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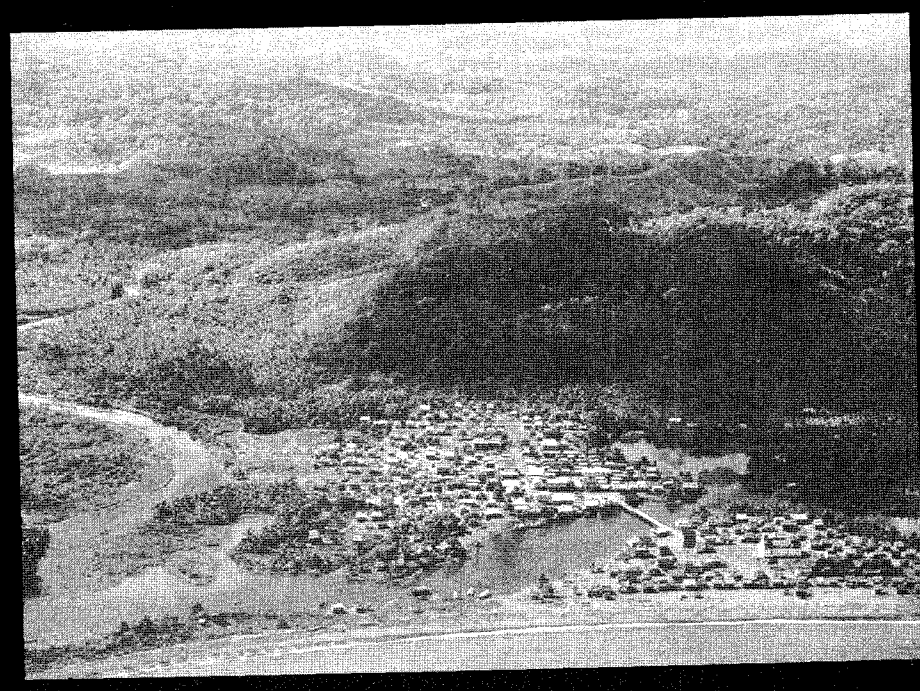

BALANCING THE SCALES:

Guidelines for Increasing Biodiversity's Chances Through Bioregional Management

KENTON R. MILLER

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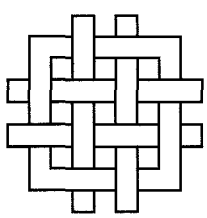

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K.R.M.

Foreword

Storm-battered islands of biological diversity in a sea of human settlement: that may well be the fate of the world's parks and natural areas as wildlands give way to farm, pasture and settlements. Lands set aside for conservation have been at the center of the world's efforts to protect biological diversity, and that strategy is under siege. What can be done to shore up these vital areas, and as important, maintain key habitats, species and genetic materials wherever they are found across human modified landscapes while fostering their careful use?

The answer must address the way people manage and interact with nature outside of protected areas, where they live and work, and in forestry, agriculture, fishing, wildlife management and other major uses of land and water resources. As Kenton Miller argues in *Balancing the Scales*, we must first expand the geographic scales of conservation and development programs—shifting their traditional scope to embrace whole ecosystems. We must then change the process of these programs to involve the broad array of people and institutions who have a stake in the management of the region. Only by adopting this larger "bioregional" approach can we nurture our natural resources while giving local communities the chance to derive sustainable livelihoods from those resources. *Balancing the Scales* is a practical book that explores the lessons to be drawn from current experiments with bioregional approaches, and proposes sensible guidelines for policy-makers, and especially for practitioners, on making bioregional management work.

The rubric of "bioregional management" draws upon worldwide achievements with protected areas and is enriched by a number of different approaches, including bioregionalism, biosphere reserves, integrated conservation and development projects, and ecosystem management. Each builds upon a strong ethic of "place" and stewardship. Each promotes the use of best-available science and information to help protect, restore and carefully manage biodiversity and natural resources. But how well do bioregional methods work in practice?

To learn how policy-makers, managers and communities go about uniting conservation and development on larger scales, *Balancing the Scales* looks at La Amistad Biosphere Reserve in Costa Rica; the Greater Yellowstone Ecosystem in the United States; the Wadden Sea, extending from the Netherlands to Germany and Denmark; the Greater Serengeti Ecosystem on the Kenya/Tanzania border; Australia's Great Barrier Reef Marine Park; the Mediterranean regional sea; Zimbabwe's CAMPFIRE program; the United Kingdom's North York Moors National Park; and the Hill Resource Management Program in India. These programs were established with a variety of goals, not always giving highest priority to biodiversity conservation. Yet, experience demonstrates that region-wide programs offer important opportunities for embedding biodiversity objectives into resource management.

These long-running programs have had varying degrees of success in meeting their ambitious objectives, but all provide useful insights into meeting the three major challenges facing those bent on applying bioregional approaches.

The first great challenge is *building capacity.* At larger geographic scales, managers must be able to plan and implement activities that may call for skills and experience not found in their own organizations. The needed tools, methods and talents may be found, however, in other levels of government, in the private sector, or in indigenous or civil society groups. Bioregional programs should plug the gaps in organizations' and individuals' capacities—building upon existing capacity wherever possible, while being able to respond to changes in attitudes, the economy and the environment as necessary.

Another challenge for bioregional management is *engaging local residents and other stakeholders,* that is, those who depend upon, utilize, live within, or otherwise care about the place and its biological resources. Stakeholders who do not become full partners in planning and implementing programs can end up hindering the program's chances of success. So leaders, planners, and policy-makers should get to know the stakeholders, their concerns, interests and perspectives, and should seek to involve them in planning and implementation. One key is to help them select issues of common interest for action and investment. These individuals and groups may need help gaining the access, skills and information needed to participate fully in decision-making, as well as a fair share of the benefits. Government agencies, for their part, must honor their commitments to local communities, work quickly to implement programs, and be prepared to share authority and responsibility in new creative ways with regional and local public and private partners.

The final challenge facing bioregional managers is *promoting cooperation between organizations and institutions* already working in the area. This means developing management options that balance local interests with society's larger interests. Adjusting the design and delivery of technology may be necessary to give communities and institutions the space and time to adapt.

Similarly, drawing on external funding sources may be vital to securing short-term support—so long as that funding gives way eventually to a sustainable flow of resources.

These challenges notwithstanding, bioregional management has the potential to reap huge gains for biodiversity—in part by attracting a larger, more complex pool of skills and tools. Dr. Miller argues that this approach also helps local communities grasp the connections between biodiversity and their own livelihoods and encourages them to begin voluntarily restoring the habitats, sites, and ecological functions that determine the health of larger ecosystems. In the end, all interested parties recognize the importance of social and institutional concerns and scientific knowledge in charting a better future.

Balancing the Scales is part of a larger group of studies by the World Resources Institute and its United Nations, governmental and NGO partners around the world. The 1992 WRI/IUCN/UNEP *Global Biodiversity Strategy* provided a framework for policy and action worldwide. The 1995 WRI/UNEP/IUCN *National Biodiversity Planning* report draws upon the experience of 17 partner countries to offer guidelines to nations in the throes of planning how to implement the Convention on Biological Diversity. Nested within that national perspective, this study explores options for transforming global and national goals into practical guidelines for management on the ground. Other reports that expand upon biodiversity topics include *Keeping Options Alive, Biodiversity Indicators for Policy Makers,* and *Biodiversity Prospecting.* WRI researchers are now taking these ideas and concepts to the regional and national level in Indonesia, the Philippines, and in Amazonia.

We would like to express our appreciation to the Netherlands Ministry of Foreign Affairs, the Danish Ministry of Foreign Affairs, the Swedish International Development Cooperation Agency, and the Sasakawa Peace Foundation for their generous support of WRI's program in biodiversity and biological resources. For their foresight and support we are deeply grateful.

Jonathan Lash
President
World Resources Institute

I. Introduction

In this Chapter:
- *the need for bioregional management*
- *what is a bioregion? what is bioregional management?*
- *the aim and message of this report*
- *characteristics of bioregional management*
- *three challenges to be anticipated*

At the scale of the bioregion, people can understand the flow of natural systems, whereas at the global, or national levels, the mind boggles.

Kirkpatrick Sale

How can the elements of wild nature—its species, genetic traits, populations, habitats and ecosystems—be maintained in landscapes that also need to produce material goods, environmental services, and the many cultural, aesthetic, and spiritual benefits that people everywhere want? Governments and communities entering the 21st Century must find answers to this fundamental question.

Scientists, resource managers, and local community leaders agree that the best policy approach is to expand the geographic scales of our conservation and development programs to cover whole ecosystems. In some situations, they also note, the best policy is to shift downward, focussing more attention upon habitats and sites in trouble (European Centre for Nature Conservation, 1995; Risser, 1995; Aberley, 1994; ANZECC, 1994; Noss, 1994; May, 1994; U.S. Department of State, 1994; Batisse, 1993; Bennett, 1993; King, 1993; Wells et al., 1992; Noss, 1990; Lowrance et al., 1986; Noss and Harris, 1986; Conway, 1985; Harris, 1984; Noss, 1983).

Whatever the shift, the question is one of balancing the scales—of finding the best places for conserving nature and natural resources without relinquishing products and services that can be developed and produced sustainably.

A parallel shift is needed in the way we deal with nature's scales of time, which are rarely synchronous with agency plans or administrative cycles. Animals migrate at certain times of the year, plants are best re-established during certain seasons. There is a hurricane season and a time-honored cycle of animal reproduction. Management programs must anticipate nature's timing of events as well as the amount of time society needs to adapt to new information, technology, and global change. Even earthquakes, floods, volcanic eruptions, and other natural disasters, while hard to predict exactly, can be prepared for if nature's cycles are understood.

Shifting scales to align action to place and time will have many benefits. First, communities and management agencies stand to gain a better awareness of the linkages and interdependencies among the resources and environmental services of their ecosystems, their jobs, food supplies, and material needs, as well as of the potential and limits of their habitat.

Second, this approach enables managers and communities to address the key components of ecosystems. What forest canopy, grassland, coral reef, sea grass beds, caves, or other ecological structures need to be maintained or restored in the overall ecosystem? How can such ecological

functions as stream flow and daily and seasonal migration be managed and monitored in practical terms? Should management be extended over geographic space and through additional seasons to accommodate additional stakeholders? And what species, genetic resources, wildlife populations, and communities are found and where? Which warrant restoration, introduction or control? And which can be harvested sustainably?

Third, residents and managers can reconsider their resource-related activities and their use of land and water areas with global change in mind and prepare for possible increases in rainfall or drought, sea level rises, and locational shifts in habitats and wildlife communities.

Fourth, by working with other inhabitants who live in, work within, or otherwise care for this larger ecosystem-wide geographic space, interested parties can more systematically examine their conflicts—for example, over access to and use of goods and services (Saunier, 1995; Saunier and Meganck, in press).

