

Guest Editorial, part of a Special Feature on [Scale and Governance](#)

Scale and Governance: Conceptual Considerations and Practical Implications

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ABSTRACT. Policies have many unforeseen impacts on social-ecological systems at different levels of spatial and temporal scales. Partly because of this, both scale and governance have been and continue to be hotly debated and studied topics within many scientific disciplines. Although there are two distinct vocabularies, both communities seem to be struggling to come to terms with a shift that has common elements. This special feature has two types of contributions, three scoping papers, providing a state-of-the-art overview of the conceptual discussion, and six case study papers that set out to deal with the practicalities of combining scale and governance. The scoping papers strongly indicate that using the notion of complex systems, specifically the social-ecological system, is needed to improve the understanding of scale and governance. They furthermore confirm that both communities are shifting. Additionally, the papers show several promising ways forward to link scale and governance, even though they differ in their suggestions on most important courses of action and research agendas. The case study papers show that conceptual advances have not been taken up to their full extent in practice. Importantly, none of the papers is being very specific on the definition of the term governance. Additionally, most attention is given to spatial, temporal, and jurisdictional scales, largely ignoring, for example, network and knowledge scales. What is urgently needed are more case study papers that explicitly make use of the conceptual literature and through that attempt to link scale and governance. Ultimately, there is a challenge to more effectively include nonscientists in the debate. A transdisciplinary arena is required where the concepts of scale and governance are framed such that a broad variety of stakeholders can join the debate and/or the decision making process.

Key Words: *governance; scale; social-ecological system*

INTRODUCTION

Policies have many unforeseen impacts on social-ecological systems at different levels of spatial and temporal scales (Wiens and Bachelet 2010). For example, it has been argued that the EU decision to stimulate biofuel production leads to competition of fuel and food crops causing an increase in global food prices affecting local poor populations in underdeveloped countries (van der Horst and Vermeylen 2010, Bryan et al. 2011). Apart from these direct links between policy and agroecosystems at different spatial scales, often unexpected and unforeseen temporal consequences in social-ecological systems exist that find their origin in the multiscale interactions within these systems (Pelosi et al. 2010). These observations fit well within a

long history of disappointments in policy, and management related to our environment indicates that scale-sensitive policies and governance structures are required (Veldkamp et al. 2009).

Scaling and governance may not seem to represent new issues in need of intensified research attention. For in separate studies, they have both been labeled as buzzwords or even growth industries (Henle et al. 2010). With this special feature we hope to demonstrate that governance and scaling issues deserve more attention as a combination, not just in separate studies. We look at this integration as a major challenge for both the social and the natural sciences, in which policy makers need to be engaged as well. To get to transdisciplinarity, that is to say, cooperation between scientists from different

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disciplines as well as policy makers and citizens, innovative vigorous communication between scientists from the natural sciences and the humanities is needed.

Scale

Scales and scaling as determining factors behind many environmental problems have become prominent issues in recent literature (Gibson et al. 2000, Cash et al. 2006, Verburg et al. 2006, Kok et al. 2007). Among scientists and policy makers alike, awareness has grown that current environmental problems manifest themselves at various scales and that action should account for these scales to accurately deal with them (Moreno-Mateos and Comin 2010, Louzao et al. 2011). The multitude of scale-sensitive issues, the sheer complexity of the issue, and the potentially large number of scales that can and sometimes should be considered have spawned an impressive body of evidence (e.g., Gibson et al. 2000, Biggs et al. 2007, Gabriel et al. 2010). Key publications that introduced scaling issues include the groundbreaking work on the Hierarchy Theory by Allen and Starr (1982) and later Robert O'Neill (1988). This theory influenced a range of disciplines including landscape modelers (Verburg and Veldkamp 2005); scenario developers (Kok et al. 2006); and other spatially oriented disciplines such as erosion studies (Schoorl and Veldkamp 2006). The awareness of scale issues gave rise to the recognition of disciplinary related scales, so-called 'scapes.' This introduced scale-sensitive but mono-disciplinary system perceptions such as seascape, soilscape, or mindscape (Veldkamp 2009, Louzao et al. 2011). Thus, the practice of scale-related research in environmental sciences departs from a set of influential theories from ecology. Initially, scale research yielded a wealth of scaling techniques and models in the search for appropriate disciplinary scales to detect relevant levels of organization. The shift toward more integrated theory and practice was initiated by the inclusion of the human factor. As a result, levels of organization became clearer, systems became more complex, and interdisciplinarity a necessity. This culminated in a new research paradigm that advocates cross-scale, integrated methods, including stakeholders (see Baker et al. 2010), accepting an irreducible complexity of the system with humans and powerful actors that can and possibly should influence the system under study (Katz and Fischhendler 2011). In social sciences the scale

issue is less extensively discussed, but with the notable exceptions of political geography and literature on public administration (see Brenner 2001, Jessop 2005). Topics like the organization of public administration across temporal-spatial scales are extensively addressed.

