BIOSPHERE RESERVES: EXPANDING THE FUNCTIONAL AREA FOR CONSERVATION THROUGH COOPERATION

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Increasing the functional area for conservation beyond the boundaries of protected natural area requires a broad constituency for scientific information. The biosphere reserve concept is facilitating cooperative development of information programs in biogeocultural regions of exceptional importance for conservation. Agencies, private institutions, and nongovernmental organizations are developing various models for cooperation. Brief histories and status reports illustrate how biosphere reserve concepts have influenced cooperation in 13 biogeocultural areas. The examples include informal cooperation on specific projects (Chihuanhan Desert, Sonoran Desert, Crown of the Continent Area); ad hoc regional cooperation to support nomination of new biosphere reserves (Ozark Highlands) or to plan and implement focused biosphere reserve programs involving designated sites (Mammoth Cave Area, Land Between The Lakes Area, Champlain-Adirondack Area, Virgin Islands); ad hoc regional cooperation contributing to the biosphere reserve-related functions of designated sites but not explicitly focused on developing biosphere reserve programs (Yellowstone, Colorado Rockies, Virginia Coast), and permanent organizations involving government and private entities working together to implement biosphere reserve goals (Southern Appalachians, Central California Coast). U.S. biosphere reserves are categorized according to the biosphere reserve functions they implement. The discussion explores how consolidation and expansion of existing biosphere reserves can strengthen constituencies for developing information needed to conserve biological diversity.

To: Bill G-
This
Looks fine.
Mike
6/16

To: Mike R.
6-8-92
Proposed talk
for Nat. Areas
assoc. in
Oct. – Could
you "quick
review" it.
Thanks. Bill

OUTLINE

Biosphere Reserve Concept
(Framework for generating, sharing, applying scientific information to address interrelated environmental, land use, and socioeconomic problems affecting conservation of biological diversity in particular biogeocultural region)

Biogeocultural Region Concept
(Spatial framework for understanding interactions among natural and human systems at a scale relevant for management of biological diversity

Categories of U.S. Sites Designated as Biosphere Reserves
Protected Natural Areas
Research Reserves
Biosphere Reserve Cluster
Multi-site Biosphere Reserve
Regional Biosphere Reserve

Models for Cooperation in U.S. Biosphere Reserves
Project-oriented Cooperation
Nomination-oriented Cooperation
Ad-hoc Cooperation Focused on Implementing Identified Biosphere Reserve Goals
Ad-hoc Cooperation Contributing to General Biosphere Reserve Functions
Permanent Cooperative Organizations

Discussion
(Focused on benefits of expansion of biosphere reserves; integration/consolidation of biosphere reserves; role of BR concept and sites in promoting and stabilizing cooperation)

Conclusion

BIOSPHERE RESERVES: EXPANDING THE FUNCTIONAL AREA FOR CONSERVATION THROUGH COOPERATION

Natural area managers face two overriding challenges in sustaining natural processes and biological diversity. The first is to minimize the direct effects of human disturbance within the boundary of the management unit. The second is to minimize the indirect effects of human activities in the surrounding region and beyond. Scientific methods, management practices, and legal tools are widely available for meeting the first challenge. We have much less experience in addressing the second, which requires us to consider the larger ecological, social, economic, and cultural environment in which natural areas exist.

MAB MISSION

The international network of biosphere reserves is a project of UNESCO's Man and the Biosphere Program (MAB). UNESCO launched MAB in 1971 to facilitate the cooperation of science and society in building harmonious relationships between people and the environment.

BIOSPHERE RESERVE MISSION

Conservation of natural areas was one of MAB's 13 original themes. A key component was the establishment of an international network of biosphere reserves to improve the scientific basis for ecosystem conservation and demonstrating harmonious relationships between people and Nature.

In achieving this mission, biosphere reserves pursue three roles:

BIOSPHERE RESERVE ROLES

The Conservation Role focuses on conservation of ecosystems and their biological diversity in large landscape units that are representative of a terrestrial or coastal/marine biogeographical province.

The Development Role (Sustainable Use Role) focuses on developing a model for demonstrating sustainable ecosystem uses through participatory approaches that include local people.

The Logistic Role focuses on facilitating long-term monitoring, research, education, and demonstration activities; and on sharing information regionally and internationally.

UNESCO designation of a biosphere reserve represents an invitation to implement theses roles in a particular region.

BIOSPHERE RESERVE ZONATION

UNESCO uses a flexible zonation to describe the contributions of particular lands and waters in a biosphere reserve.

A **Core Area** is a strictly protected, legally delineated terrestrial natural area or carefully regulated marine area, suitable for baseline study, and large enough and configured appropriately to maintain ecosystem processes and natural biological diversity. Every biosphere reserve has at least one core area. Federal and state wilderness areas, marine sanctuaries, nature reserves, and research natural areas are typical examples.

A **Buffer Zone** is a legally delineated area, usually adjoining or surrounding the core area(s), that is managed in ways compatible with conserving natural ecosystem processes and biological diversity(s). In the U.S., these areas are usually called **Areas of Managed Use.** The term "buffer zone" implies management restrictions that are inconsistent with the principle that biosphere reserve designation does not infringe on the management prerogatives of designated areas. These areas may include experimental research areas, multiple use areas, state and regional planning districts, traditional use areas, and areas for environmental education and resource-oriented public recreation.

A **Transition Area**, or Area of Cooperation, is typically an undelineated area where the information and management practices developed in the other zones are creatively applied to help address regional problems and the needs of local people. The dimensions of areas of cooperation may vary considerably in space and time depending on the cooperative activities taking place.

