



## Analysis

# Explaining institutional persistence, adaptation, and transformation in East German recreational-fisheries governance after the German reunification in 1990



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## ABSTRACT

We investigated the capacity of a natural resource governance system to absorb a disturbance while maintaining its major structures and functions (defined as institutional resilience). Exemplified by East German recreational fisheries governance being disturbed by the German reunification, we studied why in five out of six East German states the former centralized governance system persisted while in one state a decentralized governance system was implemented. Based on resilience thinking and new institutional economics, three analytical steps were developed to assess: (1) the structure and function of the governance system, (2) the attributes of the disturbance and the reorganization process, and (3) human motivations. The centralized system persisted because leading managers wanted to preserve customary structures and functions, minimize transaction costs of change, and maintain powerful positions. This was possible because of their influential positions in the reorganization process. Our results suggest that in externally induced, fundamental, and rapid disturbances decision-makers tend to prevent transformations in their governance system. However, key managers in the sixth state faced the same disturbance but their lack of leadership and an emerging rivalry for fishing rights facilitated a transformation to decentralized governance. Thus, attributes of disturbances can be leveraged by actors' motivations in the reorganization process.

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## 1. Introduction

In a dynamic and uncertain world, social–ecological systems (SESs) are continuously challenged by disturbances. Such disturbances carry a risk of system destruction when they radically change the existing characteristics of a system such as its structure and function (e.g., Forbes et al., 2009; Zurlini et al., 2006). The challenge for humans is to navigate SESs through new conditions arising from the disturbance without risking a fundamental shift that would critically endanger the capacity of the system to support the livelihoods of the human population (Gunderson et al., 2002; Olsson et al., 2006) or the provision of valued ecosystem services. Therefore, enhancing resilience to disturbances may be a governance goal as long as the current state of the system is a desired one (Folke et al., 2002; Kinzig et al., 2003). In this context,

scholars have been interested in the interplay of persistence, adaptation, and transformation to avoid undesirable regime shifts and maintain resilience in diverse social–ecological settings (Cinner et al., 2007; Pikitch et al., 2004).

The research objective in this study was to explore resilience in the specific SES of German recreational fisheries after being disturbed by the German reunification in 1990. We focused on the social system where various actors engaged in decision-making processes steer the system towards a particular state (Hughes et al., 2005; Olsson et al., 2006). We found the SES being resilient because the activity of recreational fishing as the main relationship within the SES continued in all parts of East Germany after the reunification; hence, the SES maintained its basic function. However, we ascertained varying processes of persistence, adaptation, and transformation within the governance system in the reorganization phase. Specifically, in five of six East German states a centralized governance system persisted similar to the one that existed in the GDR.<sup>1</sup> In the sixth state the centralized approach was transformed

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<sup>1</sup> The territory of the former GDR (German Democratic Republic) is referred to as East Germany, whereas the territory of FRG (Federal Republic of Germany) before the reunification in 1990 is referred to as West Germany. Both parts together form Germany.

to a decentralized governance system on local level as it is common in West Germany. Accordingly, we formulated the following research question: what are the reasons explaining the different outcomes of the reorganization process in the six East German states?

We combined system-based resilience thinking with the explanatory power of actor-based new institutional economics (NIE) to answer the research question. Resilience and SES literature call for interdisciplinary studies, and provide initial frameworks to study SESs from a social science perspective (e.g., Anderies et al., 2004; Hunt et al., 2013; Ostrom, 2007; Walker et al., 2006). However, we did not find an analytical framework explicitly including NIE theories into resilience concepts that also stressed the importance of the attributes of disturbances in reorganization phases. Thus, based on both research branches, we developed three analytical steps for the present case study.

The first two steps (assessment of the structure and function of the governance system, and of attributes of the disturbance and the conditions in the reorganization phase) were derived from resilience concepts. The third step (evaluation of actors' motivations in reorganization processes) was based on concepts from NIE. Resilience thinking allows for an in-depth understanding of the components and dynamics of non-linear, interlinked and multi-scale changes of SESs, while NIE provides actor-based analytical concepts such as social capital and transaction cost economics to explain human behavior and motivations, e.g., in institutional change situations (North, 1990). We developed these three analytical steps from the literature with the aim to understand each part as interactive component similarly influencing the resilience of the specific social system studied here.

There are numerous studies on institutional change and persistence in NIE covering all kinds of aspects explaining those processes (Libecap, 2007; North, 1991; Paavola, 2007). The strength of the present paper is the interdisciplinary combination of NIE with resilience thinking, and the provision of a three-step analytical framework to explain institutional change and persistence exemplified by the SES of East German recreational fisheries governance. As suggested by Ostrom (1990, 2007), the application of analytical frameworks enables researchers to identify patterns of interactions between the framework-embedded concepts explaining a particular outcome such as persistence or change in governance systems. Besides the analytical novelty in this paper, the case study of East German recreational fisheries governance provided a comparative analysis of six cases (East German states) under the condition of a unique natural experiment situation. Being in the same situation of a fundamental socio-political change after the reunification in 1990, one state showed a different outcome after the reorganization process than the other five states in East Germany. By applying the three-step analytical framework, we were able to explain the difference in the outcome and to assess which of the applied concepts had explanatory power.

The remaining of the paper is structured as follows. Section 2 introduces the case study of German recreational fisheries in more detail and explicates the phenomenon of change and persistence in the governance system. Section 3 describes concepts and theories of resilience thinking and NIE that formed the conceptual basis of our analysis. Section 4 presents the analytical approach, the operationalization process, and data and methods. Section 5 contains the results, and Section 6 the discussion.

## 2. Persistence and Change in German Recreational Fisheries Governance

Recreational fishing or angling is defined as “fishing of aquatic animals that do not constitute the individual's primary resource to meet nutritional needs and are not generally sold or otherwise traded on export, domestic or black markets” (FAO, 2012, p. v). In 2002, there were about 3.3 million German anglers older than 14 years (Arlinghaus, 2006) and as in most industrialized countries (Arlinghaus et al., 2002) anglers are currently the dominant users of inland fisheries resources

in Germany (Arlinghaus, 2006). Recreational fisheries in Germany are diverse covering freshwater and marine fisheries. Major geographical regions include the North German lowlands, Central German uplands, and the Bavarian Alps, which offer distinct water bodies and associated fish communities (Fig. 1).

The SES of East German recreational fisheries is defined as consisting of the water bodies and fish stocks in the East German states, and the institutions and governance structures managing the use of this natural resource by anglers. Within the social system, institutions are (bundles of) rules which shape human interactions (North, 1990) such as access regulations in recreational fisheries. Moreover, those institutions of natural resource use link social and ecological systems in a SES. Governance structures comprise rules of decision-making and forms of organizations, either individuals or groups of individuals, which are empowered by law to mold, change, maintain and eventually implement institutions (Williamson, 1996). These organizations with decision-making power are often holders of property rights (Schlager and Ostrom, 1992). In German recreational fisheries it is usually angler associations or clubs that are the holders of fishing rights. Such fisheries constitute a common property rights regime, i.e., groups of private people organized in angling clubs or associations, own or lease fishing rights and are thus involved in recreational fisheries management (Daedlow et al., 2011a).

Angling clubs and associations in Germany are users and managers of the resources at the same time. Fisheries authorities supervise and support inland fisheries activities and management according to rules prescribed in fisheries legislations but usually do not take an overly active role in site-specific management initiatives by angling clubs and associations (Arlinghaus, 2006). However, there are marked differences between recreational fisheries governance in West and East Germany (reviewed in Daedlow et al., 2011a). In West Germany, angling clubs on the local level are the major leaseholder of fishing rights and often manage a limited number of water bodies in the proximity. The angling clubs are organized in associations, which engage in public outreach and lobbying at the political level. By contrast, in East Germany fishing rights are typically held by large state or regional angler associations, which centrally manage large numbers of water bodies scattered throughout the state territory. Here, angling clubs and anglers as members of angler associations only support the associations in fisheries-management activities, but do not take a decision-making role. Hence, in East Germany, angler associations, not angling clubs, are fisheries-management decision-makers.