Today governments and communities rely mainly on their national parks, and other special protected areas, seed banks, tissue collections, zoos, and botanic gardens to maintain the diverse lifeforms found in the world's many habitats (UNEP, 1995; WCMC, 1992; WRI et al., 1992; McNeely et al. 1991). In some countries, community-led initiatives involve the protection, restoration, and use of biodiversity and biological resources (*Planet Drum Foundation*, 1995; Western and Wright, 1994). In many cases, however, the contribution of these protected areas, germplasm facilities, and other tools vital to biodiversity protection, restoration, and use may be limited by under-investment, growing competition for scarce land and funds, and the overwhelming number of endangered species, genetic resources, communities, populations, habitats, and landscapes in need of saving (Reid, 1992; Wilson, 1991).

Take protected areas as an example. The 1993 *United Nations List of Protected Areas* presents more than 9,800 sites in the world (IUCN, 1994b). *(See Box 1.1.)* Their contribution to nature conservation and human wellbeing through the protection of scenic and natural wonders, the protection and use of various species, natural populations, communities and habitats, and the provision of recreation, tourism education, research opportunities, ecosystem services, foreign exchange, and checks on renewable resources production are significant, if poorly understood. In many parts of the world, these areas are governments' sole or main approach to biodiversity conservation.

Yet, many protected areas are under-funded, understaffed, and short on opportunities for staff to build their capacity. They also fail to employ information and science to improve management practice, they lack effective mechanisms for working with nearby residents, and they operate without a government commitment to supporting management over the long term (Noton, 1995; Wells et al., 1992).

In many of these areas, national parks and protected areas are becoming isolated as wildlands get converted to farm, pasture, settlement, and infrastructure (IUCN, 1994a). Some are simply too small to meet the habitat requirements of local species, wildlife communities, and populations or to encompass ecosystem processes (Ecological Society of America, 1995; Paquet and Hackman, 1995; McNeely et al., 1994; Newmark, 1987). So too, many protected areas have become too isolated from regional economies to undergird neighbors' livelihoods. And the pressures of shrinking wildlands, even in the most remote regions, seemingly pit the goals of many protected area programs against the interests of local cultures and traditional groups seeking more space and access to natural resources.

Since the landscape is fragmented and much wildland has been converted to other uses, the boundaries and coverage of some protected areas may not conform to the size and shape of the ecosystems that are to be maintained and managed (Newmark, 1987; Harris, 1984). Moreover, in landscapes where protected areas have not been established, key genetic, taxonomic, and ecological elements of diversity that once may have been found in wildlands, or extensive farm or forest operations, are now relegated to isolated patches in

Box 1.1. Objectives and Categories of the World's Protected Areas

I. **Strict Nature Reserve/Wilderness Area:** Areas of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring; or large areas of unmodified or slightly modified land, and/or sea, retaining their natural character and influence, without permanent or significant habitation, which are protected and managed so as to preserve their natural condition.

II. **National Park:** Protected Areas Managed Mainly for Ecosystem Conservation and Recreation. Natural areas of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for this and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

III. **Natural Monument:** Protected Areas Managed Mainly for Conservation of Specific Features. Areas containing one or more specific natural or natural/cultural features of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.

IV. **Habitat/Species Management Area:** Protected Areas Managed Mainly for Conservation Through Management Intervention. Areas of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

V. **Protected Landscape/Seascape:** Protected Areas Managed Mainly for Landscape/Seascape Conservation and Recreation. Areas of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, cultural and/or ecological value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

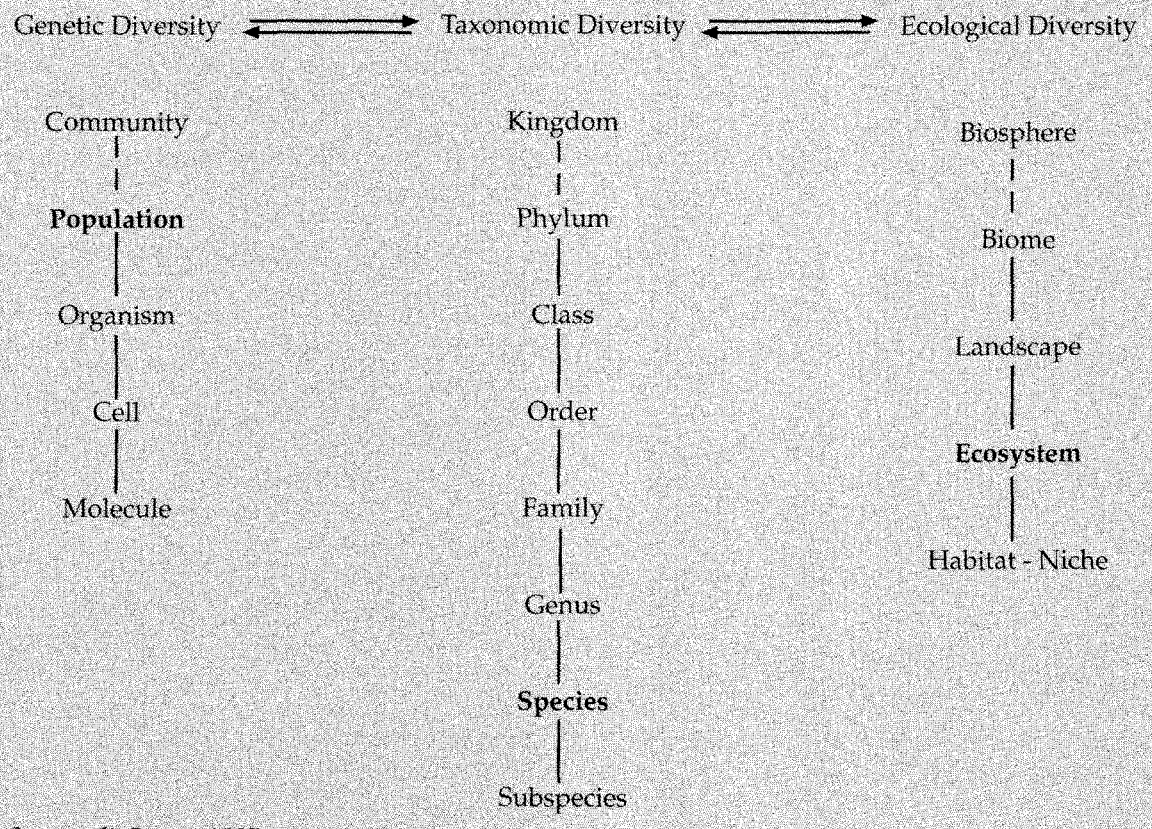
VI. **Managed Resource Protected Area:** Protected Areas Managed Mainly for the Sustainable Use of Natural Ecosystems. Areas containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

Source: The modified system of protected areas categories agreed at the IV World Congress on National Parks and Protected Areas, 1992.

intensively managed farms, pastures, timber-harvesting sites, fishing grounds, and suburban, urban, and industrial areas *(See Box 1.2)*. Indeed, these vestiges are increasingly found in a mosaic of mixed private, public, and communal ownership.

New policies are needed to protect, restore, and foster the careful use of biodiversity and biological resources *wherever they are found*. On the one hand, protected area programs need to be strengthened; other *in-situ* measures and all *ex-situ* facilities and measures need to be applied much more widely and their use integrated into overall biodiversity-conservation strategies (UNEP, 1995). Where important biodiversity is found on mixed public and private lands, property rights and tenure over

Box 1.2. Three Scales that Shape the Concept of Biodiversity



Source: di Castri, 1995

resource use must be strengthened and new arrangements promoted among various levels of government and among local communities to foster the long-term exercise of authority and responsibility (Asher, 1995; Lynch and Talbott, 1995; Barber et al., 1994; Western and Wright, 1994; Davis and Wali, 1993; Bromley, 1991; Ostrom, 1990; Poole, 1989). The growing list of goods and services being demanded from wildlands by local, national and global communities, listed in Box 1.3, makes the need for new policies even more urgent.

What is a Bioregion? What is Bioregional Management?

The term *bioregion* in this study denotes a geographic space that contains one whole or several nested ecosystems. It is characterized by its landforms, vegetative cover, human culture, and history, as identified by local communities, governments, and scientists.

Already in Australia, California, and Western Canada, the bioregion is a unit of planning and

Box 1.3. Potential Goods and Services from the Natural Components and Processes of Ecosystems

Ecosystem Operation, Maintenance, Adaptation, and Evolution

1. Potable water: surface, ground
2. Industrial water: surface, ground
3. Nutrient distribution: floods, dust, sediment transport
4. Photosynthesis
5. Respiration
6. Oxidation
7. Adaptation
8. Self-regulation
9. Mineral cycling
10. Habitat for local land, air and aquatic animals, insects and other lifeforms; feeding, breeding, nursery, shelter areas
11. Habitat for migrating land, air and other life forms
12. Feeding, breeding, nursery, shelter areas

Non-Tangible Goods and Services

1. Windbreak
2. Shade
3. Recreational use of water: swimming, boating, water skiing, sailing
4. Recreational use of land: hiking, climbing, sports
5. Recreational use of air: flying, gliding, parachuting, hang-gliding
6. Recreational use of animals: sport hunting, fishing, insect collecting, photography, observation
7. Recreational use of ecosystems: sightseeing, tourism
8. Scientific tourism
9. Exploration
10. Historical values
11. Cultural values
12. Early warning system: weather, climate change, hazardous events
13. Moisture modification
14. Temperature modification
15. Light modification
16. Filtration of ultraviolet and other radiation
17. Storage of genetic information
18. Other scientific values

Economic Services

1. Energy sources: wind, solar, hydro, tidal, biomass, geothermal
2. Dilution of contaminants
3. Decomposition of contaminants: oxidation, evaporation, dissolution
4. Transport of contaminants by wind and water, animal consumption, dilution by air and water
5. Storage of contaminants
6. Erosion control
7. Sediment control
8. Flood control
9. Other control of water regime
10. Ground water recharge
11. Space for urban, industrial, agriculture occupation, roadways, canals, airports
12. Physical support for structures
13. Climate control and protection
14. Disease control and protection
15. Storm buffering

Source: Saunier, 1995

management (ANZECC, 1994). In the United States alone, more than 600 relatively recent bioregional initiatives have been inventoried by a University of Michigan study (Frentz et al., 1995). The *1995 Planet Drum Bioregional Directory* includes 204 projects in Canada and the United States, 5 in Mexico, 6 in Australia, 26 in Europe, and 4 in the Pacific Islands (Planet Drum Foundation, 1995). New Zealand is now reforming its land subdivisions to better reflect its diverse ecosystems and to provide a more ecologically oriented geographic framework for public and community organization and administration (Helen Hughes, pers. comm., June 5, 1995).

