

CLIMATE ALERT

Summer 1988

Vol. 1, No. 2

Four Warmest Years Since 1880s in Current Decade

The four warmest years in the history of instrument records all occurred in the 1980s, according to two NASA Goddard Institute for Space Studies scientists, James Hansen and Sergej Lebedeff. The warmest years were 1981 and 1987, the scientists reported in a paper published in the April issue of *Geophysical Research Letters*. The other two very warm years were 1980 and 1983. The findings refer to global air surface temperatures which, the scientists write, "is a primary measure of global climate change."

Warming between the 1960s and the present took place at a more rapid rate than in the 60 years between the 1880s and 1940, a previous period of rapid warming. Prior to 1880s, temperature records are too limited for reliable global trends. Even corrected for urban heat island effects, the growth of cities in the last 100 years (estimated by the authors to contribute a warming of 0.1–0.2 degrees C), the significant difference remains.

The global warming in 1987 was entirely due to a large jump in annual mean temperature of 0.4 degrees C at low latitudes (between 23.6 degrees N and 23.6 degrees S, covering 40 percent of the globe) near the equator. Both Northern and Southern latitudes were actually colder.

The 1987 warmth was unusual because the sustained level of high temperatures at low latitudes exceeded even those in 1983, the time of the strongest El Nino of the century. It was also remarkably warm in the northern half of North America, in large parts of southern Asia, southern South America, and southern Africa. Europe had an unusually cold winter and

Continued on page 10

FY89 US Climate Funding Prospects Uncertain

In a tangible dividend from the December 1987 Reagan-Gorbachev communique highlighting global climate issues, the Administration has increased budget requests for climate programs for FY89 substantially.

The House markup significantly exceeded the Administration's bolstered EPA fund request, but deleted the entire \$15 million NOAA climate change initiative and sharply cut the requested funding for NASA's NSCAT satellite, a crucial part of the World Oceans Circulation Experiment measuring winds over the oceans.

In mid-May the House Appropriations Subcommittee on HUD and Independent Agencies voted to hike EPA climate policy funds to \$6 million, a \$4 million increase over the Administration request, while also providing a \$4 million increase over requested stratospheric protection policy

funds to \$7 million. The Subcommittee voted one million for climate research moving it to \$5 million while voting only \$5 million for stratospheric research compared with an Administration request of \$8 million. This overall funding represented a potential jump in total climate and ozone funds at EPA to \$23 million, compared with current annual funding of under \$10 million. (Our Spring 1988 issue noted that EPA's combined funds for climate and ozone dropped from FY 1987 to 1988 just as the agency received increased policy responsibilities. Funds for policy and regulatory work were cut from \$5 million to \$4 million while research funds remained essentially level at just over \$5 million. This cut in FY 1988 funds voted by Congress last December was still several million dollars above the

Continued on page 10

CFC Producers Plan Phaseout

Ten days after the NASA press conference reporting new evidence on ozone depletion and increased concern by scientists on the Ozone Trends Panel, the du Pont company announced that it plans to phase out production of chlorofluorocarbons (CFCs) almost completely by the end of this century. The announcement also followed by one day U.S. Senate ratification of the Montreal Protocol. While the Montreal agreement signed by 31 countries last September called for a 50 percent cut in CFC production (based on 1986 figures) over the next decade, the du Pont Company is pledged to nearly double that goal, cutting output by 95 percent by the year 2000.

Two weeks later, manufacturers of foam plastic food containers announced plans to stop using CFCs in their products this year. They will switch to hydrochlorofluorocarbon 22 (HCFC-22) formed by adding a hydrogen molecule to CFCs that causes the compound to break down in the lower atmosphere before it reaches the ozone layer. HCFC-22 is said to be 95 percent less damaging to ozone than CFCs.

Proportionate shares of CFCs and halons by use, provided by EPA, are: 30 percent of CFCs for refrigeration and air conditioning, 30 percent for blown-foam products such as insulation and disposable food containers, 17 percent for solvents

Continued on page 4

Ultraviolet May Activate AIDS Virus

Investigators at Smith Kline and French Laboratories in King of Prussia, Pa., suggested in a recent study that ultraviolet light may be a catalyst in transforming the AIDS virus (HIV) from a latent or dormant state to an active, replicating, and harmful state. The study was published in the British scientific weekly, *Nature*, in early May.

When the research team exposed HIV-infected cell cultures to ultraviolet light, HIV activity in cells increased 50 to 150 times, greatly enhancing opportunities for viral reproduction and growth. When they

exposed the HIV-infected cells to direct sunlight for 30 minutes, viral activity in the cells was 12 times higher than in control cells.

The lead investigator, Martin Rosenberg, reported that HIV has been isolated from epidermal cells of an AIDS patient, suggesting laboratory findings could be clinically relevant. The AIDS virus in the patient's outer-layer skin cells may have been activated either by direct exposure to the sun or to the ultraviolet rays of a commercial tanning spa.

In This Issue

- Pullout Agenda for 2nd Conference
- Editorial
- Third World Symposium
- Infrastructure Symposium
- Climate Calendar

Technological Breakthroughs for the Third World:

Imperative to Prevent Climatic Chaos

by John C. Topping, Jr.
President of Climate Institute

Over the past several years a solid consensus has developed within the world scientific community that humanity is facing significant and potentially jarring changes in global climate. Human industrial and agricultural activity has produced a steady buildup in concentrations of greenhouse gases. Climate modelers tell us that this could result in a rise in average annual global temperatures of as much as 9 degrees Fahrenheit and a rise of several feet in sea level within the next century. Dr. Wallace Broecker has also warned that records of past climate change suggest that we could experience abrupt climate change as a result of shifts in little understood ocean circulation patterns. There is some evidence that rapid global warming may already be underway—the four warmest years since the Industrial Revolution have all occurred in the current decade.

In recent weeks the immediacy of the climate change issue has been driven home by findings that the stratospheric ozone layer shielding out deadly ultraviolet radiation has been thinning over populated areas of North America, Europe and Asia and that the precipitous drops of ozone around Antarctica are spreading outward toward populated portions of the Southern Hemisphere.

Any realistic strategy to address this rapid change in global climate will require concerted action by nations across the world. A first start in this direction occurred in Montreal in September 1987 when most of the major producers and consumers of chlorofluorocarbons and bromine compounds signed a treaty agreeing to curtail use of these compounds which deplete the ozone layer.

Building on this success, a two-day symposium was held in Washington, March 24–25 on the impact of climate change on the Third World. Over 30 embassies, The World Bank, the OAS and A.I.D. were represented at this session convened by the Climate Institute with The Conservation Foundation and EPA as co-sponsors.

Chaired by Ambassador Richard Benedict, who represented the U.S. in the ozone treaty negotiations, this symposium addressed such issues as the impact of climate change on agriculture, water resource planning and coastal protection in the developing world. While numerous uncertainties abound and experts differ on specific regional impacts, it was clear that climate change will be a life and death issue for much of the Third World. Entire

nations such as the Maldives and Kiribati could succumb to a several feet rise in sea level. A storm surge from a single tropical cyclone claimed three hundred thousand lives in Bangladesh. Hundreds of thousands have perished from drought related starvation in both the Sahel and East Africa. Climate models indicate that such extreme events could become more common.

