

Editorial

## Facing Global Change through Social-Ecological Research

[Carl Folke](#)<sup>1</sup> and [Lance Gunderson](#)<sup>2</sup>

---

### INTRODUCTION

Some people claim that we have recently witnessed a tipping point in the perceptions and values of western-oriented leaders and others involved in issues related to global environmental change. Western cultures now recognize that environmental issues formerly viewed as external to society are in reality embedded in the dynamics of the biosphere, and that economies are fundamentally dependent on the capacity of the environment to support and generate the preconditions for human and societal development. We have also acknowledged that ignoring this interdependence may lead to substantial costs, as highlighted in the widespread results of the Stern (2006) report on the global economics of climate change and amplified by reports on melting glaciers and ice sheets, flooding, fires, and storms. Technologies, investors, and markets are reviving and emerging for alternative energy sources that have the potential to mitigate the burning of fossil fuels. Across all scales, from the local to the global, more attention is being given to the abilities and possibilities of societies to adapt to climate change.

Nevertheless, the link between climate challenges and social-ecological resilience, i.e., the capacity of social-ecological systems to deal with change and continue to develop, is fairly weak in mainstream policy and science, although there are exceptions. These connections are becoming increasingly explicit and comprehensible through the efforts of the Earth System Science Partnership, the Millennium Ecosystem Assessment, Sustainability Sciences initiatives, the Resilience Alliance, and similar organizations. Complex systems theory and the cross-scale dynamics of intertwined social-ecological systems are generating a lot of interest. Three recent books in this area are worth mentioning. The first is *The Upside of Down: Catastrophe, Creativity and the Renewal of*

*Civilization* by Thomas Homer-Dixon (2006), in which the author, inspired by the panarchy concept of Gunderson and Holling (2002), takes us on a journey of crisis, creativity, and renewal of societies and civilizations. The second, *Getting to Maybe: How the World is Changed* by Frances Westley, Brenda Zimmerman, and Michael Quinn Patton (2006), explores the experiences of social innovators who can see and create windows of opportunity for transforming social-ecological systems. The third, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World* by Brian Walker and David Salt (2006), provides a comprehensive overview with examples from regional social-ecological systems. It is interesting to note that Island Press, a nonprofit group focused on leading societal change, published three of the four books mentioned above. All these books move beyond doom and gloom and seek paths toward sustainable and desirable development in the face of change.

Research on sustainability increasingly addresses the intricate feedbacks of social-ecological systems, their complex dynamics, and how these play out across spatial and temporal scales. A deeper understanding of coupled systems undergoing change is essential in this context. In this sense, it is truly inspiring to be the editors of *Ecology and Society*. We are receiving amazing work that explores this research arena in a novel and integrative fashion, as reflected in the papers published in the current issue. We have 44 contributions, of which 23 appear in the regular issue and the rest in special features. We review these, beginning with the article that was given an award for the best paper on the Science and Practice of Ecology and Society. We follow that with a discussion of the articles in the regular issue and conclude with the amazing set of special feature contributions.

---

<sup>1</sup>Stockholm University, <sup>2</sup>Emory University

## SPES AWARD

The Science and Practice of Ecology and Society Award is an annual award given to the individual or organization that is the most effective in bringing the transdisciplinary science of the interactions between ecology and society into practice. The first SPES award was given to Glória Gaia, a self-educated grandmother and forest farmer from a small town in the Amazon who has taught scientists how to communicate the real values of forests to people in the Amazon and abroad. Glória Gaia was nominated for the award by Dr. Patricia Shanley, a researcher at the Center for International Forestry Research (CIFOR), who also wrote the article that we refer to. Read more about Glória Gaia and her work in the [news release](#) of the SPES award. (See [Erratum](#))

## REGULAR ISSUE

We'd like to call the attention of our readers to a few articles in this issue that present especially new and novel approaches to confronting the complexities of global environmental change. One of these is the research article by William (Buz) Brock and Steve Carpenter (2006), "Variance as a Leading Indicator of Regime Shift in Ecosystem Services," in which they provide a set of methods that researchers can use to look for signals of the loss of resilience, which is critical for understanding and managing potentially catastrophic change. The second, "Conservation Biology and Traditional Ecological Knowledge: Integrating Academic Disciplines for Better Conservation Practice," is a synthesis piece by young scholars Josh Drew and Adam Henne (2006) on the need for integrative theory and practice to confront conservation issues.

The other articles in this issue fall into three general categories: (1) the ways in which people influence ecological processes across scales, (2) the ways in which humans attempt to integrate different disciplines in scholarship and application, and (3) how to increase our understanding of social-ecological resilience. The first category discusses the influence that managers and practitioners have on ecological processes across a range of scales. Brenda Shepherd and Jesse Whittington (2006) examine the response of wolves to management corridors. Maria Åqvist Almlöv and Monica Hammer (2006) track the response of coastal fisheries in Sweden to changes in feedbacks. Will Turner (2006) monitors changes in species

distributions across scales in urban landscapes, and Sarah Dalle and Sylvie de Blois (2006) look at the effect of altering fallow cycles on noncrop vegetation in shifting cultivation systems. Krista Jones and colleagues (2006) investigate ecological responses to riparian buffers in the southeastern United States. Priscila MacCord and Alpina Begossi (2006) examine diet changes over time in the indigenous population of Brazil's Atlantic Forest.

