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Dan is an evolutionary biologist and parasitologist who pioneered the integration of phylogenetic and ecological information in evolutionary biology. Since the early 1990s, his research has focused on issues of biodiversity, climate change and emerging disease.

From 1996-2005, he was the coordinator of an inventory of all parasites inhabiting 1,000 species of vertebrates living in the Area de Conservacion Guanacaste, Costa Rica. Results of that project demonstrated that climate change was associated with many parasites changing hosts, the fundamental signal of emerging disease. Similar projects by colleagues working in the Arctic at the same time found similar patterns. The clear implications are that emerging disease triggered by climate change, globalization, overpopulation, and conflict represents an existential threat to technological humanity. In reality, those countries that feel the least threatened at the moment may be the most vulnerable in the long term.

After serving as Professor of Ecology and Evolution at the University of Toronto, Dan took early retirement in 2011 to have more time to help understand and develop policies to anticipate, mitigate and adapt to emerging disease triggered by climate change. This led to the Stockholm Paradigm, a general framework for understanding the evolutionary implications of climate change and biodiversity dynamics for emerging disease. More importantly, the Stockholm Paradigm provides clear guidance about new policies that can be implemented to help "anticipate to mitigate" the effects of emerging diseases. In particular, we need to begin to "find them before they find us." These policies are encapsulated in the DAMA protocol – Document, Assess, Monitor, Act.

The author of more than 350 scientific articles and books, Dan is a Fellow of the Royal Society of Canada and a Fellow of the Linnean Society of London. He has been awarded honorary degrees by Stockholm University and the University of Nebraska-Lincoln.

## Climate change and the emerging disease crisis: An existential threat to technological humanity

For most people, the emerging disease crisis is a matter of a few highly publicized viruses restricted to tropical developing countries. In reality, the crisis encompasses all pathogens affecting humans and all species upon which humans depend for survival and for socio-economic development and growth. Viewed in that light, the emerging disease crisis constitutes an existential threat of global proportions. And humanity is playing a losing game with respect to emerging diseases, mostly by failing to internalize the scope and cost of the crisis. Our failure is further exacerbated by an odd mixture of psychological denial and over-confidence with respect to our technological capabilities, coupled with ignoring fundamental evolutionary principles. Biodiversity, disease, and climate change are linked, and integrating the fundamental evolutionary nature of diversifying life can allow us to "buy time" and save resources in our efforts to cope with emerging diseases.

The Stockholm Paradigm is new as a "named" conceptual framework, although its elements are each well established scientifically. It provides a comprehensive view explaining the ease with which pathogens can "change allegiance" even without genetic changes, given the opportunity, something not considered in current "health" frameworks. This makes the planet an evolutionary minefield of potential EID, needing only climate change and the resulting movements of humans and other species to trigger them. Our inattention has allowed pathogens to be better at finding us than we have been at finding them. We need to change from a crisis-response policy paradigm of "Do No Harm" to a proactive policy paradigm based on the Precautionary Principle. I will discuss concrete proposals for what we can do to "anticipate to mitigate" the impact of emerging disease and climate change on humanity, helping to buy time and save resources while humanity searches for ways to achieve a sustainable existence of indefinite duration. Much of this is embodied in the DAMA protocol - Document, Assess, Monitor, Act – which can augment existing measures. I will close with an assessment, based on the Darwinian principle John Maynard Smith termed "The Gambler's Ruin," of just how well-insulated technological humanity is, as opposed to how well it thinks it is insulated, from the impact of climate change and disease. In particular, large densely populated cities may be vulnerable in ways not generally appreciated.