



Guidelines for Identification, Evaluation and Selection of Biosphere Reserves in The United States

U.S. Man and the Biosphere Program

U.S. MAB Report No. 1, (First Revision), 1983



UNITED STATES MAN AND THE BIOSPHERE PROGRAM
PROJECT 8: BIOSPHERE RESERVES

GUIDELINES FOR IDENTIFICATION, EVALUATION AND SELECTION
OF BIOSPHERE RESERVES IN THE UNITED STATES

Prepared by an Expert Panel on Biosphere Reserves

Edward A. Fernald, Chairman

Thomas V. Armentano

William P. Gregg, Jr.

Albert Radford

Rebecca Sharitz

Charles Wharton

U.S. MAB Secretariat
Department of State
OES/ENR (MAB)
Washington, D.C. 20520

1983

TABLE OF CONTENTS

INTRODUCTION	1
CHARACTERISTICS OF BIOSPHERE RESERVES	3
PROCEDURE FOR SELECTION	5
Establishment of the Ad Hoc Selection Panel	5
Identifying Candidate Sites and Listing	
Evaluative Factors	5
Preparation of Descriptions of Candidate Sites	7
Selection Criteria	12
Evaluation of Candidate Sites	15
Special Considerations in Selection	16
Preparation of Nomination Forms and Summary Report	19
Follow-up Actions by the Ad Hoc Selection Panel	19
Summary of Selection Procedures	19
SUMMARY OF RESPONSIBILITIES RELATING TO SELECTION OF BIOSPHERE RESERVES IN THE UNITED STATES	21
TYPES OF BIOSPHERE RESERVES	22
The Integrated Biosphere Reserve	22
The Multiple-Site Biosphere Reserve	22
Multiple Biosphere Reserves in the Same Province	23
MANAGEMENT AND USE CONSIDERATIONS	25
LITERATURE CITED	28
APPENDIX A: Map of Biogeographic Provinces Represented in North America (from Udvardy, 1975)	29
APPENDIX B: Site-rating Form for Biosphere Reserve Nomination	30
APPENDIX C: Biosphere Reserve Nomination Form (UNESCO, January 1980)	31

INTRODUCTION

The increasing influence of human activities on the physical and living resources of the biosphere has made it clear that a new global initiative in conservation is needed to promote wise stewardship of the world's biological diversity. The International Network of Biosphere Reserves is being established through MAB's Man and the Biosphere Program as the cornerstone of such an initiative.

Under selection criteria developed by MAB in 1974, biosphere reserves are being established throughout the world to provide secure sites for protecting representative samples of the genetic and ecological diversity of the biosphere and to include both undisturbed sites and sites modified by human use. The sites are managed for observational and experimental research. This research furthers our understanding of the structure and function of natural ecosystems and enables us to distinguish between natural and human-caused changes in these systems. It also provides an objective basis for developing land use and management policies that assure sustained productivity and diverse, continuing benefits to human society. In addition, biosphere reserves, as sites for education and training, enhance public awareness of the interrelationships and interdependencies between human populations and natural ecosystems.

In August 1980 an expert panel convened to develop a systematic procedure for selection of biosphere reserves in the Southeastern Evergreen Forest Biogeographic Province (also referred to as the Austroriparian Biogeographic Province in the 1975 classification of Udvardy, which is shown for the continental United States and Canada in Appendix A). Because the province represented one of the most ecologically diverse in the United States, it readily became apparent that a workable procedure developed for this province would probably be applicable to other areas of the United States, and possibly to many other areas of the world. A decision was made at the outset to develop guidelines for completion of the Biosphere Reserves Network in the United States and to test this procedure in the complex Southeastern Evergreen Forest Province. These guidelines, approved by the MAB Directorate on Biosphere Reserves, provide such a framework and reflect the expert panel's recommendations.

The guidelines describe a procedure for identifying candidate biosphere reserve sites, for describing these sites in a way that facilitates objective comparison, for evaluating sites relative to MAB criteria, and for selecting sites to be recommended. The procedure provides reasonable flexibility in identifying factors appropriate to characterizing candidate sites in each province. Yet it assures the greatest possible consistency in evaluation of sites relative to established criteria. Most importantly, it promotes the active involvement of a multidisciplinary team of scientific and resource management authorities in developing a balanced perspective and a traceable record of the selection process.

The guidelines are intended to supplement MAB guidelines contained in MAB Report Series No. 22 (UNESCO, 1974), which provides a consistent framework for developing the International Network of Biosphere Reserves. That report should be consulted for additional information on the Biosphere Reserves System. These guidelines supersede U.S. MAB Report No. 1, entitled "Interim Guidelines for Selection of Biosphere Reserves in the United States" (Risser and Cornelison, 1979).

The guidelines apply to all "terrestrial" land and water areas outside the coastal zone, which include barrier islands, wetlands, and estuaries bordering saltwater oceans and seas as well as immediate offshore slopes. Separate guidelines pertain to selection of biosphere reserves in the coastal zone (Ray et al., 1981). The two sets of guidelines differ primarily in the classification system defining biogeographic regions, in site description factors, and in site evaluation procedures. Administrative procedures and responsibilities are similar.

When sites contain both "terrestrial" and coastal zone resources, the resource predominantly contributing to the protection of representative ecological diversity should dictate selection guidelines. The characteristics of the less dominant resource should be considered in site description and evaluation on a case-by-case basis. Particular emphasis should be placed on evaluating the role of these resources in enhancing the research and educational value of the site as a whole.

CHARACTERISTICS OF BIOSPHERE RESERVES

Biosphere reserves are protected areas of land and water that are managed to provide secure sites for research, resource management, and education and training. These research and educational activities focus on promoting increased understanding and awareness of the interrelationships between human activities and the biosphere that supports them. Each reserve encompasses interacting physical and biological resources and processes characteristic of one of the world's natural regions, as generally defined and delimited in the biogeographic classification system of Udvardy (1975). To the greatest extent practicable, a biosphere reserve contains complete gradients of continuously varying factors, such as elevation and aspect, as well as a large diversity of spatially discontinuous factors, such as rock and soil types, which control the structure and function of natural ecosystems. Biosphere reserves thus tend to be natural areas larger than 5,000 hectares which are sufficiently expansive to accommodate scientific studies under conditions of minimum interference from extraneous human activities.

The primary reason for establishing biosphere reserves is the inclusion of the greatest possible diversity at the community and ecosystem levels. Reserves may contain highly significant resources, such as endangered species populations and unique geological features. In fact, many reserves enclose large numbers of such resources. However, inclusion of significant or unique natural resources remains secondary to greatest community and ecosystem diversity. In the United States, this emphasis clearly distinguishes the biosphere reserve from designations such as world heritage and natural landmarks, which give primary emphasis to rare, unusual, or unique features. These features are usually of limited geographic extent and possess significance at the regional, national, or international level.

In the United States, most biosphere reserves have a substantial history of monitoring and ecological research which have resulted in a baseline of information that can be used to evaluate the effects of natural and human-caused events, cycles, and trends. Long-term ecological data bases collected in the reserves frequently prove invaluable for making planning and resource management decisions, and for developing and testing research hypotheses, both in reserves and in larger biogeographic provinces. Whether long-term data bases have been collected or not, the designation of a biosphere reserve confers responsibility on the land administrator(s) to encourage multidisciplinary monitoring and research that will progressively increase a reserve's educational value and its effectiveness in furnishing information for land-use and management decisions. In this context, a biosphere reserve represents a geographic focal point for integrating activities of domestic researchers and for coordinating these activities internationally in order to develop balanced scientific perspectives on land-use and resource-management issues of regional, national, multinational, and global importance.

Because an understanding of cause and effect relationships requires the availability of ecosystems that can be experimentally manipulated as well as undisturbed areas that can be used for control data, a complete biosphere reserve in a particular biogeographic province must provide opportunities for both observational and experimental research. The ideal reserve is thus a single protected site administered to accommodate both types of work. Unfortunately, this is not always possible because of policy constraints of the administering agency or institution or limitations in availability of suitable resources or other factors. In these cases, multiple sites may be designated in a particular province, either as

separate reserves or as component units of the same reserve, depending on the degree of biogeographic continuity among the sites (see section on multiple-site designations).

Biosphere reserves play a major role in the protection of the world's genetic resources and serve as living reservoirs to be perpetuated for the benefit of future generations. Thus, they are characterized by a high diversity of plant and animal species native to a particular province. Regardless of particular research and resource management objectives, biosphere reserves should be managed to protect and, where appropriate, to restore and enhance the diversity of native species and to reduce the impact of exotic species and human influences on the native biota of the reserve. Activities incompatible with long-term conservation of genetic resources should be considered inappropriate in a biosphere reserve.