These discussions sought to explore creative mechanisms for factoring climate change and sea level rise into development planning. Most troubling, however, was the discussion of the contribution of Third World emissions to global warming. The great bulk of greenhouse gases and stratospheric perturbants in the atmosphere are a result of human activity over the past century in the industrialized world. The huge rises in average annual global temperature projected in most of

Principal focus for such a pooled research interest would be on developing economically attractive and environmentally benign electric power systems, motor vehicles, and refrigeration systems for use in China, India, Pakistan, Indonesia, Nigeria, and Brazil.

the climate models, however, in large part reflect the development of the Third World as the burgeoning populations strive for a better life.

As the perceptive Science Counselor from the Embassy of India, Dr. J.S. Rao, pointed out, Third World countries would be delighted to use technologies or fuel systems that will conserve energy and restrain growth of greenhouse emissions, but they lack the resources to finance the development research for such technologies. Absent such breakthroughs, the Third World can be expected to emulate the fossil fuel consumption patterns of the West to the peril of the entire planet.

With an Olympian disregard for the practicalities of implementation, some observers have started to bandy about the notion of a global fossil fuel tax. Far more feasible, however, would be a concerted research effort to develop energy conservation, non-carbon and low carbon fuel systems, improved agricultural practices and chlorofluorocarbon substitutes. Such

a crash effort would ideally involve pooled funding from the OECD and Soviet Bloc countries. The principal focus of such an effort should be on developing economically attractive and environmentally benign electric power systems, motor vehicles and refrigeration systems for use in China, India, Pakistan, Indonesia, Nigeria and Brazil. Only by ensuring satisfaction of the development needs of those countries can the developed world help build the global consensus necessary to prevent climatic chaos.

Japan Passes CFC-Conserving Bill

Both Japanese houses of Parliament have approved a bill to protect the ozone layer and guard against harm from ultraviolet rays. The bill includes tax incentives for consuming industries to recycle and conserve chlorofluorocarbons (CFCs) and to limit production in accordance with the Montreal Protocol.

Manufacturers and importers must seek permission from the Ministry of International Trade and Industry (MITI) to produce or import CFCs. The Japanese Environment Agency and MITI will promote CFC conservation and provide financial incentives for consuming industries to invest in equipment to recycle or conserve CFCs.

The Environment Agency will be responsible for evaluating depletion of the ozone layer and changes in levels of chemicals which destroy ozone.

Industries using CFCs as solvents, accounting for 40–45 percent of consumption, may recycle up to 95 percent of the harmful chemicals. Urethane foam makers, accounting for another 20–25 percent of consumption, may be able to recycle 30–40 percent. Consumers will be encouraged to have recycling movements for refrigerators which account for 30 percent of CFC use.

CLIMATE ALERT

Quarterly Newsletter published by the Climate Institute

Stephen Leatherman, *Chairman*
John C. Topping, Jr., *President*
Mark Goldberg, *Publications Chairman*
Nancy C. Wilson, *Editor*
Blackstone Graphics, Inc., *Design & Production*

Suite 403
316 Pennsylvania Avenue, SE
Washington, DC 20003

(202) 547-0104

Third World Climate Symposium Draws Wide Embassy Participation

Nearly 40 countries participated in a *Symposium on the Impact of Climate Change on the Third World: Implications for Economic Development and Financing* on March 24 and 25. This day and a half meeting, organized by the Climate Institute with the co-sponsorship of The Conservation Foundation and the EPA, was chaired by Ambassador Richard Benedick, chief U.S. negotiator for the recently signed ozone treaty.

"It is a challenge to the world community to recognize that issues of climate change are worldwide, not confined to just a few countries," said Joan Martin-Brown of the United Nations Environment Programme. "We want all countries to perceive the problem and participate in ratifying protocols."

The most plausible scenario for future climate trends is a warming of one degree Centigrade in the next 25 years, according to James Hansen, Director of the Goddard Institute for Space Studies (GISS).

While scientific findings propelled us to drawing up and signing the Montreal Protocol, said NASA scientist Robert Watson, information gained in the last 6 months has given us even more reason to be concerned about stratospheric ozone depletion. Chlorofluorocarbons and other stratospheric perturbants have 70- to 150-year lifetimes, Watson pointed out, and it would take many centuries for them to dissipate. Dr. Michael Oppenheimer of the Environmental Defense Fund contended that Third World countries are most vulnerable to climate change related to sea level rise due to the location of much of their population on river deltas near coastlines.

Temperature changes coupled with a potential doubling of CO₂ will have a dire effect on crop yields, said Dr. Cynthia Rosenzweig of Columbia University. The temperature requirements of 0 to 18 degrees Centigrade for a growing crop of wheat will not be met in many developing countries. The photosynthesis rate of cotton and corn will increase with a rise in CO₂ and leaf conductance (the opening of stomata in leaves) may lead to an increase in water use efficiency. This may offset a change in the transpiration rate or may cause an increase in evapotranspiration. The impact is uncertain.

As the climate has warmed in the past, monsoon lands have tended to become wetter, reported Dr. Hassan Virji of the National Science Foundation. Changes in solar radiation also may reshape monsoon patterns.

A proportion of dietary energy consumed by animals is lost to methane and

in some cases the animals are producing no useful product, said Dr. Henry Tyrrell of the U.S. Department of Agriculture. The production of methane by animals is a significant proportion of the amount of methane entering the atmosphere. In lactating dairy cows, one-half of dietary energy may be lost to methane. An effort is being made to improve the metabolic process of animals, increasing the efficiency and productivity of the animal population and reducing its methane production.

Even without the greenhouse effect, we need better agricultural planning for preparation for climatic stress, said Norman Rosenberg of Resources for the Future. Any preparations for drought made today will be useful in mitigating drought due to climate change. In the short-run we can construct new wells and stock ponds and adjust the supply of livestock. In the longer term, we can engage in snow management, schedule irrigation appropriately, take measures to decrease evaporation, harness water by diverting and holding it, and plant alternate crops. Dan Dudek of the Environmental Defense Fund viewed future water cost and availability as critical factors in Third World agricultural planning.

Dr. James Broadus of the Woods Hole Oceanographic Institution placed some estimated dollar figures on value of land losses due to rising sea levels in two developing countries—Egypt and Bangladesh. In Egypt, the loss would amount to \$0.5 billion, 2 percent of gross domestic product, in Bangladesh, to \$1 billion.

Many Third World nations would lose significant amounts of land, said James Titus of EPA. Bangladesh could lose 25 percent of its area, the Maldive Islands 100 percent.

The option of retreating inland is not open to Bangladesh; it needs land too badly. The solution is probably a hybrid: to build walls around major cities, construct some levees, and promote as much land building as possible.

Many other island nations are facing the same problem, and most are unable to afford engineering solutions. In Rio de Janeiro, mangrove marshes spread by trapping sediment, but mangroves are being cut for firewood and houses are replacing mangrove marshes, said Dr. Stephen Leatherman of the University of Maryland. Brazilian shore developments are on a collision course, with beaches shrinking in front of new high rise buildings. In Argentina, the coastal plains of the Pampas are undergoing erosion like that along the western shore of the Chesapeake.

