

## About the Cover

# Cover Essay: The Fearsome and the Fuzzy

Cute-looking polar bears drifting at sea on an ice cube and ugly mosquitoes poised to take over the world. At first glance, it seems that the two images have little in common, but popular press coverage of climate change has put both in the headlines frequently in recent years. The tone of this coverage, however, is deeply divergent. For example, both the loss of habitat driving the potential extinction of polar bears and the expansion of mosquito-habitat due to global warming are both presented as imminent catastrophes. The scientific community has also been subject to this dichotomy; conservation science and disease ecology are regarded as disparate disciplines.

An anthropocentric worldview often divides global biodiversity into good and bad species. Species that are subjectively considered useful, pretty, or awe-inspiring are considered to be deserving of our protection. Other species that are, again, subjectively considered dangerous, ugly, or inconvenient must be eradicated, controlled, or ignored (sometimes at our peril). Such over-simplification is not scientifically useful, since organisms are perceived out of the context of their ecosystems, which comprise multiple, interacting elements that affect and are affected by humans in myriad ways. Of course, disease-vectoring insects may not be regarded in the same light as polar bears or other threatened species, but let us remember that mosquitoes—as all organisms on our planet—are part of the complex and subtle web of biodiversity.

The concept of ecosystem services is a useful framework for discussing human interactions with nature. It has long been recognized that the fulfilment of human needs (e.g., alimentation and health) are closely related to the health of the environment. Recent research has begun to demonstrate the degrees to which our activities compromise the very systems on which we depend for benefits like clean air and water. Disease and pest mitigation is con-

sidered to be an ecosystem service, but often neglected is the fact that bacteria, viruses, mosquitoes, and other disease carriers also belong to ecosystems. These cannot, even conceptually, be separated.

There is a tendency to regard disease as evil and aberrant, but nature as morally neutral. To regard disease and disease vector dynamics as distinct from the ecosystems to which they, and we, belong is to cripple our understanding of how human activities influence disease emergence and spread. However, the anthropocentric ecosystem service concept can easily be made to include diseases: They are ecosystem disservices (Vanwambeke et al., 2007).

The framework of ecosystem disservices permits us to consider diseases in the same way that we consider other species within the context of human manipulation and transformation of the environment. Measles, for example, could not become an endemic disease until humans began to settle in large groups (Bartlett, 1957). On the other hand, swamp drainage and increased agricultural land use have contributed to the eradication of malaria in Europe (McMichael, 2001; Reiter, 2000). Anthropogenic ecosystems can provide both services and disservices to human health; both should be considered together in creating any meaningful assessment of the relationship between environmental and human well-being.

We must expand current epidemiology frameworks to integrate ecosystem disservices, such as pathogens and their animal vectors, with ecosystem services. Sparse references to ecosystem disservices in such major and foundational reports as the Millennium Ecosystem Assessment (e.g., WRI, 2003) and apocalyptic statements about climate change and vector-borne diseases are unhelpful. Instead, an ecosystem service/disservice framework would facilitate studies on the effects of climate change, demographics, socioeconomic forces and other environmental factors

(e.g., land use) on disease dynamics. This would be a valuable reminder that climate change is not just about increasing temperatures or changes in precipitation, but also about vegetation, crop yields, and the social and economic functioning of human societies. Currently, most scientists investigating species distribution focus either on friendly or unfriendly species, but this distinction is irrelevant to species dynamics in the face of environmental manipulation and climate change. Scientists studying polar bears must communicate more with scientists investigating mosquitoes—especially when friendly and unfriendly species, such as polar bears and mosquitoes, share an ecosystem. Community ecologists and disease ecologists have many useful insights to exchange with one another—if they would only compare notes!

Human opinions are a matter of indifference to the forces that are changing the world as we understand it; whether a species is charismatic or repulsive, fearsome or fuzzy, it is part of an intricate mystery that only sustained, integrated, and interdisciplinary scientific efforts can untangle.

## THE ARTIST

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Carol Tinga is a Canadian artist who travels whenever she can and is interested in creating paintings that result from a collision of materials (e.g., wax, oils, acrylics, and nail polish) and source images, the results of which may pose social and political questions. Working from variously derived source materials (e.g., webcam and Internet images, handheld digital camera and satellite images, a Japanese paper collection and books), she manipulates and plays with them to create paintings that are mediations and iterations of the original sources. Arctic animals rest in flower-filled landscapes. Architectural landmarks, explorations of the importance of place, are painted from atypical vantage points. Herd animals like beef cattle are treated to the singularity of a portrait, albeit one employing metallic and fluorescent paints.

Carol's art reflects her desire to better understand the complex interrelatedness of all living beings and with the ecosystems in which they gyre. Her paintings mirror the infinite layers of which we are composed. In the case of our

cover art, *Climate Change I*, the first painting in an ongoing climate change series, she began with a photograph of a polar bear cooling itself on the ice surface. Overlaying the polar bear, she painted a cherry tree, symbolic of springtime and the promise of new growth and continued life. Carol is an emerging artist and consultant epidemiologist holding degrees in Human Biology, Epidemiology, and Studio Art from the University of Guelph, Canada.

## COVER ART

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*Climate Change I* by Carol Tinga. 2007–2008. 16" × 16". Acrylic on wood. Private collection, Canada. Reproduced with the generous permission of the artist and owners, and with thanks to Professor David Waltner-Toews and Professor Chandler Kirwin.

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