MAB guidelines authorize the designation of biosphere reserves in areas with unique natural features, harmonious landscapes resulting from traditional patterns of land use, and modified or degraded ecosystems capable of restoration (UNESCO, 1974, discussion of applicable criteria). In the United States such areas may form part of a larger single site or multiple site reserve. However, they are not designated separately in order to avoid proliferation of reserves and to promote integration of scientific and educational activities in areas that fully satisfy essential selection criteria.

To the greatest extent possible, the boundaries of biosphere reserves are established to facilitate long-term protection and scientific study of complete natural ecosystems. In most areas, drawing boundaries along watershed divides affords such protection. Reserve boundaries, however, may not coincide with land ownership boundaries nor management jurisdictions which typically are strongly influenced by political considerations. For this reason, a biosphere reserve may contain a mix of management strategies, which, although different, can still be accommodated within the overall purpose of the reserve.

PROCEDURE FOR SELECTION

The procedure for selection in the United States provides the framework for objectively evaluating natural and human-modified areas within a biogeographic province according to criteria used by MAB in designating biosphere reserves throughout the world. This helps ensure that all potentially qualifying sites within a particular province are equally considered and that only the sites most fully satisfying these criteria are selected. Additionally, the procedure yields a traceable record of the basis for evaluation and selection.

The stages in the selection procedure are described below. For a flow chart summarizing activities leading to selection of reserves, see page 20.

1. Establishment of the ad hoc Selection Panel

The selection procedure is carried out by an ad hoc selection panel specifically created for this purpose by the MAB Directorate on Biosphere Reserves. The chairman of the panel is appointed by the MAB Directorate during a semiannual meeting, or by the directorate chairman, if authorized to do so by the assembled directorate. Panel members are selected by the panel chairman, except in cases where the directorate specifically elects to select the panel members itself.

Panel members should be recognized experts on the natural resources of the biogeographic province and should have established reputations in ecological research, resource management, or research administration. To the extent possible, panel members should be selected from different universities, research institutions, and land management agencies. If it is known from the beginning of the selection process that lands under administration of a particular entity are likely candidates for nomination, representation on the panel of a qualified scientist or resource manager from the entity should be considered. Should such a site be designated, this would enable complete and realistic site assessment and would also help the selection panel ascertain the willingness of the administrator to provide the requisite protection and to otherwise fulfill the purpose of a biosphere reserve.

2. Identifying Candidate Sites and Listing Evaluative Factors

As soon as possible following the selection of the panel members, the chairman should convene a meeting to delimit boundaries of the biogeographic province, to identify candidate sites within the province, and to specify factors that would sufficiently describe the candidate sites and that would enable evaluation.

The panel should review the boundaries of the biogeographic province as shown in Udvardy (1975) (see Appendix A for map) to determine whether particular areas should be added, deleted, or placed in an adjoining province. Such adjustments should be made only to clarify the status of areas where obvious ecological and physiographic affinity to a particular province requires such action to enable comprehensive identification of candidate sites.

In identifying candidate sites, panel members should begin by listing all natural areas and research sites in the province for which the administrator has the legal authority and management capability as well as the presumed intent to provide long-term protection. Although primary emphasis should be placed on identifying individual sites satisfying all essential MAB criteria (see section on evaluation of sites), sites not fulfilling all criteria may be included if they provide opportunities for creating a complete reserve through linkage with one or more other sites in the province. For example, a site containing an exceptionally good representative of a rare ecological community may not itself satisfy the "diversity" criterion, yet may deserve consideration because of its naturalness, protected status, and history of research. Thus, the panel should give attention to identifying not only individual sites but also pairs and clusters of ecologically and programmatically related sites for description and evaluation against the established MAB criteria.

As a general rule, the panel should attempt to identify all sites and site clusters that appear to satisfy MAB criteria. In provinces containing a high degree of biological diversity, the impossibility of selecting a single site or a cluster of sites that includes a representative diversity of the biological resources characteristic of the province as a whole may be obvious from the start. In such cases the panel should subdivide the province into two or more subregions possessing sufficient ecological cohesiveness to enable selection of sites satisfying the essential criteria. In order to prevent excessive proliferation of reserves, no more than four subregions should be delimited in a given province, except in unusually large provinces containing a very high natural diversity.

The factor headings to be used in describing and evaluating candidate sites are listed on the MAB nomination form (Appendix C). There are, however, many specific biological, physical, managerial, and other factors unique or especially associated with a given province on which information should be gathered to enable full description and comparison of sites. The latter factors, which are appropriately included within the broad factor headings of the nomination form, should be selected by the panel through multidisciplinary consultation. Thus, many factors, such as land tenure, protection status, and acreage, will be described consistently from province to province; many other factors--particularly those involving natural resources and processes--will be listed only for particular provinces. The number of these "discretionary" factors should be limited to the minimum number that the panel believes is required to provide objective description and comparison of candidate sites. These factors should also be limited to those for which information is believed to be consistently available from site to site, because large gaps in information, particularly for narrowly defined factors, would impede objective comparison.

During its first meeting, the selection panel must agree on a standard format to display information on the factors to be used for describing each candidate site and later in evaluating sites against MAB criteria. Following the meeting, the chairman should prepare an appropriate matrix or tabular evaluation form and distribute it to all panel members. The form should provide information on those factors most relevant to selection in a particular province but need not supply information on all factors listed on the MAB nomination form. Exhibit 1 provides a sample form displaying broad factor headings and should be of general utility.

In unusually large or diverse provinces with numerous candidate sites, it may be desirable to assemble information on a limited number of important factors to enable early culling of unqualified sites. The panel should determine at its initial meeting whether such a pre-review would improve the efficiency of the site-selection process and, if so, should agree upon the factors, assign sites to individual panel members for descriptions, and prepare and submit descriptions to the chairman with recommendations for action. The chairman may, at his or her discretion, call a meeting to reach agreement on sites to be culled or may simply eliminate from consideration all sites recommended by panel members for deletion and then notify panel members of the sites that will be evaluated in detail.

3. Preparation of Descriptions of Candidate Sites

During the first panel meeting, members should be assigned responsibility for preparing or arranging for the preparation of descriptions of particular sites. In either case, descriptions should be prepared in sufficient detail to provide an objective basis for systematic and objective evaluation and selection of sites and for completion of the required nomination forms. A separate information file for each site should become part of the permanent record. To the greatest extent possible, preparers of site descriptions should subdivide the information file and summarize information using the topic headings of the MAB nomination form (Appendix C). This should allow direct transfer of information to the form if the site is recommended for nomination.

Each panel member should fill out site description forms for assigned sites. To the extent practicable, the general factor headings in Exhibit 1 (see page 13) should be used and information displayed according to the instructions below. If the panel decides to use additional factor headings or alternative methods of displaying information, the basis for the decision should be included in its summary report to MAB. After completing the forms for a particular site, a panel member should forward a copy, along with any personal analysis, references or other information that he or she considers particularly valuable in evaluating the site, to the panel chairman and all panel members.

The procedure for displaying descriptive information involves scoring factors either according to a quantified measure of the relative quality of the factor (on a scale of 1 to 4) or, if a quantitative rating is inappropriate, noting the presence or absence of the factor. Factor-by-factor instructions based on Exhibit 1 follow.

EXHIBIT 1

SAMPLE SITE DESCRIPTION FORM

Physical and Biological Evaluation Factors

Name of Candidate: _____

County: _____ State: _____

Area (hectares): _____

Geology		Vegetation	
Clay	_____	Western Gulf Coastal Plain	_____
Claystone	_____	Big thicket ecosystem complex	_____
Silt	_____	Upland hardwoods	_____
Siltstone	_____	Arkansas oak forest	_____
Sand	_____		
Sandstone	_____	Central Gulf Coastal Plain	
Conglomerate	_____	Cypress-tupelo forest	_____
Peat	_____	Wetland series	_____
Lignite	_____	Bottomland cypress swamp	_____
Muck	_____	Slash pine savanna	_____
Marl	_____	Longleaf pine forest	_____
Etc.	_____	Jackson prairie	_____
		Bottomland hardwoods	_____
Soils		Oak-hickory mixed forest	_____
Alfisol	_____		
Entisol	_____	Mississippi Alluvial Plain	
Histosol	_____	Bottomland hardwoods and cypress	
Inceptisol	_____	swamps	_____
Mollisol	_____	Oak-hickory forest	_____
Spodosol	_____	Beech-magnolia forest on loess	_____
Ultisol	_____		
Vertisol	_____	Florida	
Etc.	_____	Sand pine/oak & Kissimmee prairie	_____
		Bottomlands cypress	_____
Hydrology		Flora	
Acidic	_____	Rare/endangered species	_____
Neutral	_____	Culturally important species	_____
Basic	_____	Major plant groups (list by group)	_____
Topography		Fauna	
Basin	_____	Birds-aquatic	_____
Hills and ridges	_____	Birds-terrestrial	_____
Lowlands	_____	Insects	_____
Lakes and pools	_____	Reptiles	_____
Alternate top.	_____	Amphibians	_____
Etc.	_____	Mammals	_____
		Molluscs	_____
		Etc.	_____