The reason for the difference in governance in East and West Germany originates in the history of East Germany. Before 1990, under the socialist regime of the GDR, East German recreational fisheries were centrally governed by an umbrella angler association called DAV (*Deutscher Anglerverband der DDR = German Angler Association of the GDR*). Founded in 1954 (Winkel, 1998), the DAV was responsible for all management regulations on the GDR territory up to local level, supported by its lower-level organizations, namely associations on district level (in total 14 on GDR territory), associations on county level, and clubs on local level (Fig. 2, the figure reflects the prototypical situation). The 14 district associations were connected to 5 “economic sections”, which mainly produced fish for lake and river stocking programs. Recreational fisheries governance was regulated by a single fisheries act applied throughout GDR territory. Because fishery authorities focused on commercial fisheries in the GDR, the main decision-making in recreational fisheries was delegated to the umbrella angler association DAV. Private ownership of individuals, and groups of people (common property) of water and fisheries resources were mostly not exercised in the socialist economy of the GDR.

In the course of the German reunification in 1990, the centralized governance system of the GDR was heavily disturbed by the reorganization of the socio-political and economic structures during the German reunification (Sinn and Sinn, 1993). The change opened a window of opportunity to reorganize the centralized recreational fisheries governance system, for example to a local governance system of angling

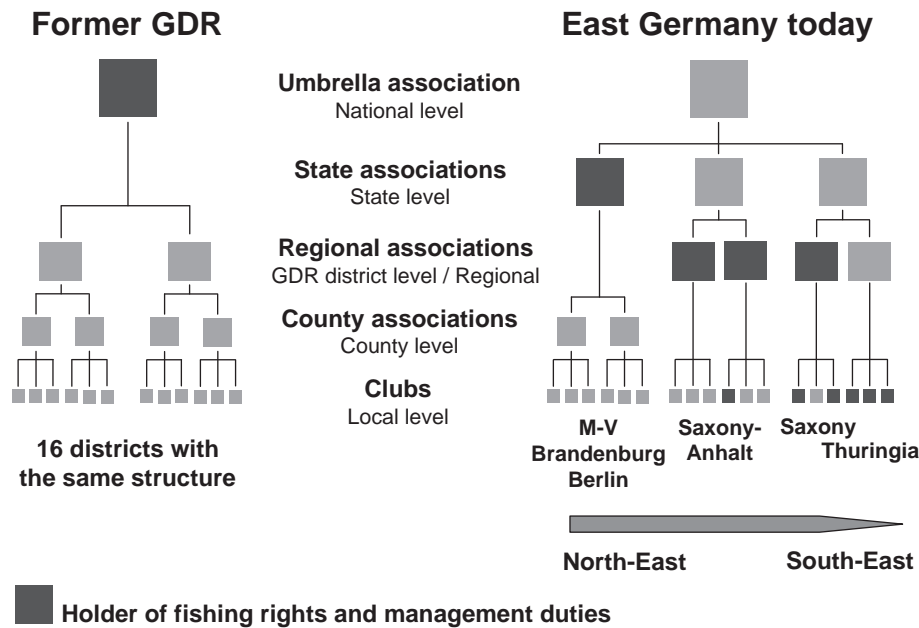


**Fig. 1.** Topographic map of Germany with the six East German states.

Source: accessed via Wikimedia commons: Permission is granted to copy, distribute and/or modify this map under the terms of the GNU Free Documentation License, Version 1.2 or any later version published by the Free Software Foundation; Modified as follows by the authors: The white solid line mirrors the former border between the GDR (East Germany) and the FRG (West Germany) before the reunification in 1990. The white dashed lines show the borders of the East German states which were newly implemented after the reunification in 1990.

clubs, which is and was dominant in West Germany (Daedlow et al., 2011b). East German recreational fisheries managers, however, generally did not take this opportunity but maintained a centralized governance system throughout the disturbance and reorganization phase

(Daedlow et al., 2011b). The East German managers also refused to become members of the West German umbrella association at this time, and only very recently (in March 2013) the recreational fisheries governance leaders in East and West Germany decided to merge their



**Fig. 2.** Persistence and change of centralized East German recreational fisheries governance after the reunification in 1990 showing a trend of decentralization in the governance system from the North to the South in East Germany.

umbrella associations at the national level after a long and highly contentious process of negotiations over multiple years (Connolly, 2013; Daedlow et al., 2011b).

After the reunification in 1990, former districts were aggregated to six newly constituted states on the territory of East Germany, namely Mecklenburg-Western Pomerania (M-V), Brandenburg, Saxony-Anhalt, Saxony, Thuringia and the reunified capital Berlin (Fig. 2). Three states in the North (Mecklenburg-Western Pomerania, Berlin, and Brandenburg) kept the former centralized governance system on state level. In the South-East German states Saxony-Anhalt and Saxony the centralized governance system was kept on regional level (= former GDR district level), i.e., in each of these two states three regional associations became the main holders of fishing rights (Fig. 2). Only very rarely angling clubs obtained fishing rights for local water bodies in these five states. By contrast, in the South-East state Thuringia the centralized governance system dissolved after the reunification, i.e., here it was the angling clubs on local level not the angler associations that acquired fishing rights and are now responsible for fisheries-resource management similar to the situation in West Germany (Fig. 2). After introducing East German recreational fisheries governance in this section, we explain the theoretical basis for the analysis of this case study in the next section.

### 3. Resilience Thinking and New Institutional Economics

#### 3.1. Resilience Thinking

Folke et al. (2010) defines resilience as “the capacity of a SES to continually change and adapt yet remain within critical thresholds” (p. 20). These thresholds separate alternative basins of attraction, defined as a state in which a system tends to remain while actors in this system hesitate to transform to other basins of attraction (Walker et al., 2004). For example, the two different governance systems in German recreational fisheries – decentralized versus centralized – represent such potential attractors in terms of governance of fisheries resources.

Three different aspects are important for a resilient SES: persistence, adaptability, and transformability (Folke et al., 2010). The maintenance of major variables and relationships after a disturbance indicates persistence of a resilient SES. Thus, resilience is a property of the system and persistence the result (Holling, 1973). Adaptability is defined as the

capacity of a SES to absorb disturbances through incremental change to stay in the same stability domain, whereas transformability is the capacity of a SES to create a new stability domain with new stable structures and functions that are fundamentally different from the previous system (Folke et al., 2010; Walker et al., 2004). While adaptability adjusts existing variables in a SES, transformability allows for introducing new variables and is characterized by novelty in relation to the original system's configuration (Folke et al., 2010; Walker et al., 2004). Both processes retain major relationships of the system and therefore indicate its resilience. In the present study, we looked for all three aspects (persistence, adaptation, transformation) in the reorganization of East German recreational fisheries.

While persistence, adaptability and transformability are important components of the resilience thinking framework, these processes alone cannot fully explain the resilience of a system. Other properties of the system and its components such as the attributes of the disturbance, the consecutive stages of a system's reorganization while changing, or cascading effects within subsystems and over different scales are also relevant (Walker et al., 2004, 2006). In particular, we focused on the attributes of the disturbance and the conditions in the reorganization phase in the analysis. Explaining resilience in SESs also requires research approaches that combine actor-based concepts from social sciences with system-based concepts of resilience thinking (Daedlow et al., 2011b; Lebel et al., 2006; Walker et al., 2006). In this paper, we particularly focused on actor-based, behavioral theories of NIE to complement concepts of resilience thinking.

#### 3.2. Integrating New Institutional Economics and Resilience Thinking

NIE aims at understanding and explaining processes of persistence and change in social systems. Hence, NIE can complement the more system-oriented resilience thinking approach by focusing on the reasoning behind actors' decision-making within institutional change situations (Lebel et al., 2006; North, 1990; Vatn, 2005). Change in NIE involves both adaptation and transformation as distinguished in resilience research. Similar to resilience thinking, North (1990) departs from the traditional discrete economic equilibrium approach based on individual maximization of possible net-gain by investigating continual trajectories of persistence in evolving economic systems, known as path

dependency (North, 1990). North (1990) found evidence that economic structures such as governance structures and institutions persist because of positive feedback mechanisms in the social system, e.g., actors strive to secure income and avoid costs of change because future benefits are unknown. In addition, economic traditions and customs have been considered very persistent because of the deep-seated cultural roots that underlie many informal constraints to human behavior (North, 1990). Similarly, most people seem to be risk-averse in choices involving sure gains in situations of high uncertainty because losses are perceived as being more severe (Tversky and Kahneman, 1992). Thus, path dependency in an economic system is the result of actors' decisions to maintain rules and governance structures because of their past experiences and customs, and risk-averse behavior.