Management units can contribute as designated core areas or zones of managed use, or as program partners in the Area of Cooperation. The flexible interplay between program participation and designation is unique process that helps assure continuity in cooperative programs through international recognition of the roles of their participants.

BIOGEOCULTURAL REGION DEFINITION

The potential outer limits of a biosphere reserve's Area of Cooperation roughly correspond to a **biogeocultural region.** This is a geographic area distinguishable in terms of its physiography, climate, natural processes, vegetation, characteristic species, human populations, cultural values, the characteristic types and patterns of resource uses, and institutional relationships. It is also a region where inhabitants have a strong sense of place based on longstanding relationships with its ecosystems. A biogeocultural region provides the geographical framework for involving agencies, organizations, and local people in developing and sharing information and experience relevant to managing ecosystems and species. Recent biosphere reserves are usually named after their biogeocultural region, such as the Southern Appalachians or Central California Coast, to encourage broad participation in developing biosphere reserve programs.

HYPOTHETICAL BIOSPHERE RESERVE

This is a hypothetical configuration of biosphere reserve zonation categories. The configuration is dynamic, and changes as the biosphere reserve program develops and the number, spatial dimensions, and roles of the participating areas change.

NORTH AMERICAN MAP

The foremost early goal of the U.S. Biosphere Reserve Program -- to establish biosphere reserves within each biogeographical province --is now within sight of being accomplished. By the end of 1992, the U.S. had 47 biosphere reserves in a global network of 300 biosphere reserves in 75 countries. Our biosphere reserves represent all North American biomes, as well as 20 of the 23 terrestrial biogeographical provinces represented in the U.S. and its territories.

BIOME SLIDE

Biosphere reserves are especially well represented in the Rocky Mountains, the humid subtropical mixed forests of the Southeast, the Pacific Northwest rainforests, the Mediterranean forests and chaparral of California, the broadleaf forests of the Appalachians and the interior plateaus, and Southwestern warm deserts.

SIZE DISTRIBUTION

Nearly half (46%) of the U.S. biosphere reserves are larger than 100,000 hectares, but only seven approach regional scale (larger than 1,000,000 hectares).

DISTRIBUTION BY ADMINISTRATOR

Of the 96 management units in the U.S. network, 65% are administered by Federal agencies, 19% by state agencies, 2% by local government, 10% by private organizations, and 4% by multiple owners. Individual biosphere reserves contain as many as 14 cooperating units.

The National Park Service administers the largest number of units -- 30, followed by the Forest Service (16), the State of California (10), and NOAA (6). There has been a trend toward greater state participation. Nine of the 12 biosphere reserves designated since 1982 include one or more state-administered units; prior to 1983, there was no state participation. The U.S. also has the largest number of coastal and marine biosphere reserves. About a third of U.S. biosphere reserves include coastal or marine ecosystems.

Our network is diverse in terms of the objectives of its designated management units and how they relate to the biosphere reserve roles. We can recognize five categories, each offering somewhat different opportunities for building programs to support ecosystem conservation.

PROTECTED NATURAL AREAS

I. Protected Natural Areas (32% of U.S. biosphere reserves) are managed for strictly for nature conservation, and are designated wholly or primarily as core areas. Most were included in the original U.S. designations in 1976. They are usually large areas of global significance in ecosystem conservation. Most are named after the management units and have the same boundaries.

Biosphere reserve status has helped some of these units justify research and cooperation with neighboring management units to address shared problems. For example, six of these biosphere reserves are participating in the National Park Service's global change research program, which emphasizes use of biosphere reserves as core research areas. At Yellowstone National Park, the biosphere reserve concept influenced ongoing efforts to demonstrate cooperative management involving the park (the only designated biosphere reserve unit) and neighboring management jurisdictions.

Some protected areas identify strongly with biosphere reserve concepts and are implementing biosphere reserve programs.
The program at Virgin Islands National Park focuses on cooperative monitoring and research on coral reefs and dry tropical forests, training of for research and resource management specialists in the eastern Caribbean, and public education on regional issues. Much of this work has been accomplished through an organization of regional agencies and organizations, patterned on MAB concepts. The park has a dedicated biosphere reserve center that supports its program.

Organ Pipe Cactus National Monument also has a dedicated biosphere reserve center, and a biosphere reserve program focused on regional issues, such as the effects of agricultural development in Mexico on groundwater and wildlife. The ongoing general management planning process is using biosphere reserve concepts to help plan the park's future role in the western Sonoran Desert Region. Developing and sharing information to enable the NPS and other stakeholders in ecosystem conservation to respond effectively to the effects of North American Free Trade Agreement is an important consideration. Last week, the Sonoran Institute sponsored a regional forum involving representatives from U.S. and Mexican agencies, and the Tohono O'oodham Nation. There was broad consensus on the need for a regional approach in improving multi-cultural communication and information sharing, and interest in exploring the potential benefits of biosphere reserves. The potentially imminent establishment of a large biosphere reserve adjacent to the Monument in Sonora's Gran Desierto, together with expanded participation of land managers in the U.S., could eventually create a biosphere reserve zone of cooperation covering more than 10% of the Sonoran Desert.