Cultural Evaluation Factors

<p>Legal Protection¹ (List by category²)</p>		<p>Monitoring</p>	
		Animal populations	_____
		Plant populations	_____
		Climate/faunal inventory	_____
		Floristic inventory	_____
		Harvesting	_____
		Hydrology	_____
		Pollution	_____
		Soils	_____
		Vegetation	_____
		Etc.	_____
<p>Land Tenure³ (List by type of ownership and percent of total area)</p>			
<p>Land Use (Indicate approximate percent of total area by category)</p>			
Agriculture	_____		
Forestry	_____		
Grazing	_____		
Human settlements	_____		
Industry	_____		
Recreation	_____		
Transportation	_____		
		<p>Public Involvement/Environmental Education/Training</p>	
		Public involvement	_____
		Environmental education	_____
		Professional training	_____
<p>Science Facilities</p>		<p>Historical/Archaeological</p>	
Research station	_____	Record of human use	_____
Field station	_____	Historical resources	_____
Experimental plots	_____	Archaeological resources	_____
Technical staff	_____	Traditional land use systems	_____
Resident research staff	_____		
Housing and amenities	_____	<p>Threat/Vulnerability (List by source of threat)</p>	_____

¹ Categories are those used for the Austroriparian Biogeographic Province.

² Legal Protection: N=National park or equivalent reserve. E=Experimental/scientific reserve. O=Undeveloped open space. W=Wilderness area. P=strict nature preserve (including wildlife sanctuaries, wildlife refuges, etc.)

³ Land Tenure: F=federal, S=state or local government, P=Private, P(U)=Private University/research institution.

Name of Candidate Site, State, County, Elevation Range (in meters) and Surface Area (in hectares) are self-explanatory. If two or more sites are being considered for designation as a single reserve, separate descriptions should be prepared. These will be considered together in evaluating sites against MAB selection criteria.

Physical and Biological Evaluation Factors

Geology--The site should be evaluated according to the presence (P) or absence (A) of special geologic features that add to the natural value of the candidate site. A geologic feature should either cover at least five percent of the site area or add exceptional value to the site as a whole in order to be considered present.

Soils--The site should be appraised according to the presence (P) or absence (A) of each of the major soil orders covering at least five percent of the total site area. The U.S. Department of Agriculture's Soil Classification System should be used (USDA, 1975). If a biotic community of extraordinary value is dependent upon the presence of a soil order, a (P) may be given even though the order covers less than five percent of the area.

Hydrology--The presence (P) or absence (A) of hydrologic features of significant value in perpetuating biological communities should be indicated. Water chemistry factors should apply to specific water bodies considered as major features of interest on the site.

Topography--The presence (P) or absence (A) of topographic features covering at least five percent of the site should be noted. Exceptional features covering less than five percent may be recorded as present if associated with a biotic community of extraordinary value.

Vegetation--The plant cover type should be scored according to dominant tree, shrub, and herb species. For a given cover type to be recognized, it should cover at least five percent of the nominated site. Each tree cover type should be graded according to its condition.

- 4 = all successional stages present from immature (pole-sized timber to virgin forest)
- 3 = immature to old-growth stages present, but virgin timber largely cut
- 2 = immature to mature second-growth stages present
- 1 = only immature stages present

For a growth stage to be considered important enough to influence the grade level, it should cover at least five percent of the cover type. If it composes less than that, it should contribute exceptional or unique value to the cover type.

Shrub and herb cover types should be marked as present (P) or absent (A). Use of the classification system developed by the Society of American Foresters (Eyre, 1980) is recommended for forest vegetation.

Flora--The flora, as distinct from vegetation, should be evaluated according to the presence of rare and/or endangered species and special features, such as unusual aggregations of biologically or culturally valuable species (e.g., carnivorous plants, edible plants) or wild flowers. These species and floral features should be listed under the major plant groups (e.g., algae, fungi, bryophytes, pteridophytes, gymnosperms, and angiosperms) and their presence (P) or absence (A) noted.

Fauna--The same considerations of species' uniqueness and exceptional value described for flora should apply to the fauna. Scoring of (P) and (A) shall be done according to major animal groups.

Cultural Evaluation Factors

Legal Protection--The existing legal status of the site should be indicated using letter codes as follows:

- E = experimental/scientific reserve
- H = historical or equivalent reserve
- O = undeveloped open space
- P = strict nature preserve (including national parks, wildlife sanctuaries, and refuges)
- R = resource reserve (national forest, multiple-use area)
- W = wilderness area
- X = world heritage site

If two or more of these indicators apply, the designations given to the larger surface areas should be listed first. Copies of the principal legal documents governing the protection and use of a site should be included in its information file.

Land Tenure--Existing ownerships composing more than one percent of the total surface of the site should be indicated using the codes: F = federal government, S = state or local government, P = private, P(U) = private university or research/conservation institution. In cases of multiple ownership, the ownerships should be listed in order of decreasing area owned. Available information on amounts of land in different ownerships, as well as the existence of leases and other legal obligations and restrictions relating to land tenure, should be included in the site's file records.

Land Use--Use of the seven categories in Exhibit 1 is recommended. These categories are taken from the Land Use/Land Cover Classification System developed by the United States Geological Survey and adopted by many governmental agencies (Anderson et al., 1976). The approximate percentage of the site in each land use category should be indicated. If this is not possible, a check should be placed opposite each land use estimated to involve more than ten percent of the total area. The file record should contain available information on the extent of human modification and activity on the site and applicable zoning (including maps and planning documents directly governing use of the site, such as site management plans).

Scientific Facilities--The presence of scientific facilities useful or essential for ecological research should be noted with a check. The file record should indicate the accessibility of the site and contain a brief description of past, present,

regional, national, and international scientific investigation should also be indicated.

Monitoring--A current and well-maintained monitoring program for various biotic and abiotic components of the ecosystem is a useful adjunct to research. The presence of a documented, long-term record of baseline data (i.e., spanning five years or more) for key ecosystem parameters may prove essential to analyzing new data. Thus, a check should be placed opposite the parameters for which such a data record exists. The file record should include available information on the monitoring programs for individual parameters, operational data management systems, and integration of the site into monitoring networks at the regional, national, and international levels.

Public Involvement/Environmental Education/Professional Training--The presence of an active program in public involvement in planning and management, environmental education, or scientific or resource-management training at the site should be indicated with a check. Available information on the nature and level of support for these programs should be incorporated into the file record.

Historical Use--The presence of a record of previous human use of the site as well as the existence of significant historical or archaeological resources should, including the presence of traditional land use systems, be indicated with a check. An associated bibliography should be included. Appropriate information on the specific nature of these resources should be placed in the file record.

Vulnerability to Human-caused Threats--The security of the site from destructive or damaging external and internal influences that would render it unsuitable as a biosphere reserve should be considered under the threat/vulnerability factor. Sources of known or suspected threats should be listed on the site description form. The presence of a threat to continued site integrity or the vulnerability of the site to a threat should be designated as either NS (not significant) or S (significant). If the latter designation is valid, it should be followed by a negative number signifying the estimated period within which the threat is imminent:

- 4 threat imminent within the next year
- 3 short-term threat probable or possible within the next 1 to 5 years
- 2 medium-term threat probable or possible within the next 5 to 10 years
- 1 long-term threat possible or plausible beyond 10 years

Depending on the severity of the threat, any "S" score, but particularly S-4, S-3 or S-2, could lead to rejection of the candidate site because of jeopardy to site integrity, unless the panel can determine that existing or planned actions to alleviate the threat, whether by the site administrator or outside parties, are reasonably assured of success.

4. Selection Criteria

After the information files and descriptive factor summaries have been prepared by the panel members, the panel as a whole should reconvene to evaluate the overall qualification of individual sites for nomination as biosphere reserves, based on MAB site-selection criteria. Each site, or group of related sites, under consideration for nomination should be evaluated according to a numerical evalua-

tion procedure whereby each site is scored relative to the selection criteria, which are themselves weighted to reflect their relative importance in biosphere reserve nomination. The selection criteria and their relative weights are listed below. Essential criteria, which are viewed as mandatory for selection of biosphere reserves, are indicated by an asterisk.

Representativeness and Diversity* (weighting factor = 10). The MAB Task Force on Criteria and Guidelines for the Choice and Establishment of Biosphere Reserves (UNESCO, 1974) identifies representativeness as the primary criterion for selection of a biosphere reserve. A site must contain the characteristic features of a particular biogeographic province in order to enable the greatest possible extrapolation of ecological information from the site to an entire biogeographic province. The MAB guidelines acknowledge that, in many provinces, more than one biosphere reserve will be required to encompass the characteristic ecological gradients, interrelated living and non-living resources, and natural processes that compose the province as a whole (see Appendix B).

