The Unique Role of Biosphere Reserves in Conserving Biological Diversity

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Biological diversity, as defined by the OTA report, is the variety and variability of life at many levels. The components of biological diversity include the genetic inheritance of individual plants and animals, groups of interbreeding individuals, species consisting of all the populations of these interbreeding individuals, habitats providing the environmental resources to meet the biological needs of the species, communities consisting of collections of interacting plant and animal species existing in a given habitat at a given time, and, at the highest level of organization, ecosystems containing many communities which interact with each other and with their habitats to form a dynamic system with its own structure and functions.

Most of the world's protected areas have been established to conserve biological diversity through protection of particular species, communities, or ecosystems. Wildlife refuges, for example, are frequently managed to enhance species of migratory waterfowl, raptors, or endangered species. Other areas, such as many of The Nature Conservancy's preserves, conserve an outstanding example of a particular community. Still others, such as the wilderness areas of our national parks and forests, conserve major ecosystems as complex associations of ecological communities.

The ideal biosphere reserve is a large unit of landscape which conserves as many of the ecosystems characteristic of one of the world's large natural regions as possible. These regions, called biogeographical provinces, have been mapped to provide a geographical framework for UNESCO's designations of biosphere reserves, which are based on nominations from the 114 countries presently participating in its Man and the Biosphere Program, or MAB. A major goal is to designate one or more biosphere reserves in each of the 193 biogeographical provinces. Since the first designation in 1976, 266 biosphere reserves have been established in 104, or 54%, of the provinces (see Attachment). Seventy countries, about two-thirds developed and one-third developing, now have biosphere reserves. The United States has the largest domestic network with 43 units, followed by the Soviet Union with 18, Bulgaria with 17, the United Kingdom with 13, Australia with 12, Spain with 11, Iran with 9, and Chile with 7. There are 25 biogeographical provinces wholly or partially in the United States. We have biosphere reserves in 19.

teristic of many biosphere reserves which is proving to be important in fostering political support for conservation and rational development. In developing countries, where poaching and encroachment in protected areas are serious problems, some of the most successful biosphere reserves have been those which have been able to achieve conservation goals by giving priority to the legitimate needs of local people. Mexico's network of biosphere reserves is based substantially on addressing these needs through projects which demonstrate the successful marriage of conservation and development.

United States Participation

The United States has been an active participant in UNESCO's biosphere reserve project for more than a decade. The project, and the MAB program in general, was discussed in testimony before this Subcommittee in April 1985 to review the implications for U.S. science associated with U.S. withdrawal from UNESCO at the end of 1984. Since Fiscal Year 1986, U.S. MAB has shared appropriated funds from the Foreign Assistance Act's international conventions and scientific organizations contributions account (ICSOC) to help maintain the benefits through cooperation with other countries and international organizations involved in these programs. In addition, the U.S. program receives contributions from seven participating agencies.

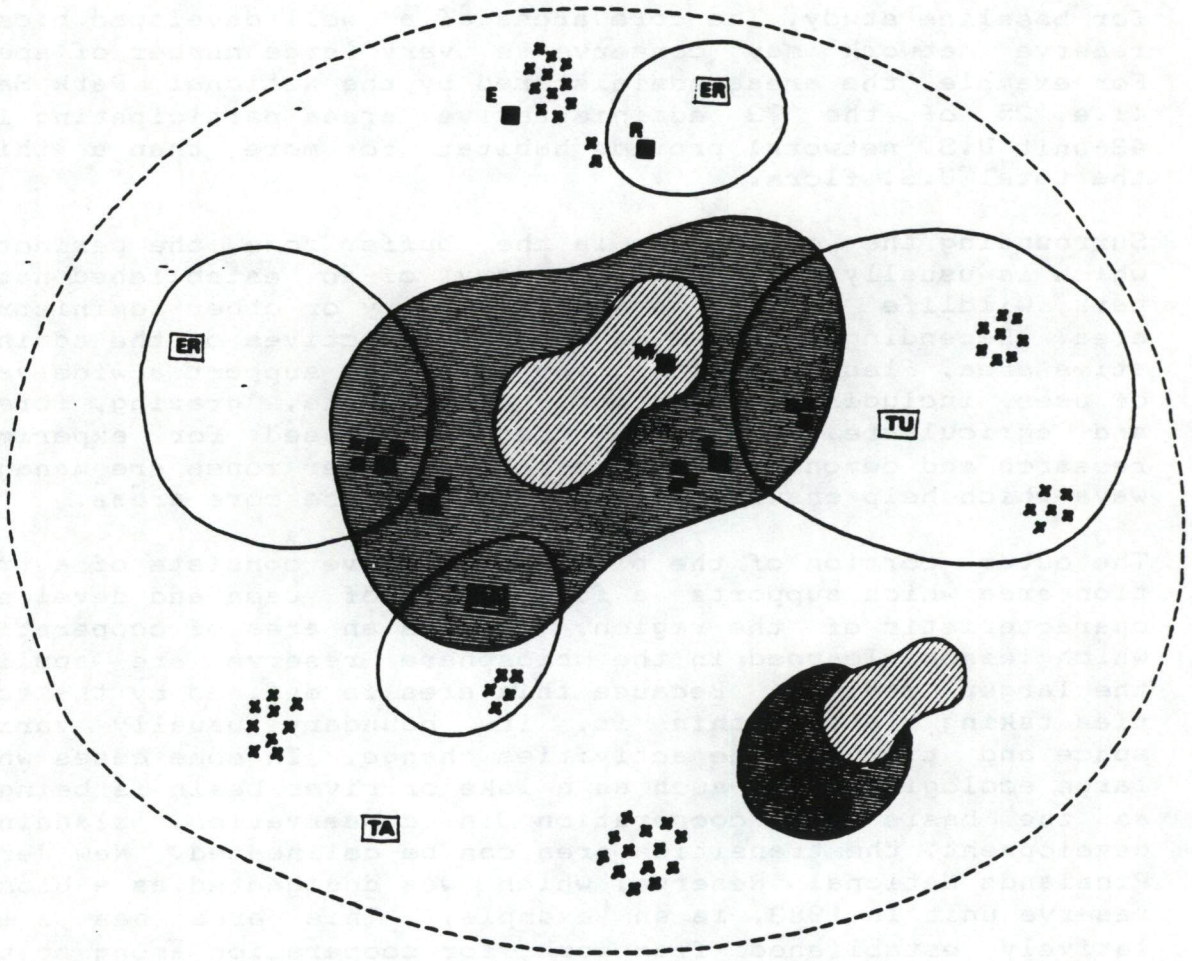
Since 1980. the U.S. MAB program has supported numerous projects relating to the conservation of biological diversity, including a major conference on the applications of genetics in the management of wild plant and animal populations, research in conservation biology, a national geographic information system on large protected areas, the first ethnobiological assessment of the flora of a large national park, and the preparation of educational materials on biological diversity. Last year, a cooperative program between MAB and the Smithsonian Institution was initiated to support biological surveys, monitoring, and related training in biosphere reserves, with emphasis on developing countries. The program received financial support from U.S. MAB this year.

