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Using power, mental model, and learning to analyze the evolution of water governance in Bangalore

Sanchayan Nath^{1,2} | Frank van Laerhoven²

¹School of Public and Environmental Affairs, Indiana University Bloomington, Bloomington, Indiana

²Copernicus Institute of Sustainable Development, Utrecht University, Utrecht, The Netherlands

Correspondence

Sanchayan Nath, Copernicus Institute of Sustainable Development, Utrecht University, 3584 CB Utrecht, The Netherlands.
Email: s.nath@uu.nl

Abstract

Over the last few decades processes of water governance have been characterized by a gradual evolution from “governance by unitary state” to “governance by partnerships.” However, there is limited understanding of how such shifts take place. The case of Bangalore's lakes is an interesting example of such a transition. In the past Bangalore's lakes have been governed by unitary state actors. But over time, this changed. Today a multiplicity of governance processes is associated with the lakes: state-dominated unitary-systems coexist with partnerships between state and non-state actors. Therefore, in order to understand how governance by unitary state evolves into governance by partnerships, this article answers the following research question: “How did the governance of *some* of Bangalore's lakes evolve from a state-dominated, publicly governed model to one in which local communities have a much larger say?” Using data collected via semi-structured interviews and secondary research, this article argues that while processes of urbanization may indeed have contributed to changing the city's landscape, in more recent years, socio-political processes have contributed to governance transition: actor interactions and changing power dynamics interacted with processes of learning to bring about changes in mental models leading to change. This finding assumes significance in view of the fact there is limited research which demonstrates how these socio-scientific processes interact with each other for bringing about governance transition.

KEYWORDS

actor interactions, coalitions, learning, mental model, power, water governance

1 | INTRODUCTION

Over the last few decades, water governance has been characterized by a gradual evolution from “governance by unitary state” to “governance by partnerships” (Rhodes, 2006). Centralized, top-down decision-making structures have gradually been replaced by diffuse arrangements in which a wide diversity of actors partner with public agencies to govern water (Driessen, Dieperink, Laerhoven, Runhaar, & Vermeulen, 2012; Loorbach, 2010; Susskind, 2013). Such transitions

have taken place in developed countries (Cairney, 2009; Hall, Kettunen, Löfgren, & Ringholm, 2009; Jordan, Wurzel, & Zito, 2005) as well as developing countries (Guarneros-Meza, 2008; Larson & Soto, 2008). Not all these governance-shifts have succeeded. In some cases, administrative control has transferred back to public hands (Ribot, Agrawal, & Larson, 2006). Amongst those which succeeded, the case of Bangalore's lakes is an interesting example. In the past, Bangalore's lakes have been governed by unitary state actors. But, over time, this changed. Today a multiplicity of governance processes

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is associated with the lakes: state-dominated unitary-systems coexist with partnerships between state and nonstate actors. The governance of some of the city's lakes¹ has switched from a publicly governed model to one in which local communities have a larger say (Unnikrishnan & Nagendra, 2015). This article is narrowly focused on dynamics associated with only those lakes in Bangalore which have witnessed transition from governance by unitary state by governance by partnerships between state and nonstate actors, in order to understand how governance by unitary state evolves into governance by partnerships.

Therefore, this article answers the following *research question*: "How did the governance of some of Bangalore's lakes evolve from a state-dominated, publicly governed model to one in which local communities have a much larger say?"

"Governance by unitary state" is characterized by strict boundaries between governmental actors and nongovernmental actors. Political decision-making is hierarchical and confined to the domain of governmental actors. Power flows from the top to the bottom and from governmental actors to the rest of the system. Management and policy implementation responsibilities lie with governmental actors. This is in contrast to "governance by partnerships," wherein the boundaries between governmental and nongovernmental actors get eroded significantly. In such systems, decision-making is more participative and the source of power varies depending on who is taking decisions. In other words, the distribution of power is more fluid and heterogeneous. Community participation is politicized. Management and implementation activities are carried out by a wide range of governmental as well as nongovernmental actors (Driessen et al., 2012; Lange, Driessen, Sauer, Bornemann, & Burger, 2013; Sandström, Bodin, & Crona, 2015; Shapiro, 2000). As a system transitions from a hierarchical state to a more participative state, bounded-rationality characterizes decision-making within the system. Mental models about governance also change (for acronyms, definitions, and introduction to key concepts see Table 1). The system witnesses dramatic variation in power dynamics.

However, there is limited understanding of how such changes in power dynamics leads to learning and how learning is associated with changes in mental models for bringing about a switch from "governance by a unitary state" to "governance by partnerships" (Driessen et al., 2012; Lange et al., 2013; Orach & Schlüter, 2016; Sandström et al., 2015). Some theoretical approaches have demonstrated that learning leads to changes in mental models (for instance, see Pahl-Wostl, 2015), but such approaches have not been designed to analyze the role of power in such changes. In contrast, well developed models of power (for instance, see Arts & van Tatenhove, 2004) have often ignored the role of learning and changes in power models. In addition, most of these approaches are focused on the role of state actors, but are often ambiguous about the role that nonstate actors play in governance transition. However, approaches which study the role of nonstate actors in governance change (for instance, see Hecló, 1978) are sometimes silent about power, learning and mental models. In other words, *on their own each of these approaches can only explain certain aspects of the same case.*

Therefore, *in-order to provide a more integrated explanation of ground realities*, this article links arguments from the following analytical approaches for analyzing governance change: (a) Management and Transition Framework (Pahl-Wostl, 2015); (b) three-layered model of power (Arts & van Tatenhove, 2004); and (c) issue networks (Hecló (1978).

2 | ANALYTICAL APPROACH

2.1 | Explaining why existing literature cannot explain ground realities without synthesis

The management and transition framework (MTF) has successfully used a *triple-loop* model of learning to demonstrate how mental models transform over time and how such alterations are associated with governance change (Pahl-Wostl, 2015). However, this theoretical approach was not designed to explain how power dynamics leads to governance transition in settings characterized by power asymmetries between different actors. Nonetheless, changes in power dynamics are associated with governance change (Armitage, Marschke, & Plummer, 2008). Therefore, in order to deal with this lacuna a theory of power had to be identified which could be synthesized with the MTF. However, studies on power are characterized by unending contestations (Lukes, 2005). What was required was a theory of power that can encompass such theoretical contestations so as to accurately depict real-life power-play. The *three-layered* model of power developed by Arts and van Tatenhove (2004) fits this bill. It can be used to analyze how *three types of power* (relational, dispositional, and structural) interact with each other and with other societal variables to influence governance outcomes. This model of power can be easily *synthesized* with the theory of learning envisaged by the MTF because both conceptualize change using a triple-looped structure. However, an examination of ground realities revealed that actor interactions and coalition behavior as characterized by the MTF and the three-layered model of power was not sufficient to capture the spontaneous but diffuse manner in which nonstate actors were taking on governance roles. A review of the literature also revealed that governance change often gets initiated in settings outside state control. However, most theories of change focus on the state-driven, formal aspects of governance. Therefore, in order to analyze the spontaneous, diffuse and informal aspects of governance change, this article also draws on the concept of issue networks proposed by Hecló (1978). This is because issue networks direct our attention on the informal aspects of governance by highlighting the role that nonprofits and other nonstate or disenfranchised actors play in governance (Henry, 2011; Nyland, 1995). For discussion on why it is possible to synthesize these three different approaches, see Data S1.

