

Table of Contents

<u>Conversations</u>	0
<u>Lessons from the December Issue</u>	1
<u>The Lessons of the June Issue</u>	2
<u>RESPONSES TO THIS ARTICLE</u>	4

Conversations

[C.S. \(Buzz\) Holling](#)

University of Florida

- [Lessons from the December Issue](#)
 - [The Lessons of the June Issue](#)
 - [Responses](#)
-

How can a scientific journal like *Conservation Ecology* use the novel medium of the internet to deepen understanding of emerging and unfamiliar ecological issues?

Most readers and contributors to *Conservation Ecology* share a goal of achieving a sustainable future for regions and for the planet. Sustainability does not mean stasis. It means change and being able to benefit from change. A sustainable future is one that encourages innovative opportunity for people to learn and prosper; that incorporates responsibility to maintain and restore the diversity of nature; and that is based on a just, civil society.

To achieve that, we need to explore ways to unite three solitudes — compartmentalized communities — whose unfamiliarity of the others inhibits learning to achieve these goals. One solitude includes science and scholarship, one includes business and policy, and one includes community and citizen action. Together, they can contribute to a sustainable future. Alone, they cannot. Each has only one part of the answer. However, there are few environments in which to even begin considered conversations among the three.

Constructive conversations among such separate groups are very difficult when there is so much noise. There is hardly an environmental topic concerning science, business, and citizens that is not noisy and contentious. Policies to protect or restore biodiversity threaten defenders of personal private property rights; policies to reduce greenhouse gases threaten interests of the fossil fuel industry; policies to manage and restore degraded wetlands and grasslands threaten agribusiness and development interests. With such deep differences, improved understanding and considered response end up as victims. Where are the policies that provide mutual benefit? Are there any? Have we gone too far to recognize them?

Unhappily, scientists themselves contribute to the noise when they define problems too narrowly, or presume that the world is static, or myopically defend pet, simplistic hypotheses, or seek for certainty rather than understanding. That provides ammunition for the disinformation campaigns of threatened interests.

There is both a need and an opportunity for considered conversations. Hence, a direction can be defined. The opportunity is provided by people who are developing tested experience in integration: integrative theory that deals with change at multiple scales in biological, ecological, economic, and social systems; integrative methods — such as computer simulation and visualization, evolutionary models, and historical reconstructions of environmental history; integrative examples of ways to link science, policy, and practice in realistic, uncertain regional settings.

That experience provides the seeds to begin thoughtful, deliberative conversations away from the noise. Conversations that can start with the readership of *Conservation Ecology* as a foundation for later conversations with those in the other solitudes: business, policy, and citizen. Conversations paced by Perspectives and peer-reviewed Research and Insight papers that explore novel linkages between separate areas of knowledge, between science and policy, between fast and slow processes and local and distant ones.

We began two such conversations in the December issue of *Conservation Ecology*. One was motivated by the Third Conference of the Parties (the Kyoto Conference) and concerned regional consequences of climate change (Brian Walker and Will Steffen, [An Overview of the Implications of Global Change for Natural and Managed Terrestrial Ecosystems](#)). The other concerned adaptive ecosystem management (Carl Walters, [Challenges in Adaptive Management of Riparian and Coastal Ecosystems](#)), a potential way to deal with regional impacts of uncertain events such as climate changes.

The June 1998 issue continues those conversations as we begin to discover fruitful ways to use the internet and facilities of the journal. Here is what is happening, what we are learning, and what we anticipate will happen.

Lessons from the December Issue

An immense amount of experience has developed since the mid-1970s to deal with science and policy aspects of the complex issues of global climate change. Much has been structured by the Intergovernmental Panel for Climate Change. That experience provides a lesson in how to develop conversations among scientists, retain the integrity of the science, expand understanding, and connect growing knowledge to policy. Its success is measured by the large amounts of money used by vested interests to counter the assessments of the IPCC and to distort information in order to influence national and international efforts to control greenhouse gas emissions.

