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Tahira Syed

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Tahira Syed

E-mail: tahira.syed@tufts.edu

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Introduction

Understanding multi-scale interactions and their effects across spatial, temporal, and organizational scales are important aspects of designing effective environmental governance policies. Problems of scale are intrinsic to environmental governance, where managing natural resources across political jurisdictions and biophysical scales is a familiar theme in the complex human–environment relations (Cash et al. 2006, Newig & Moss, 2017). Some agreement has emerged that scale is fundamentally a relational concept that is socially constructed and both fluid and fixed (Norman et al. 2015) and must therefore be considered when analyzing effectiveness of environmental governance policies. However, what form such an analysis should take to accurately capture the multifaceted relations and interactions, remains an open question. Given that policies designed for environmental governance often carry objectives at larger geophysical scales of resource management, the design and implementation strategies of such policies must include better description of how different design aspects and implementation measures lead towards long-term sustainability and equitable outcomes (Syed & Choudhury, 2018).

First discussed in Syed et al. 2020, the Scale-Descale-Rescale (SDR) is a new analytical tool in response to the methodological gap for studying scale issues in environmental governance policies. The SDR was used to assess the EU's Water Framework Directive (WFD) at its 20-year milestone and provided a scale-based analysis of the implementation challenges across the Danube River Basin. The SDR analysis showed that such challenges relate not only to the huge variety of riparian states along the Danube, but also to the disparity that occurred between data collected at national and at river basin scales despite concerted efforts to align reporting structures to meet WFD. The difficulty of cross-scale cooperation between biophysical and governance scales requires a cross-spatial and cross-sectoral shift for effective implementation of the WFD (Moss et al. 2020). The SDR provided an important means for studying the WFD and presented how its implementation is not fully effective because policy design takes place at the basin level while the scale of implementation is at the national and sub-basin level.

This paper describes the SDR tool, its various components and how these work in conducting scale-sensitive analysis of environmental governance policies.

Scale-Descale-Rescale (SDR)

Recognizing the operational difficulties of studying the interactions across scales and among levels within one or more scales, scholars such as Cash et al. (2006) and Daniell and Barreteau (2014) describe schematic ways to identify cross-scale and cross-level as well as multi-scale and multi-

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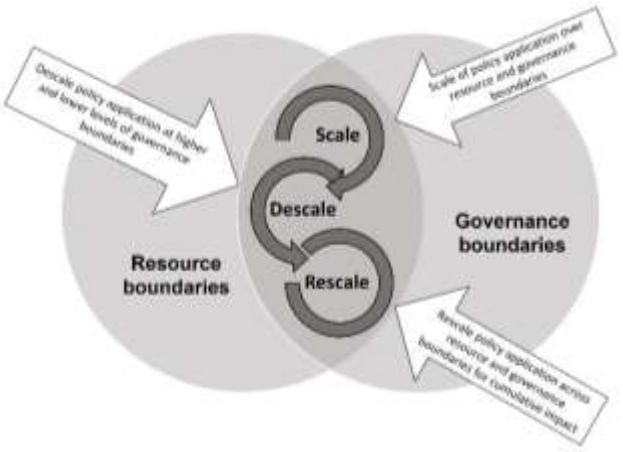
level interactions. However, a frame of analysis that can empirically evaluate these interactions and present them in a meaningful way to show the patterns emerging at different scales and levels is yet to be addressed in research. Applying such a frame of analysis will need accurately establish and account for which scale to start with in order to build a pattern towards cross and multi-scale and level observations. This would involve first identifying and then isolating the scale at which observational data can be collected and analyzed for reaching an empirical inference. Following from establishing a specific scale as a starting point, the interactive patterns will need to emerge by looking outwards towards other levels within that scale as well as other scales and levels. The SDR is a direct response to such problems as it shows how scale can be operationally deployed to a complex system.

The SDR analysis tool is based on the premise that actions at one scale influence outcomes and actions at other scales leading to impacts on the larger system as the human-environment interactions are occurring at different governance and resource boundaries with implications for the whole system. Using examples of transboundary water management policies, the SDR tool covers both physical (sub-basin and basin) and governance (local, national, and multi-country) scales. The SDR uses governance boundaries as set spatial demarcation of decision-making and resource boundaries as the points of decisions interacting with the biophysical demarcation of water as a resource.

Components of SDR

Figure 1. Schematic of scale-descale-rescale



The SDR analytical tool has three distinct components: current scale, descale, rescale (Figure 1) that reframes scale-based interactions in aggregated as well as disaggregated ways. Such reframing of governance and resource scales or boundaries in the SDR tool has certain advantages. First, it creates an observational link between local data with multi-level and multi-scale institutional analysis across scales. Second, it captures the political or power dynamics underpinning the link between various scales and levels as these interact with the policy design features such as planning and participation mechanisms, and policy implementation arrangements including actors and institutions. Third, it generates a disaggregated view of structures, processes, and outcomes to provide a better understanding of possible entry points for change in policy design and implementation. A short description of three components is as follows:

Current scale

The scale at which environmental governance policies are set to produce benefits or policy outcomes and are organized into institutional units for implementation. In analyzing such policies, the SDR tool establishes the current scale of observation in order to build scale and level interactions emanating from the current scale towards multiple levels within that scale or across other scales and levels. Through establishing the current scale for analysis, the SDR considers the resource and governance boundaries at which a given policy applies.

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Descale

The descaling process in the SDR tool, provides the means to study policy design and its implementation through data at governance scales and levels that are higher or lower than the current scale, thus allowing for the comparison of scale-drivers and how these impact the policy outcomes. Descaling is done through extrapolating possible outcomes of policy by considering various components of the policy above [higher] or below [lower] than the current scale at which policy is designed and implemented. The higher or lower levels may entail both or either of the resource and governance boundaries. For instance, water governance policy is often promoted at national scale even for transboundary water resources. Here the descaling process will require looking at the scales beyond national boundaries and above the current scale of policy. In this situation, the SDR tool will allow observing how the same policy if operationalized at another scale may produce outcomes that can inform future national policies or a course-correction within the existing policy to fully achieve national interests.

Rescale

In SDR, the term rescale refers to cumulative analysis through regrouping or aggregating various policy components and interactions therein to evaluate their combined effects on the scale of resource boundary such as transboundary water governance policy design and implementation at river basin scale. In the SDR analysis, the descaling process is followed by rescaling of policy design and implementation to account for cumulative impacts from policy operations. Here much of the normative discussion is based on asking: what will happen if policy operations are coordinated across scales (between local, national, and regional/multi-country spaces)? This question is key to presenting how scale-sensitive environmental governance can translate into scale-aware policy design and implementation to achieve intended outcomes.

Final Remarks

The SDR is a descriptive analytical tool to study scale interactions in a given environmental governance policy that can purposefully select different segments of policy design and implementation arrangements to show the patterns of scale-driven interactions. Using multi- and cross-scale analysis, the SDR tool teases out the underlying interactions and show how basin management and transboundary cooperation cannot be achieved by any single set of actors without acknowledging the interactions at multiple scales. In doing so, the SDR tool sheds light on the significance of scale mismatch to show where a full alignment of politically driven governance boundaries with resource-planning boundaries might be possible. Applied to the cases of transboundary water governance policies (Syed et al. 2020), the SDR tool makes an important contribution to the scale discourse and operationalizes the study of scale interactions as these transpire or shape the success and failure in achieving intended policy results.

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