Recently, a small but significant number of papers have addressed the use of scale from an epistemological point of view (see Sayre 2005, Manson 2008, Silver 2008). All note the ontological tension between logical positivism and realism on the one hand, and constructivism and relativism on the other. Particularly political geographers have thoroughly addressed the idea that scales are socially constructed, a notion that is gaining importance. Recognizing the domination of ecological theories, Sayre (2005) for example, states that ecology goes astray if it mistakes the scales of natural processes as sufficient grounds for positivist-reductionist metaphysics. Manson (2008) introduces a 'scale continuum', in which the Hierarchy Theory is placed in the middle, which is thus being put forward as applicable to a range of research questions. Future research will have to show what practical methodologies are needed to deal with this tension.

In short, scale has been and continues to be a hotly debated and studied topic within many scientific disciplines. However, the nature of the debate has markedly changed, at least in part because of the increased interdisciplinary nature of the bulk of the scale-related research. Importantly, scale-related research has to come to terms with epistemologically opposing views on the existence of scale.

Governance

One of the buzzwords of the 2000s in political sciences, public administration, political geography, and human ecology alike is the concept of governance (Ostrom 1999, Pierre 2000, Hooghe 2003, Folke et al. 2005). Additionally, the concept of governance is used and defined within economic sciences such as institutional economics (e.g., Dixit 2004) and ecological economics (Costanza et al. 1999). As a result, there are many definitions of governance. Van Kersbergen and van Waarden (2004) for instance distinguish between nine forms of governance. Pierre (2000) speaks of a "governance continuum", with state-centric approaches at the one end and society-centered

perspectives at the other. State-centric approaches focus on the question 'how states govern.' From this perspective, states do things differently nowadays because they operate in different network formations and use other instruments. However, in this perspective the state is still the engine that keeps the motor running. In contrast, society-centered perspectives even consider the possibility of 'governance without government' (Rhodes 1996).

A particular type of governance concept that has been thriving in research since the 1990s is multilevel governance, accentuating the multilevel or multiscale character of societal problems and the corresponding need to address these problems at multiple levels. It has been suggested that there has been a shift from government to governance. The shift is mostly explained in terms of changes in the relations between governing levels, which no longer represent a hierarchy.

In short, governance has likewise been and continues to be a hotly debated and studied topic within different disciplines. Similarly, it can be argued that changes in the nature of the discussion are related to the increased attention for complex, multiscale system definitions, which in turn is challenging the conceptualization of notions such as system, level, and scale.

Scale and governance

There are clearly two distinct vocabularies, one with regard to scaling and one with regard to governance. However, the conclusion seems valid that both communities are struggling to come to terms with a shift that has common elements. To further elaborate on this hypothesis, the special feature has two types of contributions, three scoping papers and six case study papers. The scoping papers all set out to provide a state-of-the-art overview and conceptual discussion of the efforts to link scale and governance from four different angles, i.e., geographical, ecological, social, and economic, thus giving body to the elaboration of theoretical and conceptual issues. The case study papers are a collection of studies that all specifically set out to deal with the practicalities of scale and governance and their interactions. Contributions include papers by researchers from within the scale and governance program (Mandemaker et al. 2011, van Lieshout et al. 2011), or that are closely related to it. Together they provide a significant contribution to a range of

possible practical solutions when dealing with scale and/or governance.

SCOPING PAPERS: CONCEPTUAL CONSIDERATIONS

The three scoping papers (Termeer et al. 2010, Buizer et al. 2011, Veldkamp et al. 2011) all provide an evaluation of the conceptual issues of linking scale and governance, but from four different starting points covering a broad range of disciplines. In Buizer et al. (2011), scale is introduced using ecological theories, mainly the Hierarchy Theory, whereas governance is predominantly described from using insights from the political sciences. Veldkamp et al. (2011) discuss scale from a geographical/ecology perspective, but the focus is on bridging the gap toward economic governance. Termeer et al. (2010) provide a broad overview of different types of governance, treating scale from a multilevel governance perspective.

