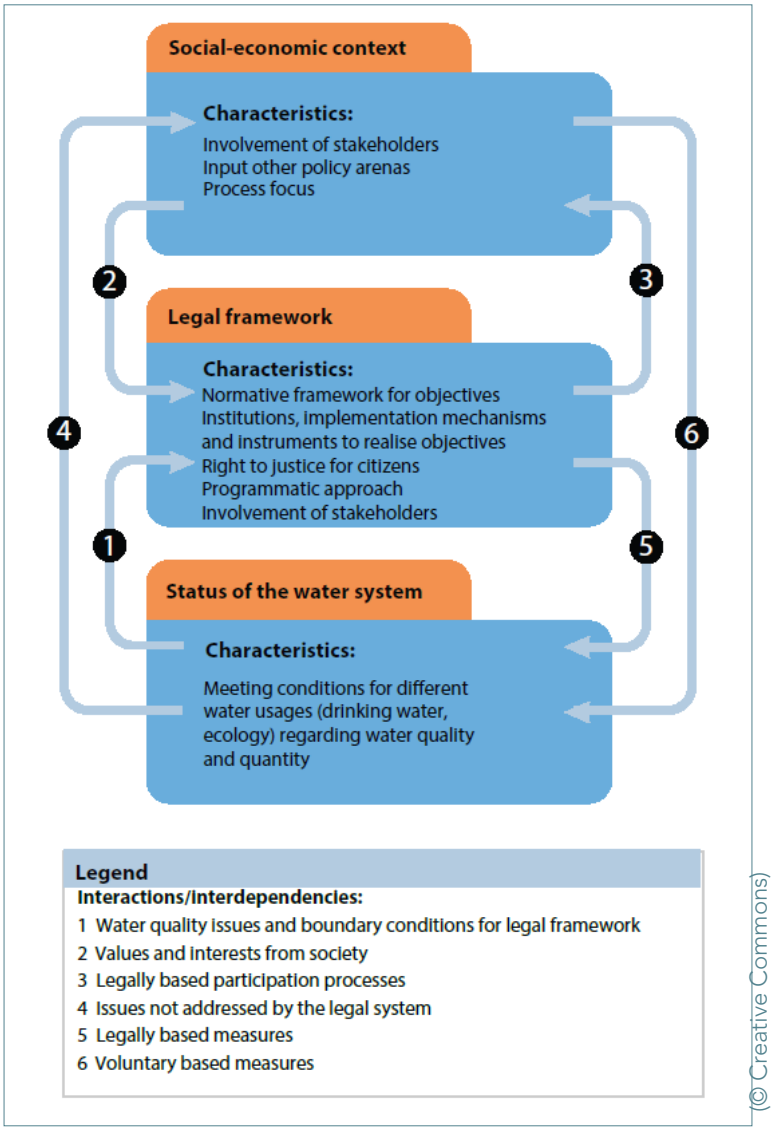
The literature review showed that perspectives on effectiveness may differ between scholars from the social-economic, legal and ecological-hydrogeological knowledge domains (Wuijts, Driessen and Van Rijswick 2018). These differences and the interdependencies between knowledge domains should be considered in a governance approach (Figure 3).

Examples from the Netherlands showed that the absence of input from the social-economic context and legal framework, can result in the stagnation of water quality improvement. For instance, if other, conflicting priorities are set in the societal debate, such as regarding the use of pesticides in agricultural practices, this may influence the achievement of water quality ambitions. In practice, this information on possible trade-offs for water quality ambitions is often not included in decision-making.

Research to date has often been set up from a specific knowledge domain, with the exception of the field of social-ecology. However, the role of the legal domain and its interactions with other knowledge domains should also be considered, for instance in terms of the identification of pressures on water quality, the complex groundwater response, and how to anchor them in legal frameworks.

The literature review also revealed that the scientific debate focuses on policy preparation and design, but much less on implementation. This could explain the weak understanding of how governance approaches are linked to water quality improvement and what could be done to increase effectiveness of governance approaches.

Figure 3.
Perspectives on effectiveness and the interactions between knowledge domains (Wuijts et al., 2018)



Case studies

The cases studied show that the interlinkages between governance approaches and water quality improvement are much more complex than has been described in the scientific literature.

The case of drinking water resources showed that governance approaches are often not designed with the characteristics of the water system and drivers of water quality in mind, but rather follow existing relationships and structures. This means that parties that have to act on drinking water objectives may not be aware of or feel the need to do so. This is especially the case for emerging contaminants not yet covered by legal standards.

In the transboundary context, protection zones are often delineated by national borders rather than hydrogeological zones. Recent initiatives to overcome this gap were often incident-driven, e.g. based on the risks for groundwater quality posed by the development of underground storage of chemical and nuclear waste and illegal manure dumps. In these cases, the incidents prompted the actors involved to meet and discuss strategies to reduce current and future risks.

The case of freshwater ecosystems showed that healthy freshwater ecosystems have hydrological, morphological and physical-chemical needs, each of which require specific governance conditions. For instance, it is possible to adopt policies at a more local level to address the groundwater dependency of an ecosystem, but upstream spills need to be addressed in a river basin context and require cooperation with other authorities within other policy and regulatory frameworks. This means that objectives need to be specific enough to identify the governance conditions needed and need to include the institutional settings of the diverse governance levels of the countries involved.

Discussion and conclusions

The complex relationship between governance and water quality improvement may explain the challenges experienced in policy practice. Choices made in the governance approach (who to involve and at what level, availability and use of instruments, measures, and monitoring) influence the water quality improvement that can be achieved. In the transboundary context, this plays an even stronger role, since it has been found that countries apply different modes of implementation (Voulvoulis, Arpon and Giakoumis 2017).

Governance conditions needed to improve water quality include engaging actors at relevant hydrological scales and at the appropriate level and creating connectivity between the different institutional levels involved. Local authorities should be able to list issues that cannot be resolved at the local level (e.g. emerging contaminants) and have them aligned to policy development on these issues at national and transboundary level, especially in countries with a high level of decentralisation (principle of subsidiarity), in addition to the subsidiarity principle that is leading in EU environmental law.

Furthermore, objectives may create different demands for governance conditions, e.g. regarding the scale, the actors to be involved at the various levels and the coherence and consistency of the legal and policy frameworks in place. This may require opening up governance approaches beyond the jurisdiction of water

authorities but could contribute substantially to achieving WFD objectives. Further guidance, also on a European level, could support this development.

As the achievement of water quality ambitions takes place in the context of other social and economic activities, tailored information on the value of water to society and its vulnerability should be brought into the societal debate more explicitly at different levels and scales to get sufficient societal commitment and adapt policy interventions in response to monitoring of results.

Discussions on transitions in agriculture, SDGs, urban and industrial development should be fed with this information on water quality, its challenges, and its usages. This is necessary not only to prevent deterioration, but also to set shared objectives and to achieve co-benefits.

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