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BULLETIN

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MISSION STATEMENT OF THE UNITED STATES MAN AND THE BIOSPHERE PROGRAM

"The mission of the United States Man and the Biosphere Program (U.S. MAB) is to foster harmonious relationships between humans and the biosphere through an international program of policy-relevant research which integrates social, physical and biological sciences to address actual problems. These activities—broadly interpreted—include catalytic conferences and meetings, education and training, and the establishment and use of biosphere reserves as research and monitoring sites."

*Adopted by the U.S. National Committee for the
Man and the Biosphere Program, January 6, 1989*

Comments by the U.S. MAB Chairman

The threshold of the 1990's. Behind us a year of sweeping changes in Europe providing hope that other kinds of sweeping change might also be possible. Before us the years in which fundamental changes have to be made in how society relates to the limits of the biosphere.

U.S. MAB stands rebuilt and ready to join in the challenge. We welcome the new addition of EPA as a member, and the additional funding under study or forthcoming from other agency members. MAB's new directorates have met to consider anew the challenge of effectively linking the social and the biological sciences in search of sustainable forms of development.

The membership of the new directorates is listed fully in this issue of the bulletin. The members are, in the end, the greatest asset of MAB, providing intellectual power from a broader array of disciplines than would ever be possible within a single agency. That is the power and promise of MAB: to go beyond what is possible within ordinary structures. We are deeply grateful for your participation, for these are unconventional times with unconventional problems that demand unconventional answers.

In a sense it can be said that the environmental problems now upon us derive from insufficient links between biological/natural resource problems and socially driven systems and decisions. The MAB Program is one of the few specifically designed to investigate how to constructively integrate the social and the biological. So our challenge is very big: as big as Man and the Biosphere.

Thomas E. Lovejoy

In This Issue

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- Membership U.S. MAB Directorates
- Workshop on Forest Hydrological Research in China
- Role of Landscape Boundaries in Changing Environments

U.S. MAB Supports Workshop and Publication on Forest Hydrological Research in China

In August 1987, a group of specialists from the People's Republic of China, the United States and other countries met at the Northeast Forestry University, Harbin, Heilongjiang in the People's Republic of China to analyze the status of research in forest hydrology in China. The workshop was designed as a forum for the evaluation of research objectives and methodologies and for making suggestions on future approaches to forest hydrological research in China in relation to international experience.

The agenda for the workshop included the presentation of papers on current forest hydrological research in China, summaries of forest hydrological research in other countries, principal research techniques used in forest hydrology, forest hydrological research problems in specific regions of China, the adequacy of existing measurements, data bases and research techniques in addressing these problems, applications of simulation models in forest hydrology, the relationship of the ecosystem concept to forest hydrology, the relationships between forests and water quality, and instrumentation for forest hydrological research.

Proceedings of the workshop were compiled and edited by Professors Peter F. Ffolliott and D. Phillip Guertin of the School of Renewable Natural Resources, College of Agriculture of the University of Arizona. They were among the participants at the workshop. These proceedings will be published by the Secretariat of the U.S. MAB Program. Be on the look-out in the Publications section of future issues of this bulletin for its availability.

U.S. MAB Kick-Off Meeting

The organizational meeting of the five new directorates of the U.S. Man and the Biosphere Program was held at the Smithsonian International Center in Washington, D.C. from December 11 through 13, 1989. Membership on the new directorates represented a balance of biological, natural and social scientists and representatives from federal/governmental agencies and from universities, private organizations or private industry. They met together with members of the U.S. MAB National Committee to get to know each other and to familiarize themselves with the goals and mandate of the U.S. MAB Program and the missions of their directorates. Several speeches were given by U.S. National Committee members to challenge the new members to maintain their emphasis on excellent science while carrying out the broader goals of the program in providing guidance based on applied research to policy makers.

The new directorate members began their discussion of planning a directorate research project or activity that they would themselves supervise and actively work on to implement each directorate mission statement.

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Notes from the Executive Director

As the holiday season passes, U.S. MAB enters the new decade with a new structure and a new program—an event and process for which many thanks are due to a great number of people. The first thanks are due, of course, to the many scientists throughout the country who so selflessly volunteered their time and talents to the U.S. MAB Program in the past. Indeed, the U.S. MAB Program will continue to be known by the excellence of their efforts and the quality of their products. A large number of these scientists were most active in counseling the U.S. MAB National Committee on the need for new directions, and drafting alternatives and mission statements for the new directorates. My reluctance to name each individually results only from my fear that I might egregiously overlook someone.