There are a number of interesting similarities between the three scoping papers. First, all three papers emphasize the growing complexity of the system and the changing but increasing role of governance and scale in research that attempts to understand the functioning of such a system. Interestingly, all papers present the notion of social-ecological system as a central concept. Particularly because of the disciplinary differences between the scoping papers, this shows a number of things:

1. All perspectives agree that systems are complex and need to be studied as such.
2. The notion of the social-ecological system has successfully engaged scientists from a variety of backgrounds, and provides the necessary basis to address both scale and governance issues.
3. There is indeed a shift in both the way scale and governance are conceptually framed because all papers discuss the notions dynamically.

Second, despite the long history and the overwhelming number of scale-related papers, all three scoping papers use Cash et al. (2006) as the benchmark of the state of the art. For governance, on the other hand, a large number of papers from a variety of disciplines are used to demonstrate the

recent advances. Moreover, the scoping papers are very strong on emphasizing the large diversity in ways that governance is understood in literature. All maneuver carefully in defining how governance will be treated. This seems to hint at the fact that compared with governance, there is more consensus on how scale-related issues can be treated or in the very least, that there is more agreement on use of terminology.

Third, all scoping papers stress that there is no silver bullet solution, with a different view on both scale and governance being appropriate depending on the specific case. Buizer et al. (2011) are strongest on this view by presenting and discussing a framework. Termeer et al. (2010) confirm that there is no best governance approach, drawing an analogue with a similar conclusion on scale by Cash et al. (2006), while also Veldkamp et al. (2011) conclude that there is no single, correct, or best solution.

Finally, and perhaps most importantly, all scoping papers conclude that there is sufficient and promising common ground for further collaboration and integration of scale and governance, not only among scientists, but with policy makers and other relevant stakeholders as well.

Interestingly, despite all commonalities on the description of the state of the art, analysis of the conceptual issues, and the similar starting point, the concretely proposed research agendas differ considerably. Veldkamp et al. (2011) are most clear-cut and propose among others a clearer communication to policy makers and further elaboration of spatial and temporal scale issues. Buizer et al. (2011) make a strong case for introducing “knowledge claims” by creating arenas for the testing and recognition of knowledge claims rather than knowledge. Termeer et al. (2010), finally, make a case that norms need to be developed that allow for evaluating and judging of governance effectiveness.

Summarizing, the three scoping papers confirm that using the notion of complex systems, and particularly the social-ecological system, is a precondition when the understanding of scale and governance is to be improved. They furthermore confirm that both scale and governance are shifting. It also seems more than reasonable to assume that no single solution will exist, either for scale-related issues, governance issues, or in a combination. Most likely because of this, the papers differ in their

suggestions on most important courses of action and research agendas.

CASE STUDY PAPERS: PRACTICAL IMPLICATIONS

Conceptually, all case study papers address the issues of both scale and governance, but the focus and conceptual understanding differs. Of the six case study papers, roughly four deal predominantly with scale (de Blaeij et al. 2011, Turnhout and Boonman-Berson 2011, van Apeldoorn et al. 2011, van Lieshout et al. 2011) and two with governance (Mandemaker et al. 2011, van der Veen and Tagel 2011). The papers show the application of a wide variety of methods, thus also spawning multiple disciplines and theoretical starting points. Methods range from model development and application and a statistical empirical analysis to semistructured interviews. The case studies are somewhat limited in geographical coverage: three are in the Netherlands; two are global; one is in Ethiopia. As with the scoping papers, however, there are a number of general observations that are valid across the six case study papers.

On the conceptual starting points

Despite an agreement on the starting point of complex systems and their properties, there is only one case study paper that does so systematically (van Apeldoorn et al. 2011). In fact, in all other case study papers there is barely any reference to the literature on social-ecological systems and their complexity. Although this does not indicate a lack of understanding, it does hint at an apparent difficulty of embedding the results in the broader concepts that are implicitly used. Similarly, the paper by Cash et al. (2006) is directly used to frame research in only one case (de Blaeij et al. 2011).