2.2 | Synthesized approach

A water system consists of various action arenas (Figure 1a); action situations are nested within action arenas; and, issue networks are

**TABLE 1** Acronyms, definitions, conceptualization of mental models, and introduction to key concepts

Definitions, introduction to key concepts, acronyms, and key definitions of various individual and shared mental models	
<i>(a) Definitions and introduction to key concepts</i>	
Mental models	<p>Mental models are cognitive constructs in the sense that mental models are representations about the world held in our minds. They shape our thinking and enable us to make sense of the world (Denzau & North, 1994; Pahl-Wostl, 2015)</p> <p>A range of mental models about a range of topics may guide the behavior of an individual actor, or the behavior of a collectivity of actors. This article is narrowly interested only on mental models about resource governance</p> <p>An individual mental model about resource governance held by an individual actor enables him to make sense of how resources are governed and also determines what the actor thinks about how resources should be governed. In addition, it determines how the actor behaves or acts in matters related to resource governance</p> <p>A shared mental model about resource governance is a mental model held collectively by society or a group of people. It determines how such a collectivity makes sense of how resources are governed and also determines what the collectivity thinks about how resources should be governed. It also determines how the collectivity behaves or acts in matters related to resource governance</p>
Three-layered model of power	<p>Power can be of three types: relational, dispositional, and structural (Arts & van Tatenhove, 2004)</p> <p>Relational power arises out of social relationships and is exercised in social relationships (Giddens, 1984). It refers to the capacity of actors to achieve desired outcomes during interactions with other actors. It is jointly exercised by a group of actors and results in the achievement of shared outcomes which benefit the whole group (Arts & van Tatenhove, 2004)</p> <p>Dispositional power arises out of rules and resources (Clegg, 1989). Rules delineate and legitimize the position of an actor vis-à-vis other actors in the same setting. Differences in access to resources constrain the autonomy and independence of an actor, relative to other actors. Therefore, dispositional power influences the capacity of actors to exercise relational power (Arts & van Tatenhove, 2004).</p> <p>Structural power arises out of macro-societal structures such as “political, legal, and economic institutions of societies” and is also influenced by shared mental models and societal discourses about what kinds of actions and thoughts are considered acceptable in society (Giddens, 1984). Access to structural power allows actors to shape societal rules. Structural power also affects an actor’s access to resources. In other words, structural power influences the capacity of actors to exercise dispositional power (Arts & van Tatenhove, 2004)</p>
MTF	<p>The management and transition framework (MTF) has been designed for the study of water systems. This framework takes an evolutionary, process oriented, polycentric approach to analyze the “structural characteristics” and the “processes of change” associated with the governance of water systems. The MTF draws on conceptual approaches from social psychology, complex systems science, adaptive management, and social learning. It aspires to explain outcomes across a range of governance mechanisms. An important theoretical contribution by the MTF is in demonstrating how processes of learning are associated with changes in governance systems (Pahl-Wostl, 2015)</p>
Single-loop, double-loop, and triple-loop learning	<p>The process by which learning can lead to changes in mental models as well as governance change is as follows:</p> <p>The most basic form of learning that can result from actor interactions is single-loop learning. During single-loop learning no changes in mental models, institutions, or governance mechanisms take place. Existing rule systems may be reinterpreted to perform minor changes in work practices. The goal of such reinterpretation is often to improve system performance using existing governance mechanisms (Pahl-Wostl, 2009, 2015)</p> <p>However, actor interactions may often lead to a questioning of the underlying assumptions guiding the prevalent management paradigms. This leads to double-loop learning. Under such circumstances, actors may conclude that the prevailing institutional structure is a barrier to change. This may lead to a conflict between the proponents of change and the proponents of no-change. New ideas may emerge and ideological debates may take place. Established practices may be questioned. Actors may actively seek out new sources of knowledge. Under such circumstances, the prevailing governance mechanism may be questioned and actors may seek to experiment with newer rule systems. Double-loop learning may therefore weaken existing management paradigms and existing governance mechanisms (Pahl-Wostl, 2009, 2015)</p> <p>This sets the condition for triple-loop learning to take place which is accompanied by change in the “reigning paradigm” at the collective level and the establishment of a new management paradigm. Actor interactions are dominated by discussions about the new management paradigm. Gradually, newer governance mechanisms get implemented (Pahl-Wostl, 2009, 2015)</p>
Coalitions, coalition levels, and coalition characteristics	<p>A coalition is a group of actors who share the same mental models and who work together over time to achieve common goals (Schlager, 1995)</p> <p>In this article, actor interactions are analyzed using a nested structure of three different levels of coalitions: action arenas, action situations, and issue networks (Cairney & Heikkila, 2014). Issue networks lie within action situations. Action situations are “embedded” in action arenas. A water system consists of various action arenas (Pahl-Wostl, 2015)</p> <p>Coalitions at different levels differ in terms of characteristics such as size, membership, composition, power structure, levels of conflict, consensus</p>
Issue networks	<p>An issue network is a coalition where actors are bound together loosely by a common interest in an issue (Hecllo, 1978)</p>
Action situation and action arena	<p>An action situation represents a venue where actors interact with each other (Pahl-Wostl, 2015; Pahl-Wostl, Knieper, & Holtz, 2015)</p>

TABLE 1 (Continued)

Definitions, introduction to key concepts, acronyms, and key definitions of various individual and shared mental models	
	The political context within which action situations operate is specified by an action arena. Each action arena is associated with a specific policy sector "such as flood protection or water supply" (Pahl-Wostl, 2015; Pahl-Wostl et al., 2015) A "sequences of linked" action situations can be used to represent any learning or policy process within an action arena (Pahl-Wostl, 2015; Pahl-Wostl et al., 2015)
Process-tracing	Process-tracing is the step-wise analysis of change using a sequence of variables interacting with each other at each step with interactions at each step leading to events in the next step. Process-tracing enables researchers to analyze how events have "unfolded" over time. Therefore, the first step is to identify the time-period of interest: that is, the start-date and the end-date during which events will be analyzed. The next step is to identify the events-of-interest. In order to properly analyze the unfolding of events over time, researchers need to first describe every event as they occurred at particular points in time. Therefore, process-tracing begins by developing "snapshots" of every event as they occurred over time. Once the period-of-interest and the events-of-interest have been identified, a time-line is prepared, delineating how the sequence of events unfolded over time. The final step is to analyze and explain this "unfolding" of events: how and why event-A led to event-B and so forth, that is, "tracing" the process of change from the beginning of the period-of-interest to the end. This is done using the concepts-of-interest: by explaining how at every step in the sequence, various independent variables interacted with each other to bring about change. This is done by drawing on empirical data on the concepts-of-interest: the "facts" of the case (Collier, 2011)
"Crucial" case	A case is crucial "if the facts of that case are central to the confirmation or disconfirmation of a theory" (Eckstein, 1975)
<i>(b) Acronyms</i>	
BDA	Bengaluru Development Authority
BBMP	Bruhat Bengaluru Mahanagara Palike
LDA	Lake Development Authority
ESG	Environmental Support Group
PPP	Public-private partnership
PIL	Public interest litigation
MoU	Memorandum of understanding
<i>(c) Key definitions of various individual and shared mental models</i>	
Shared mental model (SMM1)	Public agencies are the sole custodians of the city's lakes and therefore they will act in public interest. According to this shared mental model nongovernmental actors are viewed as bystanders in the governance process
Shared mental model (SMM2)	Communities can successfully organize themselves and undertake lake conservation activities on their own without active involvement of public agencies
Shared mental model (SMM3)	Both public agencies as well as communities need to work together for successful rejuvenation and conservation of the city's lakes
Individual mental model (IMM1)	Skepticism about whether public agencies always act in public interest
Individual mental model (IMM1a)	Officials of the Lake development authority were using the public-private partnership route to indulge in private profiteering while ignoring the larger interests of the city
Individual mental model (IMM2)	Communities can successfully organize themselves and undertake lake conservation activities on their own without active involvement of public agencies

nested within action situations² (Figure 1b). In other words, water governance can be analyzed using a *three-layered* structure of three different kinds of coalitions (Cairney & Heikkila, 2014).

The first level consists of various action arenas. In any action arena the common binding element is that all actors are engaged in collective action directed at tackling the same societal issue "such as flood protection or water supply." Different action arenas are associated with different issues (Pahl-Wostl, 2015). If issues overlap across action arenas, events within one action arena may influence events in a neighboring action arena.

The second level consists of action situations. Actors and their action situations are "embedded" in action arenas. An action situation represents a venue where actors interact with each other. As actors

get involved in governance they repeatedly interact with each other and also with their biophysical world in order to find solutions to governance problems. Processes of governance can therefore be characterized as a sequence of linked action situations (Figure 1a). Interactions with an action situation can generate three types of outcomes: institutions, knowledge, or operational outcomes. Such outcomes influence other action situations.