The term *bioregion* as used here connotes the inclusion in the early steps of planning of all interested local residents, those who use or depend upon the area's resources, and those who have other interests in the area and its people. It also implies ecological, social, and economic analysis and participatory approaches to establishing goals and implementing plans. Stakeholder planners and managers understand the need to work at various scales from the ground upward through local, provincial or state, national, and international levels, thus linking tiers of ecological, social, economic and institutional organizations. *(See Figure 1.1.)*

Whether defined by science, governmental administration, or community action, the bioregion reflects the perceptions of the resident human community toward its sense of place or "homeland" (Aberley, 1993; Cronon, 1991; Andruss et al., 1990; Lane, 1988). It is a part of larger landscapes and biomes, and it can be subdivided into smaller ecosystems, such as stream catchments, valleys, and individual patches of forest or wetland, etc. (Naveh, 1984).

"Bioregional management" seeks to encompass *whole* ecosystem(s) so as to protect and restore their components sustainably. It nurtures the mechanisms by which these ecosystems function. Its guiding commitment is to using ecosystem resources for the long run cooperatively with resident inhabitants and other interested parties. "Bioregional planning" is an organizational process that enables people to work together, acquire information, think carefully about the potential and problems of their region, set goals and objectives, define activities, implement projects, take actions agreed upon by the community, evaluate progress, and refine their approach. As used here, bioregional management is thus an integrating concept, one that amalgamates the learning and perspectives of several like-minded approaches to resource management.

The Aim and Message of this Study

Policy-makers, resource- and protected-area managers, and community leaders need to understand and take action to better protect and restore biodiversity and biological resources and to promote their careful use by adjusting the scales of management programs to cover whole ecosystems. The guidelines presented here should help them establish bioregional management policies and programs where planning goals are heavily weighted toward biodiversity protection, restoration, and use.

The study's message is addressed to policy-makers, resource managers, and community leaders:

> Re-scaling your field-conservation programs to cover whole ecosystems through bioregional management programs can increase the opportunities to protect and restore biodiversity efficiently and foster its sustainable use. Unnecessary delays and conflicts can be reduced and more easily resolved if you anticipate the main challenges facing bioregional planners and implementors.

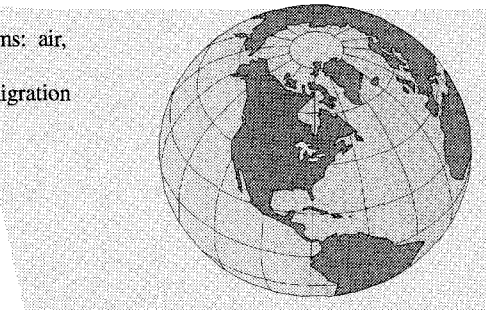
Two other groups should also be interested in this report. Those concerned with implementing the Convention on Conservation of Biological Diversity (Glowka et al., 1994) and *Agenda 21* can use it to develop tools and policies for meeting the provisions of the international agreements, and development assistance organizations can use it to help design multilateral and bilateral biodiversity projects.

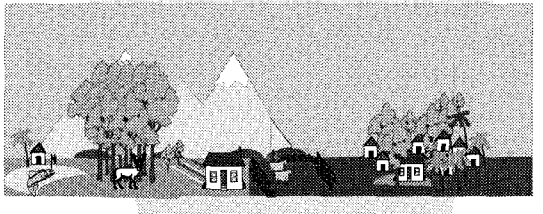
Characteristics of Bioregional Management

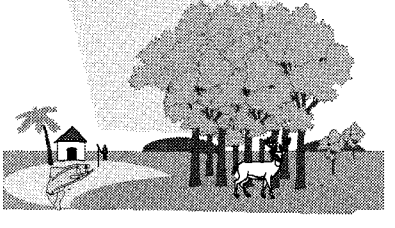
This study builds upon ongoing work in bioregionalism (Aberley, 1994; Aberley, 1991; Sale, 1985), the Man and the Biosphere Programme (UNESCO, 1995; USMAB, 1994), integrative conservation and development projects (ICDPs) (Wells et al., 1992), and the rapidly evolving philosophy and principles of ecosystem management (ESA, 1995; U.S. Department of State, 1994). It extracts from this base an idealized set of characteristics for bioregional management. *(See Box 1.4.)*

Figure 1.1. Hierarchies of Bioregional Management

Ecological Levels of Organization	Levels of Bioregional Organization and Management	Indicative Activities and Capacities for Each Level
• Global ecosystems: air, water, nutrients, geo-chemical, migration	• Global/ Inter-governmental programs: - Conventions on: Biological Diversity, Climate, Wetlands, Migratory species, Forest and Germplasm Agreements, etc.	• Intergovernmental negotiation • Diplomacy • Supported by science, information and management
• Regional ecosystems: - Biogeographic province level - Landscape level - Plant/ animal communities - Migration	• Bioregional programs: - Multi-country level: Mediterranean Action Plan, Wadden Sea, La Amistad Biosphere Reserve - Country Level: Great Barrier Reef Marine Park, Yellowstone National Park, North York Moors National Park, CAMPFIRE community wildlife management, Hill Resource Management Program	• Sciences • Information gathering, development and delivery • Regional planning, inter-country planning and cooperation • Protected area planning and management • Cooperative mechanisms for private, public and communal land owners • Policy and technology development to encourage sustainable practices in forestry, agriculture, fisheries, wildlife, tourism and water management • Monitoring and reporting
• Local ecosystems • Habitats - Structure - Species composition - Genetic variation - Local migration - Patch dynamics	• Local site level: - Community protection of fish spawning areas, local watershed management plans, and forest rehabilitation efforts	• Develop and use skills and knowledge (traditional and technological) to protect, restore, inventory, research and sustainably harvest natural resources







Box 1.4. Key Characteristics of Bioregional Management

Drawing from the elements and experience of Bioregionalism, Man and the Biosphere Program, International Conservation and Development Projects, Protected Area Management, and Ecosystem Management, 14 defining characteristics of bioregional management work can be identified:

1. ***Large, Biotically Viable Regions***—Bioregional management programs embrace regions large enough to include the habitats and ecosystem functions and processes needed to make biotic communities and populations ecologically viable over the long-term. These regions must be able to accomodate migratory patterns, anticipate nature's time cycles, and absorb the impacts of global change.

2. ***Leadership and Management***—The leadership to establish bioregional programs may come from public agencies or from the community of residents and resource users. The tasks of convening stakeholders, preparing and negotiating vision statements, planning and implementing agreed-upon activities can be shared cooperatively between public and private entities, or fully community-based.

3. ***A Structure of Cores, Corridors and Matrices***—These programs include core wildland sites that feature representative samples of the region's characteristic biodiversity. Ideally such sites, which may already be designated as protected areas, are linked by corridors of natural or restored wild cover to permit migration and adaptation to global change. Both the core sites and corridors are nested within a matrix of mixed land uses and ownership patterns.

4. ***Economic Sustainability***—The livelihoods of people living and working within the bioregion, including those in industry, and especially in the matrix, are encouraged. Appropriate incentives to make optimal use of local resources, and apply sustainable technologies, are combined with a system for sharing the costs and benefits of conservation and managed use fairly.

5. ***Full Involvement of Stakeholders***—All parties who can affect or benefit from the resources in the region develop skills, information, and opportunities to be fully involved in planning and managing the bioregional program. Key here is building the local capacity to participate, negotiate, and perform the various tasks involved.

6. ***Social Acceptance***—Any proposals for changes in the way of life and livelihoods of the residents and local peoples, including indigenous communities, need to be acceptable

The Bioregionalist Approach

Bioregionalism is a grassroots, "bottom up" approach led by communities themselves, primarily in North America, but increasingly in Australia and Europe too. This approach provides one example of community-led efforts to work at the scale of the ecosystem; its use is rapidly spreading, and it appears to be quite transferable.

Bioregionalists aim to find a balance between the resident community's need for livelihoods and the potential of natural resources in their bioregions, as defined by ecological, economic, and social criteria (Aberley, 1994). They refer to "homeland" as a geographic space that encompasses their water sources and other key ecological features, food production, forests and wilderness, villages and infrastructure (Aberley, 1993; Andruss et al., 1990; Cronon, 1990; Lane, 1988).

This approach focusses upon the political means to promote restoration and maintenance of the natural systems that ultimately support the

to them. All stakeholders warrant the opportunity to participate in program management and implementation.

7. ***Solid and Comprehensive Information***—All stakeholders have at their disposal the critical information needed to facilitate biodiversity management. Geographic Information System technology is used to help stakeholders envision their region and its distinctive features clearly. GIS also helps them model options and scenarios for the future.

8. ***Research and Monitoring***—Research and inquiries focus on people/environment interactions, the development of innovative methods for managing natural resources, and the long-term monitoring of environmental factors and the impact of management practices.

9. ***Use of Knowledge***—Scientific, local, and traditional knowledge are employed in planning and management activities. Biology, anthropology, economics, engineering, and other related fields are tapped. Such knowledge helps stakeholders and program managers to anticipate nature's long and short cycles and to track global change.

10. ***Adaptive Management***—Bioregional programs are operated on an experimental basis, from which lessons may be drawn from real-world experience to respond appropriately.

11. ***Restoration***—Where the viability of some habitats or ecological functions have been impaired through excessive or inappropriate use, then these areas are to be restored.

12. ***Cooperative Skills Development***—Communities and public and private organizations together locate and mobilize the skills, knowledge, and information needed to be able to manage the area.

13. ***Institutional Integration***—Alliances with other institutions and with local organizations are forged to close gaps, minimize overlap, and make management and investment in the region more efficient.

14. ***International Cooperation***—Because some ecosystems cross international boundaries and, in some cases, extend globally along animal-migration routes or along venues where endangered species are traded, international cooperation agreements for debate, mechanisms for joint research, information management, and investments are part of the biodiversity management program. (The Man and the Biosphere Programme is particularly suited to this purpose.)

people and nature in each area. It rests on a commitment to the health of natural systems; a spiritual and cultural affinity to community, the land, and ecological processes; and the goals of political decentralization, self-determination, and social equity (Dodge, 1990).

Bioregionalism is as much a movement of practitioners as it is a methodology. Its adherents are rapidly developing concepts and guidelines for planning, land use, social behavior, and other dimensions of bioregional management. *(See Box 1.5.)* In fact, formal methodologies and structures are avoided, and this decentralized movement has no formal institutions. Bioregional programs are federated, however, and tied to each other both culturally and commercially.

Every bioregional project prepares a resource inventory, maps, a list of local economic enterprises, and food-production options. It also establishes working groups of residents to address social equity and gender issues. Land use is planned and managed to achieve a

Box 1.5. Guiding Tenets of Bioregionalism

1. Bioregions offer the most opportune spatial scale for human governance and socio-economic development;

2. Governance within a bioregion should be democratic and responsible to local control, should nurture a high quality of life, and should be judged on its ability to achieve social justice;

3. Economic development within a bioregion should be locally regulated, based on the use of appropriate technology, focussed on self-reliance (with limited, value-added export manufacturing), and expanded only to the extent that resident ecosystems can sustainably support exploitation; and

4. The political and economic interdependence of bioregions should be institutionalized at state/provincial, federal, continental, and global levels through federation.