RESEARCH RESERVES

II. Research Reserves (23%) are managed for manipulative research. They are essential in implementing the scientific and demonstration

roles of biosphere reserves. They facilitate research to develop multiple ecosystem uses in ways that sustain natural processes and biological diversity. They also facilitate comparative regional and international studies of the effects of regional (e.g., acidic deposition) and global influences (e.g., the greenhouse effect) on natural and managed ecosystems. Some are important field stations for providing reliable data for modeling regional and global change. The sites in this category are mostly experimental forests and ranges administered by the U.S. Department of Agriculture. The National Science Foundation has designated many as Long-term Ecological Research Sites.

The core areas in research reserves are usually small and play a minor role in in situ conservation. For this reason, research reserves are frequently linked with other management units in new biosphere reserve combinations.

Most research reserves do not distinguish biosphere reserve activities in their programs. However, some are participating in cooperative programs sponsored by MAB. For example, the Hubbard Brook and Coweeta Biosphere Reserves are actively exchanging data with ecologically similar biosphere reserves in the former Soviet Union from comparative studies of ecosystem processes, pollutants, and biodiversity in small watersheds.

BIOSPHERE RESERVE CLUSTER

III. A **Biosphere Reserve Cluster (15%)** is an association of separately designated biosphere reserves in the same province or biogeocultural region that cooperate in implementing biosphere reserve roles. Cooperation is usually ad hoc and focused on specific programs or projects. Most clusters generally include Protected Natural Areas and Research Reserves that were nominally paired in the initial U.S. biosphere reserve nominations in 1976.

CHIHUAHUAN DESERT BIOSPHERE RESERVES

The three biosphere reserves in the Chihuahuan Desert have been cooperating informally for several years. Cooperation has resulted in a proposal to test range management techniques developed at the Jornada Experimental Range in ecosystem restoration at Big Bend National Park. Another proposal involves the experimental restoration of the endangered Bolson tortoise in the Big Bend ecosystem, using a founder population from the Mapimi Biosphere Reserve which supports the only remaining natural population of the subspecies.

COLORADO ROCKIES BIOSPHERE RESERVE

Several years ago, agencies and organizations in the Colorado Rockies began informal discussions on improving regional cooperation involving several biosphere reserves in the biogeocultural region. The discussions led to a cooperative demonstration project to share basic information on wildfire,

wildlife management, and other issues. A memorandum of understanding, signed so far by 12 entities, encourages development and sharing of information on natural resource issues. A steering committee is assessing the feasibility of establishing a regional cooperative. As part of this effort, the Committee is identifying regional issues relating to biodiversity, resource management, and the human-wildland interface. The Committee has prepared a conceptual delineation of biosphere reserve zones as an aid in identifying and prioritizing issues in the biogeocultural region.

CROWN OF THE CONTINENT BIOSPHERE RESERVE

The Crown of the Continent biogeocultural area has three biosphere reserves: Glacier National Park and the Coram Experimental Forest, and the Waterton Lakes National Park in Canada. Glacier and Waterton cooperation regularly on research, management, and public education programs. A biosphere reserve management committee, chaired by a local rancher, facilitates cooperation between the national park and the ranching community, primarily on wildlife and range management issues. During the past decade, there has been extensive scientific cooperation in the Upper Flathead River Basin, focused on assessing the potential effects of a proposal to developing the Basin's coal deposits. The Basin includes the parts of the park, adjacent national forests, and extensive crown lands in British Columbia. Although the proposed mine is no longer an active proposal, there remains much interest developing a model plan for sustainable development that conserves the region's outstanding natural resources. Discussions continue on the possible role of biosphere reserves in facilitating this process.

MULTI-SITE SLIDE

IV. A **Multi-site Biosphere Reserve (17%)** contains two or more complementary management units designated together as a single biosphere reserve in the same biogeocultural region. This approach encourage voluntary cooperation by linking the complementary units in the same biosphere reserve. Most were designated before UNESCO began to consider coordinating mechanism in decisions on designations, and most sites have yet to develop such mechanisms. The development of such mechanisms could strengthen the scientific basis for conservation in some particularly diverse regions, such as the Channel Islands, Hawaiian Islands, and California Deserts. In a few of these biosphere reserves, some of the ecologically complementary sites are so far apart that cooperation is logistically difficult.

REGIONAL BIOSPHERE RESERVE SLIDE

V. A **Regional Biosphere Reserve (13%)** is an association of management units, designated as a single biosphere reserve. The units participate in an organized, cooperative program involving multiple agencies and nongovernmental entities to implement and integrate biosphere reserve roles in their biogeocultural region.

This has been the "full development model" for U.S. biosphere reserves since the establishment of the first regional biosphere reserve was established in the Southern Appalachians in 1988. Regional biosphere reserves often involve consolidation of biosphere reserves originally designated as protected natural areas or research reserves.

HYPOTHETICAL REGIONAL BIOSPHERE RESERVE

A regional biosphere reserve may include many core areas and areas of managed use, surrounded by an open-ended area of cooperation in a biogeocultural region.

BIOSPHERE RESERVES BY CATEGORY

Although regional biosphere reserves constitute only 13% of the U.S. network, the proportion is likely to increase steadily through expansion and consolidation of reserves in the other categories.

SIZE DISTRIBUTION BY CATEGORY

Regional biosphere reserves are, on average, very large functional areas for conservation, that are likely to increase in area as programs develop and more management units opt for designation as components of the biosphere reserve.

The organization of regional biosphere reserves reflects the conditions of a particular biogeocultural region.

SAMAB REGIONAL SLIDE

The Southern Appalachian Biosphere Reserve was established in 1988 through the consolidation of a cluster biosphere reserve containing the Great Smoky Mountains National Park, the Coweeta Hydrologic Laboratory, and the Oak Ridge National Environmental Research Park. The potential zone of cooperation is the Southern Appalachians, a biological diverse and culturally cohesive region including parts of six states.