Development of the Biosphere Reserve Network

The development of the biosphere reserve network has always been a MAB priority. In the years following UNESCO's initial designation of biosphere reserves in 1976, filling gaps in the network was the primary emphasis, domestically and internationally. Existing national parks and other protected areas have been the building blocks of the network. Although a few countries, such as Mexico and Honduras with less well developed systems of resource protection, have recognized the biosphere reserve as a separate legal category of protected area, most national networks--including all of those in developed coun-

A Schematic Distribution of Biosphere Reserve Functions

(from Batisse, M. 1986. Developing and focusing the biosphere reserve concept. Nature and Resources 22(3):1-12)



Conservation and monitoring (core area)

Research, education, tourism, and other environmentally compatible uses (buffer zone)

ER Experimental research

TU Traditional use

RA Rehabilitation

TA Cooperative activities involving multiple uses (transition area)

Facilities for: research R, education E, tourism T, monitoring M

Human settlements

logical boundaries than the individual associated units, and in this way to improve prospects for conserving biological diversity at all levels through better cooperation. For example, a biosphere reserve unit in South Carolina has recently been designated which includes six units under Federal, state, and private administration. Together, these areas comprise virtually the entire Santee Delta, the largest river delta on the U.S. east coast. The new biosphere reserve supports large populations of waterfowl, shore birds, diverse marine life, and a wide range of coastal barrier and associated wetland habitats . It includes outstanding demonstrations of wildlife management techniques, one of NSF's long-term ecological research sites, and provides exceptional opportunities for generating and sharing useful information for conserving the biological diversity of dynamic coastal ecosystems.

It is worth noting that biosphere reserves also can provide an aegis for transborder cooperation among complementary sites. The Waterton Lakes National Park in Canada and the Glacier National Park in the U.S. are adjacent biosphere reserves which have a long history of cooperation in research and educational activities. The U.S. and Canadian MAB organizations are exploring a possible association in the Bay of Fundy and Gulf of Maine; a recent joint MAB panel has recommended linkages of sites in Minnesota and western Ontario, and a large biosphere reserve around Lake Champlain including areas in New York, Vermont, and Quebec. Other possibilities exist in the U.S. and British Virgin Islands, and between the U.S. and Mexico along the Rio Grande and in the Sonoran Desert.

However, it is not enough to establish the linkages. Effective mechanisms for institutionalizing cooperation must also be established. This is now the major focus of the U.S. program. Biosphere reserves require cooperation at policy, operational, and specialist levels. Senior policy-makers in the biogeographical region must be comfortable with the biosphere reserve as a framework for allocating resources to cooperative projects. Administrators of the associated sites must be satisfied that these projects contribute to their management objectives and are operationally feasible. And there must be a framework for cooperation among scientists and other specialists to develop the projects themselves. U.S. MAB is exploring opportunities in the Southern Appalachians, the Lake Champlain Basin, Sonoran Desert, and elsewhere.