The third level consists of action situations. Any action situation consists of various overlapping issues networks (Figure 1b). Within an issue network, actors are bound together loosely by a common interest in an issue. In comparison to action arenas and action situations issue networks are more fluid in nature—changing shape and size—as interest in the associated issues changes (Hecl, 1978;

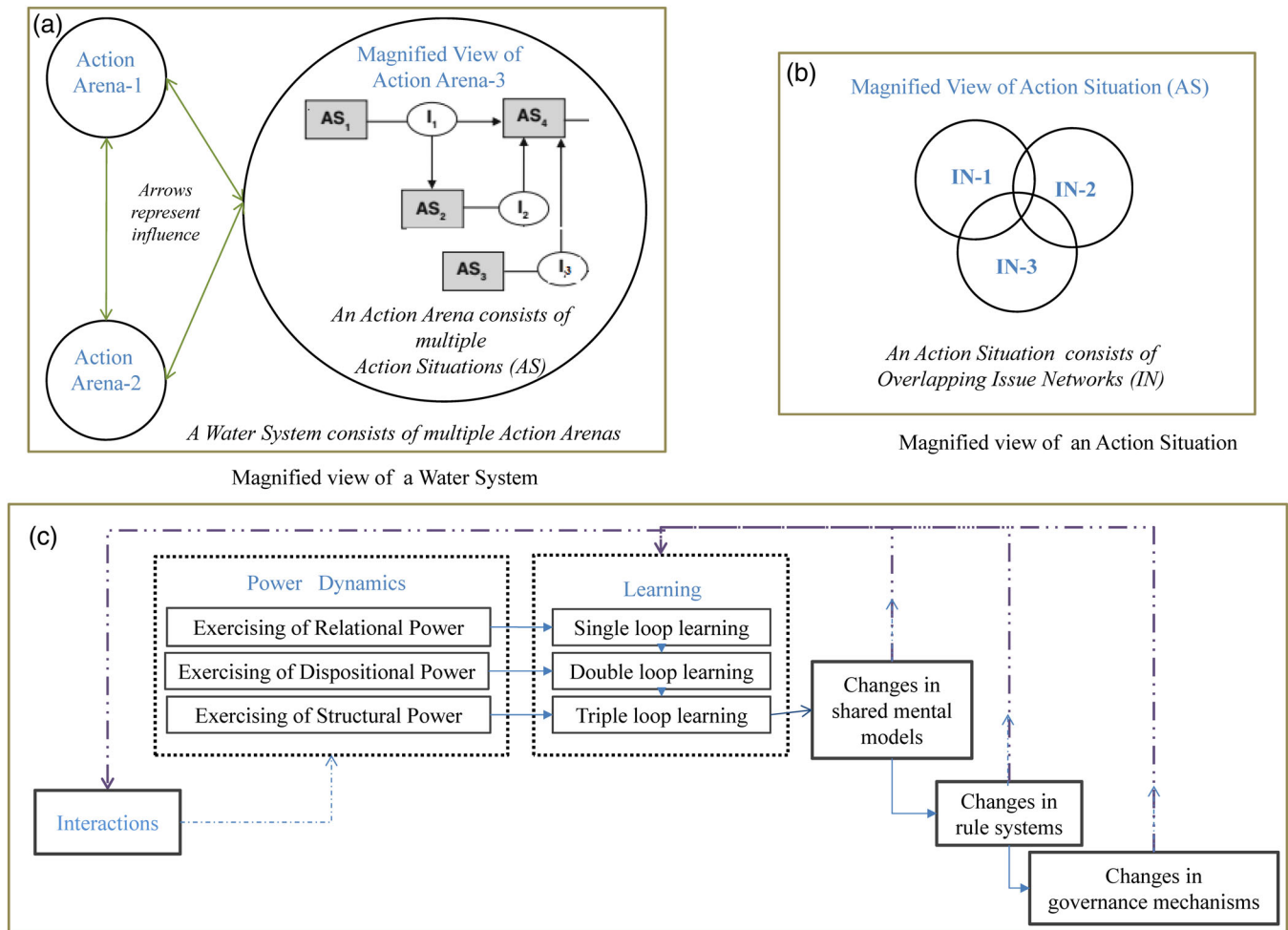


FIGURE 1 Diagrammatic representation of analytical approach. Adapted from Pahl-Wostl, Knieper, and Holtz (2015) [Color figure can be viewed at wileyonlinelibrary.com]

Michaels, 1992; Nyland, 1995; Rhodes, 2006). There is no fixed power structure within issue networks; the distribution of power is diffuse (Jordan, 1981; Jordan & Schubert, 1992). "Conflict is ever-present" but consensus is sometimes reached (Jordan, 1981; Marsh & Rhodes, 1992). Actors within an issue network often establish links with external actors in order to achieve common goals (Henry, 2011). As actors interact with each other in order to move toward issue resolution they "reinforce each other's sense of issues." This leads to the development of shared mental models about governance (Nyland, 1995). Every action arena is thus characterized by a "dominant" shared mental model (Pahl-Wostl, 2015).

Water systems are subject to various rule systems framed by state actors. Existing rule systems may discourage change. If power is concentrated in the hands of dominant actors (such as state actors or monopolistic economic actors) such that other actors have limited leverage then society is characterized by *stable* governance mechanisms (Arts & van Tatenhove, 2004). Similarly, interactions amongst actors operating under the *same* "shared mental model" or holding similar "individual mental models" often lead to reconfirmation of

existing mental models. This leads to inertia in the system and institutional change becomes difficult (Pahl-Wostl, 2015, p. 66).

However, interactions amongst actors operating under *different* "shared mental models" or holding different "individual mental models" may initiate processes of learning and lead to changes in mental models (Figure 1c). Nonetheless, such interactions are not sufficient for mental models to change to a different, stable version. Learning will take place only if interactions are accompanied by processes of critical reflection which force actors to acknowledge the presence of mental models other than their own.

The simplest form of learning that results from actor interactions is *single-loop learning*. During single-loop learning no changes in mental models or governance mechanisms take place. Existing rule systems may be reinterpreted to perform minor changes in work practices. The exercising of *relational* power also leads to minor changes in work practices or results in reinterpretation of existing rule systems. The goal of such reinterpretation is often to improve system performance using existing governance mechanisms. At this stage no changes in institutions or governance mechanisms take place. However, actor

interactions may often lead to questioning of the underlying assumptions guiding the prevalent “shared mental models.”

This leads to *double-loop learning*. Under such circumstances actors may conclude that the prevailing institutional structure is a barrier to change. This may lead to conflict between the proponents of change and no-change. Ideological debates may take place. Established practices may be questioned. Actors may actively seek out new sources of knowledge. The exercising of *dispositional* power also enables actors to challenge the rules of the game or to increase their access to resources. Under such circumstances the prevailing governance mechanism may be questioned and actors may seek to experiment with newer rule systems. Double-loop learning may therefore weaken existing “shared mental models” and existing governance mechanisms.

This sets the condition for *triple-loop learning* to take place which is accompanied by the establishment of a new “shared mental model.” Actor interactions are dominated by discussions about the new “shared mental model.” Gradually newer governance mechanisms get implemented. The exercising of *structural* power also leads to the implementation of a new governance mechanism (Arts & van Tatenhove, 2004; Pahl-Wostl, 2015, pp. 59–62; 167–169).

3 | METHODOLOGY

A qualitative research methodology consisting of in-depth, within-case analysis and process-tracing has been used in this article. This is because this article seeks to capture an intricate, complex picture of how multiple variables interacted with each other to bring about change. Therefore no attempt has been made to quantify causality.

The unit of analysis is the series of events associated with governance evolution. Therefore the case selected is an example of a “crucial” case.³ The governance of Bangalore lakes is a crucial case for analyzing transition from “governance by a unitary state” to “governance by partnerships” (Rhodes, 2006). This is because governance change associated with some of Bangalore's lakes is one amongst only a few successful examples of such change, especially in developing countries (Unnikrishnan & Nagendra, 2015).