Three additional factors emphasized in NIE are important for explaining institutional persistence or change in the present case study. First, it takes resources to transform or adapt a system into another state, and these resources are defined as the transaction costs of institutional change (North, 1990). Transactions can be broadly understood as use and exchange of (natural) resources between actors according to agreed institutions, and the potential change of those institutions. Transaction costs of institutional change include, for instance, search and information costs, bargaining and decision costs, and monitoring and implementation costs (Richter and Furubotn, 1999). These costs may hinder institutional change if they are perceived by decision-makers as too high (North, 1990). In addition, the frequency of a management activity, the specificity of knowledge and skills for certain actions developed over time through learning, and the perceived uncertainty and complexity of an activity determine individual transaction costs of change (Williamson, 1996), and thus, influence decision-making in times of reorganization.

Second, social capital is likely to be very important for explaining change or persistence of institutions. The general "capacity of social groups to act in their collective interest" has been defined as social capital (Paavola and Adger, 2005, pp 363). The concept of social capital includes aspects such as leadership, networks, common values, attitudes, and shared mental models on the one hand, and professional and learning skills of actors as human capital on the other hand. Also other aspects of social capital such as trust, information availability, and power relations among actors or groups of actors, and their common experience and knowledge in management influence transaction costs in decision-making of institutional change. Thus, social capital among actors is one important feature from NIE that is needed for studying persistence, adaptability and transformability in resilience research (Walker et al., 2006).

Third, human decisions in relation to natural resource governance are likely influenced by the properties of the resources to be governed such as their stocks and flows, and the corresponding properties of transactions in resource use such as rivalry between and excludability of users of the resource (Hagedorn, 2008). The expected benefit stream from resource use secured by rules of e.g., fair and secured distribution among authorized users, might compensate for transaction costs invested in institutional change establishing those rules (e.g., Liscow, 2013; Nolte et al., 2013). Reciprocal interactions of ecological and social systems based on institutions represent key links in a SES, and understanding these might provide insights into how far the characteristics of the ecological system (e.g., scarcity or abundance of resources) affects the overall resilience of a SES and the social system in particular.

### 3.3. Implications and Propositions for the Case Study

Based on the theoretical background we formulated propositions supposed to explain the persistence of East German recreational fisheries governance in most of the states examined. Following the systems-based resilience thinking approach, we assumed that the particular attributes of the disturbance and the conditions of the reorganization

influenced East German recreational fisheries managers' decision-making about institutional persistence and change. Accordingly, we formulated the following propositions:

- 1) The specific attributes of the disturbance (e.g., speed, severity) to the system facilitated the persistence of centralized governance of recreational fisheries in most East German states.
- 2) The specific conditions of the reorganization process (e.g., position of decision-makers) influenced the actors' ability to maintain a centralized governance system in most East German states.

Following the more actor-based NIE theories, we developed the following propositions about East German recreational fisheries managers' motivations to maintain a centralized governance system:

- 3) Past shared experiences and customary rules had a major impact on the persistence of the centralized governance system in most East German states.
- 4) High social capital among key East German managers supported the maintenance of the centralized governance system.
- 5) The transaction costs of keeping the centralized governance system were lower as the costs of the alternative of changing to a decentralized system, in turn reinforcing the persistence of the centralized governance system.

Finally and again in line with NIE, we considered the properties of transactions in natural resource use potentially decisive for the outcome of the reorganization in East German recreational fisheries governance. For example, the perceived scarcity of fish resources might have influenced the decision-making of fisheries managers to invest in changes of the future governance system in place. Conversely, we assumed that:

- 6) Perceived abundance of water bodies and fish resources supported the maintenance of the centralized governance system in East Germany.

We developed a three-step analytical framework to test whether these propositions were supported in the present case study explaining the persistence of the centralized governance system in most of East Germany, and the decentralization towards local governance in one state (Thuringia).

## 4. Analytical Approach, Operationalization, Data Sources, and Coding

### 4.1. Three Analytical Steps and Operationalization of Theoretical Concepts

Based on central concepts of resilience thinking and NIE, we derived three analytical steps (Fig. 3) we found best to explain the variation in outcomes of the reorganization phase in East German recreational fisheries:

- 1) An assessment of system's characteristics (i.e., structure and function) of the East German recreational fisheries governance system before and after the reunification in 1990.
- 2) A characterization of the attributes of the disturbance and the conditions in the reorganization process.
- 3) An evaluation of the motivations of East German recreational fisheries managers involved in the decision-making process.

The rationale for the three steps and their operationalization for the analysis are explained as follows. The first step allowed us to identify the type of change (adaptation and transformation) or persistence in the recreational fisheries governance system in each of the six East German states by investigating the system's characteristics before and after the disturbance of the German reunification in 1990. We focused on the system's characteristics of social variables and their structure and function. Variables in social systems are individuals or groups of individuals (organizations) who govern natural resource use such as

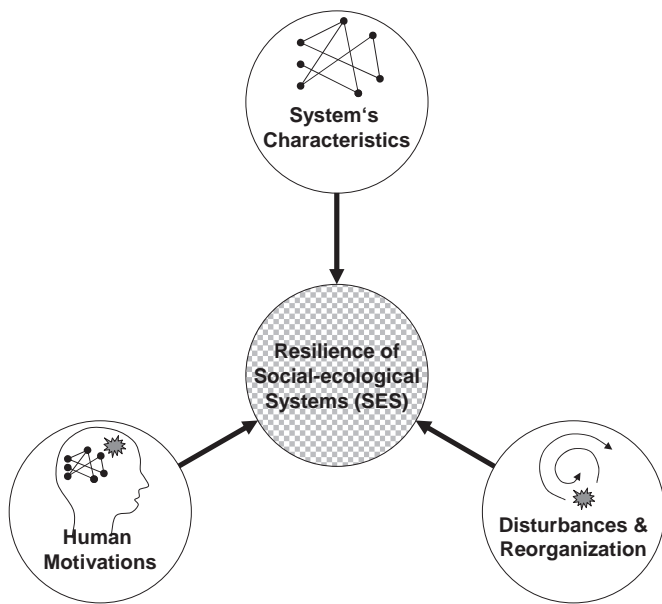


Fig. 3. Three analytical steps to analyze resilience in social-ecological systems.

angling clubs and associations in German recreational fisheries. We measured the structure of the governance system by looking at changes in the organizational levels of governance, in the property rights regimes, and in the level of decision-making regarding institutions (i.e., rules) such as fisheries acts and regulations. The governance structure and established rules of natural resource use and management provide the conditions for the functioning of the SES and the delivery of services for humans. The functions of the SES, beyond the provision of recreational fishing as mentioned above, include the execution of management measures to regulate fish stocks (i.e., access restriction for anglers, use restrictions such as daily bag limits, and fish stocking measures), and the provision of social services (i.e., provision of angling opportunities, membership, rewarding of anglers involved in management, and providing benefit to the public).

We defined the following recognition criteria to be able to distinguish between persistence, adaptation and transformation of structure and function. Persistence is the preservation of the same structure (e.g., centralized governance system) and function (e.g., provisioning of access to fishing), adaptation is the transfer of variables and their structure and function to lower organizational levels (e.g., from GDR territory to state level), and transformation is the appearance of new variables and new structures (e.g., angling clubs in a decentralized governance system) and functions (e.g., restricted access to local fisheries) in the system.