Source: Aberley, 1994

diverse landscape and to protect water, soil, and biodiversity.

National, regional, and local bioregionalist congresses have been held, with the first proceedings published in 1984. A current bioregional directory and map were published in 1995 in *Raise the Stakes* (Planet Drum Foundation, 1995).

The Biosphere Reserve Approach

The Man and the Biosphere Programme (MAB) was launched by UNESCO in 1972 to increase understanding of the earth's processes and resources and of the relationships between people and nature. Along with international research and monitoring programs, perhaps the centerpiece of the MAB program has been its worldwide network of *biosphere reserves.* This program exemplifies an international consensual approach to managing whole ecosystems to preserve key biodiversity. *(See Box 1.6.)*

Biosphere reserves are "designed to deal with one of the most important questions the world faces today: how can we reconcile conservation of biodiversity and biological resources with their sustainable use? An effective biosphere reserve program involves natural and social scientists; conservation and development groups; management authorities and local communities—all working together on this complex issue" (UNESCO, 1995).

Presently, there are 338 biosphere reserves in 82 countries. Most have been initiated by central

Box 1.6. Elements of Biosphere Reserves

1. *One or more Core Zones*: securely protected sites for conserving biological diversity, monitoring minimally disturbed ecosystems, and undertaking non-destructive research and other low-impact uses (such as ecotourism and education).

2. A well-defined *Buffer Zone*: which usually surrounds or adjoins the core zones, and is used for cooperative activities compatible with sound ecological practices, including environmental education, recreation, and applied and basic research.

3. A flexible *transition area*, or area of cooperation, which may contain a variety of agricultural activities, settlements and other uses and in which local communities, management agencies, scientists, non-governmental organizations, cultural groups, economic interests and other stakeholders work together to manage and sustainably develop the area's resources.

Source: UNESCO, 1995

government agencies in collaboration with scientists affiliated with universities, NGOs, and government agencies. Occasionally, local communities participate too. Established national parks and other types of protected areas are often the starting point (McNeely and Rojas, 1995). Biosphere reserve designation, planning, and management are strictly national prerogatives, though international leadership to establish reserves throughout the world and to promote and coordinate international cooperation in research, monitoring, and information exchange has its role. Methods for designing and managing biosphere reserves are kept general, so the great variation in how the biosphere reserve concept has been applied around the world comes as no surprise.

In several cases, the biosphere reserve approach is being promoted and employed by communities and NGOs to strengthen local resource management. Examples include the pioneering work at Mexico's Montes Azules Biosphere Reserve (Halfter, 1994; 1993) and Guatemala's Maya Biosphere Reserve (Santiso, 1993). The Mata Atlantica Biosphere Reserve in Brazil illustrates how the concept has been applied to a fragmented, but critically important biodiversity region of tropical coast (Conservation International et al., 1993).

At the Second World Congress on Biosphere Reserves held in Seville, Spain in June 1995, a strategy for further developing the Biosphere Reserve network was agreed upon (UNESCO, 1995).

The Integrated Conservation and Development Project Approach

In the early 1980s, overseas development agencies sought ways to support the long-term conservation of areas critical to biodiversity's survival. Drawing upon experience in both development and conservation projects, the World Bank, bilateral donors, and other groups looked for ways to complement biological considerations with social and economic analysis. The term ICDP originated in the work of Wells, Brandon, and Hannah (1992), which was supported by the U. S. Agency for International Development, World Bank, and World Wildlife Fund-US. The ICDP approach warrants a closer look here because ICDP projects aim to "...enhance the conservation of biodiversity in protected areas by focusing on the social and economic needs of people living in or nearby communities" (Brown and Wyckoff-Baird, 1992).

While traditional protected area management has been largely confined within an area's legal boundaries, ICDP personnel and budgets explicitly aim to meet the needs and aspirations of people living around as well as within these areas. ICDP increases options for local residents to manage resources for their own benefit and for that of generations to come. Indeed, access, stewardship, and ownership are vital dimensions of this approach. By building conservation and development goals and activities into project design and implementation, the ICDP approach balances the immediate needs of local people with short- and long-term conservation goals (Wells and Brandon, 1993; Brown and Wyckoff-Baird, 1992).

In the ICDP approach, a key concern is equity in the distribution of benefits, so all stakeholders are involved early in project planning, as well as in implementation and evaluation. Social Impact Assessment (SIA) is used to identify possible adverse social effects and to help planners and managers mitigate those they cannot avoid (Hough, 1991). *(See Box 1.7.)* ICDPs also employ Participatory Rural Appraisal (PRA)—a planning technique that helps communities define their problems, analyze past successes, evaluate local institutional capacities, set priorities, and tailor a plan for the community to adopt and implement. The use of PRA exemplifies how ICDP seeks to empower the local communities to take charge of their own development. *(See Box 1.8.)*

The ICDP approach emphasizes systematic data gathering and analysis of ecological, geophysical, social and economic data to support site selection and planning decisions. Significantly, while this approach is heavily oriented toward the development of economically sound livelihoods, biological factors do come first in decision-making. This way, when political considerations arise, options and priorities for biodiversity

Box 1.7. Social Requirements for Selection of Integrated Conservation and Development (ICDP) Projects

1. Any disruptions or alterations to indigenous land use and production systems that are proposed in the ICDP must be made acceptable to participating resource user/owner groups;

2. Local resource user/owner groups must have the organizational capability to represent their interest so that they can modify and renegotiate activities as experience is gained;

3. Most people likely to be affected by the project must perceive the conservation of biodiversity in the proposed activities to be of local benefit, and mechanisms must be developed to educate skeptics;

4. The activity must not make poor people poorer or already marginal social groups even more marginalized; and,

5. An already-established local NGO that can promote communication among the local community and national and provincial or district government agencies in charge of protected areas must be a partner in the effort.

Source: Brown and Wyckoff-Baird, 1992

and human needs investments have already been thought through.

Most ICDPs accord primary attention to the development potential just outside of protected areas. The objective of such buffer-zone management, according to Brown and Wyckoff-Baird (1992,) is to "...optimize the political, economic, social, cultural, ecological and intrinsic worth of resources through active adaptive management, with fairness to all groups, and allowing for changing values over time."

Box 1.8. The International Conservation and Development Project Approach

1. Gather data and provide analysis to support planning, monitoring and evaluation;

2. Take steps to conserve the resource base and provide overall environmental management;

3. Take action to boost social and economic development;

4. Strengthen local NGOs, private groups, and resource agencies; and

5. Broker and balance the interests of the various stakeholders to strike cooperative agreements and further sustainability.

Source: Brown and Wyckoff, 1992

The Ecosystem Management Approach

The emerging fields of conservation biology and of ecosystem and landscape science have brought scientific rigor to bear on biodiversity loss and sustainable resource management (Council on Environmental Quality, 1995; Hansen and di Castri, 1992; Haveh and Lieberman, 1984). Systematic analysis of the impacts of human-caused and natural change upon forest, island, marine, and other environments have over the past two decades greatly enlarged our understanding of human/nature interactions. The philosophy and principles of *ecosystem management* are quickly converging with those of the previous approaches to suggest that achieving sustainability and conserving biodiversity require shifting conservation programs to ecosystem scales of management (Council on Environmental Quality, 1995; Ecological Society of America, 1995).

Ecosystem management has been defined operationally as "...an innovative framework for achieving harmonious and mutually dependent

sustainability of society and the environment, that focuses on human and natural systems at regional scales across inter-generational time periods" (U.S. Department of State, 1994). Similarly, the Ecological Society of America (1995) defines ecosystem management as "...driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and function" (Reid et al., 1993). *(See Box 1.9.)*

One hallmark of ecosystem management is the systematic use of scientific tools to identify high-priority areas for biodiversity conservation and to analyze and prescribe management options. Much as in the other approaches described here, wildland sites form the **core** of each ecosystem-wide program. A distinction, however, is that these core sites are linked by **corridors**—ideally, swaths of natural or restored wildland, but in practice often crop, pasture, and harvested forest lands—so animals can move freely and communities can respond to global change.

The **matrix** consists of the lands and waters that surround the core sites and corridors and extend outward to the boundaries of the ecosystem or set of ecosystems under consideration (Noss, 1983).

Box 1.9. Principles of the Ecosystem Management Approach Derived from the Man and Biosphere Program Study of the Everglades, Florida, U.S.A.

One of the most technically, socially, and politically advanced applications of ecosystem thinking in the United States has been the analysis of the Greater Everglades ecosystem performed by the Human-Dominated Systems Directorate of the U.S. Man and Biosphere Program. The U.S. MAB program features among its co-sponsors the U.S. Forest Service, Park Service, Fish and Wildlife Service, Bureau of Land Management, Department of Defense, and other components of the federal government that manage public lands, in cooperation with state and local organizations and universities. In June 1994, more than 100 participants from these agencies developed a set of ecosystem management principles at a workshop at the Isle au Haut. Highlights include:

- Aim to recover and maintain the biological diversity, ecological function, and defining characteristics of natural ecosystems.
- Recognize that people are part of ecosystems, that they shape and are shaped by the natural systems, and that ecological and societal systems are mutually dependent.
- In planning and management, remember that all ecosystems and institutions have unique and varying conditions.
- Integrate sustained economic and community activity into ecosystem management.
- Develop a shared vision of the social, economic, and environmental conditions desired.
- Make sure ecosystem governance takes place at the appropriate ecological and institutional scales.
- Use adaptive management to achieve desired outcomes and deepen understanding of ecosystems.
- Integrate the best available science into decision-making while continuing research to reduce uncertainties.
- Implement ecosystem management principles through coordinated government and non-government plans and activities.