On governance

None of the case study papers is very specific on the definition of the term governance. It is either not explicitly referred to or only a general way, mostly using terms such as ‘quality of governance’ or ‘good governance.’ Often governance is treated as synonymous with policy, which is a rather narrow perspective given the broad disciplinary notions as provided in the conceptual papers. At least for the case studies presented here, there seems to either be confusion on how to use the body of literature on

Table 1. Scales as mentioned in Cash et al. (2006) and their occurrence in the six case study papers.

Paper	Scales as mentioned in Cash et al. (2006)							
	space	time	juris.	inst.	man.	netw.	know.	other
Van Apeldoorn et al. 2011	X	X			X			
Mandemaker et al. 2011	X	X	X	X				
Van der Veen and Tagel 2011	X	X	X					
De Blaeij et al. 2011	X		X	X			X	(spatial) beneficiaries, ecosystem services
Turnhout and Boonman-Berson 2011	X		X					
Van Lieshout et al. 2011	X		X					agricultural

juris. = jurisdictional
 inst. = institutional
 man. = management
 netw. = network
 know. = knowledge

governance at a case study level, or a lack of compatibility between methods employed and governance related concepts.

On scale

Scale has been treated very differently in the papers. In two cases scale is regarded as either constructed (Turnhout and Boonman-Berson 2011), or in the very least framed (van Lieshout et al. 2011). In other papers a more realist stance is taken, assuming that scales and levels exist in reality and can be discovered and modeled (notably van Apeldoorn et al. 2011).

On challenges for future research

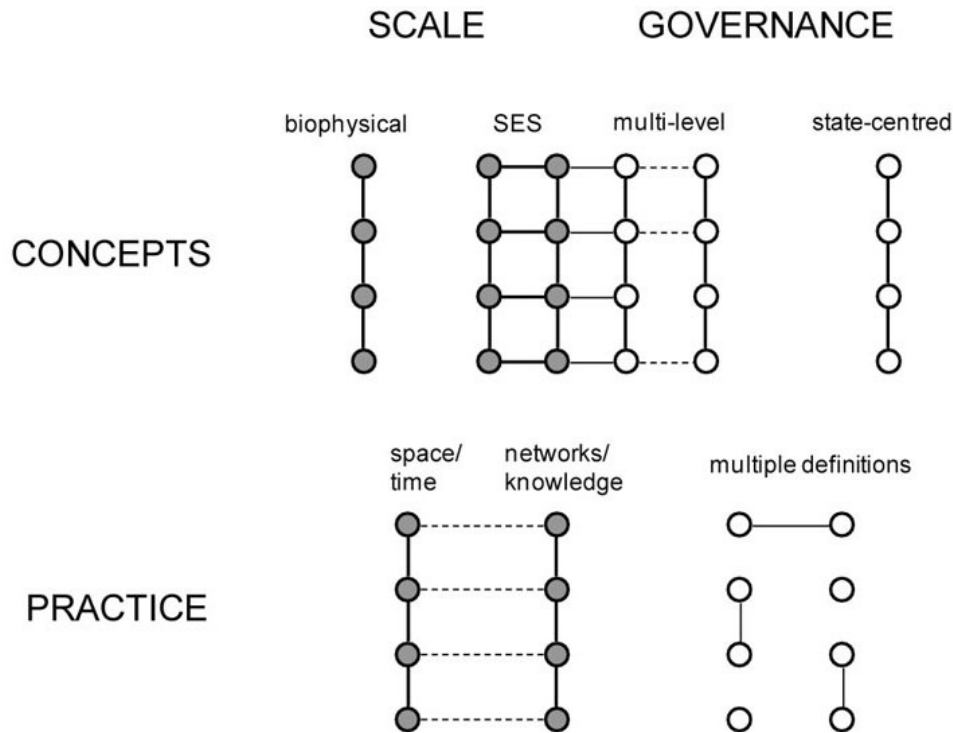
All papers provide challenges for future research. Interestingly, most are related to scale rather than to governance. Two papers (De Blaeij et al. 2011, van Lieshout et al. 2011) specifically mention both cross-scale and cross-level challenges, mostly concerning the jurisdictional scale. This focus on jurisdictional scale is corroborated by two other papers (Mandemaker et al. 2011, van der Veen and Tagel 2011). Turnhout and Boonman-Berson, however, are not in favor of this focus on concepts

and warn for decontextualization and alienation from the practical issues.