Justification for U.S. Support of the Biosphere Reserve Network

Biosphere reserves are well suited to play an important role in addressing biological diversity issues for several fundamental reasons:

benchmarks of environmental quality against which to assess the effects of human interventions. They give us an aegis for strengthening cooperation among established protected areas within a biological region, as well as between these areas and resource users in the surrounding areas. Finally, they provide a basis for strengthening political support for protected areas by strengthening their role in providing the information for addressing the interrelated environmental, land use, and socio-economic problems facing each nation and our global society.

COLOMBIA/COLOMBIE			
Cinturon Andino Cluster Biosphere Reserve	8.33.12	855,000	1979
El Tuparro Nature Reserve	8.27.10	928,125	1979
Sierra Nevada de Santa Marta (incl. Tayrona NP)	8.17.04	731,250	1979
CONGO			
Parc national d'Odzala	3.02.01	110,000	1977
COSTA RICA			
Reserva de la Biosfera de la Amistad	8.16.04	500,000	1982
COTE D'IVOIRE			
Parc national de Taï	3.01.01	330,000	1977
Parc national de la Comoe	3.04.04	1,150,000	1983
CUBA			
Sierra del Rosario	8.39.13	10,000	1984
Cuchillas del Toa	8.39.13	127,500	1987
Peninsula de Guanahacabies	8.39.13	101,500	198
Baconao	8.39.13	84,600	1987
CZECHOSLOVAKIA			
Krivoklatsko Protected Landscape Area	2.11.05	62,792	1977
Slovensky Kras Protected Landscape Area	2.11.05	36,165	1977
Trebon Basin Protected Landscape Area	2.11.05	70,000	1977
Palava Protected Landscape Area	2.11.05	8,017	1986
DENMARK/DANEMARK			
Northeast Greenland National Park	1.17.09	70,000,000	1977
ECUADOR			
Archipielago de Colon (Galapagos)	8.44.13	766,514	1984
EGYPT/EGYPTE			
Omayed Experimental Research Area	2.18.07	1,000	1981
EQUATEUR			
Voir paragraphe Ecuador			
ESPAGNE			
Voir paragraphe Spain			
ETATS-UNIS D'AMERIQUE			
Voir paragraphe United States of America			
FRANCE			
Atoll de Taiaro	5.04.13	2,000	1977
Forêt domaniale du Fango	2.17.06	6,410	1977
Réserve nationale de Camargue BR	2.17.06	13,117	1977
Réserve de la biosphere du PN des Cévennes	2.09.05	323,000	1984
GABON			
Réserve naturelle integrale d'Ipassa-Makokou	3.02.01	15,000	1983

Reserva de la Biosfera del Canal y los Tiles	2.40.13	511	1983
Reserva de la Biosfera del Urdaibai	2.16.06	22,500	1984
Reserva de la Biosfera "Sierra Nevada"	2.17.06	190,000	1986
SRI LANKA			
Hurulu Forest Reserve	4.13.04	512	1977
Sinharaja Forest Reserve	4.02.01	8,864	1978
SUDAN/SOUDAN			
Dinder National Park	3.13.07	650,000	1979
Radom National Park	3.05.04	1,250,970	1979
SUEDE			
Voir paragraphe Sweden			
SWEDEN			
Lake Torne Area	2.06.05	96,500	1986
SWITZERLAND/SUISSE			
Parc national Suisse	2.32.12	16,870	1979
TANZANIA, UNITED REPUBLIC OF			
Lake Manyara National Park	3.05.04	32,500	1981
Serengeti National Park	3.05.04	2,305,100	1981
TCHECOSLOVAKIA			
Voir paragraphe Czechoslovakia			
THAILAND/THAILANDE			
Sakaerat Environmental Research Station	4.10.04	7,200	1976
Hauy Tak Teak Reserve	4.10.04	4,700	1977
Mae Sa-Kog Ma Reserve	4.10.04	14,200	1977
TUNISIA/TUNISIE			
Parc national de Djebel Bou-Hedma	2.28.11	11,625	1977
Parc national de Djebel Chambi	2.28.11	6,000	1977
Parc national de l'Ichkeul	2.17.06	10,770	1977
Parc national des Iles Zembra et Zembretta	2.17.06	4,030	1977
UGANDA			
Queen Elizabeth (Rwenzori) National Park	3.05.04	220,000	1979
UKRAINIAN SOVIET SOCIALIST REPUBLIC/UKRAINE			
Chernomorskiy Zapovednik	2.29.11	87,348	1984
Askaniya-Nova Zapovednik	2.29.11	33,307	1985
UNION OF SOVIET SOCIALIST REPUBLICS/			
UNION DES REPUBLIQUES SOCIALISTES SOVIETIQUES			
Chatkal Mountains Biosphere Reserve	2.36.12	71,400	1978
Kavkazskiy Zapovednik	2.34.12	263,477	1978
Oka River Valley Biosphere Reserve	2.10.05	45,845	1978
Repetek Zapovednik	2.21.08	34,600	1978
Sikhote-Alin Zapovednik	2.14.05	340,200	1978
Tsentral'nochernozem Zapovednik	2.10.05	4,795	1978
Astrakhanskiy Zapovednik	2.21.08	63,400	1984
Kronotskiy Zapovednik	2.07.05	1,099,000	1984