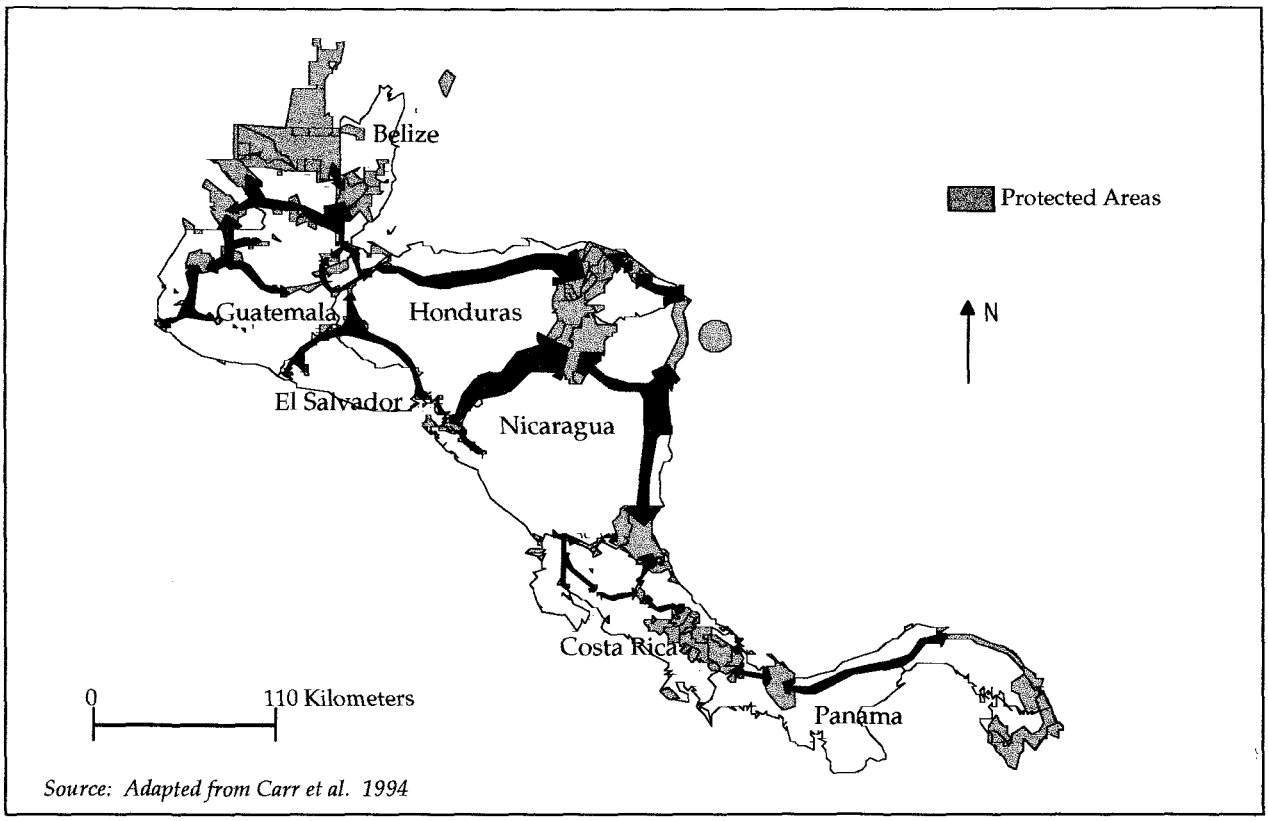
Source: U.S. Department of State, 1994

More explicitly than other approaches, ecosystem management emphasizes the need and role for a matrix large enough to maintain the region's characteristic biological diversity, including ecological functions and processes. In the matrix of farms, harvested forests, fished areas, and human settlements, upstream catchments, stands of old-growth forest, grasslands, coral reefs, sea-grass beds and mangroves, genetic resources, and rare communities of wildlife will need to be managed as components of the overall ecosystem. Accordingly, public agencies, private land owners, corporations, and communal groups will need to be partners in the development of the information base, the identification of key components of biodiversity, and the design and negotiation of management arrangements. From a management perspective, the matrix may need the most analysis.

Proposals to link programs through large corridors down the length of the U.S. Rocky Mountains, the Central American Isthmus *(See Figure 1.2.)*, and the Andes of South America are being developed by scientists, NGOs, and governments.

In the United States, ecosystem management has become an important political issue within broader public debates on how government should manage public lands and on how private property rights should change. Without effective mechanisms to establish and foster cooperative arrangements with land owners and interests

Figure 1.2. The Proposed Central American Biological Corridor



Source: Adapted from Carr et al. 1994

located outside central government jurisdiction in the surrounding matrix, stakeholders are naturally worried about their future rights of ownership and access to private and public lands and resources.

Three Challenges to Bioregional Management that Policy-Makers Can Anticipate

Three complex challenges await policy-makers, managers, and communities. All grow partly out of the deeply embedded values and practices of public agencies and the land-use and lifestyle traditions of local people.

Capacity

First, policy-makers and interested parties can anticipate that managing whole ecosystems will require drawing upon a range of scientific, technical, social, and policy tools and capabilities rarely found in any single established institution in the region. New policies should promote the pooling of the tools and capabilities of a region's communities, agencies, and individuals. In some cases, certain skills will have to be imported from outside the region or developed from scratch.

Obstacles abound. Existing agencies may be legally bound to restrict their scope of activity and limit their expenditures to their own established jurisdictions. Historic jealousies may obstruct the exchange of information, species collections, and local know-how. In some cases, new organizations may be needed to develop and share the missing skills.

Stakeholder Involvement

The second predictable challenge is that each new party to the debate or program brings additional concerns and values that may vary considerably from those of the original, more traditional constituents of nature conservation, recreation, tourism, and natural science. The key here is making newcomers both stakeholders and partners without alienating those who came to the table first. Whether new participants become disgruntled neighbors and enemies of biodiversity conservation or allies depends upon how fully established partners involve them.

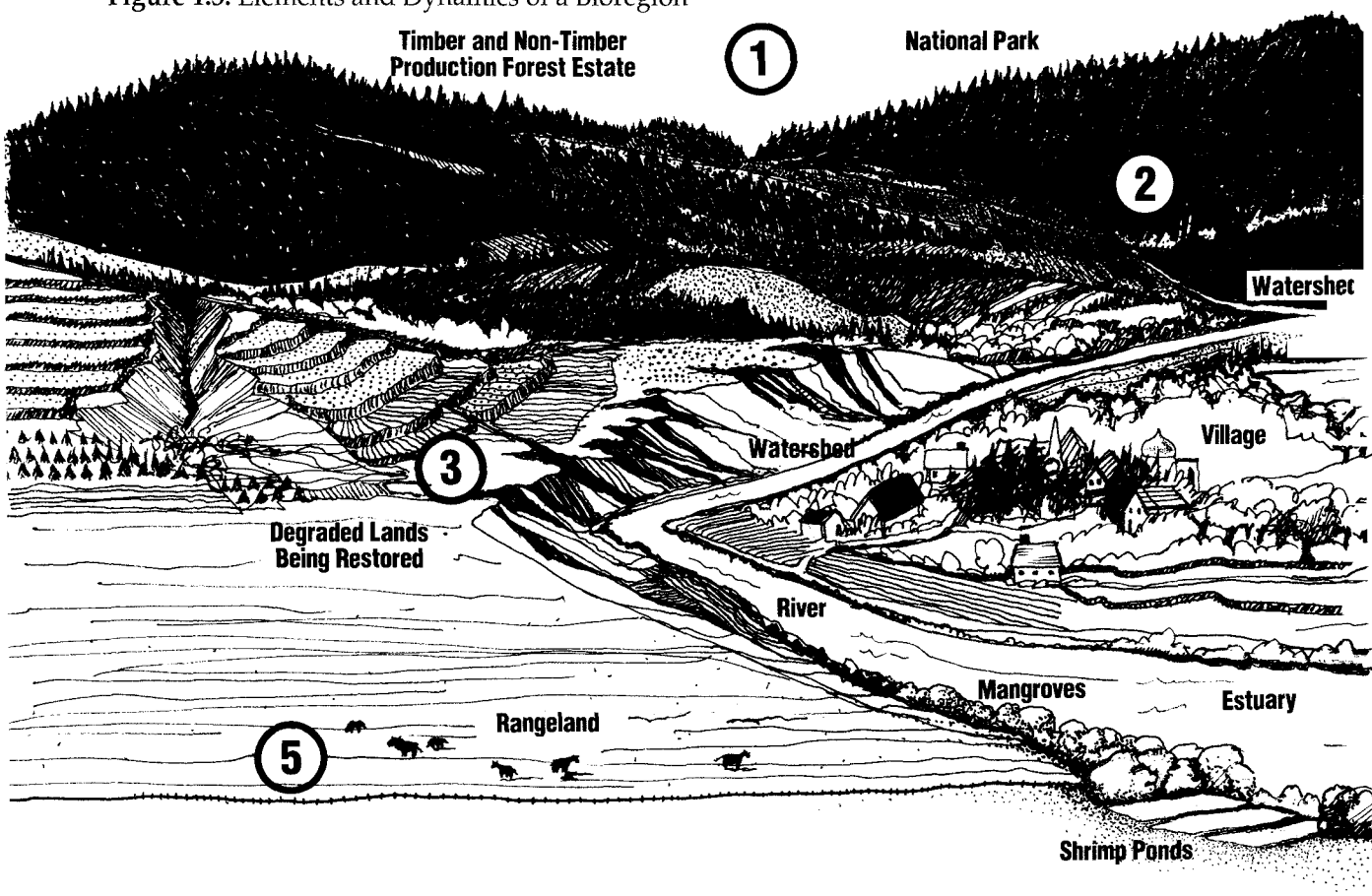
In some cases, government agencies need to take the lead, catalyzing and forging cooperative agreements, a common vision, and an action plan based on common interests. Inter-governmental and non-governmental organizations can help provide orientation and support (Olivieri et al., 1995). In other cases, authority and responsibility may best be redistributed from central government to local government, to communities, or to private hands. Either way, authority, responsibility, leadership, and management are established and legitimated locally once the communities themselves reach consensus.

Who best can care for various natural resources? How can the "taking" of local rights of access and resource use be avoided? Most pointedly, what mechanisms permit stakeholders to help set goals, design and implement mechanisms for reaching them, and enter into co-operative management and even co-finance agreements? These are questions that policy-makers and communities can anticipate in the planning and negotiating process (Berger, 1988).

Institutional Cooperation

Third, beyond a government agency's traditional jurisdiction, policy-makers and managers will find a whole set of organizations and institutional arrangements already in place and sometimes in conflict—with each other, with local residents' objectives, and with biodiversity conservation. Often, public agencies may cover traditional sectors, including water, soil, forest, wildlife, tourism, agriculture, public health, transportation, etc. Local and state or provincial governments may or may not be in accord. Meanwhile, farmers and forest land-owner associations, indigenous tribal councils, and chambers of commerce have their own perspectives, as do universities, experiment stations, research institutes, private conservation organizations and nature reserves, corporations that extract resources,

Figure 1.3. Elements and Dynamics of a Bioregion



Elements and Dynamics of a Bioregion

1. A variety of protected area types are used in a bioregion: strictly protected nature reserves, national or state parks, areas for the controlled extraction of non-timber forest products, privately owned conservation areas, and areas of permanent forest estate managed for timber production.