Data for this case study was collected in three different phases: June 2012 to August 2012, May 2013 to August 2013 and December 2014 to August 2015. Three kinds of data collection methods were used: semi-structured interviews, archival/library research and secondary research. Eighty respondents were interviewed. All respondents in their individual capacities are actively associated with local lake-groups. The age and occupational profile varied: most respondents had a full-time, paid job; some were home-makers; and some were retired senior citizens. The gender profile was fairly well-balanced. For a more detailed discussion of respondent profile, refer to Data S1.

A purposeful, snowball sampling technique was used for respondent selection—and this was continued till saturation was reached. Initial respondents were identified from media reports and from the websites of lake-groups and nonprofits. Respondents who agreed to

participate in the research were then interviewed. A detailed questionnaire was used during these interviews. Each interview typically lasted for about 90 min. A range of topics was covered—history of the lake, major events associated with the governance of the lake, etc. Respondents were also asked if their views about lake governance, and about the role of various stakeholders in lake governance had changed over time and how such change occurred. These interviews were then transcribed. Coding categories were developed based on themes that emerged during the interviews and from literature review. The phrasing of interview questions was based on the concepts-of-interest as discussed in Section 2: actor mental models, power, learning, and governance change. Therefore, the following codes emerged directly from the interview questions: mental model, way of thinking, governance model, ideology of governance, etc. Additional rounds of coding generated codes such as: paradigm, ideas about governance, why did government do this, why did civil-society actors perform such an action.

Newspaper articles, reports, policy documents and judicial rulings were coded in parallel. Newspaper cuttings were collected from all major English newspapers in the city—any cutting which covered news associated with lake governance was collected—primarily for the period 1985 to 2013. This article focusses only on key-events between 1985 and 2013. All publicly available reports and all publicly available policy documents and judicial rulings were collected. A detailed sequence of events was constructed in order to understand the governance change over time.

The coded categories were supported by multiple forms of evidence (triangulation)—interview-data and secondary data; stories, narrative experiences and media reports. During triangulation not only was interview-data mapped with secondary data but interview-data from different kinds of respondents was cross-checked; and reports from multiple newspapers were cross-referenced. Wherever contradictions arose the information was discarded. Themes and sub-themes were identified till saturation was reached. Links and interconnections between themes and categories were analyzed for patterned regularities. This was an iterative process—“soaking & poking” (George & Bennett, 2005). Coding generated a rich dataset of information on respondents' mental models. This dataset of quotes was then interpreted to understand how mental models about lake governance had evolved over time: identifying which period of time was being referred to, identifying whether the mental model was individual or collective, identifying change, etc. The coded information was then mapped onto the sequence of events in order to understand governance transition over time. A detailed case study was then constructed from this analysis. For additional details on the methodology followed for characterizing the mental models about lake governance, refer to Data S1.

4 | CASE ANALYSIS

Bangalore was founded in 1537. Urbanization began under British rule; but, picked up pace after independence in 1945, transforming

the city into a bustling metropolis (Unnikrishnan, Manjunatha, & Nagendra, 2016). Between 1945 and 1973, built-up area in Bangalore grew at a rate three times that witnessed between 1912 and 1945, and then between, 1973 and 1980, the built-up area in the region grew at a rate two times that witnessed between 1945 and 1973 (Gopalan, 2011; Ramachandra et al. 2017a, 2017b). This rapid rate of urbanization alarmed water administrators in the city. This is because the city has traditionally depended on its lakes for meeting the water needs of its citizens; but, increasing demand for land lead to widespread encroachment of lake-beds (Unnikrishnan et al., 2016). Such processes of urbanization continue to transform water governance in the city (see Ramachandra et al. 2017a, 2017b; Map 1). However other socio-political processes are also at play. The following analysis examines these socio-political processes in greater detail. See Figure 2 for a pictographic summarization of key-events and associated influence of explanatory variables.

The water sector in the Indian city of Bangalore is associated with various action arenas: the arena on conservation of lakes, the arena on protection of open spaces and others. The focal action arena of interest is the one associated with the conservation of the lakes (*Lakes-Arena*). In this action arena all actors are bound by a common interest in ensuring the continued survival of the city's lakes. Action situations in other action arenas (for instance, the arena on protection of open spaces) have also influenced happenings in the Lakes-Arena. This article analyzes only those action situations (across action arenas) which have influenced the governance of lakes. As discussed earlier, this article focusses only on key-events between 1985 and 2013.

In July 1985, the Government of Karnataka constituted an expert-committee (the Laksman Rau Committee) to recommend solutions for protecting the region's lakes (Comptroller and Auditor General of India, 2015). Interactions within this action situation led to an institutional outcome—the constitution of the Laksman Rau Committee. Activity then shifted to a new action situation. The Committee produced a report⁴ which argued that the threat to lakes in the city was real—that while there had been 261 “live” lakes in Bangalore in 1961, by the time the committee submitted its report in 1986 the

number of “live” lakes in the region had dwindled to 81. The ownership of these 81 “live” lakes was transferred⁵ to the Karnataka Forest Department in February 1988. However, this did little to change ground realities—destruction of the lakes continued unabated till the year 2002⁶ (Narain, 2012; Thippaiah, 2009).

In other words, the Lakes-Arena entered a long period of stability which continued till early 2002. Rule systems remained consistent. No governance change took place. Mental models remained stable (see Table 1 for characterization of various mental models). For a long period of time, the predominant shared mental model (*SMM*₁) shaping the governance of lakes in the Lakes-Arena has been that public agencies are the sole custodians of the city's lakes and therefore they will act in public interest. According to this shared mental model non-governmental actors are viewed as bystanders in the governance process. The predominance of state actors as the main drivers of policy-making in the Arena probably led to the development of such a shared mental model. Consequently civil-society activists have typically had minimal say in governance. However, public agencies had their own share of problems—lack of well-trained personnel, inability to procure sufficient financial resources to solve public problems, etc. So when the Laksman Rau Committee turned to the Forest Department to manage the city's lakes, the department was unable to rise to the challenge (Thippaiah, 2009).

By 2002 the Forest Department had not been successful in preserving the city's lakes. However, the Government of Karnataka was committed to doing so. Within government circles it was felt that an agency dedicated full-time to lake conservation would do a better job. This led to the next action situation of consequence: a Lake Development Authority (LDA) was constituted by the Government of Karnataka “for the regeneration and conservation of lakes in and around Bangalore city” (Narain, 2012).

However, this agency too was hamstrung for funds. This led to the development of the public-private partnership scheme based on the rationale that leasing out lakes to private players would generate funds for lake maintenance while at the same time reducing the burden on public agencies (D'Souza, 2008; Narain, 2012). Therefore,

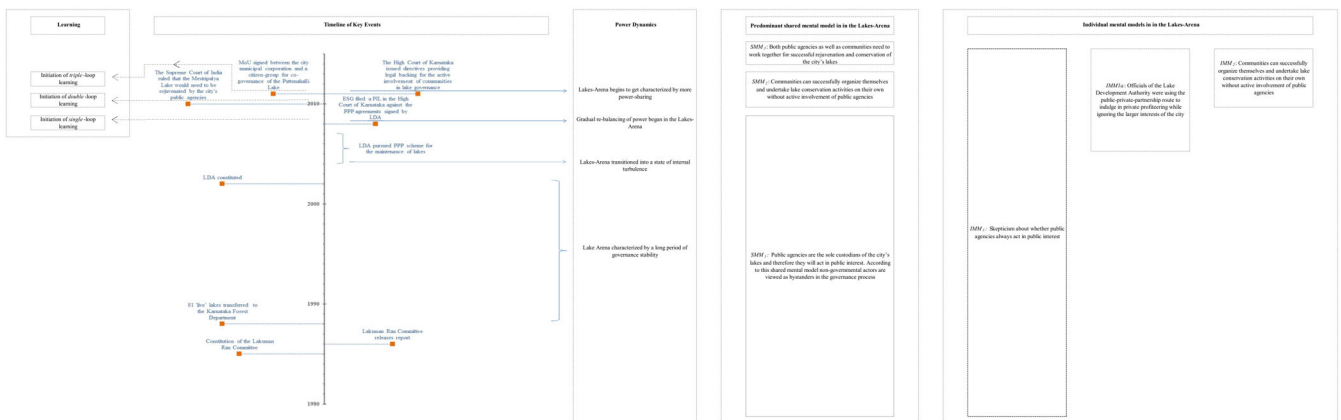


FIGURE 2 Pictographic representation of governance change [Color figure can be viewed at wileyonlinelibrary.com]