A second group to be noted and thanked must include the many who took the time to volunteer to serve on the new U.S. MAB directorates. Over 300 biological and social scientists, from both the federal and private sectors, took the time to write in to receive and study one or several of the directorate mission statements and then to send in their curriculum vitae and volunteer to serve. While only one in eight could be appointed, if MAB's fortunes continue to improve in the future, I am sure that we will be drawing further upon this large pool of excellent talent. Our sincerest thanks are extended to all of you who volunteered.

U.S. MAB functions to bring the best of science to bear on actual environmental problems that can be addressed through enlightened policy. I expect that as the new directorates develop their own projects to implement their mission statements, they will bring together scientists of a variety of disciplines who will pragmatically link and study the effects of environmental, biological and economic/social change.

At the same time, U.S. MAB recognizes that it must also hold itself open to receive ideas and projects from the broader scientific community. Consequently, on a yearly basis we will continue to solicit proposals through our Request for Proposals (RFP) as announced in this **BULLETIN** and in the **Federal Register**. We thank those scientific, conservation and other specialized associations that do us all a service in helping to spread the word by reprinting our RFPs in their bulletins, newsletters or journals. Of course, any article that appears in the **U.S. MAB Bulletin** may be reprinted without prior consent. We would, though, appreciate a note of attribution.

Roger E. Soles

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They also reviewed the more than 300 prospectuses that had been received in response to the August 1989 Request for Proposals. They ranked the prospectuses received using the criteria of the MAB Program, and made recommendations to the National Committee for their consideration. At a meeting of the National Committee to be held in January, decisions will be made as to which full proposals will be invited to be submitted for possible fiscal year 1990 funding.

U.S. MAB Funds Two Symposia Held at AIBS Annual Meeting in Toronto

Coastal Barrier Biosphere Reserves on the U.S. East Coast

A workshop was held at the American Institute of Biological Sciences Annual Meeting in Toronto, Canada in August 1989. Its primary aim was to develop a functional network of U.S. coastal barrier biosphere reserves. These areas are considered to be among our most perturbed environments, and are considered to be justified for specific attention because of their socio-political importance and because in no other system do ecological dynamics and developmental processes interact so strongly. (More on this in our next issue.)

The Role of Landscape Boundaries in the Management and Restoration of Changing Environments

The major forces for environmental change have been fundamentally altered in the last 300 years as man's increasing demand for natural resources has accelerated the pace of environmental change. There has been very little obvious recognition until recently of the limited nature of those resources and the potential economic and physical costs of increasing environmental exploitation. The scarcity of existing resources, therefore, imposes increasingly larger economic costs on environmental preservation.

At the symposium sponsored by the Ecological Society of America (ESA) in August 1989 held in Toronto, Canada, under the auspices of the American Institute of Biological Sciences, the concept of landscape boundaries (or ecotones) emerged as an organizing framework for dealing with the complex issue of integrating environmental concerns with societal needs. It was brought out at that meeting that while much previous ecological research dealt with processes within homogeneous landscape units, recent emphasis has been placed on dynamic processes occurring across the boundaries of heterogeneous landscapes.

James Gosz of the University of New Mexico reviewed the fundamental ecosystem characteristics of landscape boundaries. He noted that many of the research

issues such as scale, scale dependent results, assumptions of methods and technique-dependent results transcend all areas of ecology. However, he also noted that advances are being made in boundary detection with new applications of mathematical techniques that allow identification of boundaries at the biotic scale rather than at the human scale. Gosz used examples from research at Sevilleta to illustrate his points. Sevilleta is the largest of the National Science Foundation's Long Term Ecological Research (LTER) sites and is located on a transition between four major biomes: Great Plains grassland, Great Basin shrub-steppe, Chihuahuan desert and conifer woodland (Mogollon flora). He argued for the need for new techniques and perspectives that encompass a landscape perspective as well as multiple and dynamic scales.

Robert P. Neilson of Oregon State University and the U.S. Environmental Protection Agency examined the relationship between climate and scale in controlling ecotones located between major regional biomes. He explored the concept that ecotones can be potentially sensitive features for monitoring impending climate change from the perspective of detecting ecotone location and change in location using regional gradients in landscape patterns of habitat variability. Two types of change, e.g., boundary change and within region quality change, were viewed as being potentially independent. As such, they may require different monitoring strategies to detect impending change.