To achieve success in setting environmental policies in a particular nation, said Samuel A. Sherer, Esq., of the International Development Law Institute, an interdisciplinary unit tied to the ministry of planning and budgeting is needed. Unless it is integrated at the top level of government, he said, policy efforts will fail.

We are not managing our present coastal resources well, Dr. Robert Buddemeier of Lawrence Livermore National Laboratory stated, and, facing significant losses, we are even poorer at managing changing conditions. Intertidal and shallow marine communities are much more important to the Third World countries with their high population growth than in the temperate regions. These are living coasts; the coral community grows abundantly only close to the surface, and coral

Continued on page 10

Climate Conference at United Nations

The huge success of the symposium in Washington last March, "Impact of Climate Change on the Third World: Implications for Economic Development and Financing," prompted a call for a repeat performance for a wider audience. To meet this demand, the Climate Institute has arranged for a "Symposium on Climate Change and Economic Growth," to be held in New York City on Monday, June 13, at the United Engineering Center, 345 East 47th Street. Only one block from the United Nations, this repeat session will enable representatives from many countries to participate in a discussion on the implications of climate change on the population of the world, on energy strategies, agriculture, and the effect of sea level rise and stratospheric ozone depletion.

The Symposium will be chaired by Ambassador Richard Benedick, principal U.S. negotiator for the Montreal Protocol on ozone; Noel Brown, Director of the New York Office of the United Nations Environment Programme, will deliver opening remarks. Speakers include Stephen Schneider of the National Center for Atmospheric Research, Robert Watson of the National Aeronautics and Space Administration, George Woodwell of the Woods Hole Research Center, Amulya K.N. Reddy of the Indian Institute of Science, Stephen Leatherman of the Laboratory for Coastal Research, Robert Buddemeier of the University of California, Hassan Virji of the National Science Foundation, and Cynthia Rosenzweig of Columbia University. Sir Crispin Tickell, Permanent Representative of the United Kingdom to the United Nations, will be the luncheon speaker, and Kiliparti Ramakrishna, Senior Fellow in International Law at the Woods Hole Research Center, will provide a look toward the future from a developing country perspective.

U.N. missions, foundations and other organizations interested in global climate change have been invited to attend. The meeting is convened by the Climate Institute and co-sponsored by The Conservation Foundation, the William Bingham Foundation, and the Woods Hole Research Center.

Infrastructure Impacts of Climate Change Expected to Be Greatest in Coastal Areas

Dr. Stephen Leatherman of the University of Maryland, illustrated the disastrous effects of sea level rise already felt in numerous areas along the east coast and Gulf of Mexico with a series of slides. Erosion is eating away at beaches, shorelines are receding, and houses are perching precariously on the edges of banks or falling into the sea. The photographs set the stage for the Climate Institute's *Symposium on the Implications of Climate Change for Infrastructure Planning*.

Reports from speakers from across the U.S. and Canada showed that effects of a sea level rise differ from region to region, with enormous significance for such disparate coastal areas as Atlantic Canada and Greater Miami but much less bearing on others such as Cleveland.

The final bill for the effect of a sea level rise in 4 provinces of Atlantic Canada comes to several billion dollars and much social and economic disruption, said Marilyn Manzer, a consultant from Nova Scotia. She reported that except for park planners, very little planning is being done for sea level rise and, in fact, it is difficult to get authorities in the area to consider the question seriously, despite obvious extreme vulnerability. In Halifax harbor, electric power generation and telephone

facilities have been built on a jetty. At the port of St. John, all four Coast Guard bases would need to be relocated at a cost of \$100 million. The vast majority of the 500 fishing plants in the region would be inundated, severely affecting the 1342 fishing communities associated with them which house 25 percent of the population and account for 40 percent of this single sector of the economy.

Equally severe impacts would be felt in Greater Miami, according to William Hyman of the Urban Institute, which was a symposium co-sponsor. Forty percent of the city area is vulnerable to 25-year storms, and severe flooding already exists. A huge onslaught such as a hurricane, with a 10 to 15-foot storm surge and extensive inland flooding, would require total evacuation of the city and island, providing a dress rehearsal for the effects of climate change and alerting the city to the need for contingency plans and coordination of effort at all levels, including the private sector and the general public.

In another report from the Urban Institute, J. Christopher Walker said factoring in changes from higher temperatures (more demand for air conditioning), rising sea levels and an advancing salt front, the New York 2030 water supply

deficit is projected at 408 million gallons a day. Preventive measures are expensive: reviving the Tocks Island project on the Pennsylvania-New Jersey border at a cost of \$850 million, smaller projects augmenting the city's own supply at a cost of \$2.8 billion or phased construction of Hudson River reservoirs for \$7 to \$14 billion.

Droughts in California in 1987 and 1988 have alerted people to changes and the need for more reservoirs, according to Dr. Joseph Knox of the Lawrence Livermore Laboratory. Saline intrusion in California river systems and other changes in major ecosystems threaten intakes to many city water supplies. Because efforts to improve global climate models for more accurate forecasting will require more time than permitted by a 1992 deadline, Knox recommended relying on instrument record analysis for near term planning and prediction purposes.

James Titus of EPA described alternatives for sea level rise impacts on sewer and drainage systems in three types of U.S. communities: clearing up present facilities as in Fort Walton Beach, Florida, redesigning and enlarging the drainage system incrementally as in Charleston, South Carolina, or building a levee as in the barrier island of Long Beach, New Jersey.

Developing Country Energy Strategies Emphasize Conservation

A Workshop on Developing Country Energy Strategies: Implications for the Greenhouse Problem, convened April 28-29 by the World Resources Institute and the Environmental Protection Agency, drew about 80 scientists and policy makers from about 20 countries.

Dr. Amulya K.N. Reddy of India, co-author of the book, *Energy for a Sustainable World*, eloquently laid out a case for heavy reliance on energy conservation. Capital starved countries may find conservation economically feasible and environmentally beneficial. William Chandler of Battelle Pacific Northwest Laboratories

underscored Reddy's argument with charts showing great room for efficiency in Third World industries such as steel.

Professor Xu Shoubou of the Chinese Academy of Social Science indicated that energy conservation was being given increased emphasis in the world's most populous nation. He indicated that energy conservation and increased development of non-carbon fuels were becoming central to the PRC's energy strategy.

A workshop report from the WRI-EPA meeting is expected to be available by August 1988.

Senators Call for Greenhouse Convention

Forty-two senators covering a wide range of viewpoints joined in writing a letter to President Reagan on March 31 urging him to "continue and expand recent initiatives on the international environmental problem of the greenhouse effect and global climate change." The letter was signed by 24 Democrats and 18 Republicans.

The Senators expressed a hope that Reagan and Gorbachev would use the upcoming Moscow summit meeting as a forum to call for the negotiation of a convention on global climate change with the United States and the Soviet Union acting as leaders. They endorsed the establishment of a high level working group to study potential responses to climate change, including greenhouse gas emission reductions and adaptation to climate change.

They also urged Reagan to use the seven nation economic summit, scheduled for late June in Toronto, as a forum to push the negotiation of a global climate convention.

Phaseout *Continued from page 1*

which clean electronic parts and computer chips and the rest for fire extinguishers and halons in miscellaneous uses.

