

# Invited Feature

## Traditional Ecological Knowledge, Ecosystem Science, and Environmental Management<sup>1</sup>

As the pace of ecological change increases, so too does the need for baseline information with which to direct conservation and restoration activities. Often, however, data are scarce. The premise of this Invited Feature is that there are complementary sources of knowledge about local ecosystems held by people whose lives are interwoven in complex ways with particular lands and waters. Local knowledge is richest when it has accumulated over generations, embedding observations and corresponding cultural adaptations within a context of long-term ecological change.

This Invited Feature focuses on Traditional Ecological Knowledge (TEK), a term used to describe the knowledge held by indigenous cultures about their immediate environments and the cultural (management) practices that build on that knowledge. Most Western ecologists are unfamiliar with the many ways in which renewed interest in TEK is adding to the common store of knowledge about extant ecosystems and are unaware of the increasing number of international mandates for the inclusion of TEK in ecological restoration and conservation. This Invited Feature is intended as an introduction to these important subjects.

The language of Traditional Ecological Knowledge is not the language of scientific discourse. Mutual understanding requires mutual respect, an investment of time, and a willingness on the part of Western scientists to accept that TEK is grounded in moral, ethical, and spiritual world views. It is a common misperception that, because of this grounding, TEK is somehow mystical or out of touch with reality. This set of papers makes a different case: that, on the contrary, TEK is eminently practical. Far from being a static body of knowledge, TEK must be highly adaptive if it is to serve the needs of human populations over long periods of time. Some TEK practitioners have observed that knowledge or information by itself is subject to serious misapplication if not informed by wisdom. Because of this, TEK is often referred to as Traditional Ecological Knowledge and Wisdom (TEKW). It is largely this latter component that reflects the moral, ethical, and spiritual dimensions of TEK with which practitioners of rationalist scientific traditions are most uncomfortable.

This Invited Feature will be a venture into new territory for most ecologists. Some of the papers may be difficult because they cross scientific disciplines and/or cultural epistemologies. However, it is precisely these interfaces that provide the creative tension from which new insights and advances may spring. Much of the literature related to TEKW has been the province of cultural anthropology, which has a different style of discourse and different rules of evidence than papers typically found in this journal. For this project, we accept those differences. Further, because TEKW flows from epistemologies so different from Western science, faithful representation of underlying concepts are at best approximate. Attempts to reframe these approximations to fit standard scientific discourse would miss the point. Instead, we have asked authors to illustrate their points using case studies whenever possible, to help ground unfamiliar concepts in more familiar contexts. Finally, discerning readers of this entire feature may discover divergent and sometimes contradictory TEKW views on specific issues. In this sense, TEKW is perhaps not so different from Western science.

The first three papers in this Invited Feature lay the foundation for TEKW as a credible source of environmental knowledge. The introductory paper by Berkes et al. is a comprehensive review of the literature on TEK. The second paper by Mauro and Hardison discusses the policy context

<sup>1</sup> Reprints of this 92-page Invited Feature are available for \$13.75 each. Prepayment is required. Order reprints from the Ecological Society of America, Attention: Reprint Department, 1707 H Street, N.W., Suite 400, Washington, DC 20006.

and emerging mandates for the incorporation of TEKW into scientific research and environmental management. Next, Huntington discusses some of the sources of resistance on the part of the scientific community to TEKW and also addresses practical issues encountered by ecologists interested in TEKW but unsure of how to proceed in collecting and applying this information.

The next five papers illustrate the potential of TEKW in ecological research, conservation, and restoration. Turner et al. describe characteristics of TEKW among selected peoples in British Columbia, with particular attention to sustainable harvest of traditional root vegetables. Nabhan builds on this theme by discussing ecological interactions recognized by O'odham and Comcáac foragers of the Sonoran Desert, emphasizing the importance of local language as a carrier of such knowledge. This discussion lends disturbing dimensions to the observation that languages are currently disappearing much faster than species. Klubnikin et al. document the contributions of Altaian TEKW in illuminating the value of the Katun River headwaters (Siberia, part of the complex Mongolian biogeographic province) when faced by plans for a massive hydroelectric dam. Gadgil et al. and members of the People's Biodiversity Initiative describe an ongoing project in India to document and encourage the use of local knowledge of biodiversity. Fernandez-Gimenez discusses ecological knowledge of Mongolian nomadic pastoralists, its role in modern rangeland management, and the difficult interface between TEKW and changing socioeconomic infrastructures.

This Invited Feature began by looking at TEKW from interdisciplinary Western science with a social-science perspective, and it comes full circle with an inside perspective by Salmón (Rarámuri). Salmón discusses Rarámuri TEKW, including the reciprocal relationship with nature encompassed by the concept of *iwígara*. This conceptual translation is a difficult task, and Salmón's graceful discussion is a much needed complement to the external observations of TEKW made by Western scientists. The concluding commentary by Pierotti (Comanche) and Wildcat (Euchee) summarizes their perception of the principal elements common to much of TEKW, and how they differ from the spectrum of ideas about nature that flow from Eurocentric tradition.

We hope that this set of papers encourages discussion of TEKW. Many important topics are conspicuous by their absence in this collection, including intellectual property rights, collaborative TEKW/Western comanagement practices, and why indigenous sovereignty issues are important components of both conservation and restoration ecology. North America is overrepresented, and none of the case studies relates to primarily maritime cultures/environments. Nor are there papers that report on current progress in First Nations fisheries and wildlife management, existing TEKW/Western science collaborations in ecological restoration, and so forth. Perhaps some of these gaps can be addressed in future issues.

We believe that as a community of ecologists living in times of unprecedented ecological change, we can no longer afford the questionable luxury of working solely within our own traditions if we are to learn to live sustainably. Conserving our options means, in part, conserving the diversity of ways of thinking about problems. It is our hope that this Invited Feature will provide nourishing food for thought, open lines of communication, and inspire future research and collaborations.

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We dedicate this Invited Feature to those who come after.

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