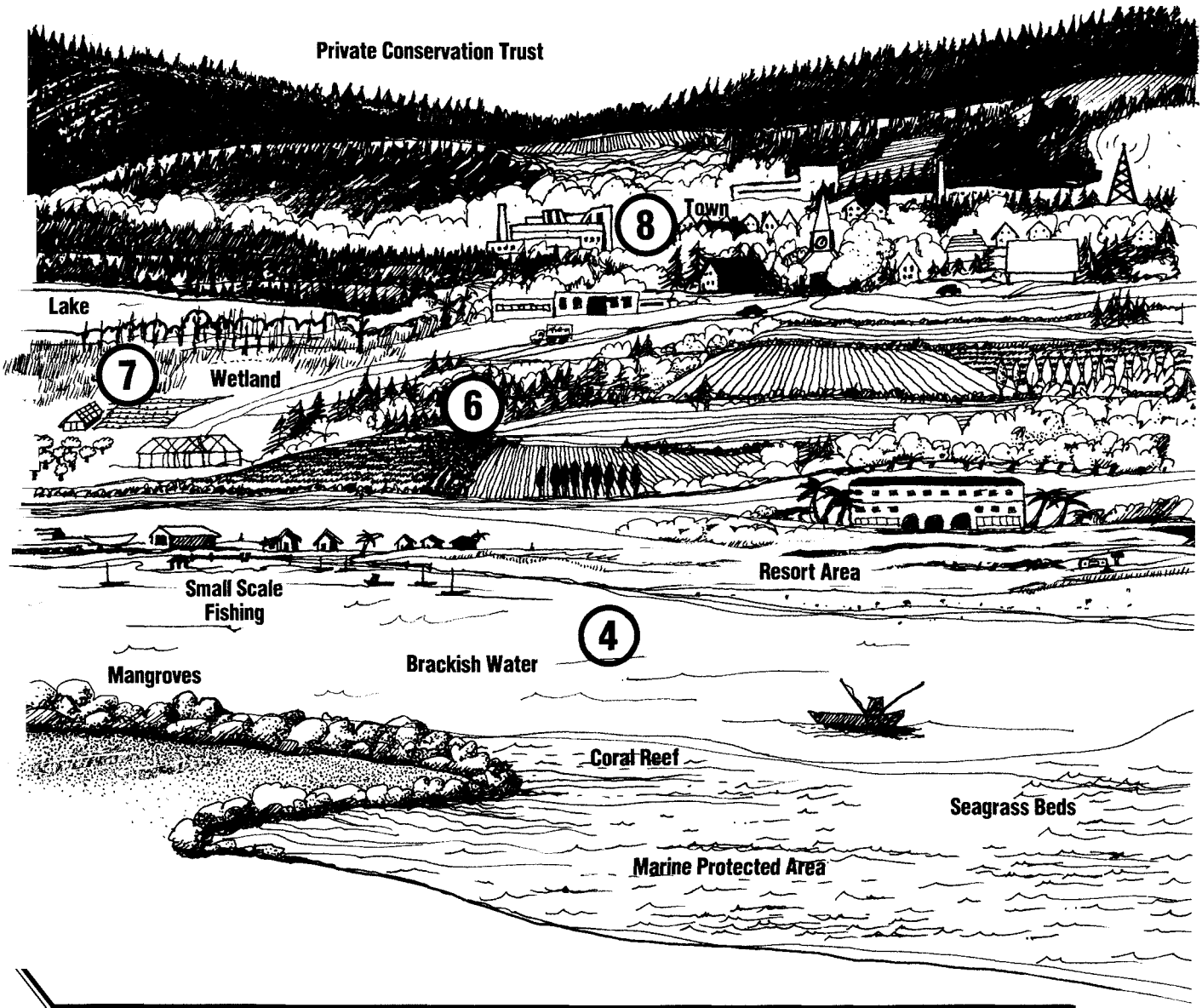
2. Watersheds are managed in their entirety, from ridgetop to blue water, and across a range of uses from strictly protected uplands to estuarine fisheries.

3. Degraded lands are restored to a variety of uses, including soil and water conservation, coastal protection, wood production, agriculture, pasture, and protected areas expansion.

4. Coastal and marine areas are managed to conserve key coral reefs, mangroves, beaches, and other elements, maintain fisheries productivity, and provide local economic opportunities through carefully managed tourism development.

5. Rangelands are managed within their carrying capacity to maintain native flora and fauna, raise livestock, and ensure the livelihoods of any nomadic pastoralist peoples.

6. Agricultural lands are managed to optimize long-term productivity and support biodiversity by minimizing



use of chemical pesticides and fertilizers, using local as well as introduced crop varieties, and including trees, hedgerows, community woodlots, and wildlife corridors within the agricultural landscape.

7. A range of community-based institutions support biodiversity conservation, including community seedbanks, agricultural extension services, and biodiversity inventory and research stations.

8. Larger towns within the bioregion provide a range of supporting institutions. These include zoos, aquaria, and botanic gardens to conserve endangered species and educate the public; schools, places of worship, and media outlets to build awareness; non-governmental organizations to provide support and information for both communities and government; and biodiversity information centers to serve as a focal point for bioregional dialogue, information sharing, and collective action.

Source: WRI/IUCN/UNEP, *Global Biodiversity Strategy*, 1992

and managers of waste-treatment facilities. In some cases, avoiding jurisdictional conflicts requires creating a "regional authority" tailored to add and embed bioregional management within overall resource development.

This challenge can be addressed by policies that promote cooperative arrangements among established organizations and institutions to define common goals, take comparative advantage of their varying mandates and missions, and take steps toward more regional perspectives. *(See Figure 1.3.)* Beyond simple negotiation, this often involves revising legal, policy, and regulatory mandates and restructuring organizations' jurisdictions to conform to the bioregion.

As the examples that follow in Chapter II will show, the motivation for establishing bioregional programs varies with the interests of the community or government agency that takes the lead. "Biodiversity" alone rarely gels common interest or rallies action. But such goals as protecting water supply, managing fish or timber to preserve jobs, and maintaining traditional ways of life often do.

II. Examples of Early Bioregional Management Experience

In this Chapter:
- *examples from worldwide experience*

Living-in-place means following the necessities and pleasures of life as they are uniquely presented by a particular site, and evolving ways to ensure long-term occupancy of that site. A society which practices living-in-place keeps a balance with its region of support through links between human lives, other living things, and the processes of the planet—seasons, weather, water cycles—as revealed by the place itself. It is the opposite of a society which makes a living through short-term destructive exploitation of land and life.

Peter Berg and Raymond Dasmann, 1978.
(Reinhabiting a separate country: A bioregional anthology of Northern California.
Planet Drum Foundation.)

Fairly long-running bioregional programs provide insights into how policy-makers, managers, and communities deal with the three challenges of building the capacity needed to manage larger and more complex ecosystems, engaging residents and other stakeholders, and promoting cooperation among organizations and institutions already working in the region. These efforts—well known to students of community-based management, economic and social development, and wildlife conservation in developing countries—suggest methods and approaches for making conservation and development more efficient and equitable. *(See Box 2.1.)*

These examples were selected to illustrate quite distinct approaches to dealing with the three challenges. None calls itself a "bioregional program." Some do not even consider managing whole ecosystems their goal. Nevertheless, all illustrate how governments, scientists, NGOs, and local communities have pursued goals that require them to shift to larger, more complex scales of management and highlight the challenges encountered along the way.

La Amistad Biosphere Reserve

The La Amistad Biosphere Reserve illustrates the challenges faced in Costa Rica when the government, public management agencies, local individuals, and NGOs decided to establish a mechanism to help manage a region where jurisdictions overlapped, interests competed, and communities felt alienated. It is the region richest in biodiversity in Costa Rica, as well as a major source of freshwater and hydropower potential and a homeland to most of the country's indigenous peoples.

Brief Description

In the early 1980s, an array of public institutions governed the region without coordinating their activities. Communal and private groups were weak, managerial and technical capacity were underdeveloped, opportunities for indigenous peoples to become full stakeholders in the program were lacking, funding was erratic, and major natural disasters threatened progress. That

Box 2.1. Selected Examples of Worldwide Bioregional Management Experience

Bioregion	Square Kms.	Main Feature
1. La Amistad Biosphere Reserve, Costa Rica	61,257	Multiple public agency jurisdictions seeking to co-manage a higly biodiversity-rich region
2. Greater Yellowstone Ecosystem, U.S.A.	730,000	Few public agencies manage major portion of biotically rich bioregion
3. Wadden Sea, Denmark, Germany and the Netherlands	90,000	Tri-country bioregion, critical migratory species, coastal zone
4. Greater Serengeti Ecosystem, Tanzania and Kenya	60,000	Bi-country bioregion, with old culture residing and practicing lifestyle inside area
5. Great Barrier Reef Marine Park Authority, Australia	344,000	Major coastal/marine complex
6. Mediterranean Action Plan	Sea and Coastal States	Nations of an entire sea basin attempt to cooperate in resource management (large marine ecosystem)
7. CAMPFIRE Program, Zimbabwe	producer unit, approx. 150 families	Community-based management of wildlife
8. North York Moors National Park, U.K.	1,436	Area with long history of human settlement, working intensively with local land users and owners
9. The Hill Resource Management Program, India	unknown	Project that illustrates the problem of adapting to time scales

began to change when Costa Rica and Panama established a boundary International Park in 1982.

Initially, each country committed 200,000 hectares, and together the 400,000 ha cover most of the Cordillera de Talamanca, a mountain range that extends from just above sea level to 3,800 meters. The Reserve embraces most of the Talamanca mountain massif in Costa Rica, including its major watersheds and the Atlantic coastal zone. In 1982, UNESCO accepted the two governments' bid to get a portion of the region internationally recognized as the bi-country La Amistad Biosphere Reserve and it was declared a World Heritage Site the following year (Gobierno de Costa Rica, 1990).

The official mandate for the biosphere reserve is to manage for multiple use while continuing to protect the natural resource base (Gobierno de