The second analytical step revealed attributes of the disturbance and of the reorganization process that influenced the outcomes of the reorganization process. The importance of the disturbance in resilience research is shown for example by Schoon and Cox (2012) and Fleischman et al. (2010) who provide first typologies of disturbances in SESs. We assessed disturbances (proposition 1) by measuring attributes such as speed (slow–fast), direction (e.g., external or internal to the SES to be analyzed), degree of the disturbance (minor or fundamental changes, e.g., fundamental changes in a constitutional laws), or whether the disturbance occurred in the social or ecological system and at which organizational level, and which actor group caused the disturbance (Pierson, 2004). Attributes of the reorganization phase (proposition 2) were assessed by analyzing the position, involvement, leadership and power assets of actors participating in this process and the (non-) influence of particular social groups. These aspects are also prominently considered in analytical frameworks of the common-pool research literature (Ostrom, 1990, 2005), where they determine the

structure of the action situation of actors producing outcomes of decision-making processes.

The third step was based on NIE theories and explained the observed outcomes through the motivations of humans for designing rules of natural resource use and the structure of property rights that determine economic behavior. We measured the motivations of actors by searching for statements describing the preservation of customary institutions and organizations (proposition 3), the (non-)existence of social capital such as presence or absence of leadership, trust among managers and anglers, common experiences and understanding about how recreational fisheries should be governed, power relations and consolidation, and the individual human capital of long-term management skills or learning ability (proposition 4). Transaction costs were mainly assessed by looking for statements on learning efforts, and time and money investment during the reorganization of recreational fisheries governance (proposition 5).

Finally in the third step, we searched for the potential influence of resource properties (availability of waters for fishing, quantity of fish stocks) with respect to decision-making about future governance systems (proposition 6). This factor allowed bringing the ecological dimension into the analysis of East German recreational fisheries that was restricted to data captured from the social system. The fact that fishing activities went on indicated that the ecological system continued to provide fish stocks for anglers and access to water bodies. Yet, we did not have ecological data to analyze significant changes or persistence in the ecological system. Therefore, we measured the perceptions of decision-makers in East German recreational fisheries governance related to this aspect.

The three steps together enabled us to explain institutional persistence and change in the SES of East German recreational fisheries governance and test the explanatory power of the six propositions introduced above. This analytical approach was based on an abductive research strategy as an alternative to inductive or deductive reasoning. Abduction starts with an empirical phenomenon (e.g., institutional change or persistence) and tries to explain this phenomenon with existing theories and concepts, and therefore alternates between the case and the theory (Douven, 2011; Paavola, 2004). The units of analysis in our case study to test the six propositions were the six East German states.

#### 4.2. Data Sources

We used a qualitative research method to collect information. We conducted ten in-depth interviews with key managers (either executive secretaries or association presidents) who were in charge of recreational fisheries governance during the reunification in East Germany. These interviews were the units of observation. The interviewees were chosen to meet the following requirements: they needed to be involved in governance decision-making before and after the reunification and during the time of reorganization, and they needed to represent one of the six East German states, which were constituted after the reunification on former GDR territory (interviewees 1 to 6). We selected managers from each state because after the reunification the sovereignty in inland fisheries was subrogated from GDR territory to state level as required in the constitution of the FRG, and managers operating on organizational levels lower than the national level became important to govern the reorganization process. In addition, we interviewed two managers from the East German umbrella angler association in Berlin (called DAV = *Deutscher Anglerverein*, interviewees 7, 8). We also interviewed two managers from the West German recreational fisheries umbrella association (called VDSF = *Verband Deutscher Sportfischer*) to obtain a West German perspective on the reorganization process (interviewees 9, 10). Interviewee 9, the VDSF president, was also leader of an East German angler association in the state Saxony before and after the reunification.

The interviews were carried out between October 2006 and August 2007 and lasted between 2 and 4 h each. Supplementary materials

such as anniversary publications, booklets, minutes of meetings or contracts of the time around 1989, mainly provided by the interviewees, were considered as well but did not systematically provide data for the study. The questionnaire guiding the interviews (Table 1) was developed according to the three analytical steps introduced above. The open questions had the purpose to obtain a narrative and complete picture of the historical process. We also avoided mentioning terminology from NIE or resilience thinking aiming to generate scientifically unbiased information about the historical process and the belief system of the interviewees (Gläser and Laudel, 2006).

#### 4.3. Data Coding

The interviews were recorded, transcribed and then content analyzed. The analysis followed a structural approach (Mayring, 2010), where the data was extracted and structured according to categories derived from the three analytical steps described in the previous sections. The categories were: “structure,” and “function” for system’s characteristics, “attributes of disturbance,” “actors’ position and influence,” and “change situation conditions” for the reorganization process, and “path dependency,” “transaction costs,” “social capital,” and “resource properties” for different motivations of actors. The analysis was conducted by a single coder. The extracted information was summarized for each interview and was tabulated according to the mentioned categories (Tables 2, 3, 4). One example of coded information for the category “structure” is the statement “formerly everything was centrally governed by Berlin” (interviewee 8) because it refers to the centralized governance structure of the DAV in the GDR, whose head office was located in East Berlin (Table 2). The statement “within the hearing procedures for the new state fisheries acts we overran the clerks with arguments to defend our interests and to influence the decision-making and it ended advantageous for us” (interviewee 7) is an example for the category “actors’ position and influence” in the reorganization process because it provides evidence of how East German managers were able to control decision-making (Table 3). The statement “the anglers had high confidence that we will do the right thing” (interviewee 3) is an example for the category “social capital” because it describes a close relationship between anglers and angler association managers and their common goal to keep the centralized governance

system (Table 4). The categories were not revised during the analytical procedure.

## 5. Results

### 5.1. System Characteristics before and after the Disturbance

#### 5.1.1. Structure

All East German interviewees described the structure of recreational fisheries governance in the GDR and its persistence and change after the reunification in a similar way (Table 2). During the reorganization process new fisheries acts and additional regulations were negotiated and implemented in each of the six newly formed East German states. Recreational fisheries governance was subrogated from GDR territory to state level to conform to the German constitution. The new civil law allowed acquiring private ownership of fishing rights for individuals or groups of people under particular conditions and this opened the opportunity for local angling clubs to acquire fishing and associated management rights similar to the situation in the West Germany. This opportunity was realized by angling clubs in Thuringia where the centralized governance structure was transformed to a local one. Note that in the GDR, for many fisheries the DAV did not hold ownership in the legal sense of a civil law such as in West Germany. Instead, waters were often left for “free use” by DAV members. The DAV did not pay rents to the government or other (previous) owners of fishing rights but still had the more or less exclusive right to use water bodies for fishing. This common practice of access was secured by the socialist regime. Institutional adaptation of the angler associations on state level occurred in response to the newly implemented civil laws. Institutional transformation in the governance structure occurred only in Thuringia, where angler associations were largely substituted by angling clubs in terms of fishing rights. Hence, angling clubs appeared as new actors (or variables in resilience terminology) with fishing rights in the governance structure on the local level in Thuringia, but not in the other five states where angling clubs were members of state associations without any independent fishing rights.

#### 5.1.2. Function

All East German interviewees stressed that the governance system was generally well functioning under the conditions of a socialist regime (Table 2). Most important were the social services provided by the DAV for their members including an angling permit for all prey fish (i.e., non-predatory fish) fisheries, and access to the “common pool of waters” that were managed on East German territory by the DAV. The main functions of fisheries governance, i.e., to secure access and provide management of fisheries, generally persisted after the reunification (Table 2). Most angler associations for example maintained large-scale access for their members to a “common pool of waters” on state or regional level and continued to implement fishery resource use regulations and fish stocking to manage the fish stocks. Furthermore, local angling clubs without fishing (and management) rights kept their functional tasks such as local support for observation and monitoring of water bodies, and controlling of anglers to ensure rule compliance. Fisheries authorities maintained their monitoring position and mandate to support angler associations in resource management. The East German umbrella angler association “DAV” adapted its functions to some degree by focusing on political lobbying and representation in national and international public relations. In addition, the formerly DAV-owned fish hatcheries, managed by five economic sections, changed to commercial business companies because it became too costly to maintain their own hatcheries. In Thuringia, angling clubs did not adapt but transformed by obtaining new functions in resource management. These angling clubs not only started to manage fisheries but also sell locally valid permits in angling club waters. Here, angler associations transformed to representative entities with mainly informational and lobbying tasks.

