

In This Issue

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STUDENTS AND ECOHEALTH

The EcoHealth journal announces a new, regular section to appear in the journal: **News from the IAEH**. This section will feature news, updates, and more formal expositions from the International Association for Ecology and Health (IAEH). The first article for the **News from the IAEH** will be the **Student Dialogues**, which will present a student perspective on an ecohealth topic along with a response from a senior member of the ecohealth community—thereby creating a dialog. The **Student Dialogues** in this issue and in future issues will provide our students with an opportunity to have a voice in the journal, but also to publish and edit for a high-quality journal as well as increase their involvement in all aspects of the IAEH.

BOOKS TO THINK BY

The transdisciplinary science of Ecohealth is still a young field of study without a clearly defined literature as its historical foundation. To help build this base of knowledge and theory, the *EcoHealth* editors have agreed to write occasional essays that describe some of the books that have been foundational in their thinking about and around the field. The first in this occasional series is the essay by **Butler** discussing three books that have shaped his way of thinking toward the EcoHealth perspective.

PLUG 'N PLAGUE

Sylvatic plague caused by *Yersinia pestis* is a disease of wild rodents that occasionally spills over into humans and other animals. Plague causes severe mortality in prairie dogs, often exceeding 90% in affected colonies, and thus impacts

other associated and predatory species, including the endangered black-footed ferret. An oral sylvatic plague vaccine (SPV) was recently developed as a potential new tool to manage plague along with insecticidal dusting of burrows to eliminate flea vectors and rodent population control. This manuscript by **Abbot et al.** reviews the problem of plague management in prairie dogs and ferrets and discusses the benefits and challenges of wildlife vaccination.

THE RISE OF LA CROSSE

La Crosse virus is transmitted by the native North American mosquito *Aedes triseriatus* and the invasive congeners *Aedes albopictus* and *Aedes japonicus*, which co-occur in water-filled containers. Historically confined to the Midwest region, La Crosse encephalitis has emerged in the Appalachian region over the last 20 years. This review by **Leisnham and Juliano** addresses evidence for how climate, land use, and biological invasions can have direct abiotic and indirect community-level impacts on immature developmental stages of *Aedes* mosquitoes, and contribute to emergence of La Crosse encephalitis in the Appalachian region. The authors propose that La Crosse virus and the ecology of its vectors represent a model for investigating other vector-borne diseases.

WAVES AND PATTERNS

Heat waves can result in increased risk of mortality especially in vulnerable population groups. However, a majority of the heat wave related health studies have been conducted primarily in areas such as the United States and Europe, and seldom elsewhere. In this study, **Li et al.** investigated

the effect on daily mortality of a 2010 heat wave in the city of Harbin in northern China. The authors found that the Harbin heat wave had a significant impact on total mortality. Analysis by different categories also found dramatic increases in deaths in different gender, age groups, and places of death. This study is first to report the short term increases in mortality during a heat wave in high latitudes in northern China, in which people may be more vulnerable to the heat.

The impact of climate change on public health is difficult to quantify. In this issue, **Semenza et al.** present an analysis of recreational water quality at southern California beaches under climate change scenarios for the 21st century. The authors rely on actual microbiological water quality measurements and precipitation in order to model coastal water quality. In addition, downscaled precipitation data were used to project future coastal water contamination. The projected decrease in precipitation over the next century is anticipated to decrease coastal water contamination with positive implications for public health. However, erratic rain events are projected to increase in the future which could threaten public health.

WE UPHOLD ECOHEALTH

Aldo Leopold's seminal concept of land health is about productive use, self-renewal, and stewardship. It can be reinterpreted and extended through a resilience lens as the health of social-ecological systems. In contemporary language, it involves the maintenance of biodiversity and ecosystem services, and the ability to exercise agency. In honor of the 125th anniversary of Leopold's birth, **Berkes et al.** discuss how the connections that Leopold saw between ecosystem and human health are increasingly becoming the foundation of a contemporary science of sustainability, conservation ecology, and ecohealth.