Closely integrated with the criterion of representativeness is the criterion of diversity. MAB guidelines require biosphere reserves to include the "maximum representation of ecosystems, communities, and organisms characteristic" of the province, with priority accorded to ecosystem level diversity so that the greatest possible range of characteristic habitats is enclosed within the reserve. The expert panel that developed these guidelines for the United States concluded that a clear distinction between these interrelated criteria as described by MAB is not practicable, and that attempting to evaluate sites relative to each criterion would result in unnecessary confusion and ambiguity in the selection process. A decision was made to consider the criteria together, according priority to sites that illustrate the greatest possible diversity of ecosystems characteristic of the biogeographic province.

In evaluating diversity, emphasis should be placed on the major ecological communities of the biogeographic province and on the gradients, processes, and physical factors associated with these communities. Although fully considered, diversity at the association level on the one hand, and at the species, population, and organism level on the other, should normally be given much less weight in the evaluation. However, the panel should use judgment in this regard, as the occurrence of major centers of speciation or similar features may be of such importance that their presence should substantially influence the evaluation.

In evaluating sites for "representative diversity," the diversity and condition of vegetation types identified in the site descriptions should be given priority, as these factors strongly indicate the strength of this essential composite criterion.

Effectiveness as a Conservation Unit* (weighting factor = 3). MAB guidelines state that "a biosphere reserve must be an effective conservation unit." This criterion involves a number of factors, such as size, shape, and location with respect to natural protective barriers. Optimum size depends largely on the type of system and the requirements of the species involved. The ideal area is one that is large enough to be self-regulating through the inclusion of all the interacting components. The relation of size of area to species diversity should be taken into consideration in planning biosphere reserves and in determining their boundaries. In terrestrial systems, watersheds will generally provide appropriate boundaries, complete catchments being preferable to parts of catchments. By this means, the

integrity and continuity of land and associated aquatic systems will be maintained together with the associated interacting land/water processes. Although existing land use constraints may, in some circumstances, prevent the achievement of this ideal, a complete catchment should be included in each biosphere reserve so far as this is attainable."

In addition to the conservation benefits afforded by the reserve boundary itself, its immediate regional context and internal land and water uses should also be considered. External land use may threaten the integrity of the reserve's ecosystems by providing staging areas for human incursions, impairing air quality, impeding wildlife migrations, interfering with gene flow between the reserve and the surrounding area, and so forth. Internal uses and human activities, such as recreation, grazing, and mineral development, may be incompatible with the purpose of the reserve, especially in cases where research, education, and conservation objectives for the area have not been established. The administrator's capability and intent, as well as the plans of outside entities, to mitigate existing and potential threats to the site should receive full consideration.

In order for a site to be considered an effective conservation unit, the administrator(s) must be determined to possess both the capability and intent to safeguard the integrity of natural resources and processes and to make the site available for research and education. Management objectives and plans, as well as administrative policies, applicable legislation, and regulations should be reviewed in addressing these considerations.

Naturalness* (weighting factor = 3). Naturalness refers to the extent to which a site resembles probable primeval conditions. Human modification of a site, interpreted broadly to include a range of conditions from total destruction to establishment of exotic species, detracts from its naturalness and normally reduces its suitability for biosphere reserve status. However, modified areas included within the boundaries of a candidate site may actually contribute to its suitability by providing areas for experimental and restoration research. This condition would pertain only if the site also contains sufficient undisturbed area to serve as a baseline observational control.

Educational/Research Value (weighting factor = 2). The actual and potential value of the site in contributing to our understanding of the structure and function of ecosystems under natural and disturbed conditions should be evaluated. Important considerations include: the availability of comprehensive baseline information, with particular emphasis on long-term monitoring of changes in physical and biological factors; the accessibility of areas that can be manipulated experimentally to provide information on cause-and-effect relationships needed to address significant resource management problems; the availability of facilities and logistical support personnel that enable multidisciplinary research projects to be carried out at the site; the existence of facilities and programs for scientific and resource management training as well as public education; the use of the site by investigators from outside institutions and agencies for research and educational purposes; and the integration of the site into regional, national, or international monitoring and research activities. The administrator's present and probable future support for scientific and educational activities, as recorded in planning and budgetary documents, should be determined to the extent possible.

Uniqueness (weighting factor = 2). The presence of rare, unusual, or unique features increases the suitability of the site for a biosphere reserve. To be considered, features should be noteworthy at the biome or global level. Examples include: confluence areas for two or more floristic regions; centers of distribution for ecologically, economically, or scientifically important species; significant habitats for rare, threatened, or endangered species; outstanding areas for the long-term study of processes responsible for forming and perpetuating natural habitats; and human-modified areas of great international scientific or educational significance. MAB guidelines allow for designation of unique areas as biosphere reserves in cases where "their international importance is beyond dispute." In order to avoid inappropriate proliferation of reserves in the United States and to promote the use of these reserves for a wide variety of research activities, such sites should be considered for nomination only if they otherwise satisfy essential selection criteria, either in their own right or through linkage with one or more sites to form a multiple-site reserve.

5. Evaluation of Candidate Sites

Each site, pair of sites, or group of sites being examined for nomination as a single biosphere reserve should be rated against each of the five selection criteria. The selection panel should review the site descriptions to agree upon factors to be rated favorably or unfavorably for each criterion. Provision should be made for rating certain factors in more than one criterion, if appropriate. A five-point scoring system should be used in rating sites as follows:

5 points: site fully satisfies the criterion. All or nearly all favorable factors are represented, and the site contains exceptional examples of most of the favorable factors. No unfavorable factors are represented.

4 points: site fully satisfies the criterion. Most favorable factors are represented, and the site contains exceptional examples of many of them. No unfavorable factors are represented.

3 points: site generally satisfies the criterion. Many favorable factors are represented, and the site contains some exceptional examples. Unfavorable factors, if represented, do not markedly impair the qualification of the site under the criterion.

2 points: site marginally satisfies the criterion. Few favorable factors are represented, but the site may occasionally contain exceptional examples of these factors. Unfavorable factors may impair the qualification of the site under the criterion to a minor degree.

1 point: site incompletely satisfies the criterion. Only one or two favorable factors are represented, and the site may occasionally contain an exceptional example of a factor. Unfavorable factors may significantly impair the qualification of the site under the criterion.

0 points: site fails to satisfy the criterion. Favorable factors are not represented. Unfavorable factors may significantly impair the qualification of the site under the criterion.

Although the selection panel may modify the procedure for arriving at a consensus on site ratings, the following is recommended. At the first panel meeting, factors to be used in site description should be listed, the format for preparing tabular information summaries developed, the relationship of the factors to the evaluation criteria determined, and panel members assigned particular sites for description. In view of the detailed knowledge they will acquire on specific sites, panel members should also rate the assigned sites against the selection criteria and be fully prepared to discuss their rationale for the ratings at the second meeting.

As site descriptions are completed, each panel member will forward to other members a copy of site description forms and other relevant material that he or she has prepared or assembled. This information should enable the other members to rate the sites against the selection criteria based on the information provided. Although the latter ratings will normally be based on a less complete perspective, their preparation in advance of the panel's second meeting will help ensure that panel members are well acquainted with all candidate sites and come to the meeting prepared to discuss substantive issues related to nomination.

At the second meeting, the panel members should discuss the qualifications of assigned sites. Ratings should be compared and adjusted as appropriate in light of the discussions, and an attempt should be made to arrive at a consensus on the ratings to be given each site. If a consensus cannot be reached, ratings of individual members should be averaged. Differences in the perspectives of panel members should be recorded in the panel's report to the US-MAB Directorate on Biosphere Reserves. A standard rating form (Appendix B) should be used for recording panel members' ratings of individual sites as well as the consensus rating of the assembled panel.

As a general rule, sites receiving the highest total scores should be recommended for nomination. However, panels should exercise judgment in evaluating site qualifications so as to select the minimum number of sites best fulfilling the selection criteria. For this reason, it would be fully appropriate to give extra weight to a site that satisfies one or more of the selection criteria to an exceptional degree, to favor a site with a lower score in a poorly represented portion of a province over a more highly rated site in a well-represented part of the province, or to take similar actions deemed appropriate in a particular case. Considerations likely to have a strong influence on site ratings are discussed in the next section. When such special considerations have such an influence on rating of a site, the rationale for them should be recorded in the panel's report to the Directorate.

6. Special Considerations in Selection

The rating of candidate sites relative to the five identified selection criteria provides valuable information for comparing sites and arriving at recommendations on nominations. However, although the rating scores are normally the key factors in decision making, other considerations must be made in some cases. These considerations may strengthen the case for nomination or cause an otherwise qualified site to be dropped to a lower priority in the listing of candidates. The special considerations most likely to affect the suitability of a site for nomination are discussed briefly below. The listed considerations are not comprehensive, and

the committee is encouraged to invoke and document any other considerations relevant to the nomination of a particular site.