Neilson also addressed processes that appear to control both coarse and fine patterns in habitat diversity suggesting that, if they can be identified, they then become early warning signals of global change. In addition, he hypothesized that if spatial and temporal gradients can be related to common mechanisms of habitat structure, we may be able to apply rules gained from analyzing the spatial patterns to the development of early warning signals of temporal environmental change. Finally, he demonstrated that all major biomes in the United States appear to be produced by well defined gradients in seasonal weather patterns, or by threshold responses at critical points along thermal gradients, which can be used to evaluate longer-term climate alterations.

Monica Turner of the Oak Ridge National Laboratory discussed a simulation model that examines factors determining rates at which boundaries move across landscapes. She explained that there are two general mechanisms by which landscape boundaries may change with the global environment: (1) disturbance regimes may change in response to climate, leading to rapid alterations in landscape structure, or (2) in the absence of disturbance, suitable habitats for different species may move gradually and directionally. She discussed these two mechanisms and explored the potential responses of landscape boundaries to global change by using a neutral modeling approach.

Robert H. Gardner of the Oak Ridge National Laboratory and his associates used a simulation model to examine the movement of organisms with different life

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history characteristics and abundances through heterogeneous landscapes with different boundary characteristics and densities. They found that the scale at which a species can move in an environment with patchy resources is determined by its inherent dispersal mechanisms. Their simulations suggest that the spread of organisms across landscapes is sensitive to differences in life history characteristics and dispersal mechanisms between species. They also noted that the existence of critical thresholds is important for many management and conservation issues, but the determination of these thresholds requires the gathering of data at scales that are determined to be relevant to each species.

David Correll of the Smithsonian Environmental Research Center examined the transfer of nutrients, pesticides and inorganic ions across boundaries between agricultural and wetland areas. He described his work on the internal dynamics of riparian forests within a watershed of the Chesapeake Bay on the inner coastal plain of Maryland, within the Eocene Nanjemoy formation. This riparian forest is the upland end member of a wetland continuum including floodplain forests, forested swamps and tidal marshes.

Dr. Correll applied the ecotone concept to intensely managed agricultural-forested landscapes, noting that human management often creates or sharpens boundaries between natural and managed systems, and that these boundaries often correspond to natural landscape features. He demonstrated that riparian forest ecotones have an important role in regulating and transforming nutrients moving from agricultural lands to streams. The management implications of this work are enormous, especially since the fragmentation of the world's riparian forests continues. Both the ecological and economic values of the riparian ecotone are large, providing practical reasons for maintaining and enhancing riparian vegetation. These ecotones could be among the first to respond to climate change since their inherent characteristics are so closely regulated by the hydrologic regime.

James Sedell of the U.S. Forest Service described federal government-sponsored stream and lake edge rehabilitation programs. He said that millions of dollars are being spent by government agencies annually for the restoration of human-impacted land/water ecotones. He cited examples of the holistic ecosystem approach to ecotone restoration in the Great Lakes basin, the arid west and in the western coniferous forest.

In summarizing, Robert Naiman of the University of Washington stated that landscape boundaries may be important sites for the early detection of global change, but the scarcity of information about boundary characteristics makes prediction difficult. He recommended further research in a number of specific areas.

The proceedings of the symposium will be published by the Secretariat of the U.S. MAB Program. Be on the look-out in the Publications section of future issues of this bulletin for its availability, probably in spring 1990. The symposium volume will be available from Marjorie M. Holland, The Ecological Society of America's Public Affairs Office, 9650 Rockville Pike, Bethesda, MD 20814.

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UNESCO MAB Project in Dayton, Ohio —Trees To Make Cities Cooler

A UNESCO MAB project in Dayton, Ohio has produced results that can help make cities throughout the world cooler and more attractive.

An experimental program called the Dayton Climate Project explored the use of trees, grass and vegetation to counter use of concrete and pavement, which contribute to the "urban heat island" effect. The project discovered that innovations like growing grass inside hollow blocks on parking lot surfaces, planting trees generously in downtown areas, and sprinkling flowers and bushes along busy streets can reduce temperatures and produce a healthier, better living environment. "Trees not only produce shade, but their leaves help remove contaminants and carbon dioxide from the air and give off oxygen, making for cleaner air to breathe," said Rowan Roundtree of the U.S. Forest Service, who was a supervisor in the Dayton Project during its most active years, from 1979-1986.

Many organizations cooperated to make the project a success, scores of volunteers got involved and a lot of public spirit was created. Through funds supplied by UNESCO's MAB, the lessons learned in Dayton were shared with other cities. MAB's global information network distributed the Dayton findings to interested city officials and urban experts worldwide.

