



## Key Messages

- Our collaborative literature review revealed that Ostrom and colleagues social-ecological systems (SES) framework is a valuable and promising tool for interdisciplinary research in the field of environmental governance and community resilience. It provides well-designed variables both with regards to ecological and social dimensions.
- Empirical work using the SES framework is relatively recent. This is especially true in the Canadian context, where there are relatively few studies that use the SES framework, and even less that focus on a resource-based context. We see strong potential to use this framework as the foundations for continued research on resource-based communities and environmental governance in Canada and to connect this research with international research initiatives for comparative purposes.
- There is room for improvement with regards to the application of the SES framework. We noted several weaknesses around the definition and operationalization of concepts and variables proposed in this framework. We therefore see an important opportunity to continue to refine this approach in terms of its application, through the establishment of clear definitions, measures, thresholds, and weightings.
- Empirical work using the social-ecological systems framework and the literature on community resilience provide important lessons with regards to the conditions supporting communities and resource governance initiatives. Our literature review identified a number of important pre-requisites for resilience including: the role of social interaction and social networks, leadership, integrated and polycentric institutions, participatory mechanisms, opportunities for social learning, respect for diverse knowledge systems, external support and social equity.
- Our research revealed a need for further research, drawing on interdisciplinary approaches. The SES literature helps to highlight the necessity (and the complexity) of situating environmental issues in a dynamic context, which considers both temporal and spatial scales. This type of research is nascent in Canada, and can be an important tool towards addressing important policy challenges, such as climate change and economic restructuring in resource communities.
- We see an important role for Canadian funding agencies in supporting this work. Currently, research funding is often divided between the social sciences and the natural sciences. We therefore need new funding formulas, which foster collaborative relationships between the disciplines and support mixed-methods approach. This type of research also requires longitudinal analysis, in order to track and measures changes and adaptive governance strategies over time.

## EXECUTIVE SUMMARY

This report presents the results of a collaborative literature review, conducted by GARAGE (*Groupe d'analyse et de recherche appliquée sur la gouvernance environnementale*). The literature review project includes three specific objectives, which link together the fields of socio-ecological systems research and studies in community resilience.

**1 – To present a critical review of Ostrom’s social-ecological systems (SES) framework focussing specifically on its suitability to the study of resource-based communities, including opportunities for refining and adapting this approach to a Canadian context.**

**2 – To review SES literature, focussed on a northern context (Europe, North America, Russia) in order to better understand underlying conditions and factors supporting community resilience in the context of global change.**

**3 – To draw specific lessons concerning 1) the policy requirements to support community resilience and 2) the opportunities for the adoption of the SES framework as a methodological tool to support research initiatives in Canada.**

The main component of this project was a collaborative literature review focussed specifically on the social-ecological systems (SES) framework developed by Ostrom and colleagues (Ostrom 2007, 2009, McGinnis and Ostrom 2014). 24 articles were reviewed. We also conducted a more limited review of articles in the field of community resilience (20 articles).

### Defining key concepts

*Community resilience* is a concept inspired by broader work in ecology, which understands system resilience as the ability of an ecosystem to adapt to change, despite the presence of perturbations and shocks (Gunderson et al. 2006). The concept of resilience was picked up by the social sciences, as it allowed for a re-conceptualization of communities, allowing for a greater emphasis on the collective capacity of a community to deal with change.

Social-ecological systems can be defined as: *an ecological system co-evolving with a human system whose actions are governed by a set of rules that evolve over time*. Ostrom and colleagues have developed a social-ecological systems (SES framework) to support interdisciplinary studies, diagnostics and comparisons of complex social-ecological systems. The SES framework is made of 4 core variables that interact with each other under the pressure of external social and ecological influences (see Table 1). The SES framework is a nested hierarchical framework in the sense that each of the core variables can be described by a set of variables at lower levels.