Evidence of Support by Managing Entity. Achievement of the objectives of a biosphere reserve requires the active and continuing support of its principal managing entity or entities. Indications of such support increase the likelihood of effective management action to protect the site, as well as the probability of implementation of interdisciplinary scientific and educational programs which a reserve is established to encourage. Without such support, designation will have little, if any, effect on management and use of the site. Moreover, lack of adequate support could cause the site to become unsuitable for biosphere reserve status if incompatible uses were permitted in the future.

Although the Committee is responsible primarily for scientific evaluation of site diversity, quality, and protectability as well as suitability for observational and manipulative research, the contacts made with site owners and administrators in gathering information provide opportunities to assess the potential acceptability of biosphere reserve designations. Obstacles to designation, such as legal obligations to accommodate grazing, mineral development, intensive recreation, or other human uses in the most suitable core zone area of a candidate site, should be identified, and the capability and intent of the managing entity to overcome these obstacles should be assessed to the extent possible. Alternatively, major evidences of support, such as willingness to make available laboratory space and logistical support for research, should also be ascertained. Care should be used in considering the views of personnel whose judgments may not accurately reflect those of the responsible decision maker. Nevertheless, it should be possible in many cases to obtain a sufficiently authoritative indication of a level of support, or lack of it, which would have a significant bearing on nomination. If the Committee obtains evidence of strong opposition to designation, the site should not be recommended for nomination.

Maintaining Balance between Observational and Manipulative Research Areas. A major objective of biosphere reserve designation is to provide opportunities for both observational and manipulative research in the same biogeographic province. The ad hoc committee should ensure that nominations are balanced and not weighted heavily in favor of sites accommodating primarily one type of research. If a province or subdivision thereof already contains a biosphere reserve that can be used primarily for only one type of research, the Committee should ensure that the subsequent nomination allows for other types of work.

In the United States, differences in the missions of the federal agencies administering protected natural areas have made it difficult to designate integrated biosphere reserves in a single geographic area. In particular, the respective management policies of the National Park Service and Forest Service, which administer about 80 percent of the existing U.S. reserves, preclude most types of manipulative research in units of the National Park System and impede the establishment of large observational research areas in the National Forests. Similar policy constraints of other agencies and institutions reinforce this condition. The need to designate separate areas suitable primarily for either observational or manipulative research has caused a proliferation in the number of U.S. biosphere reserves. In addition, differences in research program objectives and the sometimes large distances between observational and manipulative areas can present obstacles to effective science program coordination, especially in cases

where the two areas are somewhat dissimilar ecologically, a condition which normally would be less pronounced in an integrated reserve.

Ad hoc committees should give high priority to identifying sites suitable for nomination as integrated biosphere reserves, as this type of reserve often affords particularly good opportunities for the development of coordinated, cost-effective science and education programs. However, opportunities in the United States will be limited.

It should be emphasized that mere numerical balance does not suffice. Nominated sites providing for observational and manipulative research should be sufficiently similar ecologically so that research results will be comparable. This applies to integrated, multiple-site, and multiple reserves. However, it is a particularly important consideration when observational and manipulative areas are widely separated geographically or when they are located in areas of high ecosystem diversity.

In view of the overriding significance of protection of genetic and natural ecosystem diversity in biosphere reserves, selection of the principal "core zone area(s)" should normally be given priority in nomination. This area will serve as the undisturbed control for manipulative or ecosystem restoration research in areas that are selected subsequently to achieve the greatest possible comparability with the control area.

History of Inventory, Monitoring, Ecological Research, and Publications. Although research value is given only moderate weight in the rating of candidate sites, the existence of an exceptionally comprehensive, long-term history of productive scientific investigation should be given particular consideration in reaching decisions on nomination. Sites illustrating such records of scientific accomplishment that are not highly competitive on the basis of ratings for essential criteria should nevertheless be examined for inclusion in a multiple-site biosphere reserve containing one or more areas more fully satisfying these criteria. This proves particularly important if the inclusion of such a site would substantially enhance opportunities for highly productive, coordinated research in the nominated reserve.

Opportunities for International Collaboration. Most biogeographic provinces represented in the United States show strong ecological similarities with one or more provinces in other parts of the world, and excellent opportunities for international collaboration in the use of biosphere reserves for comparable scientific and educational purposes exist. The common objectives of biosphere reserves throughout the world make these areas choice sites for development of standard methodologies and execution of multilateral baseline inventory, environmental monitoring, and ecological research, which will provide new perspectives on interrelated environmental, land use and socioeconomic problems. Hence, to the extent possible, the Committee should identify existing biosphere reserves in ecologically related biogeographic provinces in other nations and assess opportunities for possible collaboration based on similarity of resources and comparability of scientific activities between these areas and potential U.S. nominations. An unusually good potential for bilateral and multilateral collaboration should be documented and given substantial weight in selecting sites for nomination.

7. Preparation of Nomination Forms and Summary Report

Nomination forms are prepared for each site recommended using the format prescribed by the International Coordinating Council (Appendix C). The members of the ad hoc committee who executed or coordinated the gathering of information on a candidate site should be responsible for preparing the nomination forms. As information for detailed site evaluation is gathered for each of the topics listed on the form, its preparation is largely a pro forma matter of direct transfer of information from files and descriptive factor summaries compiled during the selection process.

Nomination forms, along with a brief summary report prepared by the ad hoc panel chairman, are transmitted to the chairman and US-MAB Directorate on Biosphere Reserves. This summary report should include the sites considered, the site(s) recommended for nomination, the rationale for the recommendation(s), the evaluation of the probable acceptability of nomination to the managing entity, and the recommendations, if any, on special commitments that should be requested from the managing entity prior to nomination. All evaluation matrixes, files, and other materials developed during the selection process should accompany the summary report.

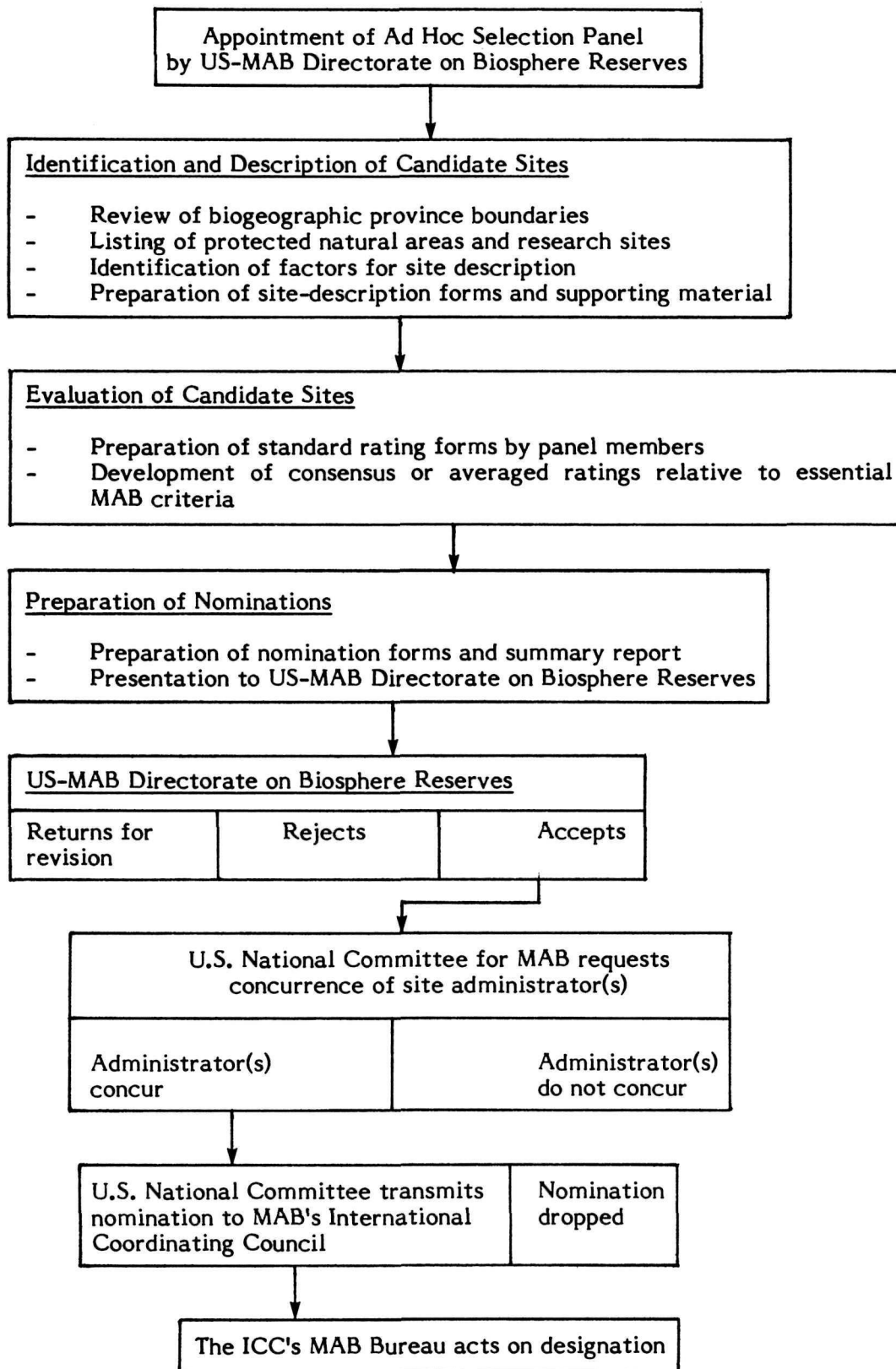
8. Follow-up Actions by the Ad Hoc Selection Panel

The chairman of the panel, or an assigned panel member, should present the panel's recommendations at a meeting of the US-MAB Directorate on Biosphere Reserves, which will either accept, reject, or recommend revision of the nomination(s). In the latter case, the panel is responsible for making revisions reasonably needed to develop adequate support for nomination.