SAMAB ORGANIZATION

The organization consists of the Southern Appalachian Man and Biosphere Cooperative, established by interagency agreement to facilitate Federal and state agency participation; the SAMAB Foundation, a nonprofit organization to facilitate by private sector participation; and a proposed association of universities to facilitate the participation of the scientific and educational communities. The Coop brings together conservation, research, and economic development agencies, which cofund the coordinating office and the activities of program committees on environmental education, research, resource management, sustainable development, public involvement, and cultural resources.

SAMAB PROJECTS

During its first 3 years, SAMAB has sponsored and coordinated forums and projects relating to conservation and sustainable use of the regional ecosystems.

Regional Forums
- Annual SAMAB Conference on Regional Issues
- Air Quality Management

Ecosystem Monitoring
- Forest Health Monitoring Program

Biodiversity
- Forest Fragmentation and Neotropical Migratory Birds
- Regional Status of Brook Trout
- Gap Analysis *

Economic Development
- Ecotourism Community Pilot Program
- Economic Uses of Native Plants

Regional Geographic Information System *

Interdisciplinary Research on Landscape Dynamics (USMAB)

Public Education
- Red wolf restoration
- Dogwood anthracnose
- Backyard biosphere reserve program
- Environmental education directory and regional network

*proposed projects

CENTRAL CALIFORNIA COAST LOCATION SLIDE

Other biosphere reserves use different organizational schemes. The proposed organization for the Central California Coast Biosphere Reserve involves a nonprofit entity with a multi-sector board of trustees and secretariat, and a series of cooperating councils to facilitate participation of conservation and professional organizations, and science, education, economic development, and land management sectors in the greater San Francisco region, including the managers of the 14 participating biosphere reserve units. The Mammoth Cave Area Biosphere Reserve coordinates its biosphere reserve program through an advisory council established through a memorandum of understanding with a regional development district, which provides the Secretariat for the council. Other organizations are being developed in the Land Between the Lakes Area and the Champlain-Adirondack Biosphere Reserves.

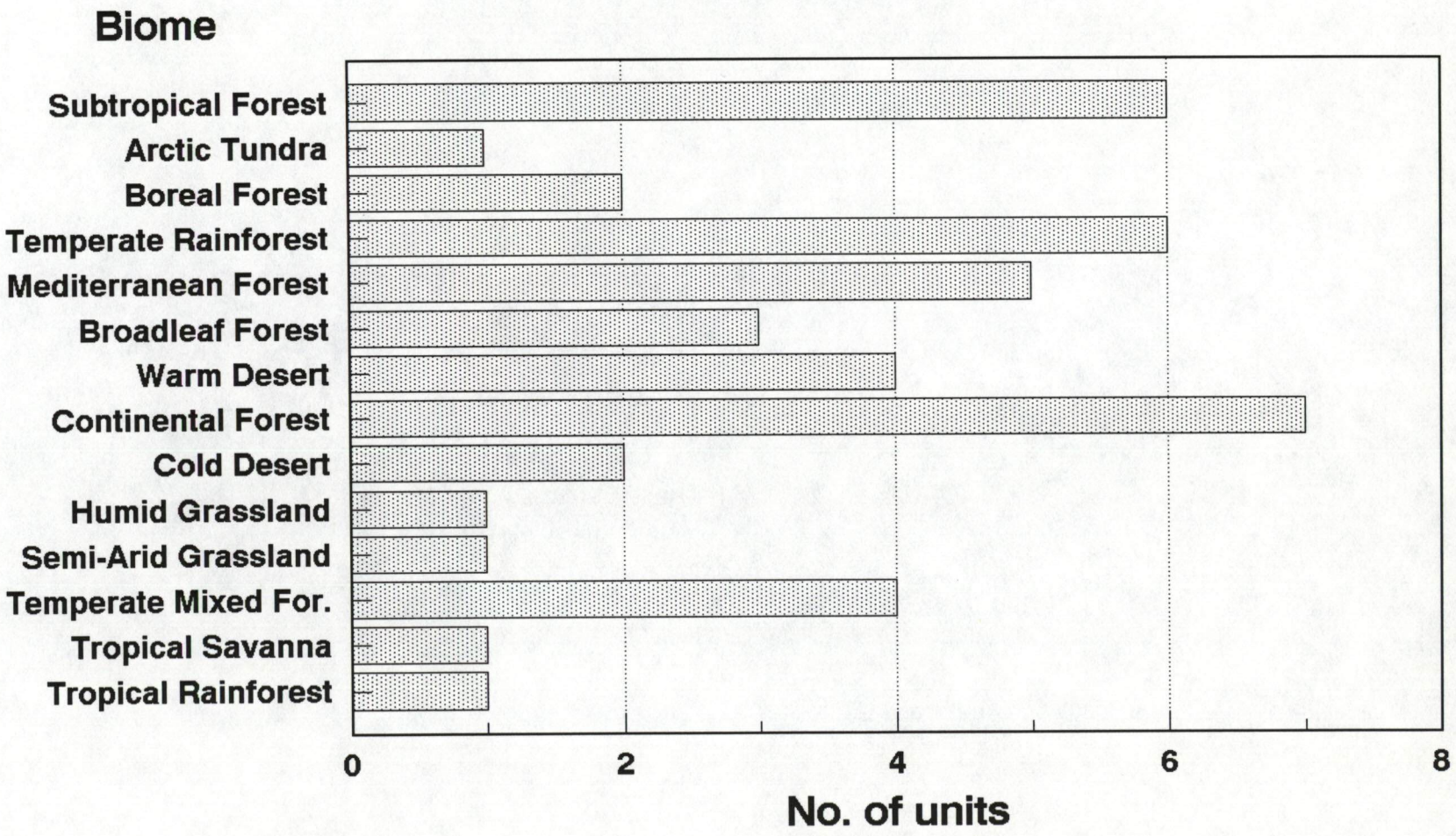
DISCUSSION

By linking areas managed for conservation, research, and multiple use objectives, biosphere reserves facilitate cooperation in developing the knowledge, skills, and attitudes required to build harmonious relationships between people and Nature.