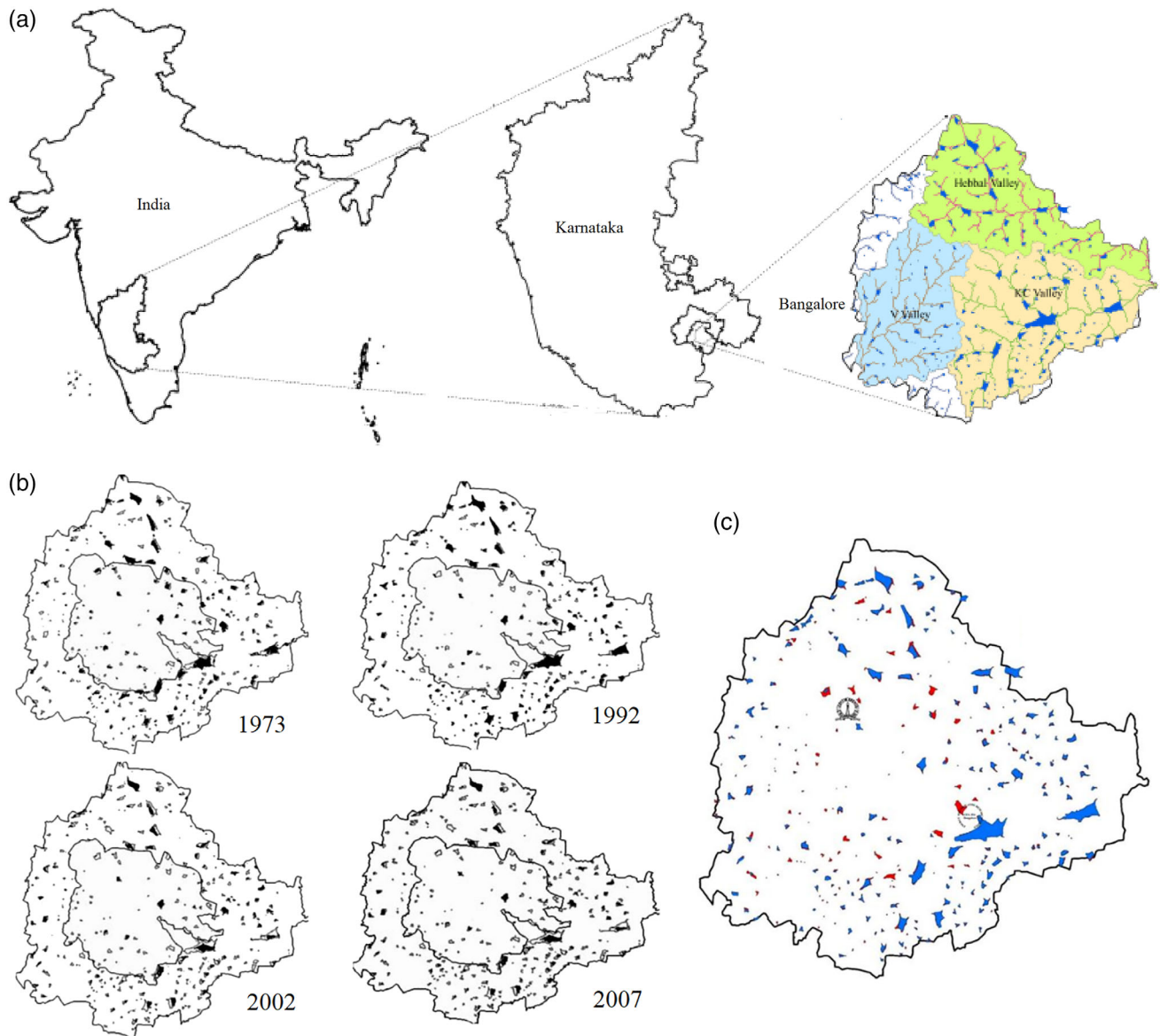


FIGURE 3 MAP1. Study site. Adapted from Ramachandra et al. (2017a, 2017b) [Color figure can be viewed at wileyonlinelibrary.com]

between 2004 and 2007 in a series of consecutive action situations the agency aggressively pursued a public–private partnership scheme for the maintenance of lakes (D'Souza, 2008; Thippaiah, 2009). Soon reports began to emerge that it was planning to lease out at least 30 more lakes to private players (D'Souza, 2008; Saldanha & Subramanya, 2011; Yeshwanth, 2007b).

Knowledge about these public–private partnership agreements was reinterpreted by local communities to substantiate the mental model (IMM_{1a}) that officials of the LDA were using the public–private partnership route to indulge in private profiteering while ignoring the larger interests of the city. The efficiency rationale—that public agencies in the city were resource-strapped and therefore men and money had to be infused into the Lakes-Arena from external sources in order to better govern the city's lakes—was rejected. However, local communities in this Lakes-Arena have also held other individuals mental

models which have sometimes been at variance with the dominant shared mental model (SMM_1). For instance, nonprofit organizations have often subscribed to a mental model (IMM_1) that has been skeptical of whether public agencies always act in public interest. The mental model (IMM_{1a}) that officials of the LDA were using the public–private partnership route to indulge in private profiteering while ignoring the larger interests of the city is a variant of IMM_1 that public agencies do not always act in public interest. LDA's decisions therefore brought the dominant shared mental model (SMM_1) prevalent in the Lakes-Arena in conflict with IMM_1 . Local communities were consequently alarmed by the turn of events and the Lakes-Arena transitioned into a state of internal turbulence. Protests erupted across the city (Narain, 2012).

Protests against lake-privatization fell on deaf ears. The dominance of state actors in the rule-making process was so entrenched



that they remained complacent and refused to pay heed. This left only one option in the hands of civil-society activists—seek an alliance with the judiciary; and, file public interest litigation. Therefore, in April 2008 the Environmental Support Group (ESG), a Bangalore-based nonprofit, filed a public interest litigation in the High Court of Karnataka against the public–private partnership agreements signed by the LDA. Action shifted to a new action situation. Between April 2008 and April 2011 as litigation continued the conditions of Bangalore's lakes continued to deteriorate. The local media continued to advocate for improved lake conditions. Local communities decided to take charge. Exhibiting relational power amongst themselves they began to organize themselves in groups and repeatedly petitioned public officials and local politicians to take action (Rajagopal, 2009). The pressure tactics worked. Public officials gave into the demands of these communities and minor stop-gap maintenance activities were conducted in a few lakes. A gradual rebalancing of the power began to take place in the Lakes-Arena. As communities interacted with public officials constantly bringing to their notice evidence of deteriorating lake conditions single-loop learning took place and public officials implemented minor technical solutions to ensure short-term improvements in lake conditions.

However, public officials refused to initiate large-scale rejuvenation activities until the impasse created by the litigation was resolved. Citizen-groups were appalled by such displays of bureaucratic apathy. Emboldened by earlier experiences in successfully pressurizing public officials and demonstrating increased awareness in the relational power possessed by self-organized groups citizen-groups becoming more involved in lake maintenance. As a first step they organized lake-cleaning drives (Khandekar, 2009). These drives led to massive mobilization in local communities and resulted in increased awareness about the deteriorating lakes.