Because all papers refer to Cash et al. (2006) in their definition of the relevance of scale, it is worthwhile to check which types of scales as proposed by Cash and his colleagues are used in the case study papers. As can be seen in Table 1, all case studies explicitly mention the importance of spatial scale, while almost all case studies mention jurisdictional scale, either explicitly or implicitly by giving importance to, for example, the national scale. Temporal scale issues are addressed, mostly implicitly, in three papers (Mandemaker et al. 2011, van Apeldoorn et al. 2011, van der Veen and Tagel 2011). Management, institutional, knowledge, and temporal scale are mentioned only one to two times, whereas networks are not mentioned at all. This small sample confirms Cash et al. who state that "... most attention given to scale in studies of human-environment interactions has focused on spatial, temporal, and jurisdictional issues."

There is, however, another possible explanation for the absence of more network-related scales. There is a large and growing body of literature on, for example, social network analysis and flows of

Fig. 1. Schematic illustration of conceptual shifts and practical implications related to the concepts of scale and governance and their interactions. White circles relate to levels of governance; grey circles to levels of scale.



information and knowledge (e.g., Borgatti and Foster 2003, Crona and Hubacek 2010). These explicitly address networks and knowledge scales, yet more often than not they are not spatially explicit and static. Similarly, multiagent systems are focusing on interactions between agents (Hare and Deadman 2004). As such, there is no shortage on literature addressing these scales, both conceptually and practically. The case studies here seem to demonstrate a dependency between spatial scale, i.e., the starting point of all case studies, and jurisdictional scale, where institutions play a minor role, while networks and knowledge are not analyzed at all. In other words, there seems to be a divide in scale-related research with two somewhat separate communities, one operating from a biophysical, spatial starting point, analyzing the role of temporal and jurisdictional scales, and one operating from a social, nonspatial starting point, analyzing the role of networks and information flows, e.g., through social learning. It might well be that these disciplinary-dependent differences in

starting point and methods employed are the underlying causes for the difficulty in bridging the gap between scale and governance.

CONCLUSIONS

Conceptually, large steps forward are made, first with social-ecological systems and scale, and the scoping papers show several promising ways forward to link scale and governance. Important is the observation of recent shifts that have brought both communities closer together and that perhaps makes joint research on scale and governance a necessity. Nevertheless, it seems that these conceptual advances have not been taken up to their full extent in case study work. Practical implications are still in their infancy and research tends to predominantly focus on either scale or governance, while scale-related studies again seem to fall into two separate categories. Figure 1 illustrates the conceptual shifts and practical implications.

The concept of scale seems to be relatively univocally understood and applied. The paper of Cash et al. (2006) is leading and seems to offer the necessary tools. All case study papers demonstrate this. Particularly De Blaeij et al. (2011) nicely illustrate how Cash's concepts can be used to identify cross-scale and cross-level issues. Additionally, however, most papers that touch upon the subject of scale seem to agree that it is most constructive to start from the premise that scales are framed and that the challenge is in knowledge claims rather than in how reality works. This allows bypassing the issue whether scales are real or constructed. Accepting this notion, communication and negotiation, and therefore framing and knowledge claims, then are key in any cross-scale, multidisciplinary research. This could also fuel discussions such as initiated by Steve Manson (2008) and lead to insights on which type of concepts are able to best communicate the differences and then seek for bridging concepts and tools. Relative to scale, the concept of governance is less advanced in this respect. Particularly the lack of a single definition leads to vague use of the term in the case study papers. Conceptual advances clearly are needed.

The scoping papers stress that there is no silver bullet solution, and different views on both scale and governance might be appropriate depending on the specific case. The case studies corroborate this finding with their broad variety of methods and conclusions of future research. However, the case studies also show that the link between new and shifting concepts and practical implications needs to be strengthened. What is urgently needed are more case study papers that explicitly make use of the conceptual literature while providing experimental insights in the value of these concepts (see de Blaeij et al. 2011, van Apeldoorn et al. 2011).

Apart from the need for more communication between the various scientific disciplines involved in scaling and governance issues, there is a clear challenge ahead to more effectively include nonscientists in the debate. A transdisciplinary arena is required in which the concepts of scale and governance are framed such that a broad variety of stakeholders can join the debate and/or the decision making process.

Responses to this article can be read online at:
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