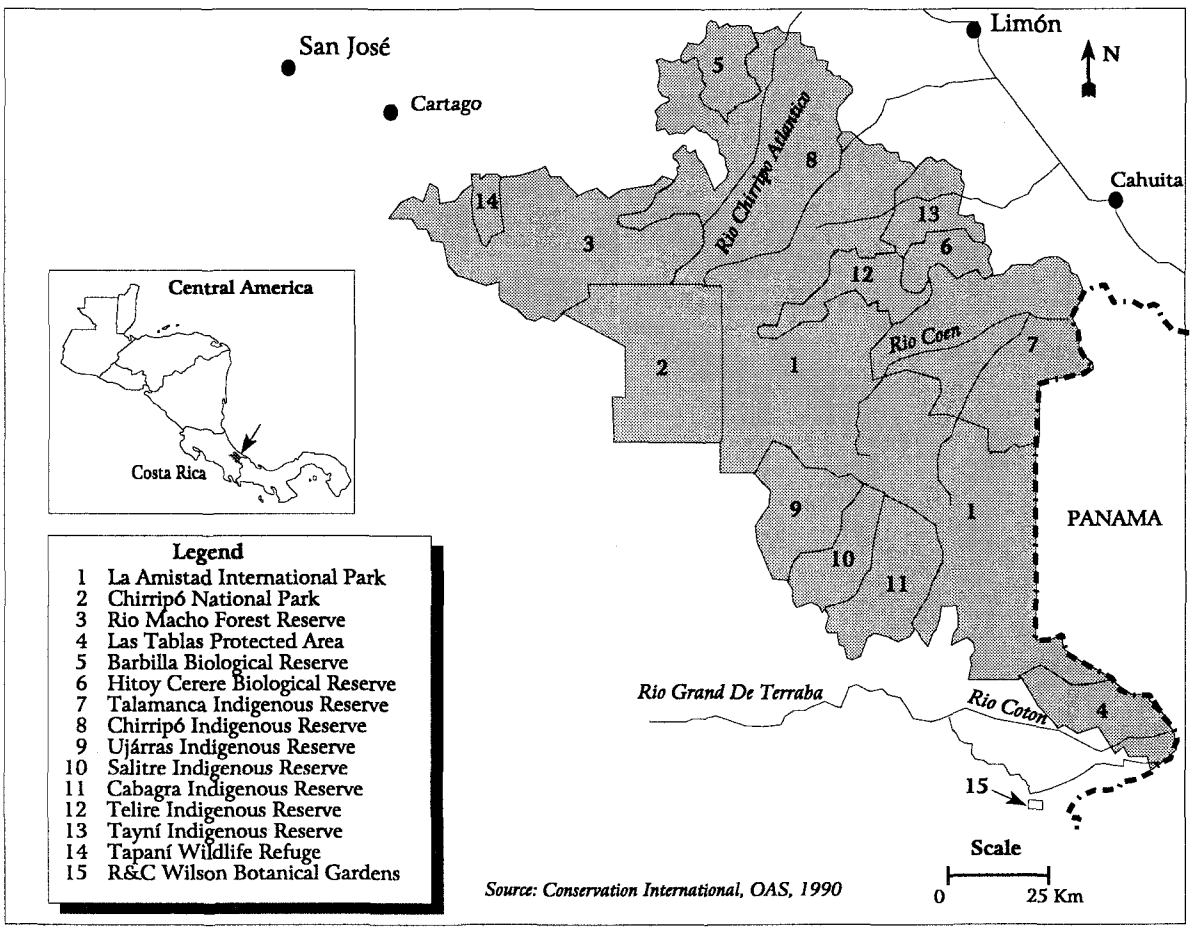
Costa Rica, 1990). Costa Rica's portion of the reserve now covers approximately 612,570 ha, some 12 percent of the nation's territory (Gobierno de Costa Rica, 1990) and an area rich in endemic plants. (Reportedly, 30 to 40 percent of the area's flora is endemic.) (Gobierno de Costa Rica, 1990.) Government studies suggest that a harmonious management framework greatly boosts tourism, hydropower, biodiversity conservation and exploration, and crop production. In any event, creating a reserve has opened the way to an equitable relationship with the region's indigenous peoples through recognition of their land rights, restoration of impoverished soils and forests, and allotment of a fair share of bio-prospecting revenues from their lands (Morales, 1983).

Challenges of Shifting to Bioregional Management

Fifteen distinct legally mandated management units had already been established before the biosphere reserve was formed. *(See Figure 2.1.)* These include two national parks, two biological reserves, one forest reserve, one wildlife refuge, one watershed-protection area, seven indigenous reserves, and one botanical garden.

Furthermore, mineral-exploration permits had already been issued for nearly 35 percent of the area overall and for almost 50 percent of the lands within the legally established Indigenous Reserves. Proposals to build an inter-oceanic

Figure 2.1. Multiple Jurisdictions in La Amistad Biosphere Reserve, Costa Rica



pipeline across the reserve, along with a proposed road through the heart of the Talamanca, and some 25 potential hydroelectric power plant projects in the area's watersheds surface occasionally (Gobierno de Costa Rica, 1990).

Developing Leadership and Management Capacity. Conflicts among the various agencies with jurisdiction in the area started growing in the mid-1980s. In response, the La Amistad Coordinating Commission was established by Executive Order of Costa Rica's President to address these and other problems (CI, 1988). Headed by the Minister of Natural Resources, Energy and Mines (MIRENEM), the Commission included representatives of all agencies with activities within the Reserve, including the Director of the National Park Service, the National Wildlife Service, the Executive Director of the National Commission of Indigenous Affairs, the Resident Director of the Organization of Tropical Studies (OTS), and the Director General of the National Parks Foundation. The Commission's aim was to set management policy for the biosphere reserve. Funding for the Commission, its General Coordinator and staff, came from a five-year debt-for-nature-swap supported by the Central Bank and Conservation International (CI) (Gobierno de Costa Rica, 1990).

Initial leadership and logistical support for the Commission was provided by the staff of Costa Rica's National Park Service. Conceptually, this role answered the call by the 1982 Second World Congress on National Parks to park and protected-area management authorities to use portions of their budgets, personnel, and other capacities to help their neighbors develop an ecosystem-wide area of cooperation and development to propel overall regional sustainability (Miller, 1984).

Shortly after, however, a newly elected government facing a fiscal crisis shrank public budgets and froze hiring for government agencies. Budget and staffing limitations kept it from fulfilling its expanded role in the bioregion—a narrow interpretation of the Park Service's mandate (Ugalde, personal communications, May 7-8 1994). All these factors combined resulted in sapped leadership and reduced capacity for program development.

This initial loss of momentum came at a time when the country was in the throes of fast-paced change. Tourism, mainly in the country's wildland areas, was becoming the nation's number-one foreign exchange earner. Meanwhile, biodiversity was receiving considerable attention as national and international pharmaceutical and biotechnology industries "bio-prospected" for promising natural substances. Further, the region's rivers were slated for hydro development. In just a few years, La Amistad changed suddenly from a remote hinterland into a focal point for national and international economic and policy interest.

Meanwhile, the Commission continued developing a coordinating mechanism for enforcing compliance with their agreements. "Informal dialogue," "enlightened self-interest," and "good ideas" simply were not enough to motivate private land-owners, commercial agriculturalists, indigenous leaders, and various public agencies to negotiate agreements for managing their resources, to formulate a common vision for the bioregion, and to agree on how to co-manage it. To them, the carrots were insufficient without the stick; they wanted assurance that behind the negotiating table and planning documents was a binding force.

The government responded in 1992 by asking the Organization of American States (OAS) and Conservation International (CI) to work with the La Amistad Coordinating Commission to develop an "institutional development strategy" (Castro et al., in press; Saunier et al., 1992). In less than six months, and without having to gather additional data or information, the team came up with a proposal for turning the Commission into a regional authority charged with the sustainable development of the "Talamanca landscape" (Saunier et al., 1992). Under this initiative, the Commission would manage both formal planning and informal dialogue throughout the region to balance all stakeholders' interests and power. The proposal emphasizes conflict resolution since most of the region's problems appear to

be social, economic, and institutional rather than technical. It also revamps the Commission, rotating leadership, adding more public and private interests to its membership, and giving it the lead in planning and guiding implementation.

The strategy also calls for setting development priorities for the region, recognizing indigenous peoples' territorial rights, preparing management plans for each protected area, and defining priorities for compensation where private lands are to be expropriated in the core areas of the Biosphere Reserve. Also, recommendations are given for managing development projects, including the Trans-Talamancan Highway, mineral-exploration concessions, pipeline and construction, carbon and hydrocarbon exploitation, and hydroelectric projects.

Responding to this study, the Costa Rican Government took two important steps. First, to insure leadership, the central government planning board was required to join the process. Second, to solve problems caused by overlapping jurisdictions, the scope of the original Commission mandate was enlarged to address development and conservation goals for the entire Talamanca mountain bioregion.

Getting Indigenous Stakeholders Involved. The indigenous peoples of the bioregion found it difficult to engage fully in the program. Both their perceived lack of skills and organizational capabilities and the failure of government and neighbors to recognize their land rights stood in the way. In fact, these peoples have in recent decades gradually become a modern Spanish-speaking political and economic community, but the pace of change had all but overwhelmed them as roads, water works, and other infrastructure entered the area. Meanwhile, squatters, marijuana growing, and the introduction of pineapple, banana, coffee, cattle, and other agro-industrial commercial commodities increased pressure on traditional lifestyles.

Faced with external market-driven pressures to grow commercial crops and to lease or sell their land rights to commercial interests, the indigenous groups formed KANEBLO, an NGO meaning "towards indigenous self-management," in 1992. The group's purpose is to enable indigenous communities in the Biosphere Reserve to survive in this rapidly changing environment by developing negotiating skills, access to information, community organizations, credit, environmental education curricula, cultural restoration techniques, livelihoods for women, forest nurseries, and other activities of local design and interest. Support comes from CARE of Costa Rica, Conservation International, and the Dutch government (Talamanca, 1992).

The involvement of indigenous peoples as stakeholders in the program was further challenged and facilitated when the Government took up the OAS/CI strategy recommendation to establish management zones within the formal Indigenous Reserves. These zones include isolated areas (where commercial contact is minimal and traditional indigenous modes of life prevail), areas integrated into the commercial economy (where the population is essentially part of the national economy), and marginal areas (where the indigenous people have paid a price for development without fully entering the commercial economy and where, often, ownership has passed out of non-indigenous hands, deforestation is complete, or commercial farms and other non-indigenous enterprises have replaced traditional land uses) (Gobierno de Costa Rica, 1990).

Finance. The costs of the La Amistad Commission, the salary of its coordinator, and other program costs are covered by various governmental and non-governmental sources. Obviously, to meet its mandate, the coordinating office needed uninterrupted operating funds to cover its technical staff, expenses for stakeholder meetings, support for stakeholder initiatives, and field projects. But once the initial five-year fund underwritten by the debt-for-nature swap was expended, no further operating funds for the program were forthcoming.

Fortunately, various international donors appreciated the integrated nature of the strategy and

its vision of local consensus-building. By 1992, funds from the Global Environment Facility, the Netherlands, the MacArthur Foundation, and Sweden combined with the joint contributions of CI and the McDonald's Corporation, the OAS, and UNEP totalled approximately US$12 million.

Costa Rica has now established a national "environmental fund" that can receive and disburse grants to projects and entities in the country, including the La Amistad Biosphere Reserve program (IUCN, 1994c; 1994d). That said, reliance upon time-bound external grants is risky unless local and national financial involvement in the reserve grows.

Risk and Uncertainty. On April 22, 1991, an earthquake precipitated the loss of more forest cover in the Talamanca than all the fires, illegal cutting, and colonization in the region during the past quarter century. By some accounts, more damage occurred to the Cahuita reef system *(see Figure 2.1)* than that caused by all the contamination from banana plantations. The 1991 quake cost the region its infrastructure, as well as housing and jobs. Disaster relief and re-investments in infrastructure absorbed manpower, facilities, and equipment and funds from all the region's government agencies and other stakeholders. Now, the lingering question is, "To what extent can policy-makers and others involved in bioregional programs anticipate such dramatic natural upheavals, put contingency plans in place, and adapt management accordingly?"

Lessons Learned from La Amistad Biosphere Reserve

La Amistad demonstrates that where conservation programs are enlarged from well-bounded protected areas to cover the whole bioregion, including public and private lands, complex challenges arise:

- leadership—lack of a mandate for public agencies to provide leadership, cooperate, and deploy personnel and budgets beyond jurisdictional boundaries to catalyze bioregional programs;
- access for stakeholders—indigenous stakeholders' lack of access and lack of skills for participation;
- funding—lack of continuity in funding for the coordinating mechanism once international sources are exhausted; and,
- natural disasters—lack of measures to anticipate and respond to nature's cycles.