The duPont Company, as the major producer of CFCs, is engaged in an intense effort to find substitutes, but testing of alternatives for health and environmental effects is likely to require 5 years or more,

according to company spokesmen. The foam-food-packaging substitute was approved last December by the Food and Drug Administration, but is not considered suitable for many other uses. It accounts for less than 2 percent of the CFCs produced annually in the U.S.

TENTATIVE CONFERENCE AGENDA

Second North American Conference on Preparing for Climate Change: A Cooperative Approach

December 6–8, 1988

Mayflower Stouffer Hotel
1127 Connecticut Avenue, N.W.
Washington, D.C. 20036

First Day: Tuesday, December 6, 1988

Morning: Scientific Overview

9:00–Noon:

Opening Remarks of Conference Chairman, Joseph Cannon,
President, Geneva Steel

Scientific Keynote, Dr. Stephen Schneider, National Center
for Atmospheric Research

"Likely Climate Changes in North America and the
Caribbean," Dr. James Hansen, Goddard Institute for Space
Studies

Potential Climate Surprises (Speaker to be announced)

"Likely Sea Level Rise," Dr. Stephen Leatherman, University
of Maryland and *Chairman*, Climate Institute

"Stratospheric Ozone Depletion," Dr. Robert Watson, NASA

"Health and Environmental Effects of Ozone Depletion,"
John Hoffman, U.S. EPA

Luncheon Panel:

"Is Antarctic ozone hole broadening? Review of 1988
results. Is there an Arctic ozone hole?" Dr. Robert Watson,
NASA, Dr. Alex Chisholm, Atmospheric Environment Service,
Canada

Afternoon: Resolving Scientific Uncertainties

1:45–3:30 p.m. Simultaneous Panels

A. Role of Climate Feedbacks in Global Warming

"Potential volume and rate of methane hydrate release," Dr.
Gordon MacDonald, MITRE Corporation

"The contribution of soil feedbacks to global warming," Dr.
George Woodwell, Woods Hole Research Center

"Feedback processes that may affect future concentrations
of greenhouse gases," Dr. Daniel Lashof, U.S. EPA

B. The Role of Oceans in Climate Change

Lag times associated with heat storage CO_2 uptake—are we
reaching a saturation point?

Can we expect changes in the Gulf Stream?

"Understanding El Nino and long term climate variability
over oceans," Henry Diaz, NOAA-ERL

"The cost of obtaining decent ocean data," John Bond,
Climate Institute

C. Role of Agriculture in Altering Climate

Role of rice production and nitrogen fertilizers

Contribution of cattle and ruminant animals

Deforestation to create farmland

D. Potential Impact of Global Warming on Public Health in North America

Chairman, Dr. Devra Davis, National Academy of
Sciences

"An overview of potential impacts of global warming on
public health," Dr. Janice Longstreth, ICF Clement

Changes in mortality from extreme heat or cold, Dr. Larry
Kalkstein, University of Delaware

"Changes in vulnerability to extreme weather related events
(e.g., fires, hurricanes, floods, tornados)," Dr. William
Riebsame, University of Colorado

E. Potential Effects of Global Warming and Stratospheric Ozone Depletion on Ground Level Air Quality

Tropospheric ozone

Carbon monoxide

Acid deposition transport

3:45–5:30 p.m. Simultaneous Panels

A. *Changes in Weather Circulation Patterns*

Chairman, Jim McCulloch, *Director General*, Canadian Climate Centre

"Past shifts in monsoon patterns associated with climate warming," Dr. Hassan Virji, National Science Foundation

"Potential changes in seasonality of precipitation and in temperature variability," Dr. David Rind, GISS

B. *Projections of Global Emission Trends*

"Base case emission scenarios," Dr. Daniel Lashof, U.S. EPA

"Effect of policy options on emission forecasts," Dennis Tirpak, U.S. EPA

Uncertainties in energy models

Effect of changes in industry sectors on emission trends

C. *Addressing Impacts of Climate on Agriculture*

Chairman, Dr. Cynthia Rosenzweig, Columbia University

"An overview of effects of climate on agriculture," Dr. Martin Parry, University of Birmingham

"Likely effects of climate change on U.S. agriculture," Dr. Leon Hartwell Allen, Jr., University of Florida

"Likely impact of climate change on Canadian agriculture," Dr. Barry Smit, University of Guelph (Tentative)

Likely impact of climate change on Mexican agriculture

D. *Impact of Stratospheric Ozone Depletion on Human Health*

Skin cancer

Weakening of immune system

Eye disorders

E. *Uncertainties in Our Understanding of Atmospheric Change*

"An overview of interrelationships among changes in the stratosphere, troposphere and biosphere," Dr. Michael McElroy, Harvard University

Relationships between stratospheric change and global surface temperature

Does methane accelerate buildup of ice crystals in stratospheric clouds?

6:30–9:30 p.m. AWARDS Reception and Dinner

Second Day: Wednesday, December 7, 1988

Morning 9:00 a.m.–Noon: Plenary, Agenda For the Next Decade

Policy Keynote Speaker (*To be announced*)

"Status of USA-USSR Global Climate Agreement," Dr. Alan Hecht, U.S. Report, Soviet Report (*To be announced*)

"Lessons from UNEP Protocol re Greenhouse Convention," Ambassador Richard Benedick

Inter-American Climate Cooperation

A Canadian View

A Caribbean Perspective

A View from Mexico

Shaping the Congressional Agenda

Establishing Climate Change on the Agenda of the Incoming Administration

Luncheon Panel: Noon–1:30 p.m.:

How do we build a constituency for credible responses to climate change?

Chairman: Michael Brewer, *Vice President*, Dun & Bradstreet

ASSESSING REGIONAL IMPACTS

1:45–3:30 p.m. Simultaneous Panels

A. *Likely Effects of Climate Change and Sea Level Rise in Caribbean*

Chairman, Anthony Desir, Trinidad and Tobago

Impact on Caribbean beaches and recreation

Effects on coral reefs and islands

Changes in hurricane frequency and paths

Impact on marine life

B. *Likely Impact of Changes in Climate Hydrology in California*

"Impact on water resources," Dr. Joseph Knox, Lawrence Livermore National Laboratory

Potential effects on irrigated agriculture

Impact of climate change on water quality in the San Francisco Bay

C. *Likely Impact of Climate Change and Sea Level Rise on Chesapeake Bay*

Chairman, Dr. Stephen Leatherman

"Marsh loss and shore erosion," Dr. Michael Kearney, University of Maryland

Impacts on aquaculture, fishing

Impacts on wildlife, recreation

D. *Likely Impact of Rapid Warming on Arctic*

"Implications of expected change in ice cover," Dr. Claire Parkinson, NASA

"Effects on migratory birds and other wildlife," Dr. J.P. Myers, National Audubon Society

An overview of potential effects of rapid warming on the Canadian Arctic

Likely rates of Arctic warming

Changed conditions for oil and gas extraction

E. Likely Impact of Climate Change on Southeastern U.S.

Chairman, Daniel Power, Nashville, Tennessee, Climate Institute

"Implications of global climate change for TVA reservoir system," Dr. Barbara Miller, TVA Engineering Laboratory
Likely implications of climate change for Southeastern forests