Table 1: Examples of first and second-tier variables of a social-ecological system (Ostrom 2009)

First-tier variables	Second-tier variables
Resource systems (RS)	Sector (e.g. water, forests, pasture, fish)
	Clarity of system boundaries
	Size of resource system
Governance systems (GS)	Government and non-gov. organizations
	Property rights system
	Collective choice rules
Resource units (RU)	Growth or replacement rates
	Economic value
	Spatial and temporal distribution
Actors (A)	Socio-economic attributes
	Leadership/entrepreneurship
	Norms/social capital

*Objectives* : Most of the articles we reviewed focus specifically on environmental governance situations and outcomes. A minority address community resilience specifically but the majority are concerned with overall social-ecological system sustainability or resilience. Within the articles that address environmental governance, there is a diversity of resource systems and activities represented. In terms of the objectives, some of the studies specifically analyse environmental governance arrangements. Other studies focus on the SES framework itself, in order to suggest improvements, adaptations, or critiques. A few of the studies deal directly with the question of rural community resilience.

*Implementation of the SES framework*: Most of the studies relied on the case study method. While most studies compared cases within the same resource sector, a few also compared governance processes across different resource sectors. The variables were analysed using a variety of data sources, both qualitative and quantitative. There was a stronger reliance on interpretive methods while a minority relied on a statistical analysis.

Our research team noted certain weaknesses in the application of the framework. One was a tendency for researchers to provide insufficient information with regards to how variables were defined and operationalized. The same problem was observed with regards to determining the actual findings with regards to each variable. Another issue that we noted was a difficulty in establishing causality. We also noted that despite the intention of the framework to represent social-ecological systems, through analysis of complex spatial and temporal relations at different levels (including feedback loops), this was not always achieved.

Our research group also noted several advantages with regards to the use of the SES framework. There was a broad consensus amongst our group that the framework is a valuable tool, insofar as it provides the basis for more structured evaluations of complex social-ecological systems. It also has the advantage of facilitating interdisciplinary work in what are challenging environmental contexts, and provides a good opportunity to combine methods and analytical tools (such as modelling and qualitative inquiry).

*Findings with regards to community resilience:* Our literature review points to a number of conditions that *can* foster better outcomes in a resource management context. Several of the articles highlight the importance of well-designed and accountable institutions, including polycentric designs, institutional connectivity and resource governance systems functioning at multiple levels (Baur and Binder 2013, Brondizio et al. 2013, Kelly et al. 2015, Lebel et al. 2006, Meizen-Dick 2007).

The role of shared norms was also highlighted (Blanco 2011, Fleischman et al. 2010, Mitchell et al. 2015). Shared norms speak to the social cohesion between groups, a shared set of values and a sense of trust. Many of the articles in our literature review pointed to the importance of effective leadership within communities and resource organizations, as well as the need for engaged and diverse citizen participation (Blanco 2011, Fleischman et al. 2010, Kelly et al. 2015, Partelow and Boda 2015, Trimble and Berkes 2015). Authors described the importance of deliberative opportunities and open communication, as this can help to reduce conflict and foster social learning (Lebel et al. 2006). These processes were seen as an opportunity for the integration of diverse knowledge systems. Finally, the articles also point to the need to have an adequate legal context surrounding resource management, in the form of secure tenure arrangements and clearly delineated property rights.

The literature on community resilience identifies was also reviewed, to add support to these findings. This literature echoed the findings of the SES literature, but added other dimensions as well, including the role of social networks, accountable and inclusive local institutions, support and resources from external organizations and social equity.

## **Conclusions**

- Ostrom's SES framework provides a strong basis for interdisciplinary research with well-designed variables.
- There is relatively little research using the SES framework in a Canadian context. There is strong potential to use this framework as the foundations for continued research on resource communities and environmental governance in Canada.
- There is room for improvement with regards to the application of the SES framework. We noted weaknesses around the definition and operationalization of concepts and variables.
- Empirical work in this area and within the scholarship on community resilience provides important lessons with regards to conditions supporting communities.
- The SES literature helps to highlight the necessity (and the complexity) of situating environmental issues in a dynamic context, which considers both temporal and spatial scales. This type of research is nascent in Canada, and can be an important tool towards addressing important policy challenges, such as climate change and economic restructuring in resource communities.
- We see an important role for Canadian funding agencies in supporting this work. We need new funding formulas which foster collaborative relationships between the disciplines and support mixed-methods approaches.

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