Upon transmittal of the nomination by the U.S. National Committee for MAB to the thirty-nation International Coordinating Council for the Programme on Man and the Biosphere (ICC), the panel is officially dissolved. In the unlikely event that additional information were to be requested by the international organization, the US-MAB Directorate on Biosphere Reserves would be responsible for providing it. Approval of sites for designation as biosphere reserves is made by the MAB Bureau, an administrative organ of the ICC.

9. Summary of Selection Procedures

A stepwise summary of principal activities leading to designation of biosphere reserves in the United States is provided in the following chart.



SUMMARY OF RESPONSIBILITIES RELATING TO SELECTION OF BIOSPHERE RESERVES IN THE UNITED STATES

The United States MAB Directorate on Biosphere Reserves prepares guidelines relating to the selection of biosphere reserves in the United States. The Directorate is responsible for carrying out studies required to support completion of the United States network of reserves. It selects ad hoc committees of scientists and resource managers to review the qualifications of available sites and to recommend sites for nomination as biosphere reserves within particular biogeographic provinces. It reviews the recommendations of ad hoc committees and recommends sites to be nominated by the United States National Committee for Man and the Biosphere.

The ad hoc selection panel, consisting of authorities on the natural ecosystems and protected areas of a particular biogeographic province, executes systematic studies leading to recommendations for nomination of sites as biosphere reserves. The committee identifies physical and biological factors appropriate to evaluation of sites in the province; identifies potentially suitable sites; evaluates and rates sites, site pairs, and groups of sites according to MAB selection criteria; selects the most qualified sites; prepares nomination forms; and issues a final report to the US-MAB Directorate on Biosphere Reserves that provides the objective basis for site nominations and a traceable report of the selection process. The panel is responsible for contacting the site manager(s) to obtain factual information about each potentially qualifying site and to ascertain, either in a preliminary way or definitively, the position of the manager(s) on designation and willingness to manage the site in accordance with the purpose of a biosphere reserve.

The United States National Committee for Man and the Biosphere reviews recommendations on nominations by the US-MAB Directorate on Biosphere Reserves and nominates sites determined to satisfy MAB criteria. Prior to transmitting nominations to the International Coordinating Council, the committee is responsible for obtaining the site manager's concurrence on the nomination and an agreement to pursue several general goals for achieving the purpose of a biosphere reserve.

The MAB Bureau, an administrative organ of the International Coordinating Committee on the Programme for Man and the reviews nominations at its annual meeting and designates those determined to fulfill established criteria. The ICC, through its Secretariat at UNESCO headquarters in Paris, notifies the United States National Committee for MAB of its decisions and transmits designation certificates signed by the Director-General of UNESCO for qualifying sites.

TYPES OF BIOSPHERE RESERVES

Ad hoc committees may recommend sites for nomination as biosphere reserves in three ways described below, depending upon the circumstances prevailing within the biogeographic provinces.

1. The Integrated Biosphere Reserve

The integrated biosphere reserve represents the classical designation described in the 1974 MAB Task Force Report on establishment of biosphere reserves and is the ideal to be pursued in all selection efforts. It is always designated as a single unit in one geographic area. The integrated reserve satisfies all essential selection criteria and contains one or more areas suitable for observational research, as well as one or more areas suitable for manipulative research. Although the area may be administered by more than one institution, use and management strategies are coordinated to fulfill the purpose of the reserve.

2. The Multiple-Site Biosphere Reserve

The multiple-site biosphere reserve consists of two or more ecologically related, but geographically separate, sites linked together to form a single biosphere reserve. The biosphere reserve will be designated by MAB under a single name appropriately descriptive of the geographic and ecological region the sites represent. Multiple-site nominations should be considered by ad hoc committees whenever one or more of the following conditions pertains:

- a. The sites collectively protect a representative diversity of genetic resources and ecosystems of a biogeographic province or major subdivision thereof, but individually fall short of satisfying the criteria for representativeness and diversity. For example, primary and secondary succession areas might be linked with a "climax" vegetation area to form a multiple-site reserve if these conditions were not available in a single site.
- b. The sites provide opportunities for development or expansion of complementary research and related educational programs. Experimental and observational research sites illustrating a high degree of ecosystem similarity would be particularly good candidates for multiple-site designation. Multiple-site designation provides an important catalyst for improved research program coordination and simultaneously reduce the proliferation of biosphere reserves in the United States.
- c. An otherwise unqualified site protects an important habitat for a migratory wildlife species during different stages of its life cycle. The provision would, for example, allow for inclusion of the winter range of a migratory ungulate that has its summer range included in a biosphere reserve site fulfilling all essential criteria, even though the winter range itself would not satisfy these criteria. The provision would apply only in cases where the habitat area is located in the same biogeographic province, or subdivision thereof, as the principal biosphere reserve site.

- d. An otherwise unqualified site includes unique resources of exceptional value in enabling the biosphere reserve to protect representative genetic diversity in the biogeographical province. Centers of distribution for a number of rare, threatened, or endangered species, as well as areas where major floristic provinces converge, are examples of areas that should be considered for inclusion in multiple-site reserves. (NOTE: the MAB guidelines indicate that uniqueness alone may be used as a basis for selecting biosphere reserves. In the United States, we are recommending that unique areas be incorporated into multiple-site designations wherever possible to promote integration of these sites into the research program activities of the representative biosphere reserves and to minimize proliferation of small reserves focused on these resources.)
- e. An otherwise unqualified site contains a modified or degraded landscape determined to be capable of undergoing rehabilitation and thought to provide exceptional opportunities for research on rehabilitation and management of areas adversely affected by previous land-use practices. Priority should be given to areas previously subject to mining, grazing, deforestation, agriculture, or other uses for which successful restoration to near original conditions is considered possible and which, if restored, are likely to contribute substantially to the protection of representative genetic and habitat diversity in the biogeographic province. (NOTE: The MAB guidelines provide for selection of separate biosphere reserves in modified or degraded landscapes. In the United States, we are recommending that these areas be incorporated into multiple-site designations to encourage coordination of research and related activities within the biogeographic province and to reduce proliferation and in the number of U.S. reserves.)

In order to preclude linkage of large numbers of marginally qualified areas to form multiple-site biosphere reserves and to ensure that biosphere reserve designation retains its unique identity among protected site categories currently in use, the number of separate sites linked together into a single reserve should be held to the minimum required to include representative diversity at the ecosystem level. Nomination of one or more sites for addition to an existing biosphere reserve may be made upon recommendation of an ad hoc committee or upon review of nomination forms submitted by the site manager to the MAB Directorate on Biosphere Reserves.

3. Multiple Biosphere Reserves in the Same Biogeographic Province

In large or diverse biogeographical provinces, protecting a representative diversity of genetic resources and natural ecosystems for an entire province within a single biosphere reserve will often be impossible. In selecting biosphere reserves in such a province, the ad hoc committee should agree upon a reasonable subdivision of the province into a number of distinct ecological regions within which biosphere reserves will be selected. As a rule of thumb, a maximum of four ecological regions should be considered as the limit per province, unless exceptional size and/or diversity requires additional subdivision. In most provinces, one or two subdivisions should prove adequate. The objective should be to nominate one reserve per ecological region, either as a single integrated reserve or, through linkage, as a multiple-site reserve.

Multiple designations of separate biosphere reserves may also be used for sites administered primarily for observational or experimental research. However, every effort should be made to link these together into multiple-site reserves in order to improve the likelihood of effective coordination of research and educational programs.