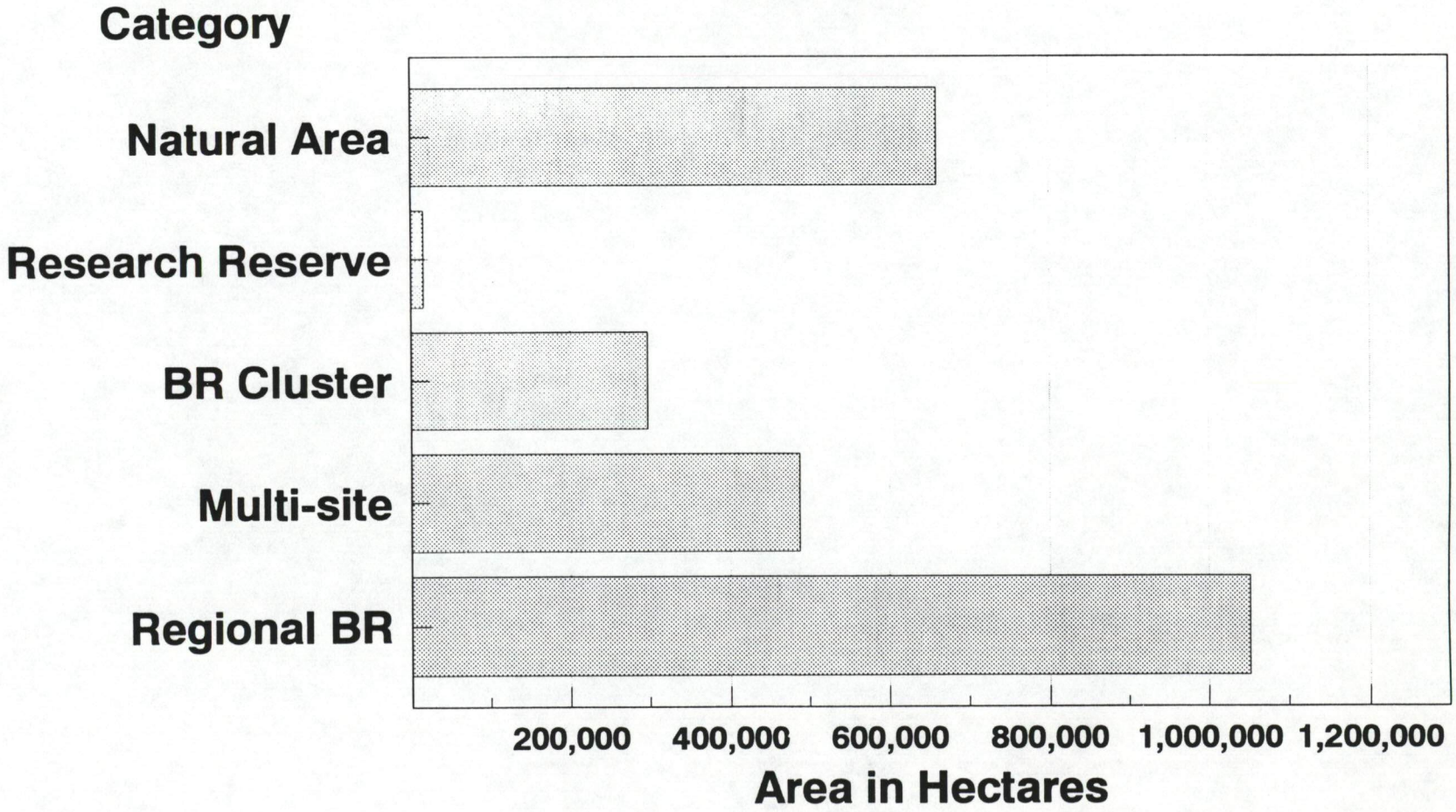
Biosphere reserves offer a conceptual framework for considering natural areas as integral parts of larger regions. They offer a practical framework for the managers of natural areas and other managed areas to work with other agencies, private entities, and local people who have useful knowledge and experience to contribute. They can increase the functional area for conservation by broadening participation in obtaining, sharing, and applying this knowledge and experience, and thus societal ownership of the information products and programs on which land use decisions are based. Finally, they offer a global network for sharing scientific information and management experience, including the experience of local people, to discover more effective ways to solve problems in particular ecosystems. This is the biosphere reserve approach for building big reserves.