International research agendas are now placing great emphasis on integrating environmental sustainability and health. Ecosystem approaches to health help researchers collaborate with communities and decision makers across disciplines and sectors to develop environmentally sound strategies for health, such as controlling infectious diseases, improving urban sanitation and health, and reducing exposure to toxic substances. **Charron** outlines how a systems perspective would be best suited for multifactorial development and sustainability issues. Benefits of the

research include innovations, evidence-based policies, and empowerment of marginalized groups.

ALL A BOAR'D

Understanding the dynamics of zoonotic diseases in their natural environment is essential for improving the management of between-host transmission and preventing human infection. Here, **Jourdain et al.** address an issue of great importance for the field of *Toxoplasma gondii* ecology, i.e. understanding environmental risk factors associated with the presence of this parasite. Using a Poisson generalized linear model, the authors found that seroprevalence in wild boars was positively explained by mild winter temperatures and by the presence of European wild cats (*Felis silvestris*). These results may help in explaining inter-regional variations observed in many species including humans, and in better identifying sources for human infection.

NOT JUST A FLUKE

Human infection of liver fluke (*Opisthorchis viverrini*) is a world health problem. Several decades of *O. viverrini* research have congregated in medical fields, while factors accounting for disease distribution and transmission are still not fully explored. This paper by **Wang** examines the landscape determinants that influence *O. viverrini* transmission in relation to the three hosts of its life cycle with an emphasis on the functional connectivity between the intermediate hosts. The authors identify areas that require further research so as to advance the understanding of the spatial variation in disease risk.

HITTING THE (HISTORIC) BOOKS

A review by **Sadgrove** aims to strengthen knowledge of traditional Aboriginal Australian ecotechnology. The authors specifically explored Aboriginal water resource management practices and the factors leading to eutrophication. A snapshot of Australia was created using historic explorer's journals and lateralisation of cultural paradigms. The journals reveal environmental conditions in remote areas of Australia before colonization. Sadgrove links cultural practices with scientific principles regarding

eutrophication and the formation of cyanobacteria blooms.

PARASITAL TENDENCIES

Disease ecologists increasingly acknowledge the importance of pathogen interactions for developing a more comprehensive understanding of disease dynamics within ecological communities. Amphibians have become the most imperiled class of vertebrates worldwide, with infectious diseases likely playing an important role. The contributing role of disease in amphibian population declines provides an added urgency to understanding the pathogen community of amphibian populations. Based on field surveys in California, USA, **Hoverman et al.** report that highly virulent fungal, viral, and helminth infections are widespread within wetland-breeding amphibian communities and that these pathogen frequently co-occur. Considering that amphibian communities are frequently exposed to multiple pathogens, a broader understanding of coinfection dynamics is essential for the development of effective management strategies.

The world's amphibians are facing a conservation crisis with one of the most insidious threats coming from the microscopic fungus, *Batrachochytrium dendrobatidis* (Bd). Amphibian declines are more evident in high elevations. The research of **Flechas et al.** extends the distribution range of Bd down to sea level and shows that it has again crossed open ocean. The authors show the pathogen has been present on Gorgona Island, Colombia, since at least 2007, yet the authors observed no obvious signs of disease or declines among hosts. The data highlight the need to better

understand the dynamics of pathogen dispersal and disease etiology.

While microparasites (e.g. chytrid fungus) have received most of the attention, macroparasites can also potentially influence amphibian hosts in complex and important ways. Although amphibian macroparasites were once thought to cause little pathology, **Koprivnikar et al.** discuss the growing evidence that suggests otherwise, especially through interactions with other stressors. It is now clear that environmental factors (e.g. pesticides, eutrophication, landscape) are important drivers of amphibian macroparasite infections, suggesting that global changes will significantly influence amphibian disease patterns. Consequently, amphibian macroparasites have valuable potential as biological and environmental indicators.

A STELLAR PROPONENT

Mercury is a global contaminant of concern for the fetus/neonate of fish consumers. Steller sea lions share common resources with humans and integrate complex marine food webs including exposure to toxic and infectious agents, making them sentinels of marine ecosystem health. In this study, **Castellini et al.** report relatively high concentrations of mercury in Steller sea lion neonates with highest concentrations in the endangered western population, mirroring patterns reported in human biomonitoring studies of Alaskan coastal communities. These data warrant further investigation with respect to sea lion recruitment and have broader implications with respect to human, pinniped, and ecosystem health.

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