Around the same time events in an adjoining action arena began to influence interactions within the Lakes-Arena. This adjoining action arena (the *Spaces-Arena*) was associated with the protection of open spaces in Bangalore. In this action arena the judiciary delivered a landmark judgment that tipped the balance of power in favor of civil-society organizations: in February 2010 the Supreme Court of India ruled that a piece of public land in Bangalore which had been encroached by miscreants in active collusion with public officials should be treated as an open public space (Vittal, 2010). Coincidentally this piece of land also held a dried-up-lake named Mestripalya Lake and the judiciary ruled that the lake would need to be rejuvenated by the city's public agencies. This decision by the judiciary in the *Spaces-Arena* further strengthened the hands of civil-society actors in the Lakes-Arena and increased the amount of dispositional power available to them. It legitimized the role of civil-society actors in lake governance and increased the capacity of these actors to exercise relational power. The decision also validated the mental model (IMM_1) held by nonprofits that public agencies had not been acting in public interest.

As the balance of power began to tilt toward civil society, interest in conserving local lakes took shape separately in the minds of disparate actors living around the lakes. Over a period of time, these actors

gradually met each other in informal settings—say while taking a walk around the lake or at various local events. During these early interactions they discovered that they share a common interest in conserving the local lake. The resolve to conserve their lake strengthened in their minds and they started building networks of like-minded actors within their local communities. This resulted in the formation of a large number of issue networks across the city. These issue networks began to meet regularly interacting jointly with public officials and planning lake-related activities (Rajagopal, 2009).

As civil-society actors organized themselves collectively in these issue networks they were able to channelize their collective relational powers in their interactions with state actors. They carried out signature campaigns—collecting signatures from residents living around the lakes and petitioning local politicians and public officials—as a way of demonstrating active public interest in lake conservation. They also conducted tree-planting activities in the land adjoining lakes (Amilineni, 2010). Various water and lake-related events began to be organized in residential complexes around the lakes (Chakraborty, 2010).

Actors from academia began to join the issue networks. They conducted scientific studies on lake conditions and shared their findings publicly. Local communities held these experts in high regard; they were believed to be acting without bias in the larger public interest—their reports attained widespread legitimacy and were reported widely by the local media (Navya, 2010; Subhashchandra, 2009). These reports substantiated visual observations about deteriorating lake conditions and further validated the mental model (IMM_1) held by nonprofits that public agencies had not been acting in public interest.

These events created conditions for second-loop learning to take place in the Lakes-Arena. As actors interacted regularly with each other in various issue networks a new mental model (IMM_2) began to form in the minds of these actors—that communities can successfully organize themselves and undertake lake conservation activities on their own without active involvement of public agencies. Under the influence of mental models IMM_1 (that public agencies do not always act in public interest) and IMM_2 actors began to question the validity of the shared mental model SMM_1 (that nongovernmental actors had no role to play in lake governance). Interactions within issue networks led actors to search for alternate models of lake governance. Second-loop learning took place and lake rejuvenation activities began experimentally in a few lakes.

As second-loop learning took place and as lake rejuvenation activities began experimentally in a few lakes, in April 2011, the High Court of Karnataka using the structural power vested on it by the Constitution of India issued directives to the Government of Karnataka which providing legal backing for the active involvement of communities in lake governance (Aleem, 2007; Jain, 2007; Narain, 2012; Yeshwanth, 2007a). This increased the amount of dispositional power available to local communities—they could now formulate rules for lake governance. Rule-making was no longer confined to state actors. This created conditions within the Lakes-Arena for triple-loop learning to take place. In May 2011 a Memorandum of Understanding was

signed between the city municipal corporation and a citizen-group for co-governance of the Puttenahalli Lake—signaling the beginning of public-community partnerships for lake governance in the city (Rajagopal, 2011a, 2011b).

The various issue networks which had sprung up around various lakes often overlapped with each. This is because some actors (such as academics, city-level activists) were involved in multiple issue networks. As these actors moved around in different issue networks they felt the need to bring all the issue networks under a single umbrella. This led to the formation of a city-wide issue network under the aegis of the “Save Bangalore Lakes” group. Various lake-level issue networks coalesced into this city-level issue network as nested entities. The expanded issue network began to act as a venue for vigorous debates on lake rejuvenation. Knowledge sharing activities—workshops, discussion forums—were organized (Mohan, 2009; Vijay, 2010).

The shared mental model (SMM_1) that nongovernmental actors had no role to play in lake governance began to be questioned both by state actors and civil-society actors. Public agencies demonstrated increased willingness to share power with local communities—they began to encourage local communities to initiate agreements with the city's public agencies for joint management and governance of the lake. Public agencies and local communities no longer looked at each other as adversaries—but as partners.

Under the influence of IMM_1 (that public agencies do not always act in public interest) and IMM_2 a new shared mental (SMM_2) model began to take shape in the Lakes-Arena. This new shared mental model held that communities can successfully organize themselves and undertake lake conservation activities on their own without active involvement of public agencies.

As actors shared information with each other in the city-level issue network and as the city witnessed vigorous public debate proponents subscribing to shared mental models SMM_1 and SMM_2 often came in conflict with each other. As more and more local communities began to collaborate with public agencies for rejuvenating the lakes in their neighborhood triple-loop learning took place and a new mental model emerged from the ashes of the debates over models SMM_1 and SMM_2 . According to this shared mental model (SMM_3) both public agencies as well as communities need to work together for successful rejuvenation and conservation of the city's lakes.

As this shared mental model began to take hold in the Lakes-Arena, more and more collaborative arrangements began to be worked out for lake governance. By 2013 communities associated with at least 51 lakes in the city were involved in lake conservation (Mapunity, 2013). Two of the most successful examples of such collaborative arrangements can be found in Puttenahalli Lake and Kaikondrahalli Lake. In May 2011, PNLIT signed a Memorandum of Understanding (MoU) with BBMP for joint management and governance of the Puttenahalli Lake, in the process becoming “the first residents group in Bengaluru to take charge of maintaining a lake” (Rajagopal, 2011a, 2011b). The lake-group associated with the Kaikondrahalli Lake too followed a similar trajectory—a formal trust (MAPSAS) for lake governance was registered in the second-half of 2011, followed by the signing of a MoU with BBMP for joint

management and governance of the lake. In other words, mechanisms of lake governance in the city had transformed and public-community partnerships became the dominant mode of lake governance in Bangalore.

5 | DISCUSSION AND CONCLUSION

Governance transition is a messy process; sometimes they succeed (Hall et al., 2009); sometimes they fail (Sandström et al., 2014). Even when successful, the change may be transient: processes of transformation may get undone and the system may revert back to the original form (Murtagh, 2008). Amongst those cases in which change is more long-lasting, a plurality of governance arrangements may coexist (Atkinson & Coleman, 1989)—such as the case of lake governance in the Indian city of Bangalore. India is characterized by a quasi-federal system of governance in which, since independence, power is centralized and concentrated in the hands of state actors (Lijphart, 1996). Nonetheless, the governance of some of the lakes in Bangalore has become characterized by co-governance arrangements in which communities have a large say. Such change became possible only because large sections of society became convinced that the lakes would remain safe under the control of local communities; that, state actors were not always acting in the larger interests of society; and, that the lakes can be better governed when partnerships develop between state and society. This change first took place in the minds of actors (as reflected by the changing mental models) which compelled them to work together with each other to force state actors to devolve power. State actors actively resisted such change. Nonetheless changes in mental models occurred via processes of societal learning. Learning took place because nonstate actors continuously interacted with each other—building new alliances and trying out different approaches for protecting the lakes from encroachment. In other words, as argued by Nyland (1995), nonstate actors play important roles in water governance—roles which are often not captured by studies in the policy sciences. For instance, consider what happened in Bangalore between 2008 and 2011 when the lakes were under litigation and public officials were unwilling to undertake lake maintenance activities: local communities willingly took over management of the lakes. In other words, the absence of the state does not always indicate the absence of governance.