Likely impact of climate change on Southeastern U.S. agriculture

3:45-5:30 p.m. Simultaneous Panels

ASSESSING IMPACTS ON MAJOR SECTORS

A. Impacts on Water Resources

Chairman, Dr. Paul Waggoner, *Chairman*, AAAS Water Panel

The state of future water resource supply and demand in North America even without climate change, Dr. J.E. Scheffer, U.S. Geological Survey

Vulnerability of North American water systems to climate change

"Likely changes in evapotranspiration," Dr. Norman Rosenberg, Resources for the Future

Likely changes in water quality related to climate change

B. Impacts of Climate Change on Urban Planning

Chairman, Neal R. Peirce

Likely effects of climate change on municipal infrastructure in Miami, New York and Cleveland, Dr. Ted Miller, Urban Institute

"Effects of climate change on coastal infrastructure," Jim Titus, U.S. EPA

"Emergency preparedness to address climate change," Dr. Sherry Oaks, AAAS

"Perspectives of a civil engineer and planner," Daniel Power, Climate Institute

C. Impact of Climate Change on Fish and Wildlife

Chairman, Dr. Robert Peters, World Wildlife Fund
Environmental and policy implications of climate change on Everglades National Park

"Potential impact of climate change on U.S. wildlife refuges," Robert Breckenridge, Idaho Falls Engineering Laboratory

Potential impact of climate change on Great Lakes fisheries

D. Impact of Climate Change on Forests

Interactive pollutant effects

Climate and UVB

CO₂ enrichment

Frequency of forest fires

E. Potential Impact of Stratospheric Ozone Depletion on Food Chain and Vegetation

Chairman, John Hoffman, U.S. EPA

Impact on marine food chain

Impact on crops

Impact on vegetation

Wednesday Evening

7:00-10:00 p.m. Dinners in private homes in the Washington area for conference participants

Third Day: Thursday, December 8, 1988

Response Strategies

9:00-10:30 a.m. Simultaneous Panels

A. Prospects for CFC and Halon Substitutes

Chairman, Dr. Stephan Andersen, U.S. EPA

"Halon substitutions," Carl Jewell, Halon Research Institute

"Substitutes in mobile air conditioning," Simon Oulouhajian, Mobile Air Conditioning Society

Status of search for CFC substitutes

"Incentives for substitution and efficiencies among CFCs and halons," Prof. Alan Miller, University of Delaware Law School

B. Preparing for Climate Change in the Great Lakes

Chairman, Dr. Stewart Cohen, Canadian Climate Centre

"An overview of EPA studies of climate change impacts on Great Lakes region," Joel Smith, U.S. EPA

Response strategies for hydropower, shipping and recreation industries

C. Preparing for Climate Change in New England and Atlantic Canada

Chairman, Greg Watson, Executive Director, Massachusetts Office of Science and Technology

"Strategies to respond to climate change and sea level rise in Atlantic Canada," Dr. Peter Stokoe, Dalhousie University

"Upland erosion in New England," Dr. Graham Giese, Woods Hole Oceanographic Institution

"Strategies for Cape Cod to respond to sea level rise," Dr. Stephen Leatherman

D. Factoring Climate Change into Industrial Planning

Chairman, Roger Strelow, Vice President, General Electric Company

"Implications of climate change for U.S. electrical demand," Ken Linder, ICF

Chemicals

Role of insurance industry

E. Energy Strategies to Restrict Emissions Growth

Chairman, Ted Williams, U.S. DOE

"Supply side strategies to reduce greenhouse emissions," Philip Jessup, Energy Probe, Toronto

Potential of conservation, fuel switching, CO₂ recapture, prospects of new technologies, and regulatory strategy.

10:45 a.m.-12:15 p.m. Simultaneous Panels

A. How to Protect the North American Coastline

"Relative vulnerability of North American coasts to shore line erosion," Jim Titus, U.S. EPA

"Limitations of fortification and beach nourishment strategy," Dr. Stephen Leatherman

Policy considerations in coastal protection

B. International Control of Stratospheric Perturbants?

Chairman, Ambassador Richard Benedick

Status of Montreal Protocol ratification?

Role of trade sanctions

Is it time to reopen Protocol, seek stricter controls?

C. Preservation of Tropical Forests

Chairman, Dr. George Woodwell, Executive Director, Woods Hole Research Center

"Status of tropical forest lands," Dr. Ata Qureshi, Climate Institute

Shaping impacts of subsistence agriculture

Role of development assistance organizations in forest preservation

D. Developing Country Energy Strategies

Impact of capital shortages

Room for efficiencies

Low carbon energy additions

Funding of technology breakthrough research

E. Development of Legal and Institutional Mechanisms for Climate Cooperation

Chairman, Dr. Alan Hecht, Director, U.S. National Climate Program Office

"Next steps for climate cooperation," Dr. Kilaparti Ramakrishna, Woods Hole Research Center

"Mobilizing a global citizens movement," Dr. Hind Sadek

Legal mechanisms for water sharing in time of drought

12:15-1:30 p.m. Luncheon: Concluding Speaker

CONFERENCE PRE-REGISTRATION

Second North American Conference on Preparing for Climate Change: A Cooperative Approach

December 6-8, 1988

Mayflower Stouffer Hotel

1127 Connecticut Avenue, N.W.
Washington, D.C. 20036

- ☐ **YES**, I will attend the conference.
- ☐ **NO**, I will not be able to attend this year—
- ☐ Please enroll me as a member of the Climate Institute so I may receive its publications and special conference rates.
- ☐ Please accept my tax-deductible contribution to the Climate Institute in support of its efforts concerning global climate issues.
- ☐ Please send room reservation forms for the Mayflower Stouffer Hotel.

Please find a check enclosed for the following:

- ☐ Conference registration—
\$250 per person by August 15, 1988
\$350 per person after August 15, 1988

(Fee includes registration materials, Tuesday Banquet, Tuesday and Wednesday luncheons, Wednesday dinner, Thursday luncheon, break refreshments, and a copy of the Conference proceedings.)

- ☐ 1 year membership in the Climate Institute—
\$50 each (with conference registration or to employees of environmental, educational or governmental organizations.)
- ☐ 1 year membership in the Climate Institute—
\$100 each (without conference registration.)

Total Amount Enclosed: _____ *

Please duplicate for additional reservations.

*Residents of Canada may pay amounts listed in Canadian dollars.

Mail Conference Registration to:

Conference Registrar

Climate Institute
316 Pennsylvania Avenue, S.E.,
Suite 403
Washington, D.C. 20003

Name _____
Organization _____
Title _____
Address _____
City _____ State _____
Zip _____ Phone _____

HOTEL RESERVATION

Second North American Climate Change Conference

December 6-8, 1988

Name _____
City _____ State _____
Zip _____ Phone _____
Arrival Date _____
Number of Nights _____
Number in Party _____
All major credit cards
Credit Card Type _____
Credit Card No. _____
Exp. date _____
Signature _____

Accommodations Desired (Check One)
Standard Single, \$75 Double, \$75
Deluxe Single, \$140 Double, \$140
(Please allow for current D.C. taxes.)

Return to: Mayflower Stouffer Hotel

1127 Connecticut Avenue, N.W.
Washington, D.C. 20036

Phone: 202/347-3000 x. 2251

In order to receive group rate, please respond by November 14, identifying yourself as attendee of Climate Institute Conference.