**Table 1**

Guiding questions from the questionnaire. The first and third part provided mainly information for the first analytical step (system characteristics). The second part provided data for the second and third analytical steps (attributes of the disturbance, conditions of the reorganization phase, and motivations in decision-making).

- 
- |  |   |
|--|---|
| 1. Part: recreational fisheries governance before and after 1990 | How was recreational fisheries management organized?<br>Who was responsible for fisheries management?<br>What were major objectives of the umbrella angler association in the GDR?<br>What were major problems in fisheries management?<br>What were major successes in fisheries management?   |
| 2. Part: decision-making during and after the reunification      | What were the first reactions directly after the fall of the Berlin Wall in 1989?<br>What were hopes and worries of East German anglers in that time?<br>Which problems needed to be solved?<br>Who decided about the future design of governance and management?<br>In how far did the DAV influence the new formulation of fisheries laws and regulations?<br>Which positions were acquired by state angler associations?<br>Which regulations became dispensable or needed to be changed?<br>Which alternatives of management existed? |
| 3. Part: recreational fisheries governance in East Germany today | How is recreational fisheries management organized?<br>Who is responsible for fisheries management?<br>What are major objectives of the present umbrella angler association in East Germany?<br>What are major problems in fisheries management?<br>What are major successes in fisheries management?   |
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## 5.2. Attributes of the Disturbance and the Reorganization Process

Based on the recollections of the interviewees (Table 3), the externally caused disturbance caused by the reunification process was perceived as a fundamental shock to the general socio-political system in East Germany. This also affected the sub-system of recreational fisheries governance to a large degree. Not being the initiators of this change, recreational fisheries managers were unwillingly forced to respond fast to inevitable changes in the socio-political system. Thus, the key attribute of an externally motivated disturbance and change situation were found to facilitate the maintenance of a centralized governance structure in most East German states in line with proposition 1.

The conditions during the reorganization phase were as follows. The newly implemented West German civil laws and the West German approach to govern recreational fisheries locally through angling clubs were unfamiliar to East Germans. East German fisheries managers were concerned about clarifying the property rights on fisheries, which had to be transferred to rent-based lease contracts as soon as possible to secure future benefit streams from the fish resources to anglers (Table 3, interviewees 1, 3, 4, 5). In all East German states, fisheries stakeholders were pro-actively involved in this decision-making and reorganization process on the state level and contributed their long-term experiences of fisheries management in the GDR (Table 3, interviewees 1 to 9). Some interviewees reported difficulties in the negotiations with civil servants from West Germany, who helped to build the new fisheries governance system in East Germany (Table 3, e.g., interviewee 2). Over time, East German managers were able to use the strong position of East German recreational fisheries associations and implemented features of their customary centralized governance system into the new legal fisheries framework, such as large-scale lease contracts for fishing rights at state waters. The West German angler associations did not directly influence the East German managers' decision-making process (Table 4, interviewee 10). Some East German managers considered following the West German example and transferring fishing rights to angling clubs. However, these managers were in minority, and either lost their influence or were excluded from the DAV angler associations as happened in the state Thuringia. These conditions of the reorganization process, i.e., involvement and powerful influence in decision-making processes, prompted East German recreational fisheries managers to keep to the centralized governance system in most states (proposition 2).

### 5.3. Actors' Motivation

#### 5.3.1. Reasons for Persistence

The majority of the East German managers decided to keep the customary governance system because they simply saw no reason to stop a well-functioning resource management system (Table 4, e.g., interviewee 8). In particular the maintenance of the "common pool of waters," their customary large-scale management, and the provision of affordable angling permits for all anglers (Table 4) were seen as major achievements of the former East German governance system. This result supported proposition 3 that customary rules had a major impact on the persistence of centralized governance systems in five out of six states.

With respect to the available social capital we found that anglers feared future changes, and that the common historical background of anglers and managers influenced the decision to keep a centralized system. One executive secretary also stressed the strong influence of the personal and leading skills of several recreational fisheries managers on the outcome of the decision-making process on district level in Saxony (Table 4, interviewee 5) resulting in the foundation of three regional angler associations in this state. There was notable mistrust of some East Germans towards West German recreational fisheries managers, and a strong common sense and trust within their own peer group. Moreover, feelings of pride of common achievements developed during

the GDR facilitated the decision of most East German managers to maintain a centralized governance system. The motivation of leading managers to maintain powerful positions in recreational fisheries governance was only mentioned by one interviewee in the position of executive secretaries (Table 4, interviewee 5). It can be assumed that this reason played a decisive role to attain a centralized system, even though the interviewed presidents did not mention this reason by themselves. Thereby, these results supported proposition 4 in that high social capital inherent in East German managers facilitated the maintenance of the centralized governance system.

But also other reasons played a role. It was for example stated that a change to a decentralized approach would have been too risky because the transfer of management responsibility to the local level would have overcharged inexperienced angling clubs in independently running their fisheries (Table 4, interviewee 9). Also, conducting such an additional fundamental change would have been too vigorous considering the already ongoing costs of adaptation in recreational fisheries governance and in the personal life of managers and anglers. Such factors supported proposition 5 because the costs of keeping the centralized governance system was perceived lower than changing the system fundamentally.

#### 5.3.2. Reasons for Adaptation

Adaptations in governance structure and function including the establishment of rent-based lease contracts of fishing rights and the redesign of clubs and associations as legal entities of the new civil law, were mainly driven by external forces. In particular, the new civil laws involving the alterations in fisheries sovereignty from GDR territory to state level necessitated some inevitable change in governance that could not be prevented by East German recreational managers. These changes were reluctantly accepted as evidenced by some of the interviewees stressing the "needlessness" of six state fisheries acts to substitute a single well-functional fisheries act that existed on the East German territory before (Table 4, e.g., interviewees 4, 5). Despite the successful conduct of the reorganization process, its transaction costs in terms of investment of money, time, collection of information and learning in after-work hours was perceived as high by many respondents (Table 4, interviewees 2, 3, 4, 6, and 9).

#### 5.3.3. Reasons for Transformation

To clarify reasons for transformation we can only draw on information from the exceptional case of Thuringia (interviewee 6), where the centralized governance system in recreational fisheries collapsed and angling clubs established a local governance system similar to West Germany. The main reason for this transformation was that none of the former managers exhibited leadership skills and were unable to deal with the enormous task to adapt the centralized governance system to the requirements of a new civil society. Instead, personal differences between the leading managers in Thuringia, and an emerging rivalry and competition for fishing rights among association members based on a perceived scarcity of fish led to the establishment of angling club ownership of fishing rights and the liquidation of the "common pool of waters" formerly governed by the DAV angler association. Thus, the lack of social capital and leadership among state managers as well as perceived scarcity of resources resulted in a transformation into small-scale governance of usually a few water bodies managed by angling clubs similar to Western Germany (Table 4, interviewees 6, 9).

