

Social scientist suggests new research framework to study complex systems

July 23 2009

The often-used one-size-fits-all approach to policies aimed at achieving sustainable social-ecological systems needs to be updated with a diagnostic tool to help scholars from multiple disciplines better frame the question and think through the variables, asserts social scientist and political economist Elinor Ostrom.

"Scholars have tended to develop simple [theoretical models](#) to analyze aspects of resource problems and to prescribe universal solutions," Ostrom writes in a Perspective article appearing in the July 24 *Science* special section on complexity.

"A common, classificatory framework is needed to facilitate multidisciplinary efforts toward a better understanding of complex social-ecological systems," writes Ostrom, who holds research and faculty positions at Arizona State University and Indiana University.

"Understanding a complex whole requires knowledge about specific variables and how their component parts are related," she says. The study of [complex systems](#) doesn't need to be complex; rather than eliminate complexity from such systems "we must learn how to dissect and harness (it)," she says.

Ostrom's *Science* essay presents an updated version of a multilevel, nested framework for analyzing outcomes achieved in social-ecological systems. In the writing, she provides an example identifying 10 subsystem variables that affect the likelihood of self-organization in

efforts to achieve a sustainable social-ecological system.

"This is not a KISS (keep it simple, stupid) approach. If we keep it too simple, we lose an understanding of what's going on out there," she says. "On the other hand, frameworks and theories always have to focus in on a subset of all of the variables operating in a complex system."

Ostrom is widely known for her study of institutions — conceptualized as sets of rules — and how they affect the incentives of individuals interacting in repetitive and structured situations. She is a research professor and founding director of the Center for the Study of Institutional Diversity at Arizona State University. The center, established in 2008, is nestled in the School of Human Evolution and Social Change in ASU's College of Liberal Arts and Sciences.

At Indiana University, Ostrom and her colleagues at the Workshop in Political Theory and Policy Analysis developed the institutional analysis and development framework that provided a common structure for research on both urban and environmental policy issues over many decades. The framework enables the researchers to analyze diversely structured markets, hierarchies, common-property regimes, and local public economies using a common set of universal components.

In her essay, Ostrom poses a question to help explain how a social-ecological systems framework can help provide guidance for researchers and policymakers: When will the users of a resource invest time and energy to avert "a tragedy of the commons?"

She looks at 10 second-level variables, out of nearly three dozen possibilities, that could positively or negatively affect the likelihood of users' self-organizing to manage a resource. One of those variables is "knowledge of the social-ecological system."

"When users share common knowledge of relevant (social-ecological systems) attributes, how their actions affect each other, and rules used in other (social-ecological systems), they will perceive lower costs of organizing," Ostrom writes.

"If the resource system regenerates slowly while the population grows rapidly, such as on Easter Island, users may not understand the carrying capacity of the resource, fail to organize, and destroy the resource."

In another example, Ostrom turns to the variable "resource unit mobility." In this scenario Ostrom writes that "due to the costs of observing and managing a system, self-organization is less likely with mobile resource units, such as wildlife or water in an unregulated river, than with stationary units such as trees and plants or water in a lake."

The framework Ostrom discusses in *Science* builds off of earlier work coordinated with colleagues at Arizona State University and written about in the Sept. 25, 2007, issue of the Proceedings of the National Academy of Sciences. In that special PNAS feature of nine articles, Ostrom and other social scientists argue that while many basic conservation strategies are sound, their use often is flawed. The strategies are applied too generally, they wrote, as an inflexible, regulatory blueprint that ignores local customs, economics and politics.

In the current issue of *Science*, Ostrom also points out that "without a framework to organize relevant variables identified in theories and empirical research, isolated knowledge acquired from studies of diverse resource systems in different countries by biophysical and social scientists is not likely to cumulate."

While convincing scholars to work within a common framework to organize their findings is one objective of Ostrom's focus, there is another audience: policymakers and decision makers, in NGOs,

international aid agencies and governing bodies, like the European Union.

The momentum is building, according to Ostrom, and a worldwide network is taking shape — interested parties are collaborating to further develop and apply this general framework for analyzing sustainability of social-ecological systems.

Source: Arizona State University ([news](#) : [web](#))

Citation: Social scientist suggests new research framework to study complex systems (2009, July 23) retrieved 26 April 2024 from <https://phys.org/news/2009-07-social-scientist-framework-complex.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.