U.S. BIOSPHERE RESERVES

DISTRIBUTION BY BIOME



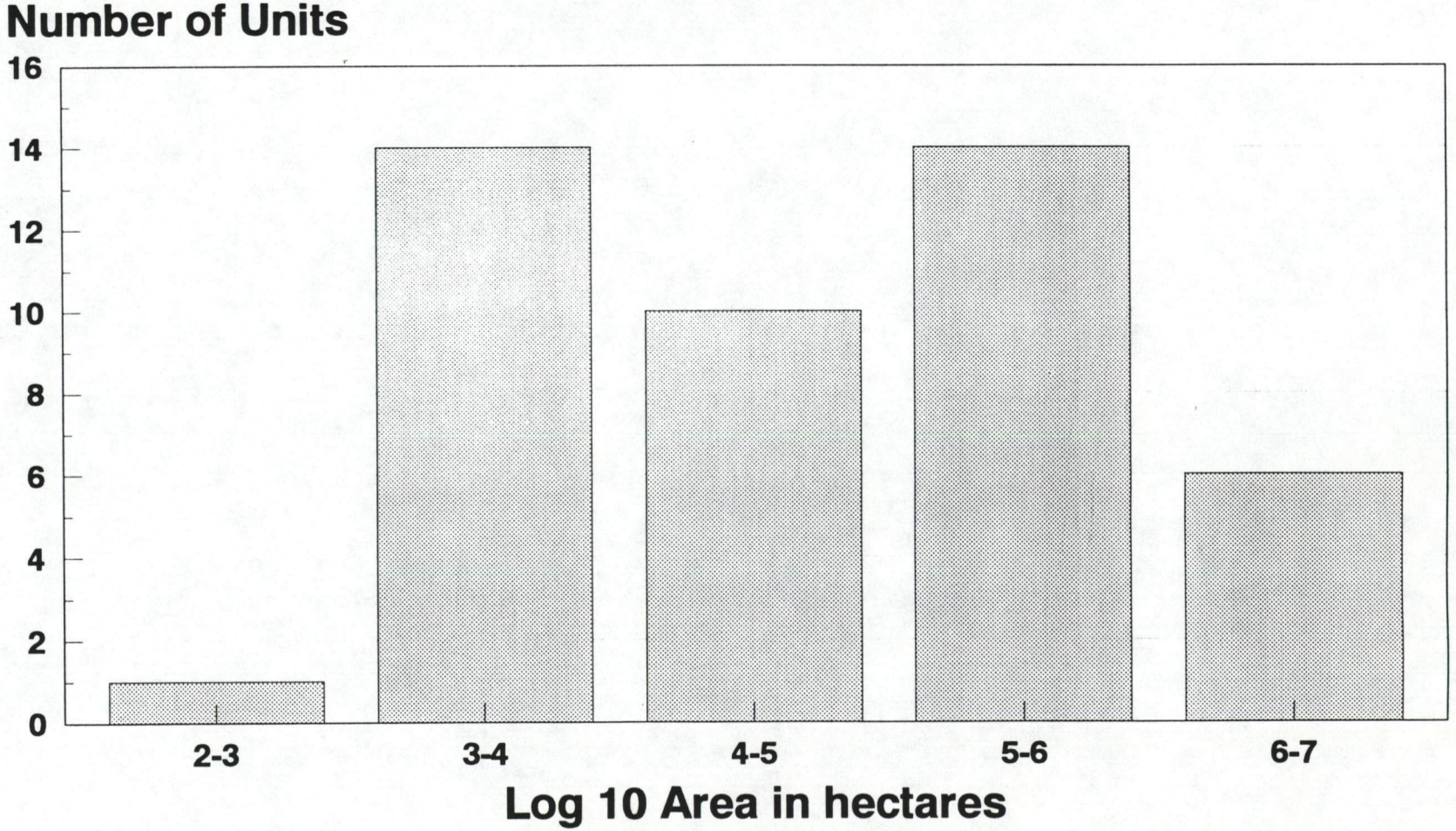
Average Size of U.S. Biosphere Reserves by Category