#### 5.3.4. Influence of Resource Properties

The influence of the resource properties (beyond the effect of perceived scarcity in Thuringia) and the corresponding properties of transactions on governance changes (proposition 6) remained somehow unresolved. None of the interviewees mentioned resource-related aspects such as a perceived abundance of water bodies and fisheries as a reason for the outcome of the reorganization process (Table 4). We asked at the end of the interviews specifically for a potential influence



**Table 2**  
Information extracted from interviews according to the first analytical step “system characteristics”.<sup>a</sup>

1. Analytical step	Structure		Function	
	Interviewee	Before 1990	After 1990	Before 1990
1. Mecklenburg–Western Pomerania President	Centralized governance structure on GDR territory (UA); GDR fisheries act; Fishing rights were ceded for free to the UA ensured by socialist regime.	Centralized governance structure on state level (1 Ass.); State fisheries act; Lease contract according to civil law but still a number of unsettled license agreements; DAV fish farms were closed.	Provision of angling opportunities on entire GDR territory (1 permit with access to the “common pool of waters”); NAPs distributed according to voluntary engagement in mgmt.; Centralized fish stocking measures; Clubs: local monitoring of waters and other support at local mgmt.	Provision of state-wide angling opportunity (1 permit with access to “pool of waters” on state level); Access agreement with other East German state ass.; Ass.: access, use & stocking mgmt.; Clubs: local monitoring of waters; Stocking material purchased from commercial fish farms.
2. Brandenburg President	Centralized governance structure on GDR territory (UA); GDR fisheries act; Fishing rights were mostly ceded for free to the UA ensured by socialist regime.	Centralized governance structure on state level (1 Ass.); State fisheries act; Today majority lease contracts, but there are still fishing rights to be clarified.	Provision of angling opportunities on entire GDR territory (1 permit with access to “common pool of waters”): in 1989 525.000 anglers and 36.000 ha; NAPs and permits for predatory fish were distributed according to voluntary engagement in mgmt.; DAV involved in socialist politics.	Provision of state-wide angling opportunity (1 permit); today 67.000 members and 14.500 ha “pool of waters” Access contracts with other East German state angler ass.; Similar to previous functioning: centralized mgmt., clubs & county ass. provide local support.
3. Berlin Executive secretary	Centralized governance structure on GDR territory (UA); GDR fisheries act; Fishing rights were mostly ceded for free to the UA ensured by socialist regime.	Centralized governance structure on state level (1 Ass.); State fisheries act; Today lease contracts according to civil law.	Provision of angling opportunities on entire GDR territory (1 permit with access to “common pool of waters”); NAPs distributed according to voluntary engagement in mgmt.; Mandatory membership in UA for anglers.	Provision of state-wide angling opportunity (1 permit with access to “pool of waters” on state level); Access contracts with other East German state angler ass. to their “pool of waters”.
4. Saxony-Anhalt President	Centralized governance structure on GDR territory (UA); GDR fisheries act; Fishing rights were mostly ceded for free to the UA ensured by socialist regime.	Centralized governance structure on regional level (2 Ass.); State fisheries act; Today lease contracts according to civil law.	Provision of angling opportunities on entire GDR territory (1 permit with access to “common pool of waters”); NAPs distributed according to voluntary engagement in mgmt.; Clubs: local monitoring of waters and other support at local mgmt.	Provision of regional-wide angling opportunity, i.e., 2 “pools of waters” with separate permits; Ass. has now to pay for fishing rights, stocking material, maintenance of facilities etc.
5. Saxony Executive secretary	Centralized governance structure on GDR territory (UA); GDR fisheries act; Fishing rights were mostly ceded for free to the UA ensured by socialist regime.	Centralized governance structure on regional level (3 Ass. established on former district level); State fisheries act; Lease contract according to civil law for fishing rights; DAV fish farms were closed.	Provision of angling opportunities on entire GDR territory (1 permit with access to “common pool of waters”); NAPs distributed according to voluntary engagement in mgmt.; Own fish farms: the maintenance was highly dependent on people who know how to organize fish food or construction material which were often not purchasable in shops, currency was fish; Voluntary work in mgmt. was socially acknowledged; Clubs: local monitoring of waters.	Provision of regional-wide angling opportunities, i.e., 3 “pools of waters” with separate permits; Much less participation of anglers in mgmt.; Social acknowledgement is low: e.g., little support from anglers’ employers or from the state; Clubs: local monitoring of waters and supervision of stocking activities.

6. Thuringia Executive secretary	Centralized governance structure on GDR territory (UA); GDR fisheries act; Fishing rights were mostly ceded for free to the UA ensured by socialist regime.	Decentralized governance structure on local level, angling clubs hold fishing rights and mgmt. liability; 2 regional ass. lost fishing rights and mgmt. liability; State fisheries act; Lease contract according to civil law for fishing rights.	Provision of angling opportunities on entire GDR territory (1 permit with access to "common pool of waters"); Centralized fish stocking measures; Clubs: local monitoring of waters; Mandatory membership in UA for anglers.	Provision of angling opportunities on local level by angling clubs; Ass. responsible for public relations and information exchange; Clubs regulate access, use and fish stocking.
7. UA DAV President	Centralized governance structure on GDR territory (UA); GDR fisheries act.	Separate development in each of the newly constituted state.	Mainly well-functioning under the regime of a socialist society; Provision of angling opportunities on entire GDR territory (1 permit with access to "common pool of waters").	Separate "pools of waters" on states or regional level.
8. UA DAV Executive secretary	Centralized governance structure on GDR territory (UA); GDR fisheries act; Fishing rights were mostly ceded for free to the UA ensured by socialist regime; 5 economic sections, controlled by UA, in charge of fish farms & stocking.	Centralized governance structure on state or regional level; Separate fisheries acts in each new East German state (in total 6); Lease contract according to civil law for fishing rights; Economic sections & fish farms were closed.	Mainly well functioning; Provision of angling opportunities on entire GDR territory (1 permit with access to "common pool of waters").	Separate "pools of waters" on states or regional level; Access contracts with other East German state angler ass. to their "pool of waters".
9. UA VDSF President, also president of regional ass. in Saxony (East Germany)	Centralized governance structure on GDR territory (UA), 16 district ass. & a great no. of county ass. & clubs; GDR fisheries act; Fishing rights were mostly ceded for free to the UA ensured by socialist regime; 5 economic sections, controlled by UA, in charge of fish farms & stocking.	Mostly centralized governance structure on state or regional level; State fisheries act; Gradual change to lease contracts for fishing rights according to civil law; 5 Economic sections were closed.	Mainly well functioning; Provision of angling opportunities on entire GDR territory (1 permit with access to "common pool of waters"); NAPs distributed according to voluntary engagement in mgmt. or political participation; UA made all decision in principle, day-to-day decisions by district ass.	Separate "pools of waters" on states or regional level; Clubs: same function as before; Ass. on state or regional level took over fishing rights and mgmt.; Today money is involved everywhere: lease contracts, purchase of stocking material, facilities etc.
10. UA VDSF Executive secretary	Very little knowledge about governance structure. /	/	Very little knowledge about function of mgmt.	/

<sup>a</sup> UA = Umbrella Association, Ass. = Association, mgmt. = management, NAPs = night angling permits, /= no information.

**Table 3**Information extracted from interviews according to the second analytical step “attributes of the disturbance, and conditions of the reorganization process”.<sup>a</sup>