In the second category, many articles look at ways of integrating different forms of knowledge for managing resources. Dylan Fraser et al. (2006) discuss the blending of traditional and evolutionary knowledge for conservation purposes. Beatrice Crona and Örjan Bodin (2006) present work on communication patterns among those seeking co-management of resources. Maricela de la Torre-Castro (2006) discusses the integration of regulations and local knowledge in the management of coastal fisheries in Tanzania. Oran Young and colleagues (2006) recommend a portfolio of approaches for the study of the effects of human-environment interactions on institutions and land-use change. Helmut Haberl and colleagues (2006) argue for the need to add a socioeconomic component to existing programs for long-term ecological research, and Chomitz et al. (2006) examine interactions between private incentives and the viability of reserve networks.

The third group of articles increases our understanding of social-ecological resilience. Sara Borgström and colleagues (2006) discuss scale-related mismatches between ecological and social features in urban systems. McAllister and colleagues (2006) examine Australian pastoralist groups as complex adaptive systems. Matthew Peeples, Michael Barton, and Steven Schlich (2006) use resilience theory to interpret prehistoric landscape changes in the southwestern United States. Andrea Martínez-Ballesté, Carlos Martorell, and Javier Caballero (2006) demonstrate how cultural values influence the demography of a palm species in Mexico. Stringer and colleagues (2006) examine participatory aspects of adaptive management. Ruth Langridge, Juliet Christian-Smith, and Kathleen A. Lohse (2006) analyze social resilience in a context of water shortages.

## SPECIAL FEATURES

As mentioned previously, about half of the published articles are in special features. We invite our readers to take a look at the newly published editorials for the special issues on *Scale and Cross-Scale Dynamics: Governance and Information in a Multilevel World* by David Cash and colleagues; on *Scenarios for Ecosystem Services* by Steve Carpenter, Elena Bennett, and Garry Peterson; and on the recent special feature *Empirically Based, Agent-Based Models* by Marco Janssen and Elinor Ostrom. Each of these special features contains a number of exciting new articles, as do the special features *Assessing Risks to Wildlife Populations from Multiple Stressors*, *Restoring Riverine Landscapes*, and *Do We Need New Management Paradigms to Achieve Sustainability in Tropical Forests?*

In the first paragraph we mentioned the need for new forms of scholarship and understanding to address the complexities of climate change. Although the tipping points may have been reached for social awareness and concern, we still need more scholarly approaches that develop new ideas and test our conceptual understanding of how we act both individually and collectively. We think that this issue contains the types of research required to fill those gaps. For all of you who have contributed, we thank you for your scholarly offerings of this past year. From the editors, associate editors, and staff of *Ecology and Society*, we close with our best wishes for a prosperous and joyful new year.

Responses to this article can be read online at:  
<http://www.ecologyandsociety.org/vol11/iss2/art43/responses/>

---

## LITERATURE CITED

- Åqvist Almlöv, M., and M. Hammer. 2006. Changing use patterns, changing feedback links: implications for reorganization of coastal fisheries management in the Stockholm Archipelago, Sweden. *Ecology and Society* 11(2): 3. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art3/>.
- Borgström, S. T., T. Elmqvist, P. Angelstam, and C. Alfsen-Norodom. 2006. Scale mismatches in management of urban landscapes. *Ecology and Society* 11(2): 16. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art16/>.
- Brock, W. A., and S. R. Carpenter. 2006. Variance as a leading indicator of regime shift in ecosystem services. *Ecology and Society* 11(2): 9. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art9/>.
- Carpenter, S. R., E. M. Bennett, and G. D. Peterson. 2006. Editorial: Special Feature on Scenarios for Ecosystem Services. *Ecology and Society* 11(2): 32. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art32/>.
- Cash, D. W., W. N. Adger, F. Berkes, P. Garden, L. Lebel, P. Olsson, L. Pritchard, and O. Young. 2006. Scale and cross-scale dynamics: governance and information in a multilevel world. *Ecology and Society* 11(2): 8. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art8/>.
- Chomitz, K. M., G. A. B. da Fonseca, K. Alger, D. M. Stoms, M. Honzák, E. C. Landau, T. S. Thomas, W. Wayt Thomas, and F. Davis. 2006. Variable reserve networks arise from individual landholder responses to conservation incentives. *Ecology and Society* 11(2): 40. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art40/>.
- Crona, B., and Ö. Bodin. 2006. What you know is who you know? Communication patterns among resource users as a prerequisite for co-management. *Ecology and Society* 11(2): 7. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art7/>.
- de la Torre-Castro, M. 2006. Beyond regulations in fisheries management: the dilemmas of the "beach recorders" *bwana dikos* in Zanzibar, Tanzania. *Ecology and Society* 11(2): 35. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art35/>.
- Drew, J. A., and A. P. Henne. 2006. Conservation biology and traditional ecological knowledge: integrating academic disciplines for better conservation practice. *Ecology and Society* 11(2): 34. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art34/>.
- Fraser, D. J., T. Coon, M. R. Prince, R. Dion, and L. Bernatchez. 2006. Integrating traditional and evolutionary knowledge in biodiversity conservation: a population-level case study. *Ecology and*

*Society* 11(2): 4. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art4/>.