Much work has focused on the climate effects of greenhouse gas accumulations in the atmosphere. Relatively little work has focused on the even more uncertain regional impacts of global change – on regional ecosystems, agriculture, and economies. We hoped that four articles, written for publication in the December 1997 issue, might start a conversation about those regional impacts. They formed the basis for a Young Scholars Dialogue, whose conclusions were published in the same issue. (Garry Peterson et al., [Uncertainty, Climate Change, and Adaptive Management](#)). Those dialogues have begun to refine an internet environment for the considered conversations that are needed.

The [Synthesis](#) article by Brian Walker and Will Steffen was the first published summary of a six-year international study of global change impacts on terrestrial ecosystems. One of its conclusions is unambiguous. That is, terrestrial ecosystems are becoming a net source of carbon to the atmosphere rather than the sink that they had been. Counteracting forces that enhance storage of carbon are being overwhelmed by observed and anticipated land use change and climate change. Increasing human population, increasing human demands, and increasing movements of people and of invasive species drive the transformation.

Therefore, carbon mitigation policies, the subject of the Kyoto conference, represent prudent steps to slow an unplanned planetary experiment whose consequences, although partially uncertain, are sure to be surprising. That is not easy and not without cost. And whatever is done will only slow, not halt, the impacts on regions.

Adaptive Ecosystem Management is a pointed way to deal with such surprises experienced in regions, in a way that embraces the uncertainties. AEM sees alternative policies as competing hypotheses and management as tests of these policies. Thus, science, monitoring, and understanding become indistinguishable from policy and management. Carl Walter's seminal [Synthesis](#) article in the December 1997 issue draws on three decades of experience in AEM to show the potential and, more pointedly, the wall of opposition to such approaches rooted in the psychology of people, scientists, administrators, and politicians. And the way such rigidities are perpetuated in organizations and institutions.

The final two papers of the planned four were Perspectives analyzing regional economic impacts of climate mitigation policies. They were meant to further the conversations on regional impacts and the need for linking ecological and economic understanding. But publication was delayed because the agency sponsoring the study upon which one paper was based (Holling and Somerville, [Impacts on Canadian Competitiveness of International Climate Change Mitigation](#)) would not approve publication. It is a living example of the bureaucratic rigidities

discussed by Walters. Publication of this paper in the June issue is a counter example of a lurching, democratic process functioning to open information and the conversations that openness allows.

The Lessons of the June Issue

Some might find it odd for a journal on conservation ecology to start the June issue with two Perspectives with economics at the center. O'Neill et al. ([Economics and Ecology: the Need for Detente in Conservation Ecology](#)) argue that the historical separation between ecology and economics was an appropriate convenience for analysis when both systems were largely decoupled. Now that their coupling is intensifying and extending to increasingly larger scales, separation of the two is impossible.

The need for integration is highlighted by two articles on the economics of climate change. Holling and Somerville, [Impacts on Canadian Competitiveness of International Climate Change Mitigation](#), indicate that there would be large economic costs for a nation like Canada to achieve typical targets for limiting carbon emissions with carbon mitigation policies. The preferred methods involving a carbon tax or tradable permits for carbon emissions, for example, would result in a projected 2% drop in GDP from business-as-usual for a decade. In a contrasting article to be published in July in Conservation Ecology, Bernow and Duckworth conclude the opposite: that similar policies would enhance economic performance. Both positions received media coverage in the debates preceding Kyoto. How can the public, or scientists for that matter, understand such opposites?

It turns out that both are correct. It is correct, but disingenuous, when a defender of the status quo claims that carbon emission policies will inhibit economic growth. It is equally correct, but equally disingenuous, for those seeking change to argue that such policies will enhance the economy. Both analyses are needed to achieve informed understanding. The Bernow and Duckworth Perspective summarizes results of a so-called bottom-up approach, where each sector of the economy is examined, energy conserving technologies are identified, economic incentives are developed to implement them, and revenue from carbon taxes is used to minimize economic costs. The Holling and Somerville Perspective summarizes a top-down study, which uses econometric models to analyze the reverberating effects through the economy of a carbon abatement policy.