unit 4

U.S. BIOSPHERE RESERVES

DISTRIBUTION BY SIZE CLASS



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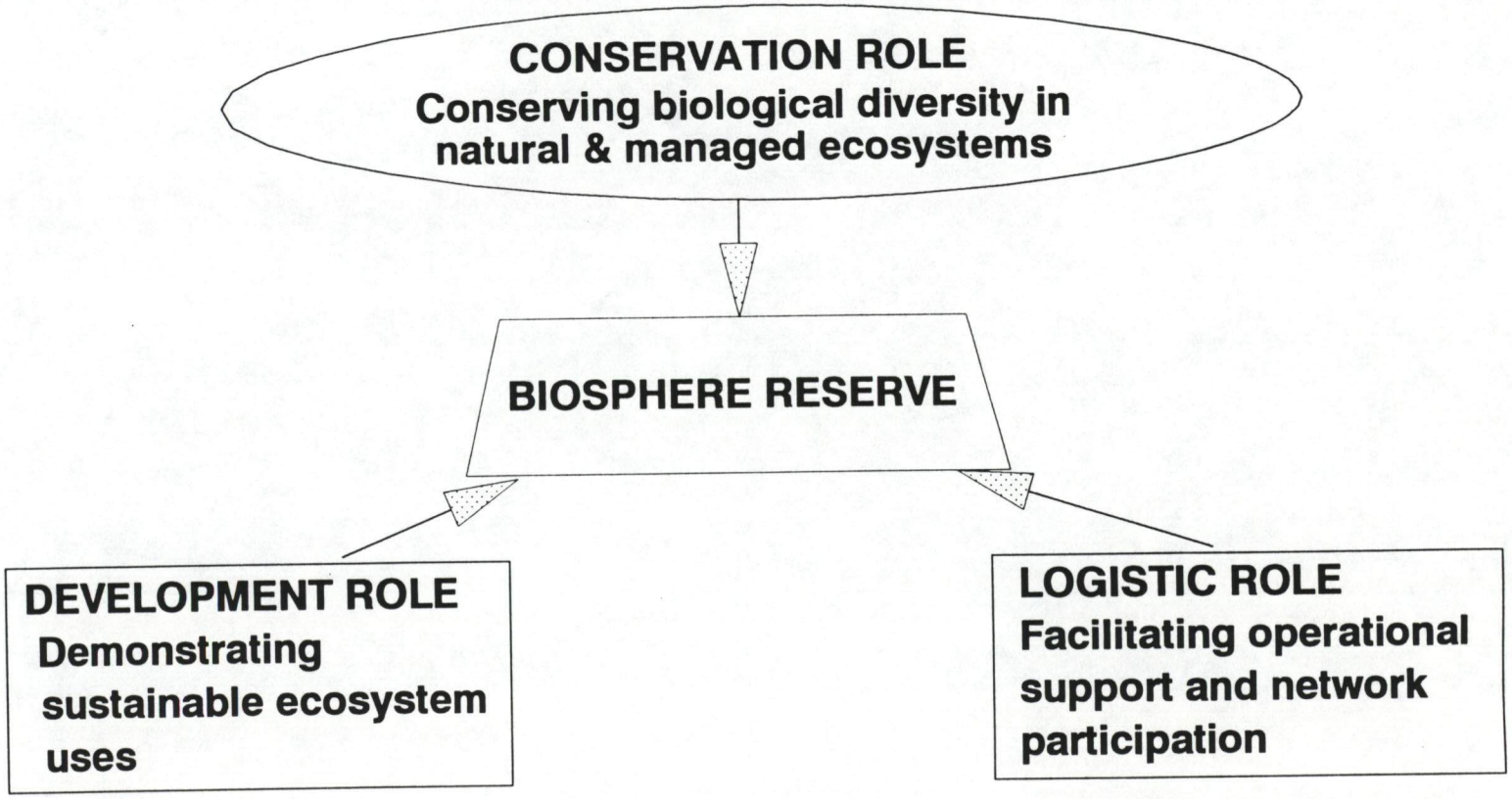
BIOSPHERE RESERVE ROLES



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U.S. BIOSPHERE RESERVES

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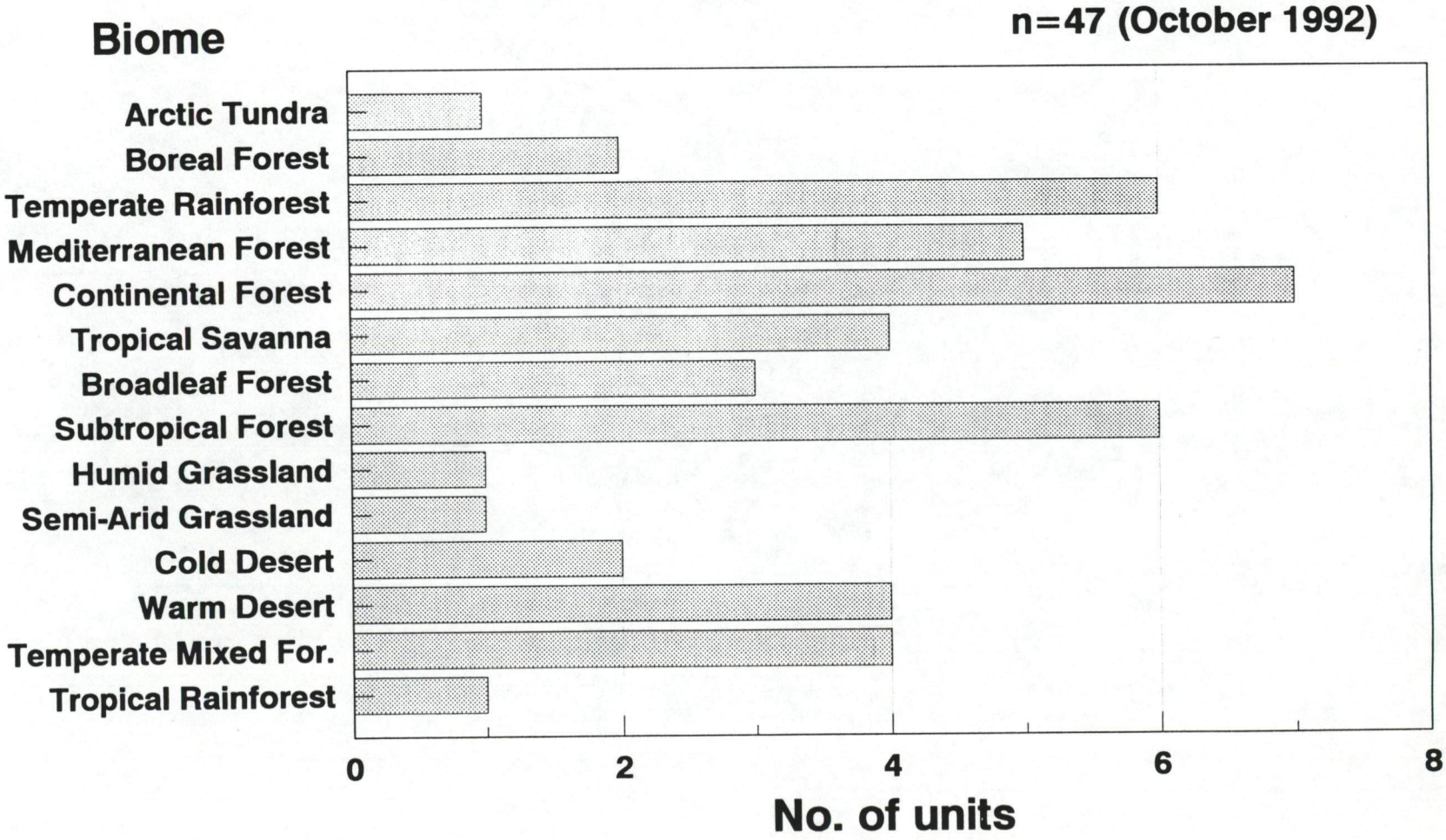


