

In This Issue

IGNITING THE ECOHEALTH CONVERSATION

This issue includes a set of articles that focus on several important themes being addressed at EcoHealth ONE, the International EcoHealth Association's first Biennial Conference. The articles were selected, and in some cases solicited, for the purpose of providing a basis for dialogue or for further research synthesis being addressed at some of the Conference's sessions. More information is available at: <http://www.ecohealth.net/Conference/site/conference.html#topics>

Possibly no issue is more compelling to the EcoHealth community than the problem of understanding and articulating the policy implications relating to the role of ecosystems and the impacts of their degradation on human health and well-being. Thus, this past year's publication of the *Millennium Ecosystem Assessment: Health Synthesis* represented an important development. It was the first time this problem, certainly one fundamental to the human condition globally, had been tackled in a comprehensive manner by a group of experts—many of them EcoHealth editors. In *Public Health Emergency on Planet Earth: Insights from the Millennium Ecosystem Assessment*, two of the authors of the *Health Synthesis*, **Hales and Corvalan**, provide an overview of the results of this assessment.

This is followed by *Personal Commentaries on "Ecosystems and Human Well-being: Health Synthesis—A Report of the Millennium Ecosystem Assessment"* by **Brown, Bunch, Confalonieri, McMichael, Noronha, Stephens, and Woodward**. These experts, some of whom were also participants in the *Health Synthesis*, demonstrate the diversity of viewpoints about the *Health Synthesis* process and outcome. Taken as a group, they suggest that while the process may

have reached its conclusion, it by no means puts closure on the issue. Strong concerns exist regarding whether the depth of the assessment and subsequent recommendations are sufficient given the gravity of our present status on Earth.

Two "Forum" articles in this issue also address pressing problems linking human health and sustainability being highlighted at EcoHealth ONE. One problem is the increasing evidence that health and sustainability are irrevocably linked. Moreover, the linkage is mediated by ecosystems and biodiversity, whose increasingly diminished condition can be described as a profound public health risk factor. In *Population Health As a Primary Criterion of Sustainability*, **McMichael** provides a compelling and provocative critique of the narrow conception of "environmental health." He argues that population health and sustainability are mutually integral and not simply two separate topics. We are reminded that nothing could be more fundamental to the quality of the human experience than health and survival, the possibilities for which appear to be increasingly jeopardized.

Human vulnerability in this regard could not have been made more obvious by the concern about the recent global spread of avian influenza (H5N1). Yet, H5N1 demonstrates how complex and uncertain is the challenge of assessing the pandemic risk of emerging infectious diseases. In fact, the case of H5N1 illustrates the limitations of current scientific knowledge and the need for transdisciplinary approaches. This argument is made in the "Forum" article, *Avian Influenza (H5N1) and the Evolutionary Ecology and Social Ecology of Infectious Disease Emergence*, by **Kapan et al.** These authors lead readers through a summary description of the evolutionary eco-

logical principles and processes affecting pathogen transmission and adaptation on the scale of pathogen molecular genetics and host–pathogen dynamics. How these processes are, in turn, linked to social–ecological drivers and influences, including macro-scale social, economic, political, and associated demographic changes in land use, farming, animal husbandry, and other practices, is explained. Using the emergence of epizootic H5N1 in Southeast Asia as a case example, the authors argue that, combined, evolutionary ecology and social ecology provide the basis for an interdisciplinary EID risk assessment framework.

Two “Profiles” describe quite different but important programmatic approaches to fostering transdisciplinarity at the interface of ecological and health sciences. Until recently, there have been few examples of education programs in developing countries that explicitly link human, wildlife, and ecosystem health. In his “Profile,” *Introducing Indonesian Medical Students to Rainforest Conservation and Community Health in the Field: A Practicum Experience in East Kalimantan*, **Ali** presents a new precedent of an innovative program in Indonesia that integrates a “conservation health” practicum into the medical curriculum in Mulawarman University in East Kalimantan. The “Profile” shares useful insights into the development and structure of this type of program, as well as important lessons learned from linking medical students with the activities of conservation organizations.

Outside the realm of medical training per se, but a program having a substantial impact on a basic biomedical science subject, infectious diseases, is described in a second “Profile” piece, *Ecology of Infectious Disease: Forging an Alliance*. Here **Scheiner and Rosenthal** describe the relatively new and successful joint grant program of the US National Science Foundation and National Institutes of Health. The authors describe this initiative’s goal to produce predictive understanding of disease dynamics, with a focus on diseases with an environmental component. They emphasize the challenge of attempting to unravel these complex systems and to determine how, and if, they can be predicted and controlled using targeted environmental, public health, or medical interventions.

SEA TURTLES STRIKE BACK

In some Latin American countries, there are cautionary horror tales told of wedding guests who die shortly after consuming the flesh of sea turtles. It turns out these tales

are probably based on actual events, as **Aguirre et al.** detail the potentially deleterious and often lethal dangers of consumption of marine turtles and their eggs in their extensive review. Not only bacteria and parasites may be found in these bioaccumulating cheloniids, but also dangerously high levels of heavy metals and toxins. The authors urge for a coordinated, global educative effort to prohibit further human health hazards—which may, felicitously, aid in conservation of these ancient animals.

CLIMATIC CHANGES RE-DISTRIBUTE ARTHROPODS IMPORTANT IN HUMAN HEALTH

Climatic changes may lead to drastic changes in the distribution of arthropods important in human health. **Estrada-Piña and Venzal** tracked changes in habitat suitability for the tick *Ixodes ricinus* in Europe from 1900 to 1999, using a geographically extensive gridded climate data set. Their results showed that habitat suitability for *I. ricinus* remains relatively stable in Europe, with no sites showing permanent changes in habitat suitability, although some zones in the continent showed a clear trend to increase or decrease.

TICKS, PATHOGENS, AND HUMANS

Continental scale analyses of host–vector–pathogen relationships are relatively rare in the literature, so the article by **Cumming and Guégan** is particularly unique in this regard. Examining ixodid ticks and their pathogen load, this paper presents a Pan-African meta-analysis of geographic and climatic variables, and species richness and community composition of both the ticks and the pathogens that they transmit to humans. A structural equation modeling approach demonstrates that pathogens are indeed influenced by climatic changes or other environmental changes, but only because these external drivers act on the vectors—in this instance, ticks—rather than the pathogens themselves.

WILD FROGS DEAL WITH CHYTRIDIOMYCOSIS

When the amphibian disease chytridiomycosis was first discovered, we relied on the traditional reductionist approach to testing the pathogen’s impact on individuals in the laboratory. In this article, **Kruger and Hero** examine the

disease's impact on wild frog populations. What they show is remarkable. First, by following individual frogs, they demonstrate that some animals can recover from infection in the wild. Second, they find that pathogen prevalence varies widely depending on temperature. Thus, for field surveys of prevalence, targeting frogs at the wrong time of year could yield erroneous results that underestimate the impact of this enigmatic infectious disease.

FUNGAL PRESENCE IS A CALL TO ARMS

Chytridiomycosis has affected amphibians in North, Central, and South America, Europe, Africa, and Aus-

tralia. Its impact is often severe, particularly in high altitude tropical species, and its discovery in a new region is a significant conservation issue. Here, **Puschendorf et al.** report the presence of the fungal cause of this disease in Honduras for the first time. The presence of this agent in a national park in a country where high altitude frog populations have shown severe recent declines is unfortunate news for the remaining species. It also highlights the urgent need for real solutions to this complex conservation crisis (see Policy Forum in *Science* 313, July 7th, 2006).

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