MANAGEMENT AND USE CONSIDERATIONS

Before a site is nominated by the United States National Committee for MAB, reasonable assurance must be established that the responsible agency, institution, or landowner intends to manage the site in a manner which fulfills the objectives of a biosphere reserve. An intent must exist to make the site available for research and related educational activities and to ensure the compatibility of other permitted uses with these activities. This requirement does not necessarily entail constraint or prohibition of pre-existent mining, grazing, timber management, agriculture, or other economic uses where a legal basis or commitment exists for such uses. However, such uses should be provided within the context of a program of scientific studies developed to improve our knowledge of the effects of land-use management or restoration practices, as well as the effectiveness of alternative ways to enhance the compatibility of these practices while maintaining the health of natural and managed ecosystems. Nomination of a biosphere reserve, therefore, should be viewed not as a roadblock to use of natural resources but as an opportunity to enhance the long-term societal benefits of physical, ecological, and genetic resources through coordinated programs of research.

General Management Responsibilities

Although their existing legal authorities may give site administrator(s) considerable latitude in managing a biosphere reserve, this flexibility should be exercised judiciously to further the purpose of the reserve. Hence, before the U.S. National Committee nominates a site for MAB designation, the National Committee will request written concurrence in the nomination from the responsible management entity or entities. The administrator(s) will be requested to agree to pursue the following general goals:

- o to encourage multidisciplinary scientific studies leading to improved understanding, management and use of natural and managed ecosystems;
- o to coordinate systematic planning for establishing the strategy for managing the area and for encouraging scientific, educational, and resource management activities;
- o to avoid undertaking or authorizing actions that would significantly impair the value of the reserve for research and educational purposes.

Additionally, more specific requests may occasionally be made on the basis of recommendations from the US-MAB Directorate on Biosphere Reserves. For example, in biosphere reserves a protected area is delineated for long-term, baseline, observational monitoring and research, within which management must be compatible with ensuring the integrity of the research site. This area, called the core zone (UNESCO, 1974), should be delineated as a part of all United States reserves. If there is a reasonable doubt as to the managing entity's capability or willingness to protect an area which appears suitable for delineation as a core zone, a commitment to do so could be specifically solicited as a precondition for nomination.

Nomination requires the voluntary concurrence of the site administrator(s). Upon receiving written concurrence in the nomination and in the general goals

from the responsible managing official, the Chairman of the U.S. National Committee transmits the nomination to the International Coordinating Council for the Programme on Man and the Biosphere, which makes the decision on designation.

In planning for the management and use of a biosphere reserve, MAB guidelines (1974) recommend subdivision of the reserve into core and buffer zones, which describe the types and levels of uses and activities within the reserve.

A core zone is a conservation area providing sites for nonmanipulative research in protected natural ecosystems and is located as far as possible from major urban, industrial, and agricultural centers to reduce the impacts of external human influences to the lowest levels achievable. It normally consists of one or more watersheds or another ecologically delineated areas of sufficient size suitable for long-term baseline study of the interacting living and nonliving components of the biome.

The core zone is a control area, providing for the inventory of physical and biological resources, monitoring of natural processes and ecosystem changes, and long-term ecological research. Uses that disturb natural vegetation or the integrity of the land surface are not allowed, except for small-scale uses requiring very limited site disturbance that are compatible with protecting the scientific and educational value of the zone. Access roads and trails, monitoring stations, field and laboratory research facilities, and associated development should have minimal impact on natural systems. Wherever possible, these uses are located outside the core zone. Public recreational use of the core zone is limited to very low intensity activities, primarily of an interpretative or educational nature, which are managed so as not to impair the research value of the area.

In national parks, national wildlife refuges, university research stations and other protected natural areas designated in their entirety as biosphere reserves, the core zone represents that portion of the protected area that is being managed to provide for observational, long-term scientific study and related educational programs. Also, within this zone, other uses are either being prohibited or strictly controlled in accordance with the ecological carrying capacity and/or scientific program objectives for the zone.

A core zone should be delineated in each biosphere reserve. In multiple-site reserves, a core zone is delineated in each unit, except in cases where a geographically separate experimental area is closely related ecologically and programmatically with an observational core zone area. A core zone, therefore, would be unnecessary in the experimental area. (However, as most experimental areas contain observational control sites, most should have areas suitable for core zone delineation.)

Buffer zones typically adjoin or surround core zones. Here uses and activities are being controlled appropriately to protect the integrity of the core zone from human influences occurring outside the core zones, as well as to make available sites for problem-oriented manipulative research, which often complements observational studies in the core zone. The size of buffer zones depends upon the acreage available, the requirements for protecting core-zone genetic resources and habitats, and the reserve's science program objectives.

The types and levels of land uses and human activities in buffer zones vary depending on the buffer zone's purpose, resource capabilities, land-use history, and relationship with the core zone. As a general rule, buffer zones:

1. provide opportunities for manipulative scientific studies, including studies to support restoration of disturbed ecosystems, as well as related demonstration projects;
2. supply habitat for wildlife utilizing areas outside the core zone for part of their life cycles. Particular emphasis is placed on maintaining the integrity of populations of rare, endemic, threatened and endangered species;
3. furnish opportunities for educational and training activities relating to the purpose of the reserve;
4. remain free of human uses and activities threatening the integrity of the core zone; and
5. contain a sufficiently large area to ensure long-term protection of the core zone from the adverse effects of land-use changes occurring in the surrounding area.

Buffer zones may include multiple-use management programs provided that the uses further the research program objectives of the reserve and do not have significant impacts on the integrity of the core zone.

The core and buffer zones are descriptive of existing management and use of the delineated areas at the time of nomination as a biosphere reserve. They do not prescribe future use and management, which are the responsibility of the reserve administrator(s). The reserve administrator(s) is (are) encouraged to prepare a management and use plan to achieve the purposes of the biosphere reserve as soon as possible following designation, either through incorporation into normal planning procedures or as a separate planning effort.