**Gunderson, L., and C. S. Holling.** 2002. *Panarchy: understanding transformation in human and natural systems*. Island Press, Washington, D.C., USA.

**Haberl, H., V. Winiwarter, K. Andersson, R. U. Ayres, C. Boone, A. Castillo, G. Cunfer, M. Fischer-Kowalski, W. R. Freudenburg, E. Furman, R. Kaufmann, F. Krausmann, E. Langthaler, H. Lotze-Campen, M. Mirti, C. L. Redman, A. Reenberg, A. Wardell, B. Warr, and H. Zechmeister.** 2006. From LTER to LTSER: conceptualizing the socioeconomic dimension of long-term socio-ecological research. *Ecology and Society* 11(2): 13. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art13/>.

**Homer-Dixon, T.** 2006. *The upside of down: catastrophe, creativity and the renewal of civilization*. Knopf Canada, Toronto, Canada.

**Janssen, M. A., and E. Ostrom.** 2006. Empirically based, agent-based models. *Ecology and Society* 11(2): 37. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art37/>.

**Jones, K. L., G. C. Poole, J. L. Meyer, W. Bumback, and E. A. Kramer.** 2006. Quantifying expected ecological response to natural resource legislation: a case study of riparian buggers, aquatic habitat, and trout populations. *Ecology and Society* 11(2): 15. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art15/>.

**Langridge, R., J. Christian-Smith, and K. A. Lohse.** 2006. Access and resilience: analyzing the construction of social resilience to the threat of water scarcity. *Ecology and Society* 11(2): 18. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art18/>.

**MacCord, P., and A. Begossi.** 2006. Dietary changes over time in a *caçara* community from the Brazilian Atlantic Forest. *Ecology and Society* 11(2): 38. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art38/>.

**McAllister, R. R. J., N. Abel, C. J. Stokes, and I. J. Gordon.** 2006. Australian pastoralists in time and space: the evolution of a complex adaptive system. *Ecology and Society* 11(2): 41. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art41/>.

<http://www.ecologyandsociety.org/vol11/iss2/art41/>.

**Martínez-Ballesté, A., C. Martorell, and J. Caballero.** 2006. Cultural or ecological sustainability? The effect of cultural change on Sabal palm management among the lowland Maya of Mexico. *Ecology and Society* 11(2): 27. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art27/>.

**Peoples, M. A., C. M. Barton, and S. Schmich.** 2006. Resilience lost: intersecting land use and landscape dynamics in the prehistoric southwestern United States. *Ecology and Society* 11(2): 22. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art22/>.

**Shanley, P.** 2006. Science for the poor: how one woman challenged researchers, ranchers, and loggers in Amazonia. *Ecology and Society* 11(2): 28. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art28/>.

**Shepherd, B., and J. Whittington.** 2006. Response of wolves to corridor restoration and human use management. *Ecology and Society* 11(2): 1. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art1/>.

**Stern, N.** 2006. *The economics of climate change: the Stern review*. Cambridge University Press, Cambridge, UK.

**Stringer, L. C., A. J. Dougill, E. Fraser, K. Hubacek, C. Prell, and M. S. Reed.** 2006. Unpacking "participation" in the adaptive management of social-ecological systems: a critical review. *Ecology and Society* 11(2): 39. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art39/>.

**Turner, W. R.** 2006. Interactions among spatial scales constrain species distributions in fragmented urban landscapes. *Ecology and Society* 11(2): 6. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art6/>.

**Walker, B. H., and D. A. Salt.** 2006. *Resilience thinking: sustaining ecosystems and people in a changing world*. Island Press, Washington, D.C., USA.

**Westley, F., B. Zimmerman, and M. Q. Patton.** 2006. *Getting to maybe: how the world is changed*. Random House Canada, Toronto, Canada.

**Young, O., E. F. Lambin, F. Alcock, H. Haberl, S. I. Karlsson, W. J. McConnell, T. Myint, C. Pahl-Wostl, C. Polsky, P. S. Ramakrishnan, H. Schroeder, M. Scouvar, and P. H. Verburg.**

2006. A portfolio approach to analyzing complex human-environment interactions: institutions and land change. *Ecology and Society* **11**(2): 31. [online] URL: <http://www.ecologyandsociety.org/vol11/iss2/art31/>.