One principal difference distinguishes the two studies. The Bernow and Duckworth study projects the economic impacts at steady state after adaptation to the policy. The Holling and Somerville study tracks the transient behavior of the economy toward a steady state. Both studies agree that, eventually, the economy is unharmed or even enhanced by adaptation to the carbon abatement policies. But it is the transition that is the killer, because that is where the politics lie.

There are other differences between the two studies that further confuse understanding, differences that are also present among the dozens of similar studies. The consequences of such differences have been brilliantly summarized and made transparent by Robert Repetto and Duncan Austin in "[The costs of climate protection: a guide for the perplexed](#)" (World Resources Institute 1997). The summary provides an exemplary use of the web for clear analysis and presentation techniques to make the complex understandable. Any analyst wishing to make a clear, comparative assessment of models should use that presentation as a standard.

Although the economic impacts predicted in these analyses are modest when their effects are absorbed, few studies consider the path to that steady state, as does the Holling and Somerville paper. It is inconceivable that there will not be a challenging economic transition under carbon abatement policies. It need not be bad; it can be renewing; but it will be challenging. The entrenched attitudes and experience of people and institutions identified in Walters' article make it inevitable. Uncertainties and past investments delay response to change even when change is in a firm's best economic interest. Moreover, the Holling and Somerville study exposes other likely political blocks to decision. The benefits and penalties are not uniformly shared. In their example, the economy of the Province of Alberta is consistently harmed; that of British Columbia is enhanced. How does a Federal political system deal with that? Salaries of workers are harmed; profits of industry are enhanced. How can

Provincial politics deal with that?

These are not certainties, but they are credible possibilities. Hiding their existence promises policies that are inadequate, are unsupported by the public, and that lead to eventual loss of public trust. The possibilities help to refine where priorities are needed, e.g., studies to better assess the economic and social impacts of climate change on traditional agricultural investments, on the sustainability of present high-intensity but low-diversity agriculture, on the emergence and transfer of new disease of plants, animals, and people, on extreme climate events, or, in northern regions, on transportation. We welcome Research and Synthesis articles on any similar subject.

One such article in the June issue provides further information for conversations and an example of integrating knowledge from another set of disciplines: ecology, epidemiology, and medicine. Lindgren ([Climate and Tick-borne Encephalitis](#)) reports the strong correlation between the incidence of tick-borne encephalitis and climate change, using a very long time series of data from Sweden. Correlation is certainly not causation, but the causal chain described is credible and competing hypotheses are shown to be unlikely. This is an example of building a case by contributing one body of careful analysis. If other lines of similar evidence develop, other equally careful explorations of competing hypotheses emerge, and a credible line of tested argument becomes an important part of the conversation.

Another example of integration in this issue is Leenhouts' [Assessment of Biomass Burning in the Conterminous United States](#). He has been successful in reconstructing the history of wildland fire in the continental United States. It reveals a dramatic reduction in biomass burning since the pre-industrial era, with major atmospheric, climatic, social, and ecological consequences. He concludes that "new policies of biomass burning that integrate all effects are needed, and are best developed at the local or regional level, where land uses, ecological responses, and atmospheric and social effects can best be assessed." Enter Adaptive Ecosystem Management again, as one approach to doing that.

At the moment, we are using two ways to encourage conversations that are stimulated by such articles. One is to develop dialogues on the internet: a workshop of invited participants discussing a topic seeded by Perspectives and Research articles, like those just described. The second is a reader response facility associated with each article. The idea is to encourage thoughtful, experienced responses to key articles in order to build a web of expanded understanding of the topic. I'll summarize our experience to date.

The Young Scholars Dialogues, have, through trial and error, developed an important way to expand and synthesize understanding. They involve an invited group of scientists and scholars (all younger than 35 years of age), with experience from several nations, active in integrative studies. A host for the dialogue conducts an e-mail survey to identify appropriate participants and invites up to 20, so as to achieve balance of expertise and nationality. One or two leaders motivate the conversation, identify common themes each day, and integrate related ideas and information as they emerge. One person writes a synthesis that is then critiqued by the group. That synthesis is then published in *Conservation Ecology*.