In case of unanticipated cancellation of plans, please notify hotel as soon as possible (before 6 pm on arrival date).

STRAWS IN THE WIND

Protocol Ratification Gains in European Community

In mid-February, the European Community (EC) Commission adopted its staff's proposed regulations for putting the Montreal Protocol in effect and transmitted them to the Council of Ministers.

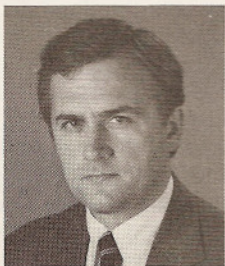
High on the agenda of the Commission is ratification by all member nations not only of the Montreal Protocol but also of the 1985 Vienna Convention to Protect the Ozone Layer. Approval by twelve national parliaments is needed for the EC to ratify the Convention, and the Commission hopes all members will ratify both the Convention and the Protocol by October 1.

The U.S. and the EC states consume about two-thirds of the 1986 levels of the five relevant CFCs, according to EPA figures. EC countries are the biggest producers, but as they export about one-third of their production, the U.S. is the biggest consumer.

Four countries (Belgium, West Germany, The Netherlands, and the United Kingdom) have obtained voluntary agreements from aerosol manufacturers to limit their use of CFCs in aerosols.

Business Leaders Debate Climate Change Impact on Investment

A key group of forty high-level representatives of the business, industry and financial community gathered to discuss the importance of projected climate change on their long-term investment plans at a dinner hosted by the Climate Institute



Michael F. Brewer, Dun & Bradstreet V.P., chaired corporate dinner on climate change.

at the National Press Club in Washington D.C. March 9. The occasion also provided public decision makers with a "reality check" on a significant emerging area of public investment in policy research and analysis.

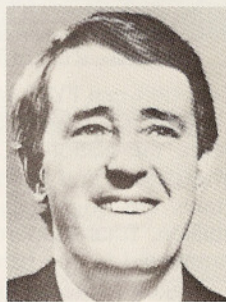
Michael Brewer, Vice President of Dun & Bradstreet and Vice Chairman of the Climate Institute, chaired the discussion. Dr. Stephen Leatherman, Director of the Laboratory for Coastal Research at the University of Maryland and Chairman of the Climate Institute, presented background on climate change issues and showed slides on sea level rise and shore line erosion on the Atlantic and Gulf

Coasts that are likely to occur by the year 2000. Dr. Richard Morgenstern, Director of EPA's Office of Policy Analysis, summarized studies of the probable impact during the next 75 years of climate change on utility demand, capacity and rates; on forest production; on agriculture; and on transportation.

The presentation was followed by a lively discussion on the significance of climate impact data for business planning and decision making.

Canada Hosts Int'l. Climate Conference

Prime Minister Brian Mulroney and top officials of the Canadian Government are convening a world conference on *The Changing Atmosphere: Implications for Global Security*, in Toronto on June 27-30, 1988. Environment Canada will



Prime Minister Brian Mulroney will host conference on Changing Atmosphere.

bring together scientists and policy-makers from around the world to: 1) assess the atmospheric changes now in progress, 2) develop ways to reduce our impact on the atmosphere, and 3) formulate plans to deal with a future of change. Canada's Environment Minister, the Honourable Tom McMillan, will be joined by several of his colleagues



Norwegian Prime Minister Gro H. Brundtland will attend Toronto Conference.

in hosting the conference. Mr. Stephen Lewis, Canada's Ambassador to the United Nations, will act as the Chair. Notable invitees include Mrs. Gro Brundtland, Prime Minister of Norway; his Excellency Emil Salim, Minister of State for Population and Environment, Indonesia; Dr. M. K. Tolba, Secretary General of the United Nations Environment Programme; and Dr. G. O. P. Obasi, Secretary General of the World Meteorological Organization.

Cape Cod Guide Book

The role of climate change—including sea level rise and coastal storms—is illustrated in a book, *Cape Cod Field Trips*, published this spring by Dr. Stephen P. Leatherman, Climate Institute Chairman. Besides describing the evolution of Cape Cod, including climate and other effects, field trip stops describe places to observe

the dynamics of barrier islands, inlets and overwashes, and tidal plains.

The guide is available by sending a check or money order, payable to the University of Maryland, for \$8.95 which includes postage and handling to the author at the Laboratory for Coastal Research, 1113 Lefrak Hall, University of Maryland, College Park, MD 20742.

Moscow Summit Addresses Climate

The communique of the recent Reagan-Gorbachev Summit stated:

"The two leaders expressed their satisfaction with activities since the Washington summit in expanding cooperation with respect to global climate and environmental change, including in areas of mutual concern relating to environmental protection, such as protection and conservation of stratospheric ozone and a possible global warming trend. They emphasized their desire to make more active use of the unique opportunities afforded by the space programs of the two countries to conduct global monitoring of the environment and the ecology of the Earth's land, oceans and atmosphere. They underscored the need to continue to promote both bilateral and multilateral cooperation in this important area in the future."

Seminar Looks at Greenhouse Agreement

Some senior policymakers, including EPA Administrator Lee Thomas, engaged May 3 in a freewheeling discussion of the process leading up to the Montreal Protocol. The Center for Study of Global Habitability, a Columbia University policy seminar program with NASA support, sponsored this day-long session at the National Academy of Sciences.

Dr. Joseph Steed, Environmental Manager of duPont, provided a detailed account of how his company had decided to phase out chlorofluorocarbons.

The consensus of participants seemed to be that a full Greenhouse Convention limiting emissions of all greenhouse gases will not be signed for many years, but that small steps are possible. Participants, including Ambassador Richard Benedick, Chief U.S. negotiator for the Montreal Protocol, noted that the international negotiating process moved rapidly toward the ozone treaty once the public became concerned over the Antarctic ozone hole. Would there be an equivalent forcing event on the greenhouse front? This question posed by Lee Thomas remained unanswered.

FY89

continued from page 1

Administration FY 1988 request which had virtually no funding for climate policy work.)

While the HUD and Independent Agencies Subcommittee boosted EPA climate funding, it cut out most of the funds for the NSCAT satellite, potentially derailing this initiative. Another House Appropriations Subcommittee turned down the entire \$15 million Administration climate change initiative for NOAA. This action could hobble efforts to improve the understanding of atmospheric and oceanic processes related to climate change.

The climate funding outlook appears brighter in the Senate where Senator Patrick Leahy and Pete Domenici have asked for a \$20 million boost in EPA climate funding above the Administration request and Dale Bumpers has asked for a \$140 million boost over the Administration request, including \$50 million for EPA, \$40 million for the National Science Foundation, and \$40 million for NASA.

The Administration's Federal FY89 budget for climate research and services grew by more than \$35 million to almost \$232 million, an increase of nearly 20 percent over the previous year. This was a large change from the growth of only 0.3 per-

Agency	FY89 Support (millions of dollars)	Percent Increase
National Science Foundation	66.1	17
Department of Commerce	65.5	29
Department of Agriculture	31.9	10
NASA	18.9	16
Research	6.6	5
Climate Observation	11.6	25
Data Management	0.7	no change
Department of Energy	18.5	26
Climate Research	0.6	no change
Impact Assessment	16.7	29
Products	1.2	9
Environmental Protection Agency	17.7	81
Global Warming	5.7	14
Stratospheric Ozone	12.0	250
Department of Defense	11.2	-22
National Climate Program Office*	1.2	-50
Department of Interior	1.0	no change

*The decline is due to proposed termination of \$1.2 million support for regional climate centers.

cent between FY87 and FY88.