An article about this project appeared in the UNESCO SOURCES, publication No. 7, dated September 1989.

SYMPOSIUM ANNOUNCEMENTS

URBAN STREAM AND RIVER CORRIDORS: A MULTIOBJECTIVE MANAGEMENT SYMPOSIUM, Portland, Oregon, April 23-28, 1990. The third annual Country in the City Symposium and a technical floodplain management workshop will be held sequentially to address management and restoration of urban stream and river corridors and wetlands. They will focus on practical concrete problem solving. For more information write: Country in the City III, Attn.: Mike Houck, Portland Audubon Society, 5151 NW Cornell Road, Portland, OR 97210. Tel. 503-224-1004.

The Second International Symposium on Advanced Technology in Natural Resource Management—RESOURCE TECHNOLOGY 90—will be held in Washington, DC, November 12-15, 1990. It will be sponsored by space agencies, natural resource agencies, universities, private industry and international conservation organizations. The conference will focus on applications of new or emerging technology for global natural resource management.

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Abstracts for papers should be 300-500 words and must include the name and mailing address of the author. Poster proposals should include a title, a 200-word description of the poster, author's name, affiliation and address. Send

abstracts and inquiries to: Resource Technology 90, 2625 Redwing Rd., Drake Executive Plaza, Suite 120, Fort Collins, CO 80526. Tel. 303-226-1688.

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Report of the Tokyo International Symposium on the Human Response to Global Change. Tokyo, Japan. September 19-22, 1988.
- MANAGING MARINE PROTECTED AREAS, An Action Plan.** Prepared during the International Marine Protected Area Management Seminar, Florida - California. June 1-12, 1986. Edited by Nancy Foster and Michele H. Lemay.
- FINAL REPORT OF THE INTERNATIONAL WORKSHOP, "LONG-TERM ECOLOGICAL RESEARCH - A GLOBAL PERSPECTIVE,"** September 18-22, 1988 in Berchtesgaden, Federal Republic of Germany. A limited number of copies are currently available from the U.S. MAB office. In the future, it will be available from: MinR Wilfried Goerke, Dipl.-Biolge, Bundesministerium fur Umwelt, Naturschutz und Reaktorsicherheit, Godesberger Allee 90, 5300 Bonn 2, Federal Republic of Germany.
- PROCEEDINGS OF THE SYMPOSIUM ON BIOSPHERE RESERVES,** September 14-17, 1987, Estes Park, Colorado. A limited number of copies of this document are available from the U.S. MAB office to meet requests for single copies, but multiple copies and single copies in the future will be available at a cost of \$15.00 each under Stock # 044-000-022-71-1 through the Superintendent of Documents, Government Printing Office, 710 North Capitol Street, NW., Washington, DC 20401.

Available from others:

CASE STUDY—VIRGIN ISLANDS BIOSPHERE RESERVE. Prepared by Dr. Edward L. Towle, President, Island Resources Foundation, and Dr. Carolyn S. Rogers, research biologist at the Virgin Islands National Park, for the UNESCO/IUCN Workshop on the Application of the Biosphere Reserve Concept to Coastal and Marine Areas, convened in San Francisco in August 1989. The case study is available for \$1.50 per copy as IRF Occasional Paper #50 from the Island Resources Foundation, 1718 P Street, NW., Suite T-4, Washington, DC 20036.

The Channel Islands Biosphere Reserve has developed a comprehensive program of long-term monitoring of populations of plants and animals believed to be useful as indicators of a wide range of environmental influences. The Channel Islands Biosphere Reserve has compiled a **Natural Resource Management Monitoring Handbook** that could be of interest to scientists and managers interested in developing population monitoring programs in other biosphere reserves. This Handbook is now available for distribution. If you would like to receive a copy of the Handbook, please contact Ms. Marcia Schramm, Channel Islands National Park, 1901 Spinnaker Drive, Ventura, CA 93001, or call (805) 644-8157.

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PUBLICATIONS

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UNESCO Publication, **MAB Digest 4, on the Role of Land/Inland Water Ecotones in Landscape Management and Restoration, Proposals for Collaborative Research**, edited by Robert J. Naiman, Henry Decamps and Frederic Fournier was recently published in the newly launched series of UNESCO MAB digests. The overall aim of the collaborative field research is to determine the management options for the conservation and restoration of land/inland water ecotones through increased understanding of ecological processes. The project proposal describes the substantive research in terms of key questions and hypotheses to be addressed. This publication is available from the Programme on Man and the Biosphere, UNESCO, 7, place de Fontenoy, 75700 Paris.

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