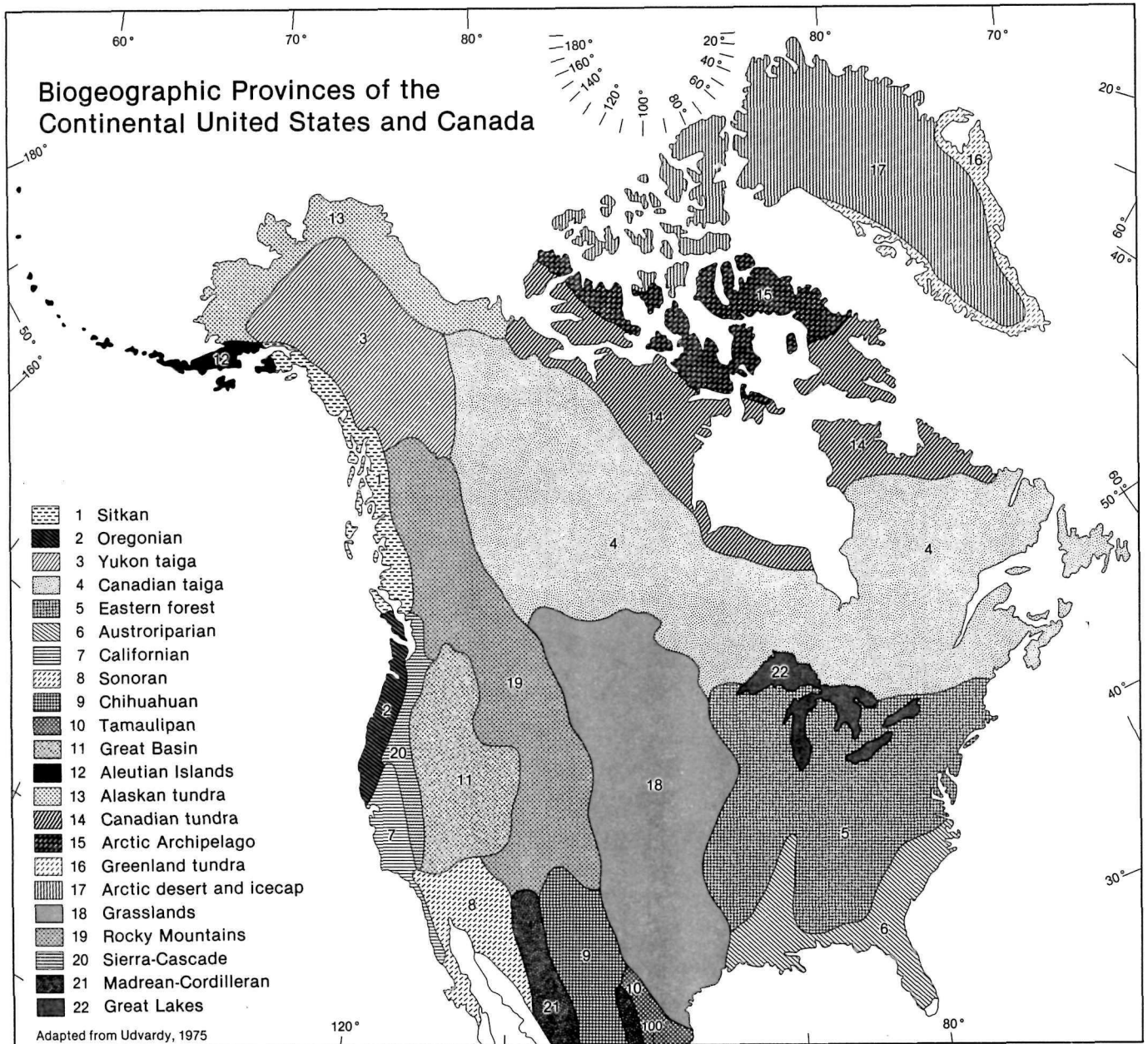
LITERATURE CITED

- Anderson, James R., E. Hardy, J. Roach, and R. Witmer. 1976. A land use and land cover classification system for use with remote sensor data. Geological Survey Paper 964. U.S. Government Printing Office, Washington, D.C.
- Eyre, F.H. (ed.) 1980. Forest cover types of the United States and Canada. Society of American Foresters, Washington, D.C.
- Ray, G. Carleton, et al. 1981. Interim guidelines for identification and selection of coastal biosphere reserves. U.S. Man and the Biosphere Program, Department of State, Washington, D.C. 34p.
- Risser, P., and K. Cornelison. 1979. Guidelines and key for the selection of biosphere reserves. MAB Publication No. 1. U.S. Man and the Biosphere, U.S. Department of State, Washington, D.C.
- Udvardy, Miklos D.F. 1975. A classification of the biogeographic provinces of the world. International Union for Conservation of Nature and Natural Resources. Occasional Paper No. 18. Morges, Switzerland.
- United Nations Educational, Scientific, and Cultural Organization. 1974. Criteria and guidelines for the choice and establishment of biosphere reserves. MAB Report Series No. 22. UNESCO, 7 Place de Fontenoy, Paris, France.
- _____. 1974. Identification and selection of coastal biosphere reserves. report to the directorate on biosphere reserves. U.S. Man and the Biosphere Program, U.S. Department of State, Washington, D.C.
- United States Department of Agriculture, Soil Conservation Service. 1975. Soil taxonomy: a basic system of soil classification for making and interpreting soil surveys. Agricultural Handbook No. 436. U.S. Government Printing Office, Washington, D.C.

APPENDICES

APPENDIX A

MAP OF BIOGEOGRAPHIC PROVINCES REPRESENTED
IN NORTH AMERICA
(Adapted from Udvardy, 1975)



APPENDIX B

SITE-RATING FORM FOR BIOSPHERE RESERVE NOMINATION

NAME OF SITE(S): _____

INDIVIDUAL EVALUATION: _____ PANEL EVALUATION: _____

Criterion	Weighting Factor	Rating ¹	Score ²
<u>Representativeness and Diversity</u>	10		
<u>Effectiveness as a Conservation Unit</u>	3		
<u>Naturalness</u>	3		
<u>Educational/Research Value</u>	2		
<u>Uniqueness</u>	2		
TOTAL SCORE:			

¹ 5-point scale.

² Score is product of weighting factor and rating; maximum possible score is 100.

APPENDIX C

BIOSPHERE RESERVE NOMINATION FORM (UNESCO, JANUARY, 1980)

1. This form is to be used by MAB National Committees to nominate natural sites in their countries for inclusion in the international network of biosphere reserves.
2. The information presented on the nomination form will be used in a number of ways by MAB:
 - a. for evaluation of the site by the MAB Bureau;
 - b. for the exchange of information about biosphere reserves among those interested in the MAB Program throughout the world; and
 - c. for the computerized data base on biosphere reserves within the MAB Information System.
3. It will help the secretariat greatly if the facts noted on the form are concise and accurate. Please be careful to follow the instructions provided as closely as possible. All the information requested is necessary for the MAB Bureau to evaluate a proposed biosphere reserve. If the form is incomplete, there may be unnecessary delays.
4. You are requested not to exceed the space provided for each item. Any additional information is welcome but should be submitted as appendices. This procedure will enable the secretariat to deal with nominations rapidly and efficiently.
5. The form completed in English, French, or Spanish should be sent in three copies with one copy of supporting documents to:

The MAB Secretariat
Division of Ecological Sciences
UNESCO
place de Fontenoy
75700 Paris
France

COUNTRY

OFFICIAL NAME OF THE RESERVE

APPROVAL BY MAB BUREAU
(to be filled in by MAB Secretariat)

GEOGRAPHICAL LOCATION

(a) Geographical coordinates of latitude and longitude (mid-point)

.....0.....;0.....;

(b) Description (not more than 10 lines) of location in relation to main town, rivers, mountain ranges, boundaries of administrative divisions. Maps should be appended showing the position in the country and the geography of the proposed reserve.

(c) Biogeographical province(s) (to be filled in by MAB Secretariat)

ALTITUDE

Lowest altitude above sea level in m _____
Highest altitude above sea level in m _____

AREA

Total area in ha _____
Core zone in ha _____

LEGAL PROTECTION

- (a) Title and date of legislation and decrees protecting the area (not more than 10 lines). Attach if possible the legal text.

- (b) Legal status (circle appropriate category)

Strict nature reserve
National park
Resource reserve (e.g., forest service)
Experimental/scientific reserve
Historical/archaeological/anthropological reserve
Protected landscape
World heritage site

LAND TENURE

- (a) Ownership (circle appropriate category)

Country
Province/state
Local community
Private
International

- (b) Give further explanation (up to 5 lines) if needed; e.g., how many hectares are owned by the various categories.

PHYSICAL FEATURES

- (a) Brief description (10 lines) of the geology and physiography, mentioning any special features.

- (b) Mean annual temperature _____ C^o
recorded at an altitude of _____ m
- (c) Mean annual precipitation _____ mm
recorded at an altitude of _____ m

VEGETATION

Brief description (10 lines) of the principal types of vegetation; biogeographical affinities of the flora; number of species; names of characteristic, unusual, and endangered species by their Latin names; special features.

FAUNA

Give similar information as for flora.

Is there a list of species available for the reserve? yes ___ no ___ (You may wish to append such a list.)

ZONING

Brief description (no more than 10 lines) of zonation: core areas, buffer zones or other zoning, activities that are permitted or prohibited, and estimated site of the various zones in ha. Attach map showing zonation, if possible.

MANAGEMENT PLAN

- (a) Is there a management plan? yes ___ no ___
- (b) If yes, brief description (up to 10 lines) of the kind of management plan. Attach copy if possible.

MODIFICATION BY MAN

- (a) Brief account (10 lines) on extent and kind of human modification to which the area has been subjected; notes on presence of "natural" ecosystems; present human population and settlements; other signs of human activity.

- (b) Major land use/human impact (circle appropriate items)

Agriculture
Forestry
Grazing
Tourism/recreation
Engineering/industry
Human settlements within the reserve
Presence of major road/railways

SCIENTIFIC RESEARCH

- (a) Brief description (10 lines) of past, present, and proposed research in the reserve; potential role of the area in an international research program; ease of access to the area.

- (b) Existence of facilities for scientific research (circle appropriate item and indicate numbers).

Research station ____
Field station(s) ____
Experimental plots ____
Climatic station(s) ____
Accommodation for scientists ____

ENVIRONMENTAL MONITORING ACTIVITIES

- (a) If there are monitoring activities, give brief description.

- (b) Monitoring of particular features (circle appropriate item)

Climate
Vegetation
Soils
Hydrology
Plant populations
Animal populations
Harvesting
Pollution

ENVIRONMENTAL EDUCATION/TRAINING ACTIVITIES

- (a) If there are such activities in the reserve, please specify the kind of activities and logistic facilities for them (up to 10 lines).

- (b) Does the local population participate in management decisions for the reserve? yes ___ no ___

If yes, describe (up to 10 lines) the kind of participation.

PRINCIPAL REFERENCE MATERIALS

List only most useful literature of scientific and general nature, indicate author, year of publication, exact title, and publishing house. Up to 10 titles. You may wish to append one or two key publications.

STAFF

Indicate separately (a) total staff of the reserve; (b) staff for administration and control; and (c) number of researchers and their qualifications.

- (a) The reserve has a total staff of _____.
- (b) Staff for administration, control, and resource management:
(1) university-trained _____
(2) other staff _____
- (c) Staff for research:
(1) Ph.D. _____
(2) other university-trained staff _____
(3) technical personnel for research _____

EXACT MAILING ADDRESS OF LOCAL ADMINISTRATION OF THE RESERVE

Name of Local Administration _____

Street _____

Post Code and Town _____

Country _____

SIGNED (ON BEHALF OF THE MAB NATIONAL COMMITTEE)

Full Name _____

Title _____

Date _____