In the early 1980s, rapid urbanization forced state actors to begin searching for governance mechanisms which could prevent the destruction of Bangalore's lakes. Urbanization and other such geophysical processes are still influencing the condition of the lakes. To counteract the effect of such processes some scholars have proposed engineering solutions (Ramachandra et al. 2017a, 2017b). The question of whether such engineering solutions have protected the lakes is outside the scope of this article and is an area of further research. Nonetheless, this article has demonstrated that aside from geophysical and engineering processes, various social and political processes also influenced lake conditions: local communities interacted with each other and with state actors; such interactions led to societal



learning resulting in governance change. In other words, transition occurred via complex interaction amongst multiple socio-scientific variables. The study of such complexity would not have been possible without synthesis of multiple theoretical approaches.

Actor interactions are characterized by complexity. In Bangalore, actor interactions took place in different kinds of coalitions. Most theories on governance and policy change assume that society is characterized by only one type of coalition: such theories do not delve deeply into how different types of coalitions influence government interactions differently (Jordan & Schubert, 1992). However, this article argues that ground realities are more complex: three different types of coalitions developed in Bangalore: action arenas, action situations and issue networks. Issue networks are informal coalitions: power differences are minimal. They develop spontaneously and are characterized by networks of nonstate actors (local communities, civil-society organizations, and nonprofit organizations) wherein interactions are directed toward rebalancing power dynamics with state actors. Such interactions are characterized by a variety of proposals on ways to govern lakes. Therefore, issue networks are characterized by continuous conflict. But, such conflict sometimes results in consensus leading to cooperation and eventual change in mental model. Action situations are more formal in nature and consist of both state actors and nonstate actors. Power imbalances characterize interactions amongst such actors. Governance change takes place during interactions in action situations. In other words, only those actors engaged in governance change are part of any action situation. Action arenas are coalitions at the water sector level and include all actors who are a part of the water sector, irrespective of whether they are engaged in governance activities or not.

During governance, the locus of decision-making can be either centralized or diffused. During lake governance in Bangalore, the locus of decision-making has evolved: from a centralized form to a more diffused form. Parallely, governance has become more networked. However, the locus of decision-making in other sectors (such as land) may still be very centralized. In other words, even under a quasi-federal structure such as that exists in India, local governance can be characterized by a multitude of governance arrangements (Jordan & Schubert, 1992). State actors may have been forced to share power with nonstate actors in the water sector; but, their dominance continues unhindered in other sectors. This is probably because there is agreement within the water sector that in order to protect Bangalore's lakes, there is no alternative but to empower local communities. Such agreement may not exist in other sectors.

In other words, it can be hypothesized that policy sectors vary according to the locus of decision-making. If the locus of decision-making is diffused, governance may be more networked (Hecló, 1978). Changes in the locus of decision-making must be accompanied by changes in societal mental models: processes of learning may bring about such transition. Such hypotheses need to be tested using: (a) large-N, quantitative regression analysis for verifying causality; (b) multicity, comparative case studies for verifying external validity; and (c) process-tracing at the individual lake-level in

Bangalore for verifying internal validity. Only then can the findings from this study be more generalizable.

In conclusion, an area for future research: this article has not discussed the implications of certain events which took place between 1985 and 2002. For instance, the number of wards was increased within the municipal boundaries periodically—in 1991 and then again in 1995; similarly, a number of lakes repeatedly changed hands amongst various public agencies: BDA, BBMP, the Minor irrigation department, etc. (Sudhira, Ramachandra, & Subrahmanya, 2007). Additional research needs to be conducted on how such events affected the governance of Bangalore's lakes.

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ORCID

Sanchayan Nath  <https://orcid.org/0000-0002-9944-1249>

ENDNOTES

- 1 The transition process for the rest of the lakes in the city is still work-in-progress.
- 2 The MTF adopts the idea of action situations from the IAD framework developed by the Bloomington School of Political Economy.
- 3 For acronyms, definitions, and introduction to key concepts see Table 1.
- 4 Knowledge outcome.
- 5 Operational outcome.
- 6 Henceforth, for the sake of brevity, no further attempt has been made to categorize outcomes into institutional, knowledge, or operational.

REFERENCES

- Aleem, A. (2007, August 15). Candle light vigil against privatisation. *Citizen Matters*.
- Amilineni, S. (2010, June 22). First tree planted at Kaikondrahalli Lake: Satheesh A - Citizen matters, Bangalore News. *Citizen Matters*.
- Armitage, D., Marschke, M., & Plummer, R. (2008). Adaptive co-management and the paradox of learning. *Global Environmental Change*, 18, 86–98. <https://doi.org/10.1016/j.gloenvcha.2007.07.002>
- Arts, B., & van Tatenhove, J. (2004). Policy and power: A conceptual framework between the 'old' and 'new' policy idioms. *Policy Sciences*, 37, 339–356. <https://doi.org/10.1007/s11077-005-0156-9>
- Atkinson, M. M., & Coleman, W. D. (1989). Strong states and weak states: Sectoral policy networks in advanced capitalist economies. *British Journal of Political Science*, 19, 47–67. <https://doi.org/10.1017/S0007123400005317>

