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Analysing water governance in heterogeneous case studies—Experiences with a database approach

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ARTICLE INFO

Published on line 28 October 2010

Keywords:
Adaptive and integrated water resources management
Governance regimes
Databases
Comparative analysis
Management and Transition Framework

ABSTRACT

Many resource management problems arise from failures of governance. A better understanding of governance regimes is therefore essential for a sustainable management of natural resources. This paper presents an approach that aims to gain insights into water governance regimes by combining a shared language for comparative analyses of case studies from different social and environmental contexts with relational databases. The shared language utilised is the "Management and Transition Framework" (MTF), a conceptual framework that allows comprehensive analyses of water management. The MTF was turned into an operational tool through the usage of a relational database, which facilitates the storage of large amounts of data and provides the possibility for structured analyses. Explorative analyses were performed for two case studies in order to exemplify the potential of the approach for the examination of vertical integration in flood management.

So far experiences let us conclude that the presented approach increases the comparability of heterogeneous case studies and facilitates systematic analyses. This is a prerequisite for the derivation of general insights into the effects of different types of governance regimes on the performance of water management. More cases need to be recorded in the future to ensure a sound statistical base for robust analyses.

1. Introduction

Water is vital for all life on Earth. Human well-being and human development directly depend on water of good quality and sufficient quantity. The sustainable management of water resources is therefore one of the central tasks in the 21st century (UNFPA, 2003; UNEP, 2007; Bates et al., 2008). Climate change, overexploitation and pollution of water resources influence the state of the water environment. Human well-being and ecosystem health are seriously affected in many places worldwide. A lot of these problems require cooperation across sectors as well as across local, regional and national levels. In response to nowadays challenges, water management has become increasingly complex. The traditional hierarchical and technocratic focus of water management has shifted towards iterative and integrated management practices, endorsed by the concepts of integrated water resources management and adaptive water management (GWP TEC, 2000; Pahl-Wostl, 2007). Approaches of public participation and cross-sectoral collaboration have complemented traditional management practices in order to increase the legitimacy and effectiveness of policy implementation (Knill and Lenschow, 2000; Huitema and Becker, 2005; Engle and Lemos, 2010). Adaptive measures that perform well under varying conditions and can be adjusted in time are considered to meet the challenges posed by increasing uncertainties such

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1462-9011/$ – see front matter
doi:10.1016/j.envsci.2010.09.002

as changing precipitation patterns resulting from climate change (e.g., Kabat et al., 2003; Pahl-Wostl, 2007). As a consequence, water management no longer only deals with complex ecological and technological systems; but water management itself has become a complex system characterised by a diversity of socio-ecological, economic and technical elements. One factor that considerably influences the performance of water management is its underlying governance regime. A governance regime as understood here characterises the way how various state- and non-state actors interact horizontally across spatial borders as well as vertically across administrative scales and how these interactions are regulated by formal and informal institutions. Many resource management problems result from failures of governance (Folke et al., 2005; Pahl-Wostl, 2009). Examples for such failures are corruption, over-regulation or sectoral fragmentation, which reduce the effectiveness of water management. In spite of its strong relevance, little is known about the relationship between governance regime properties, such as vertical integration or the degree of centralisation and their effects on the performance of water management.

Water governance regimes are highly diverse across geographical, cultural and political areas. The accordant variety of social contexts is reflected in particular regulatory frameworks, cultural norms, actor constellations and distributions of power. This high level of diversity constitutes challenges for deriving general insights. Numerous case studies have been conducted in the field of water management (see for example Brebbia and Antunes do Carmo, 2005; Brebbia and Katsifarakis, 2007) and brought about valuable findings for various basins. However, in order to gain general insights into the performance of different governance regime types, comparative analyses become necessary that include a larger number of cases.

There are many water-related case collections that describe river basins with regard to quantitative physical conditions (e.g., related to hydrologic properties or the degree of pollution (e.g., UNECE, 2007)). But case collections that systematically allow comparisons and analyses of governance regimes are rare. Huntjens et al. (in press) calculated quantitative indicators for water regime properties based on expert judgement to examine correlations with adaptive capacity. Another approach is the International Regimes Database (IRD) that was developed for comparative analyses of international environmental regimes (Breitmeier et al., 1996, 2006). The IRD offers comprehensive, standardised protocols that allow recording regime attributes on the basis of judgements by case study experts. The so-called ''Oslo-Potsdam solution'' provides a framework to measure the effectiveness of international regimes relating the actual state of affairs to a non-regime counterfactual and to a collective optimum whereas the latter two are derived based on game-theoretic considerations or using expert judgement (Hovi et al., 2003). All of these approaches have in common that regime properties are evaluated using expert judgement or game-theoretic considerations but do not make explicit the relation between a regime's structure and its respective properties.

This paper introduces and exemplifies the potential of utilising and operationalising the ''Management and Transition Framework'' (MTF; Pahl-Wostl et al., 2010), which allows comparative analyses of water governance regimes in river (sub-) basins. The MTF provides a shared language, i.e. a collection of concepts and relations that hold among them (Hinkel, 2008) to map cases in a standardised way to achieve comparability. A database, the ''Total System Database'' (TSD) was developed based on the MTF that allows case study experts to collect and store data which describes dynamic water governance and management processes as well as the context (societal and ecological conditions) in which these processes unfold. Properties of interest such as vertical integration between levels or degree of participation of stakeholder groups are subsequently derived on the basis of the collected data. The approach makes complex water management processes transparent and allows relating judgements of regime properties to an underlying regime structure. An example of how governance regime properties are derived based on a formalised representation of governance and management processes is given in Section 4. The main goals of this approach are to gain a better understanding of governance and to test hypotheses about what makes a water governance regime adaptive (e.g., as postulated by Pahl-Wostl (2009)).This paper exemplifies the potential of the methodological approach for the examination of water governance regimes.

After an explanation of the conceptual foundation underlying this methodological approach (chapter 2), the translation into a relational database and the recording of case studies will be described (Section 3). An exemplary examination of vertical integration, i.e., the way how activities from the local to the international level relate to each other and are regulated by institutions (Section 4) serves to illustrate the potential of the approach for the analysis of governance regimes. Finally, we draw conclusions based on hitherto experiences with the presented approach (Section 5).

2. Conceptual background

The approach presented here builds on the ''Management and Transition Framework'' (MTF), which provides a shared terminology to represent water management case studies. The application of a framework like the MTF ensures that all case studies are represented in a standardised and comparable way. The examined water systems are defined as ''encompassing all environmental factors of the resource base, technologies and human beings'' (Pahl-Wostl, 2007: 49). The MTF hence provides a comprehensive view on water systems although its main focus resides on the human dimension of water management, especially on water governance and on learning processes. The MTF aims at addressing the complexity of water management in a systematic fashion and with a diagnostic approach supporting context sensitive analysis without being case specific and thus not transferable (Pahl-Wostl et al., 2010). The MTF has a modular structure and can be adjusted to specific research questions. The framework consists of two components, the MTF class diagram and the MTF activity diagram, which will be briefly introduced in the following (for more explanations see Pahl-Wostl et al., 2010).

The MTF class diagram addresses the various elements, represented as classes, which together constitute the water system, as well as their relationships to each other. The nature