

Does Global Change Evidence Signal Biological Catastrophe?

Editor's Note: A battery of world class scientists addressed a two day conference at UICA/Davis recently, evoking the following report from Tom Stohlgren, Ecologist with the NPS/CPSU at UICA/Davis.

On April 30 and May 1, I heard world renowned experts address two major questions: (1) What is the evidence for global change?, and (2) How is life on earth responding to global change? Because their comments are pertinent to the proposed NPS Global Change Program, I have summarized them briefly.

Dr. Paul J. Crutzen, atmospheric chemist and Executive Director of the Max Planck Institute for Chemistry, West Germany, displayed convincing evidence of recent changes in the planet's atmosphere. He estimates a doubling of tropospheric ozone in the Northern Hemisphere in the past century. Debate, he said, should no longer focus on whether global temperatures will rapidly change, but on what combination of interactions (e.g. increased penetration of ultraviolet radiation, with increased CO₂, with changes in precipitation, etc.) will impact the earth's inhabitants. He stressed that CFCs (chlorofluorocarbons) released into the atmosphere today may not reach an equilibrium state for more than a century. Although we may internationally reduce CFC production by 50 percent, a reduction of at least 80 percent may be necessary to reduce the rate of further atmosphere degradation to the current rate of degradation.

Dr. Michael I. Budyko of the State Hydrological Institute, Leningrad, USSR, spoke for international cooperation to detect and predict climate change impacts. He showed that empirical data from many areas must be

synthesized to detect trends. He also suggested that the strengths (i.e. computer modeling by US scientists, empirical data gathering by USSR scientists) could be maximized by sharing technique developments and data.

Dr. Paul E. Waggoner from the Connecticut Agricultural Experiment Station in New Haven, emphasized the potential impacts of global climate change to California. Californians consume one quarter of the annual fresh water produced in the continental US. He claimed over 90 percent goes to agriculture. Even slight reductions in precipitation amount could reduce groundwater storage, decrease water use efficiency by plants, and increase salinization of cropland soils. His talk helped me focus on the role many national parks play as primary watersheds for agricultural districts downstream.

Dr. Vernon H. Heywood of the IUCN – the World Conservation Union – United Kingdom, suggested we focus more effort on protecting species diversity, particularly plant species. He showed how alien plant species invasions are drastically changing local habitats and microclimates. Together, these invasions are profoundly affecting our efforts to preserve the biological diversity present only two centuries ago. Dr. Heywood suggested increasing our efforts to protect genetic diversity as well – focusing on small, isolated plant populations all over the globe.

Dr. Daniel Simberloff of Florida State University, drew upon the fable of the elephant (in this case, habitat fragmentation) and the flea (climate change). He asked whether, if the elephant kills a person, does it really matter if the flea also bites said person? He cited forest destruc-

tion in the past 200 years. Over 40 percent of wet tropical rain forests are gone, the rest is being cut at a rate of 1 percent a year. Old growth forests in the Pacific Northwest once covered 19 million acres; now they occupy only 2.5 to 3.8 million acres, primarily on USFS lands in Oregon, and are being cut at 2.5 percent per year – a faster rate than tropical forests.

In another US example, southeastern long leaf pine, which covered 70 million acres 300 years ago, has been systematically reduced to only 1,500 acres; thus, it was cut at about 5 percent per year. Along with forest destruction and habitat fragmentation comes the loss of biological diversity and landscapes that may never recover due to invasion of alien species, urban development, etc. Dr. Simberloff stressed the need to inventory resources and assess the possible impacts to all remaining fragments (small parks and large?) in light of continued habitat fragmentation compounded by climate change stresses.

Dr. William C. Clark from Harvard's John F. Kennedy School of Government spoke on "Managing Global Climate Change." He noted that in the past 100 years, the human population increased 300 percent and that agricultural productivity and energy production were up 500 and 2,500 percent respectively for that same period. Forest cover, however, decreased 15 percent, atmospheric CO₂ and CH₄ increased 100 percent each, and the flux of zinc and lead increased 300 and 1,800 percent respectively. Dr. Clark added that more than 70,000 new synthetic chemicals in use today were virtually unknown 100 years ago.

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The concept of sustainable development was explored as a means of managing our global environment. Simply stated, sustainable development is management of resources to meet a society's current needs (at some reasonable level of life quality) without compromising the resources of future people. Some short term environmental degradation may occur while a given society reaches that minimum standard of living before we (citizens of the richest country on earth) can expect full international cooperation in planning global environmental management strategies. In the short term, however, we can set a better example in the US, show leadership in helping other countries achieve sustainable development, and share research and technology with developing countries.

Dr. Thomas E. Lovejoy, Assistant Secretary for External Affairs of the Smithsonian Institute, chairman of the US MAB Program, and a member of both the President's Executive Committee of the International Council of Scientific Unions and the Scientific Committee on Problems of the Environment, spoke last. He summarized current international efforts to detect and predict impacts of global change on biological diversity and then discussed why such efforts seemed only a token gesture on the part of past Administrations, the scientific community, and society. Why aren't we fully controlling CFC production? Why do we purchase products packaged in excessive, non-biodegradable containers? Why is the scientific community so fearful of taking a pro-active stance on environmental issues?

Dr. Lovejoy's presentation was delivered in a humble, almost depression-laden tone. He touched upon several of the preceding speakers' topics, concluding that "we don't know very much, we're doing very little with what we do know, and it's time to get angry."

The two-day symposium ended. The crowd left the auditorium. The speakers left Davis, presumably to speak at other symposia or to go home and carry on their important work. I left feeling more informed, more inspired to champion the cause. Perhaps it was because I was starting to get angry.