Each person spends at least 30 minutes a day commenting on previous messages; any number of comments is allowed, but each has to be limited to one or two screens of material. The whole process takes about eight to ten days (partly to compensate for international time zones). A good conversation takes the partial issues and discoveries opened by the key papers launching the dialogue, connects them to other bodies of experience, synthesizes the conclusions, and identifies priorities for future investigation.

The second device for starting conversations is a response facility that has led to a new category of article in this issue, entitled Responses. Longer responses are limited to about 1000 words and are peer-reviewed to assess their relevance and contribution to expansion of the topic. This issue has three: two are well-developed commentaries on Carl Walters' paper on Adaptive Ecosystem Management (in the December issue), expanding on the theme that our organizations and institutions are failing us – specifically the culture of ecological science itself ([Houlahan](#)) and the character of academic research/government agency collaboration ([Carpenter](#)). The other ([Tillotson](#)) is a brief and highly pertinent comment on the Young Scholars Dialogue on Climate Change.

The focus on Adaptive Ecosystem Management continues in this issue with a Synthesis by Judith Anderson ([Embracing Uncertainty: the Interface of Bayesian Statistics and Cognitive Psychology](#)). It is another example of integrated disciplines, in this case, Bayesian statistics and cognitive psychology. It leads to an identification and solution of one of the barriers impeding decision in uncertain situations. We hope that this article, Walters' original, and the two responses will motivate further responses and articles on this subject. Upcoming in a future issue of *Conservation Ecology* is a Special Topic on Adaptive Ecosystem Management.

In closing, *Conservation Ecology* has evolved to fill a particular niche not well served by traditional journals. It has the following features:

A peer-reviewed journal with a small number of articles, each of which appeals to a wide audience, rather than a traditional journal with a large number of papers dominated by ones that each appeal to different, narrow audiences.

A journal that is broadly multidisciplinary and interdisciplinary, with a goal to encourage the development of integrative science, scholarship, and policy. It does that by emphasizing the fundamental foundations in science, policy, and practice that are needed for action.

A journal encouraging papers that include well-grounded speculation and approximate answers to interesting questions, rather than precise answers to trivial ones.

A journal that develops experiments in forming interactive communities.

A journal that experiments in novel uses of the web for illustration and archiving, e.g., databases, animations of computer model output, movies.

The June issue has evolved to have a strong policy and interdisciplinary flavor. We also encourage papers that contribute to fundamental science, as long as they are of interest to a multidisciplinary audience. There are some promising ones in the review pipeline that focus on specific disciplinary facets of science, at the same time expanding scientific knowledge that has clear value for clarifying policy. Coming up, for example, are papers on the behavior of mammals, birds, and insects in response to patches, gaps, and corridors of different scales. Several papers in review concern ecosystem dynamics and succession in forests, northern fresh waters, and southern marine bays. We encourage such papers that advance fundamental scientific understanding with relevance to policy. And we encourage speculation on the ways in which science is important for policy and practice. We invite readers and authors to participate in the further development of *Conservation Ecology*.

RESPONSES TO THIS ARTICLE

Responses to this article are invited. If accepted for publication, your response will be hyperlinked to the article. To submit a comment, follow [this link](#). To read comments already accepted, follow [this link](#).

Address of Correspondent:

C.S. (Buzz) Holling
Department of Zoology
University of Florida
223 Bartram Hall
Gainesville, Florida 32611-2009 USA
Phone: (352) 543-6955
Fax: (352) 392-3704
holling@zoo.ufl.edu

*The copyright to this article passed from the Ecological Society of America to the Resilience Alliance on 1 January 2000.

[←Return to Table of Contents for Volume 2, Issue 1](#)

[Main](#)

[Issues](#)

[How to Submit](#)

[Subscription Benefits](#)