Support has fluctuated over the 10 years since the National Climate Program Act was passed and is now more than 2 1/2 times the original appropriation of \$88 million. Total support for the decade has amounted to \$1.4 billion.

Biggest gainer among the twelve agencies sharing in support of the National Climate Program was EPA whose request

jumped 81 percent. Funding for EPA's stratospheric ozone program jumped from \$4.8 million in FY88 to \$12.0 million in FY89, and for global warming from \$5.0 million to \$5.7 million.

Shares of major participants in the Administration request for support of the National Climate Program are listed above in descending order.

Third World Climate Symposium

Continued from page 3

reefs provide an energy barrier between the open sea and an island. A fairly minor change in water level makes a major difference in energy transmission from water to land, especially when land surfaces at maximum are only a few meters above sea level.

Mangroves are breeding grounds and nurseries for many important species. They form a restricted, inter-tidal community, completely controlled by sea level, and requiring both wet and dry periods. Biological communities interact; the mangrove marsh intercepts sediments and nutrients, protecting the coral reef which needs clear water; a change in the mangrove marsh may destroy the coral community. Mangroves cannot sustain the energy of waves; a change in the coral barrier reef may kill the mangroves.

Don't count on beneficial results of climate changes, Buddemeier warned. They are unpredictable and any community finds change disruptive and expensive in the short run. More rain may require more flood control and conversion to different agricultural crops. Fish population may increase with warmth, but rising salinity could overwhelm this effect in the short run. We should prepare now for the long run, making a survey of coastal resources and potential risks, Buddemeier recommended, and approaching any coastal development very conserv-

atively.

There is a large potential for improving efficiency in the use of energy, Dr. William Chandler of Battelle Pacific Northwest Laboratories pointed out, and this can slow climate change and promote economic growth. China and India have a major potential for improvement in such areas as steel production.

John Hoffman, Director of EPA's stratospheric protection staff, argued for moving faster on reducing ozone-depleting chemicals than the Montreal Protocol requires. While it is generally believed countries which are low consumers of CFCs might not want to sign the Protocol because it would hinder their growth, Hoffman said, there are alternatives which are attractive, cost less, can work better, belong to the technology of the future and will create trade opportunities. The U.S. is making an effort to get the new technologies to the low-consuming countries, with missions to the Peoples Republic of China and other countries in the works.

"Policy choices made today by Third World countries will have a critical effect on atmospheric emissions and the timing and severity of their impact," said Irving Mintzer of the World Resources Institute. He recommended focusing attention on strategies with multiple benefits: efforts to increase the efficiency of energy consumption, including biomass use; and

efforts to limit tropical forest deforestation which could decrease emission of CO₂ and methane. To counter the effects of climate change we should initiate economically viable projects, emphasizing sustainable development, declared Dr. Hind Sadek, taking the Sinai Marine Park, between the Gulfs of Suez and Aqaba on the Red Sea, as an example. Pictures of corals, angel fish, parrot fish, butterfly fish, sting ray, and the many species of birds which migrate through the park, illustrated the park's many resources: wildlife refuge and protection, a site of ecological and biological research, a well-managed tourist attraction, and a place to study how to clean up and remedy the effects of an oil spill. The dazzling photographs provided a counterpoint to the many forecasts of crisis and catastrophe during the two days of the symposium.

Four Warmest Years

Continued from page 1

spring and Siberia an especially cool spring, summer and fall.

The scientists anticipate that low latitude temperature is likely to fall in 1988 or 1989 assuming termination of the present El Nino. But, "considering the known increase of greenhouse forcing of the climate system, we do not expect temperatures necessarily to decline to recent inter-El Nino values," they conclude.

Calendar of Climate-Related Events 1988

June 13 NYC, NY
Symposium on Climate Change and Economic Growth
Convened by Climate Institute for UN Missions at
345 E. 47th St.

June 14-15 Washington, DC
Resources for Future Conference, "Controlling and
Adapting to Greenhouse Warming"
Contact: Bill Easterling, 202/328-5018
Main Building, National Academy of Sciences

June 14-15 Honolulu, HI
Pacific Rim Conference of the International Energy
Workshop (co-sponsored by the East-West Center
and International Institute for Applied Systems
Analysis)

June 21 Dallas, TX
Session on Effects of Stratospheric Ozone and
Climate Change on Tropospheric Ozone Attainment.
Contact: Paul Shapiro, 202/382-2583, Annual Meeting
of Air Pollution Control Assoc.

June 21 Washington, DC
EPA Seminar on topics related to the environment
(Gus Speth speaking.)

June 15-29 Ottawa, Canada
The Year Without a Summer? Climate in 1816.
Organized by World Climate Program, co-sponsored
by World Meteorological Organization

June 27-30 Toronto, Canada
World Conference on the Changing Atmosphere:
Implications for Global Security hosted by the Canadian
government, support by UNEP, WMO, etc.
Contact: Howard Ferguson, Conference Director, 416/
665-4760
(See Climate Alert article, Straus in the Wind, p. 9)

June 27-July 2 Brisbane, Australia
Southwest Pacific Tropical Cyclone Committee,
World Meteorological Organization.

June 28-29 Washington, DC
National Research Council Committee on Solar
Physics
Georgetown Facility, Room 130
Open to public, but please give advance notice
Contact: Don Hunt, 202/334-3511

June 28-30 Kuala Lumpur, Malaysia
Steering Committee for Long-Term Asian Monsoon
Studies, Research and Development Programme,
World Meteorological Organization.

June 28-July 1 Kuala Lumpur, Malaysia
Regional Workshop on Asian Wintermonsoon,
Research and Development Programme, World
Meteorological Organization, co-sponsored by
MOSTE

August 8-13 Goteborg, Sweden
Quadrennial Ozone Symposium, Intergovernmental
Oceanographic Commission (UNESCO)/International
Association of Meteorology and Atmospheric Physics

August 15-20 Bad Homburg, Federal
Republic of Germany
International Conference on Cloud Physics,
Research and Development Programme, World
Meteorological Organization

August 18-24 Lille, France
International Radiation Symposium

August 22-26 Calcutta, India
Asia/Southwest Pacific Workshop on Agrometeoro-
logical Information for Planning and Operation in
Agriculture

August 23-31 Acapulco, Mexico
Joint Oceanographic Assembly, co-sponsored by
World Meteorological Association

September (No date set) Boulder, CO
University Corporation for Atmospheric Research,
Third Annual Global Climate Change Workshop.

September (No date set) Univ. of Wisconsin
US/USSR Paleoclimate Meeting
Contact: Alan Hecht, 202/443-8646

September (No date set) Boulder, CO
National Center for Atmospheric Research on Effect
of Climate Change on Ecosystems.
Contact: Michael Fosberg, 202/235-8195
(Month changed from Oct. to Sept.)