2. Analytical Step	Attributes of disturbance	Conditions of reorganization process	
Interviewee		Actors position & influence	Change situation conditions
1. Mecklenburg-Western Pomerania President	Many new issues to consider and to change e.g., according new civil and fisheries laws, anglers needed to catch up also in general to the new society.	Managers voice was acknowledged in fisheries decision-making processes; Support by West German angler ass. e.g., in workshops on redesign of clubs.	East German UA leaders were unable to help in reorganization processes, e.g., misinterpretation of Civil Law; Angling in West Germany was difficult because of license system and local permit systems; Repatriation of private ownerships on waters was difficult and is still not finished until today.
2. Brandenburg President	Inrush of many things: changes in finance, politics, economics, society, open borders, traveling etc.; Vital problem for anglers: how are fisheries rights and angling in general organized now; Lack of knowledge about new civil law, e.g., constitution of associations or clubs, caused a “very, very difficult time”.	Managers voice was acknowledged in fisheries decision-making processes; No support by West German angler ass. or from fisheries authorities; Many discussions among managers to find a way through the time of reorganization and future governance & mgmt.; Hasty personnel decisions needed to be corrected.	Had to hinder implementation of West German fisheries rules, e.g., limited no. of permits per hectare water area, high fisheries fees charged by authorities, by West German bureaucrats; “Authorities wanted us to decentralize our structure, but we refused and sat it out”.
3. Berlin Executive secretary	Short transitional period, Lots of work and stress to reorganize East Berlin administration, also affecting fisheries regulations.	Managers' voice was acknowledged in fisheries decision-making processes; Pressure from VDSF to unify & to resolve DAV UA; Good contacts to fisheries authorities but no help from other state authorities, e.g., questions about new civil law.	“We just renamed different parts of the association but structure and function of these parts remained the same”; Repatriation of private ownerships on waters important.
4. Saxony-Anhalt President	Unknown & complicated process of reorganization; “Took some time to get started in the new system”.	Managers' voice was acknowledged in fisheries decision-making processes.	Repatriation of private ownerships on waters important; Introduction of state fisheries license based on qualifying examination to prove angling abilities (also in other East German states); Bureaucratization of fisheries sector: now there are in total 16 fisheries acts in reunified Germany, one national would be better.
5. Saxony Executive secretary	Many issues to change e.g., lease contracts for fishing rights and other properties, establishment of clubs and ass. as non-profit entities; “Were extremely busy and East Germans had to swallow a lot shortly after the reunification”.	Managers' voice was acknowledged in fisheries decision-making processes; Good contacts to fisheries authorities.	Repatriation of private ownerships on waters important; Critical view on new fisheries acts: 16 fisheries laws in reunified Germany are nonsense; Tried to hinder fragmentation of regulations per state.
6. Thuringia Executive secretary	/	Managers' voice was acknowledged in fisheries decision-making processes; Quick contact to clubs in nearby West Germany which were interested to lease fishing rights in Thuringia and had better financial resources.	Tried to establish new structures as soon as possible, e.g., clubs as entities of civil laws; Ass. on district level did not merge to 1 state ass. & didn't lease any fishing rights.
7. UA DAV President	Revolution had a fast & fundamental impact on all parts of the society.	Managers' voice was acknowledged in fisheries decision-making processes.	Critical view on new fisheries acts: 16 fisheries laws in Germany are nonsense.
8. UA DAV Executive secretary	/	Managers' voice was acknowledged in fisheries decision-making processes.	Critical view on new fisheries acts: 16 fisheries laws in Germany are nonsense; VDSF wanted us to resolve centralized governance.
9. UA VDSF President, also president of regional ass. in Saxony (East Germany)	Angling was out of focus for about 6 months because people had to handle so many other things; First concern was to transform the district ass. to entities of civil law to maintain entitlements of legal succession after reunification; Careful reflection about future economic, political, and general development in East Germany.	Managers' voice was acknowledged in fisheries decision-making processes; A reunification of DAV and VDSF UA would have been better to improve lobbying activity on national and international level in reunified Germany.	Too many people made mistakes, numerous discussions about future steps, e.g., yes or no about reunification with West German UA (VDSF); East German UA (DAV) was afraid to lose influence; all decision-power went to state or regional angler ass.; Cooperation with other regional ass. in Saxony was easy, no disagreement on fisheries issues.
10. UA VDSF Executive secretary	/	Quick contact to East German UA, tried to change their system according West German governance system: was rejected; No participation in internal meetings and decision-making, later stop of contact because of alienation between two systems & groups.	Planned to reunify East and West German UA but was not successful; Organized workshops to inform East German anglers about new fisheries & civil laws, fish stock mgmt. and water monitoring.

<sup>a</sup> UA = Umbrella Association, Ass. = Association, mgmt. = management, /= no information.

of resource properties. In this context, most interviewees reported that such considerations were not a reason to maintain the centralized governance system on state level (Table 4, interviewee 1, 2, 3, 4, 5, 9). Only later it was acknowledged that a centralized governance system has advantages in terms of economies of scale in natural resource use and management, i.e., in terms of easier transactions in establishing lease contracts for fishing rights and in supply of fish stocking material at a large number of water bodies.

## 6. Discussion

The three analytical steps in our study enabled us to assess the institutional resilience of East German recreational fisheries governance after the disturbance caused by the German reunification in 1990. With respect to the first step, the assessment of the system's characteristics and the definition of recognition criteria helped us to identify which particular structures and functions persisted, adapted, or

**Table 4**  
Information extracted from interviews according to the third analytical step “human motivations in decision-making”.<sup>a</sup>

3. Analytical step	Actors' motivation			
Interviewee	Past experiences and customs	Transaction costs	Social capital	Resource properties
1. Mecklenburg-Western Pomerania President	Excellent achievement of the DAV was the nation-wide “common pool of waters”; “We should try to get it back in East Germany”; Anglers wanted centralized governance because they were used to it; The historical development provided the way for a centralized system.	Problems with legal succession process of properties & fishing rights; Anglers feared costs of West German local permit system which only allow angling at some waters in the proximity of angling clubs; General change to West German local system would have been very expensive.	Mistrust between state and UA representatives: we left DAV but kept centralized system; Anglers charged & trusted leaders of state angler ass. to maintain centralized governance system.	Non influence on decision-making; The advantages of a centralized system for lease contract negotiations & purchase of stocking material was only later understood.
2. Brandenburg President	Preservation of achievement of the GDR: cheap angling & many fisheries available; “Among all these general changes we wanted to maintain as much as possible as least for angling”.	Redesign of ass. & clubs was highly work consuming: e.g., the ass. had to redesign 43 county ass. and 1300 clubs as legal entities of the new civil law which included non-profit status, tax exemption, financial self-organization, internal elections of boards etc.; “This was a pile of work and we invested a lot of time and energy.”; Successful adaptation but with high effort; High insecurity about price levels of lease contracts for fishing rights.	It was important to convey a sense of home for anglers within our ass. Everything is as always: we provide secure feeling for anglers Large majority of anglers supported our decision for keeping the customary system; DAV can be proud of its success in the GDR, we survived after 1990.	No influence on decision-making.
3. Berlin Executive secretary	“We just continued as before”; Relied on experiences from GDR but also tried to improve mgmt.	No support in knowledge building, extensive self-study required; Difficulties & long process of club & ass. redesign under new laws.	Anglers preferred the pool of waters system, so we kept it on states level; Anglers trust their managers that they will do the right thing.	No influence on decision-making.
4. Saxony-Anhalt President	DAV anglers were not used to decentralized mgmt. and voted for the centralized system; “Common pool of waters” was & is the spine of DAV ass., supports cohesion among members.	Pool of waters is the ideal mgmt. form for many anglers: provides many fishing grounds; Difficult & long process of club & ass. redesign under new laws; 16 different fisheries acts in Germany complicates angling a lot: costly to observe diff. rules, to buy diff. permits in each state; Decentralized governance weakens collective action on regional level.	“Important was to work with reliable people who we knew from previous times”; Anglers were afraid to lose angling opportunities & feared high costs of local permit system; Anglers voted for the same leaders and trusted them to kept the centralized system; “As long as I have a say this shall continue”.	No influence on decision-making.
5. Saxony Executive secretary	Regional ass. tried to maintain all what existed before; If the “pool of waters” would be destroyed, it won't come back again.	Pool of waters is the ideal mgmt. form for many anglers: provides many fishing grounds; Centralized mgmt. has lower costs of decision-making on regional level, e.g., stocking decision on rivers; Initial incapacibilities of East Germans in a new society & many unknown rules caused that ass. decided for self-governance.	Three leaders on regional (former district level) level with firm hand were not able to unify to a state ass., wanted to maintain their powerful positions; Sat together with anglers in club meetings & discussed the future: agreed on maintaining pool of waters.	No influence on decision-making; The advantages of a centralized system for sustainable mgmt. of large water areas were only later recognized.
6. Thuringia Executive secretary	/	Much change in thinking was necessary; No orientation about functioning of the West German local system; Financial problems of district ass. before 1990 influenced decision-making on reorganization; Big problems to establish new lease contracts, e.g., owner of water bodies unknown.	No leadership of district ass. presidents, but panic behavior about future & inconsolable differences between former leaders; High competition for fishing rights among ass. & club representatives.	Had an influence: scarcity of waters, in particular of standing waters, influenced the run for fishing rights of clubs, which preferred to lease fishing rights at small local water bodies (ponds).
7. UA DAV President	Protection of former mgmt. rules important.	/	Success of DAV mgmt. convinced officials in fisheries authorities.	/
8. UA DAV Executive secretary	We saw no reason to stop the centralized system.	/	Pride of ability to save customary structures and functions; Delegates of state ass. wanted to keep centralized system & DAV.	/
9. UA VDSF President, also president of regional ass. in Saxony (East Germany)	Because managers of DAV were trained in centralized mgmt. they continued the same way.	Difficult & long process (years) of club & ass. redesign under new laws; Clubs didn't have expert knowledge & financial resources: would have been overloaded with local mgmt.; Regional ass. hindered competition for fishing rights between clubs.	Conflicts between managers of East German UA about reunification with West German UA; Transformation in Thuringia: leaders of ass. wanted clubs to take over fishing rights including mgmt. duties.	No influence on decision-making; The advantages of a centralized system for sustainable mgmt. of large water areas were only later recognized.
10. UA VDSF Executive secretary	Both system emerged historically & drifted apart, therefore difficulties to understand each other's system.	VDSF was not able to help in this reorganization process, had no idea how to adapt East German centralized mgmt. on new rules.	Problems between DAV & VDSF UA: unsolved issues, e.g., on finance; Clubs & ass. which joined VDSF were insulted as betrayers.	