unit

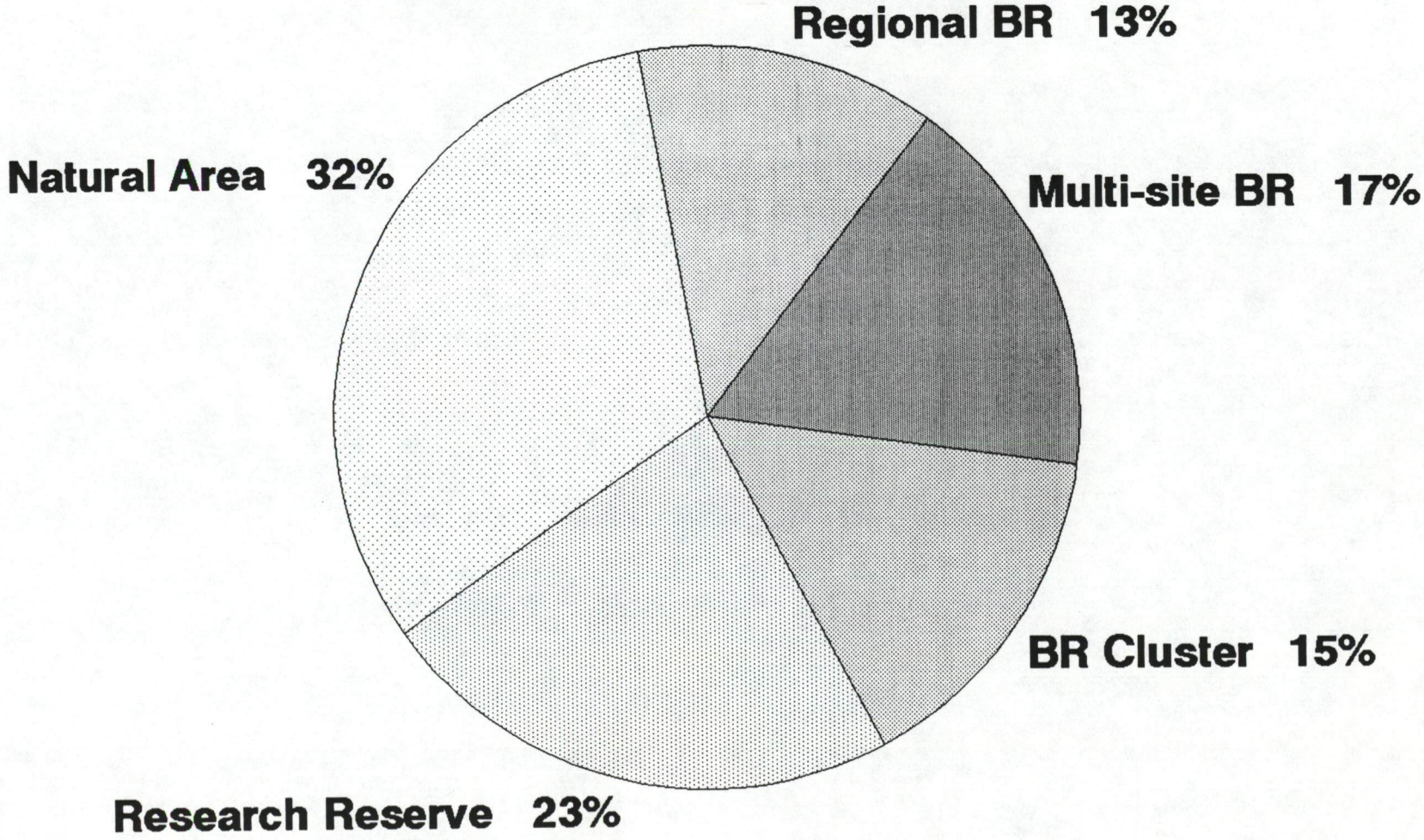
SOUTHERN APPALACHIAN BR PROJECTS

- **Regional Forums**
  - Annual SAMAB Conference on Regional Issues
  - Air Quality Management
- **Forest Health Monitoring Program**
- **Biodiversity**
  - Forest Fragmentation and Neotropical Migratory Birds
  - Regional Status of Brook Trout
  - Gap Analysis*
- **Economic Development**
  - Ecotourism Community Pilot Program
  - Economic Uses of Native Plants
- **Interdisciplinary Research on Landscape Dynamics (USMAB)**
- **Public Education**
  - Red Wolf Restoration
  - Dogwood Anthracnose
  - Backyard Biosphere Reserve Program
  - Environmental Education Directory and Regional Network
- **Regional Geographic Information System***

*proposed projects

U.S. BIOSPHERE RESERVES

BREAKDOWN BY CATEGORY



Marshall?