- Cairney, P. (2009). Implementation and the governance problem: A pressure participant perspective. *Public Policy and Administration*, 24, 355–377. <https://doi.org/10.1177/0952076709340508>
- Cairney, P., & Heikkilä, T. (2014). A comparison of theories of the policy process. In P. A. Sabatier & C. M. Weible (Eds.), *Theories of the policy process* (Third ed.). Philadelphia, PA: Westview Press.
- Chakraborty, R. (2010, April 20). Residents partner with BBMP to save a lake. *Citizen Matters*.
- Clegg, S. (Ed.). (1989). *Frameworks of power*. London, England: Sage.
- Collier, D. (2011). Understanding process tracing. *Political Science & Politics*, 44(4), 823–830. <https://doi.org/10.1017/S1049096511001429>
- Comptroller and Auditor General of India. 2015. *Performance audit on conservation and ecological restoration of lakes under the jurisdiction of lake development authority and urban local bodies*, Bangalore, India: Report no.1 of the Year 2015.Government of Karnataka.
- Denzau, A. T., & North, D. C. (1994). Shared mental models: Ideologies and institutions. *Kyklos*, 47, 3–31.
- Driessen, P. P. J., Dieperink, C., Laerhoven, F., Runhaar, H. A. C., & Vermeulen, W. J. V. (2012). Towards a conceptual framework for the study of shifts in modes of environmental governance - Experiences from The Netherlands. *Environmental Policy and Governance*, 22, 143–160. <https://doi.org/10.1002/eet.1580>
- D'Souza, R. (2008). *Impact of privatization of lakes in Bangalore*. Bangalore, India: Centre for Education and Documentation.
- Eckstein, H. (1975). Case studies and theory in political science. F. Greenstein & N. Polsby *Handbook of political science*, vol. 7, (79–138). Reading, MA: Addison-Wesley.
- George, A. L., & Bennett, A. (2005). *Case studies and theory development in the social sciences*. Cambridge, MA: MIT.
- Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. Los Angeles, CA: University of California Press.
- Gopalan, K. (2010). Torn in Two: The Tale of Two Bangalores Competing Discourses of Globalization and Localization in India's Informational City Dharna: Bhavan's International. *Journal of Business*, 42, 83. July-December 2010, Available at SSRN: <https://ssrn.com/abstract=2349006>
- Guarneros-Meza, V. (2008). Local governance in Mexico: The cases of two historic-Centre partnerships. *Urban Studies*, 45, 1011–1035. <https://doi.org/10.1177/0042098008089851>
- Hall, P., Kettunen, P., Löfgren, K., & Ringholm, T. (2009). Is there a Nordic approach to questions of democracy in studies of network governance? *Local Government Studies*, 35, 515–538. <https://doi.org/10.1080/03003930903411675>
- Hecló, H. (1978). Issue networks and the executive establishment. In A. S. King (Ed.), *The new American political system*. Washington, DC: American Enterprise Institute for Public Policy Research.
- Henry, A. D. (2011). Ideology, power, and the structure of policy networks. *Policy Studies Journal*, 39, 361–383. <https://doi.org/10.1111/j.1541-0072.2011.00413.x>
- Jain, M. (2007, August 31). Bangalore lakes on lease. *Down to Earth*.
- Jordan, A., Wurzel, R. K. W., & Zito, A. (2005). The rise of 'new' policy instruments in comparative perspective: Has governance eclipsed government? *Political Studies*, 53, 477–496. <https://doi.org/10.1111/j.1467-9248.2005.00540.x>
- Jordan, A. G. (1981). Iron triangles, woolly corporatism and elastic nets: Images of the policy process. *Journal of Public Policy*, 1, 95–123. <https://doi.org/10.1017/S0143814X00001379>
- Jordan, G., & Schubert, K. (1992). A preliminary ordering of policy network labels. *European Journal of Political Research*, 21, 7–27. <https://doi.org/10.1111/j.1475-6765.1992.tb00286.x>
- Khandekar, S. (2009, February 20). Citizens clean Agara lake, strong participation. *Citizen Matters*.
- Lange, P., Driessen, P. P. J., Sauer, A., Bornemann, B., & Burger, P. (2013). Governing towards sustainability—Conceptualizing modes of governance. *Journal of Environmental Policy & Planning*, 15, 403–425. <https://doi.org/10.1080/1523908X.2013.769414>
- Larson, A. M., & Soto, F. (2008). Decentralization of natural resource governance regimes. *Annual Review of Environment and Resources*, 33, 213–239. <https://doi.org/10.1146/annurev.environ.33.020607.095522>
- Lijphart, A. (1996). The puzzle of Indian democracy: A consociational interpretation. *American Political Science Review*, 90(2), 258–268.
- Loorbach, D. (2010). Transition management for sustainable development: A prescriptive, complexity-based governance framework. *Governance*, 23, 161–183. <https://doi.org/10.1111/j.1468-0491.2009.01471.x>
- Lukes, S. (2005). Power and the battle for hearts and minds. *Millennium: Journal of International Studies*, 33, 477–493. <https://doi.org/10.1177/03058298050330031201>
- Mapunity. (2013). *Bangalore lakes on Mapunity groups the spatial social network*. Bangalore, India: Mapunity.
- Marsh, D., & Rhodes, R. A. W. (1992). *Policy networks in British government*, (312). Oxford, UK: . Clarendon Press.
- Michaels, S. (1992). Issue networks and activism. *Review of Policy Research*, 11, 241–258. <https://doi.org/10.1111/j.1541-1338.1992.tb00471.x>
- Mohan, D. (2009, September 9). ESG workshop: Importance of wetlands in urban spaces. *Citizen Matters*.
- Murtagh, C. (2008). A transient transition: The cultural and institutional obstacles impeding the Northern Ireland women's coalition (NIWC) in its progression from informal to formal politics. *Journal of International Women's Studies*, 9(2), 41–58.
- Narain S. 2012. Excreta matters: How urban India is soaking up water, polluting rivers and drowning in its own waste (Vols. 1 and 2).
- Navya, P. K. (2010, September 15). New report raises hope for Bangalore's lakes. *Citizen Matters*.
- Nyland, J. (1995). Issue networks and nonprofit organizations. *Review of Policy Research*, 14, 195–204. <https://doi.org/10.1111/j.1541-1338.1995.tb00632.x>
- Orach, K., & Schlüter, M. (2016). Uncovering the political dimension of social-ecological systems: Contributions from policy process frameworks. *Global Environmental Change*, 40, 13–25. <https://doi.org/10.1016/j.gloenvcha.2016.06.002>
- Pahl-Wostl, C. (2009). A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19(3), 354–365. <https://doi.org/10.1016/j.gloenvcha.2009.06.001>
- Pahl-Wostl, C. (2015). *Water governance in the face of global change: From understanding to transformation* (1st ed.). Cham, Switzerland: Springer International.
- Pahl-Wostl, C.; Knieper, C.; Holtz, G. 2015. *Introduction to the MTF total system database (11c)*, Osnabrück, Germany: .Osnabrück University.
- Rajagopal, U. (2009, April 23). Kere in crisis. *Citizen Matters*.
- Rajagopal, U. (2011a, June 4). A wish that came true. *Citizen Matters*.
- Rajagopal, U. (2011b, May 18). Citizen trust to maintain Puttenahalli Lake. *Citizen Matters*.
- Ramachandra, T. V., Mahapatra, D. M., Shivamurthy, V., & Asulabha, K. S. (2017). *Bellandur and Varthur lakes rejuvenation blueprint. ENVIS technical report: 116*. Bangalore, India: Energy and Wetlands Research Group, Centre for Ecological Sciences, Indian Institute of Science.
- Ramachandra, T. V., Vinay, S., & Aithal, B. H. (2017). *Koramangala floods. ENVIS technical report: 131*. Bangalore, India: Energy & Wetlands Research Group, Centre for ecological sciences, Centre for Ecological Sciences, Indian Institute of Science.
- Rhodes, R. A. W. (2006). Policy network analysis. In M. Moran, M. Rein, & R. E. Goodin (Eds.), *The Oxford handbook of public policy*, Oxford, UK: . Oxford University Press.
- Ribot, J. C., Agrawal, A., & Larson, A. M. (2006). Recentralizing while decentralizing: How national governments reappropriate forest resources. *World Development*, 34, 1864–1886. <https://doi.org/10.1016/j.worlddev.2005.11.020>
- Saldanha L, Subramanya S. 2011. Submission of wise use practices for the protection, management and rehabilitation of lakes in Karnataka with special emphasis on Bangalore and other urban areas: Submission in



- compliance with the directions issued by Hon'ble Justice Mr. N. K. Patil Chairman Karnataka High Court Legal Services Committee. Retrieved from <http://esgindia.org/resources/resources/esgs-pil-protect-lakes-justice-n-k-patil.html>
- Sandström, A., Bodin, Ö., & Crona, B. (2015). Network governance from the top – The case of ecosystem-based coastal and marine management. *Marine Policy*, 55, 57–63. <https://doi.org/10.1016/j.marpol.2015.01.009>
- Sandström, A., Crona, B., & Bodin, Ö. (2014). Legitimacy in co-management: The impact of preexisting structures, social networks and governance strategies. *Environmental Policy and Governance*, 24(1), 60–76. <https://doi.org/10.1002/eet.1633>
- Schlager, E. (1995). Policy making and collective action: Defining coalitions within the advocacy coalition framework. *Policy Sciences*, 28(3), 243–270. <https://doi.org/10.1007/BF01000289>
- Shapiro, M. (2000). Administrative law unbounded: Reflections on government and governance. *Indiana Journal of Global Legal Studies*, 8, 369.
- Subhashchandra, N. S. (2009, September 15). Vanishing lakes: Time to act now. *Deccan Herald*.
- Sudhira, H. S., Ramachandra, T. V., & Subrahmanya, M. B. H. (2007). Bangalore. *Cities*, 24(5), 379–390. <https://doi.org/10.1016/j.cities.2007.04.003>
- Susskind, L. (2013). Water and democracy: new roles for civil society in water governance. *International Journal of Water Resources Development*, 29(4), 666–677. <https://doi.org/10.1080/07900627.2013.781914>
- Thippaiah P. 2009. *Vanishing lakes: A study of Bangalore City*, Bangalore, India: Institute for Social and Economic Change.
- Unnikrishnan, H., & Nagendra, H. (2015). Privatizing the commons: Impact on ecosystem services in Bangalore's lakes. *Urban Ecosystem*, 18, 613–632. <https://doi.org/10.1007/s11252-014-0401-0>
- Unnikrishnan, H., Manjunatha, B., & Nagendra, H. (2016). Contested urban commons. Mapping the transition of a lake to a sports stadium in Bangalore. *International Journal of the Commons*, 10(1), 265–293. <https://doi.org/10.18352/ijc.616>
- Vijay, P. (2010, February 8). The lost lakes of Bengaluru. *Citizen Matters*.
- Vittal, V. (2010, June 19). Citizens, BDA partner to restore key Koramangala kere. *Citizen Matters*.
- Yeshwanth, R. (2007a, June 1). Agara lake conversion stirring up protests. *Citizen Matters*.
- Yeshwanth, R. (2007b, July 1). Will PPP destroy lakes? *Citizen Matters*.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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