<sup>a</sup> UA = Umbrella Association, Ass. = Association, mgmt. = management,/= no information.

transformed in the governance systems in each of the six East German states after the disturbance. In this context it is important to understand that a system's stability in the same (adaptability) or in another domain (transformability) has a dynamic notion as the system is exposed to constant forces of change. In the present case study, external processes of change in the overall socio-political system (reunification) were identified as centrifugal forces to recreational fisheries governance by challenging its internal structure and function to reorganize. Centripetal forces were identified in actors' motivations that wanted to maintain recreational fisheries in the same stability domain (i.e., persistence and adaptation in five states) and lead to another system's configuration in one exceptional state (i.e., transformation in Thuringia).

With respect to the second step, we found that the attributes of the disturbance and the conditions of the reorganization phase mattered for the outcome of the reorganization process (propositions 1 and 2). Specifically, the results suggested that in external, fundamental, and rapid disturbances with high uncertainty and incomplete information about future social dynamics, the room for innovation can be restricted and decision-makers tend to rely on customary governance rules to avoid transaction costs of change. These results were in accordance with established research in NIE (Alchian, 1950; North, 1990) and with more recent research about institutional resilience (Herrfahrdt-Pähle and Pahl-Wostl, 2012). However, the results might be different if actors have more time to decide or when disturbances occur in the ecological system that requires a direct response in changing resource governance.

The position and influence of particular powerful actors in the decision-making process were seen as necessary conditions to determine a particular outcome of this process in line with the actors' motivations. Without being included in the reorganization process of East German recreational fisheries governance, the managers would not have had the opportunity to successfully implement their customary centralized governance system after the reunification. However, we found that the motivations of actors can leverage attributes of the disturbance and conditions of the reorganization process because of the outcome of the reorganization process in the sixth case Thuringia (transformation to another basin of attraction, i.e., local governance system). Here, key managers faced the same attributes and conditions like the managers in the other states but their lack of leadership abilities and an emerging rivalry for fishing rights facilitated that angling clubs started to establish a decentralized governance system on local level. Thus, for explaining the outcomes of a system's reorganization after a disturbance the motivations of actors constituted sufficient conditions as assessed in the third analytical step.

Overall, the third analytical step enabled us to explain the different outcomes of the reorganization phase in the six East German states (propositions 3 to 6). In line with e.g., North (1990), Roland (2004) or Walker et al. (2006), we found that fast changing institutions such as those affected by the general socio-political change in East Germany challenge slower moving institutions such as customs of recreational fisheries managers. This resulted in path dependency in five states where customary institutions persisted against the challenge of external and rapid change (proposition 3). Moreover, according to Newman (2000) fast changing institutions might also overwhelm humans' ability to learn because of the excessive demand for alteration by general socio-political change. This was supported by the results in five states where East German recreational fisheries managers only adapted the system to an inevitable degree as required by new constitutional laws. Thus, situational conditions, such as the attributes of disturbances and the conditions in the reorganization phase, have (within limits as described above) influence on human motivations in decision-making processes (Pierson, 2004; Ross and Nisbett, 2011).

The importance of social capital among actors, i.e., shared attitudes and networks, their interest to maintain their powerful positions, and leadership abilities in influencing the outcomes of the reorganization process in our study (proposition 4) concurred with insights from

studies on common-pool resource management about the importance of social capital and actors' behavior for natural resource management (Gutiérrez et al., 2011; Ostrom, 1990; Pretty, 2003). This causality has been confirmed by studies in social psychology that indicated that humans tend to rely on views of their peer group in situations of uncertainty because they have proved their usefulness in the past or because disagreement with the group would cause uneasiness for the individual (Ross and Nisbett, 2011). We also found that next to general transactions costs of change, individual transaction costs (satisfaction, experience, and specificity in management skills and knowledge of managers with the former customary governance system) determined their reluctance to change the system fundamentally because it would be non-substitutable in a new governance system and previously invested resources would be sunk costs (proposition 5). However, in the exceptional case Thuringia both the missing social capital among key managers and the properties of the ecological system caused a major change in the governance system. Hence, in line with other studies (e.g., Becker and Ostrom, 1995; Oldekop et al., 2012) the perceived scarcity of resources were identified as a reason for institutional transformation in Thuringia (proposition 6).

Independent of the research question, we found an interesting scale-effect when looking at the outcome of the reorganization process on the entire territory of East Germany (Fig. 2). This scale-effect is a pattern of decentralization in recreational fisheries governance systems from North-East Germany to South-East Germany where the Northern states kept the centralized system on state level, whereas towards the South the states either kept the centralized system on regional level or even transformed to a local-level system. This pattern was not anticipated by the interviewees. Such scale-effects are difficult to anticipate in advance or from a perspective of lower organizational levels because of humans' restricted perceptions and knowledge about complex systems and their various scales (Berkes, 2006; Cash et al., 2006). Therefore, it is essential to differentiate between the extracted information given by the individual interviewees, and our own synthesizing interpretation of the results.

Limitations of this study are that we did not investigate the perceptions of local anglers of the reorganization to compare them with the perceptions of leading managers. For example, instead of being supported by anglers to keep a centralized governance system, influential managers might have rather persuaded anglers to maintain a centralized governance system in cases where local angling clubs were interested in leasing their own fishing rights. In addition, the perceptions of the interviewed managers might be affected by recall bias and cognitive dissonance in terms of their own role during the reorganization process. For example, the interviewed presidents of angler associations did not directly mention that they wanted to keep their own powerful positions in governance whereas an interviewed executive secretary mentioned consolidation of power and leadership of managers as a decisive factor for the persistence of centralized governance. It can thus not be ruled out that more factors than the ones identified in the present study were decisive to shape the outcome of the reorganization process.

In conclusion, this study took advantage of the conceptual strength of two traditionally separated research branches to fully dissect the macro-level and micro-level reasons of change and persistence in East German recreational fisheries governance. This approach could be also applied to study pure social systems (e.g., health care system), not only SES such as recreational fisheries. Note that our motivation to combine resilience concepts with an institutional economics analysis resulted from the need to develop a novel scientific perspective to understand institutional change from a holistic angle taking dynamic and macro level aspects into account. It was not the aim and beyond the scope of this research to carry out an in-depth ecological analysis. For example, an analysis of the resilience of the ecosystem services, e.g., the provisioning of fish, provided to the users by the ecological system would complement the given study. However, in this study we took ecological characteristics relevant for understanding institutional

persistence or change into account from the perspective of the social system. This can be seen as a first step of an analysis of the resilience of the SES. In addition, the concepts from both branches applied in each of the three analytical steps (Fig. 3) are amendable and can be adjusted to different case study settings where, for example, identity and feedback in SESs are the focus of the analysis. Future research could assess in how far different manifestations in interactions of analytical concepts within the three steps (e.g., powerless decision-makers facing disturbances in the ecological system) might influence the outcome of systems' reorganizations, and therefore help to further understand conditions and reasons for a social system's capacity to persist or transform after a disturbance, i.e., to understand its resilience.

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