September (Tentative) Norrköping, Sweden
Committee for Climatology Working Group on
Climate and Urban Areas

September 10
International Ozone Depletion Day
Contact: Randy Toler, 312/806-9711

September 13-14 Woods Hole, MA
India climate change planning meeting.
Contact: George Woodwell, 617/540-9900
Woods Hole Research Center

September 14-18 Honolulu, HI
International Renewable Energy Conference.
Organized by State of Hawaii, co-sponsored by Dept.
of Business and Economic Development and World
Resources Institute.

September 19-22 Tokyo, Japan
IFIAS International Symposium on Human Response
to Global Change.

September 20-23 Columbus, OH
International Conference on Sustainable Agricultural
Systems
Contact: Clive A. Edwards, Dept. of Entomology, The
Ohio State University, 1735 Neil Ave., Columbus, OH
43210

September 26-October 28 Trieste, Italy
Course on Ocean Waves and Tides, co-sponsored
by World Meteorological Organization

September 27-29 Chicago, IL
First U.S.-Canada Symposium on Climate Impact on
the Great Lakes, co-sponsored by Canadian Climate
Program, National Climate Program, U.S. EPA.
Contact: William Bolhofer, 202/443-8981

October 2-8 Interlaken, Switz.
International Union of Forest Research Organizations,
Air Pollution and Forest Decline. Organized by Swiss
Federal Institute of Forest Research and IUFR.

October 3-5 College Station, TX
Solutions to the Greenhouse Effect. Organized by
Texas A&M.
Contact: John Bockris, 409/845-4947

October 4-6 Washington, DC
Conference on Biological Diversity, sponsored by
World Wildlife Fund, Conservation Foundation, U.S.
EPA, National Park Service, DOE, et al.
Contact: Robert Peters, 202/778-9610
National Zoo Auditorium

October 5-6 Washington, DC
National Research Council Climate Research
Committee
National Academy of Sciences, Georgetown Facility,
Room 126
Open to public but please give advance notice
Contact: Ken Bergman, 202/334-3517

October 20-21 Washington, DC
National Research Council Board of Atmospheric
Sciences and Climate National Academy of
Sciences, Georgetown Facility, Room 130
Open to public but please give advance notice
Contact: John Perry or Ken Bergman, 202/224-3517

December 6-8 Washington, DC
Second North American Conference on Preparing
for Climate Change. Registration forms included in
this issue of Climate Alert.
Contact: John Topping, 202/547-0104
Mayflower Stouffer Hotel, 1127 Connecticut Ave., NW

**YES, I wish to join in
the vital activities of the Climate Institute.**

_____ I am enclosing annual membership dues. Regular rate: \$100.
Reduced rate: \$50, available to members of environmental, non-
profit or government groups or to registrants of Climate Institute
conferences or symposia. Members will receive the quarterly
newsletter *Climate Alert* as well as reduced rates to Institute events.

_____ I am enclosing a tax-deductible contribution of _____ to
support the Institute.

_____ **Total amount enclosed.**

**Make checks payable to:
CLIMATE INSTITUTE**

Send To:

CLIMATE INSTITUTE
Suite 403
316 Pennsylvania Avenue, SE
Washington, DC 20003

Name _____

Address _____

Telephone Number () _____

Joseph Cannon Will Chair N.A. Climate Conference

Joseph A. Cannon, President of Geneva Steel of Provo, Utah, has been named Chairman of the Second North American Conference on Preparing for Climate Change: A Cooperative Approach. This conference, which will be held December 6-8, 1988 at the Mayflower Stouffer Hotel in Washington, D.C., is expected to draw about 600 participants from the U.S., Canada, Mexico, Central America and the Caribbean.

Geneva Steel and The William Bingham Foundation have already become sponsors of the conference. Seven U.S. government agencies and eight other groups joined as sponsors of the First North American Conference on Preparing for Climate Change held October 27-29, 1987 in Washington, D.C. As Conference Chairman Cannon will seek to broaden the sponsorship and participation at the upcoming conference.

Last year Joseph Cannon, then an environmental partner with the law firm of Pillsbury, Madison & Sutro, engineered a

purchase by a Utah investor group that he headed of USX's Geneva Steel Works in Provo, Utah. Prior to Cannon's initiative, USX was planning a permanent shutdown of the Provo facility. Cannon's business feats have been subjects of stories in both *The American Lawyer* and *Forbes*.

While a senior official at the U.S. Environmental Protection Agency from 1981 to 1985, Joseph Cannon was instrumental in launching the agency's climate and stratospheric protection program. As Associate Administrator for Policy and Resource Management, he organized a major conference in March 1983 on Sea Level Rise. Cannon also initiated the policy studies of options to address the green-



Joseph A. Cannon chairs Second N.A. Climate Conference.

house effect which were published in the fall of 1983 in the nationally acclaimed study, *Can We Delay a Greenhouse Warming?*

As Assistant Administrator for Air and Radiation, Cannon initiated the stratospheric protection activity which has culminated in both the Montreal Protocol and the U.S. regulations to regulate substances that deplete the ozone layer. Climate Institute President John Topping, who served under Cannon as Staff Director of EPA's Office of Air and Radiation, stated:

"During his time in public service Joe Cannon was at the forefront of efforts to preserve our global climate. The Climate Institute is delighted to have a person of his vision chair this watershed conference."

A member of the Board of the Climate Institute since its inception, Cannon also serves as Finance Chairman of the Institute.

Board Elects McCulloch

At the Climate Institute's board meeting on April 20, members voted to add James A. W. McCulloch, Director General of the Canadian Climate Centre, to the board, cementing the Institute's link between the U.S. and Canada.

McCulloch was a plenary session speaker at the Institute's First North American Conference last October. Most of his 36-year career with the Canadian government has been related to the Atmospheric Environment Service of Environment Canada. Before heading the Climate Centre, he was Director General of Weather Services,

Regional Director of the Atlantic Region, and Head of Lakes and Marine Applications. He has also served in a number of capacities with the World Meteorological Organization and been active in many Canadian space-related activities. He will retire from the Climate Centre in July 1988.



James A.W. McCulloch of Canada, new Climate Institute Board Member.

First N.A. Conference Proceedings Available

The Climate Institute has mailed to paid Conference registrants, sponsoring organizations, and dues-paying members of the Institute *Preparing for Climate Change*, the Proceedings of the First North American Conference, a collection of 51 papers. Additional copies are available to the public at \$74 each from Government Institutes, Inc., 966 Hungerford Drive, #24, Rockville, MD 20850, (301) 251-9250.

CLIMATE INSTITUTE

Suite 403
316 Pennsylvania Avenue, SE
Washington, D.C. 20003

Non-Profit Org.
U.S. Postage Paid
Washington, D.C.
Permit # 2303

SECOND N.A. CONFERENCE

The Climate Institute is convening a *Second North American Conference on Preparing for Climate Change* Dec. 6-8, 1988 in Washington, D.C. Besides Canada, special efforts are being made to include Mexico and other nations in Central America and the Caribbean area.

See p. 5-8 for pullout agenda.

The Climate Institute is a private, nonprofit organization formed to advance public understanding of global warming produced by the greenhouse effect and of strategies to avert stratospheric ozone depletion.