The La Amistad experience provides several lessons:

First, establishing a mechanism to coordinate public and private organizations, especially where the array of pre-existing jurisdictions is wide, may take more than setting up a working group to foster dialogue and agreement among involved parties. A government mandated "regional authority" may be needed to provide leadership, commitment, and follow through. More specifically, such an authority may be needed to reconcile policy inconsistencies, such as budget and personnel restrictions, and to make sure that the agreements stakeholders help forge will be implemented.

Second, stakeholders at a disadvantage in becoming full partners in the bioregional program can be helped along. In this case, the indigenous communities used limited external funding to establish their own independent non-governmental organization to help them develop the skills and capacity needed to participate in the program and to promote their own development and conservation agenda.

Third, financial support to the overall program needs to be constant. Start-up funds from external sources are extremely valuable in the initial phase of work, when funding for personnel, transportation, organizational meetings, and initial field activities is vital. However, other long-term internal and sustainable means of support are needed. As government priorities change, program support through public funding may be precarious. Recognizing this challenge, Costa Rica established a special environment fund for depositing, capitalizing, and distributing public and private contributions.

Fourth, even the best bioregional planning and implementation program can be interrupted by acts of God, such as the catastrophic 1991 earthquake in the Talamanca. But though natural upheavals cannot be predicted, the cycles of which they are part can be. In Costa Rica, for instance, records show that such phenomena are common. Thus, an open question is how bioregional management programs, such as La Amistad, can build in ways to forecast natural events and to prepare for them with plans for emergency health care, infrastructure replacement, etc.

Finally, as a postscript, the 1991 earthquake in Costa Rica prompted the government of Panama to ask the Organization of American States and Conservation International to come up with a strategic plan for the whole Panamanian portion of the Biosphere Reserve. The strategy and related institutional arrangements were prepared in 1993-1994 (Juan Jose Castro, personal communication, September 14, 1995). After a three-year hiatus, the Central American Commission on Environment and Development rekindled the spirit of cooperation. Presently, national commissions are developing programs that include harmonization of land use and conservation along international frontiers, and the shared Central American Biological Corridor shown in Figure 1.2 (Mario A. Boza, personal communication, September 29, 1995).

Greater Yellowstone Ecosystem, U.S.A.

The experience in Yellowstone illustrates some of the challenges of developing a vision and plan for a bioregion that is primarily under public management. It shows how a private sector mechanism can contribute to consultation and build cooperation among all stakeholders.

Brief Description

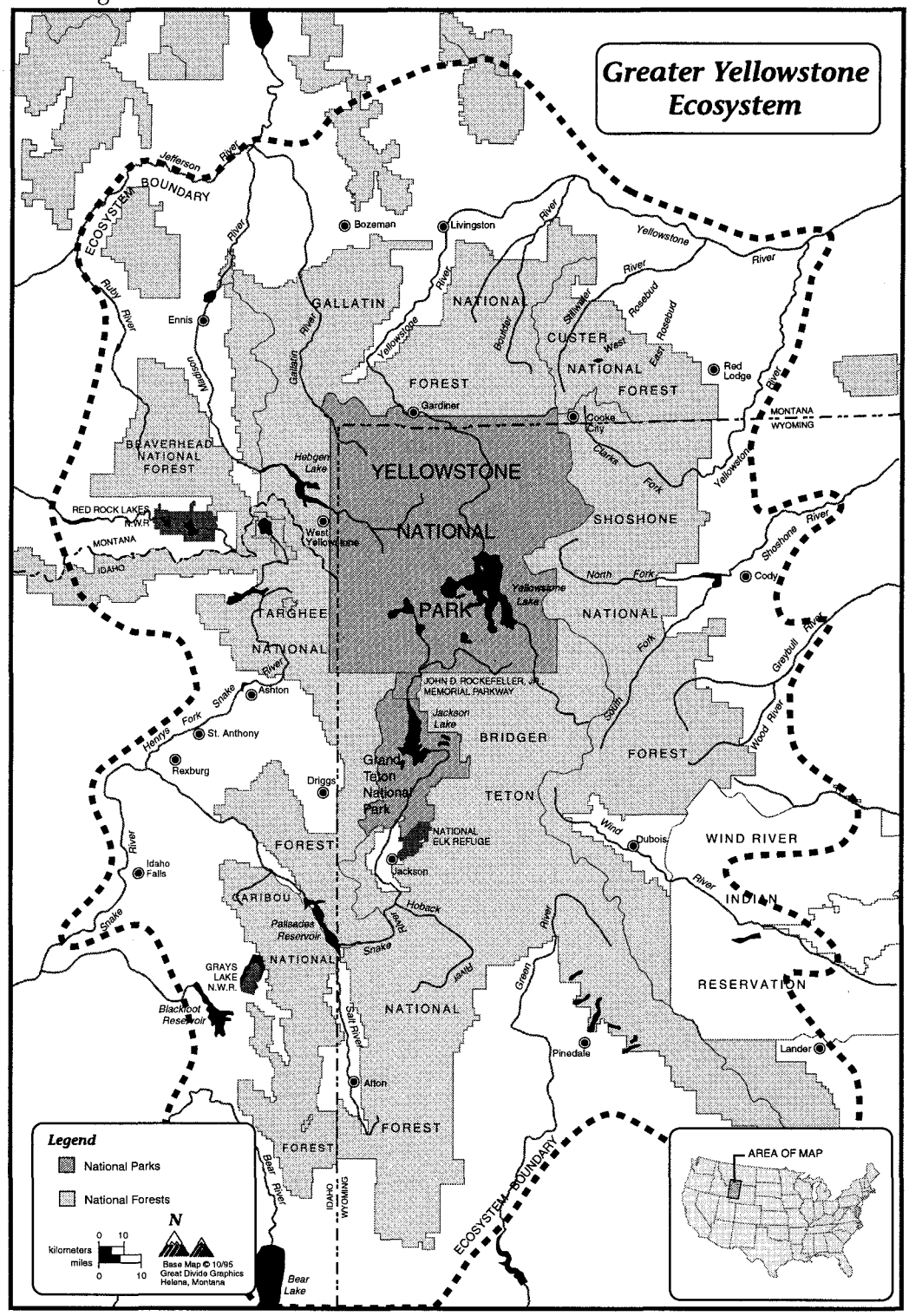
In 1872, Yellowstone was established as the first modern-era national park. Scientists, managers, and conservationists created the concept of the Greater Yellowstone Ecosystem (GYE) in the early 1970s to promote broader thinking, dialogue, and management of the Park as a component of a 7.3 million ha. bioregion. The GYE includes Grand Teton National Parks, Gallatin, Custer, Shoshone, Bridger Teton, Caribou, Targhee and Beaverhead National Forests, Grays Lake and Red Rock Lakes National Wildlife Refuges, a National Elk Refuge, part of the Wind River Indian Reservation, state and local government lands, and private lands (Clark and Harvey, 1990). The region's three important river systems—the Yellowstone, the Green, and the Snake—supply water to trout hatcheries, agriculture, and towns and cities beyond park and reserve boundaries (Ekey et al., 1994). Bald eagles over-fly the area and nest in selected habitats; elk, bison, and the threatened grizzly bear also range freely throughout the region, though even at its relatively large size of 898,349 ha., studies suggest the Park cannot maintain viable populations of major species including grizzly and elk (Newmark, 1987).

The GYE represents one of the last large, relatively undeveloped temperate-zone ecosystems left on earth (Barbee et al., 1991). *(See Figure 2.2.)* Accordingly, in 1976, UNESCO accepted the U.S. nomination of the Greater Yellowstone Ecosystem (GYE) as an International Biosphere Reserve and a World Heritage Site (Ekey et al., 1994).

The GYE also includes the homes and livelihoods of more than 220,000 people. The region's economic employment base is changing rapidly. Primary extractive industry is giving way to such activities as tourism that depend on maintaining the integrity and beauty of the region's natural systems (Goldstein, 1992). The economy is growing despite declines in the timber, oil, gas, and mining industries. Between 1969 and 1989, the number of jobs in the GYE grew by 68 percent and personal income grew by $2.2 million (Rawlins, 1994). More than 90 percent of all new jobs are outside the resource-extraction industries, and outdoor recreation accounts for 80 percent of national forest-related employment in the GYE.

The Greater Yellowstone Ecosystem illustrates an array of problems related to ecosystem planning and implementation, many of which have been amply analyzed by Goldstein (1992) and

Figure 2.2. A Large Proportion of the U. S. Greater Yellowstone Ecosystem is Managed by Few Government Agencies



Lichtman and Clark (1994). Of interest here is that a small number of public agency jurisdictions dominate this biodiversity-rich landscape.

Key Challenges to Bioregional Management

At issue is the balance between the interests of the region's diverse local citizens and those of the vast majority of the nation's population who live far from the area and may seldom or never visit the region.

Responding to growing legal and popular pressure on governmental agencies to protect, restore, and maintain ecosystems and endangered species, the National Park Service and the Forest Service took the initiative to prepare a management plan for the Greater Yellowstone Ecosystem. Since these two agencies together manage 76 percent of the GYE, they felt compelled to take the lead by establishing the Greater Yellowstone Coordinating Committee (GYCC), composed of the directors of these two services and their designated personnel. Issued in 1987, their first proposal, *Vision for the Future: A Framework for Coordination in the Greater Yellowstone Area* (GYCC, 1987), was hailed as "a model for interagency cooperation in this area well into the next century" (Mintzmyer, 1991). The report presented information on the relationships of the GYE parks and forests, aggregated current management plans for the park and the forests within the GYE, and offered an overview of their collective management. It also called for a common management of region-wide resources and a new administrative system to resolve conflicts.

Public debate of the *Vision* plan was intense. Local residents and interests gave it a rancorous reception. Conflicts were particularly strong between lumber, grazing, and other commodity interests on the one hand, and wildlife conservation and recreation interests on the other. For example, timber and cattle interests assert that their traditional way of life should be retained—a perspective common among rural people everywhere. In contrast, local wildlife-conservation proponents call for the restoration of elk, bison and grizzly habitat and advocate these species' free movement across both public and private lands. This approach, they argue, will sustain the regional ecosystem and stimulate within it a strong and growing economy based heavily upon tourism and recreation.

In 1991, the GYCC issued a second report (an 11-page brochure) containing the views not only of agency resource managers, but also of central agency officials. Critics argue that the second federal proposal basically backs away from ecosystem management and simply calls for each agency to manage its own jurisdiction (Lichtman and Clark, 1994). Negative public reaction to the second government report paved the way for a non-governmental (NGO) initiative comprised of more than 90 organizations and thousands of individuals—the Greater Yellowstone Coalition (GYC). Formed to maintain a healthy landscape while accommodating a sustainable economy (Ekey et al., 1994), the GYC's mission is to "...ensure the long-term preservation of the Greater Yellowstone Ecosystem" (Glick, in press).

In 1989, the Coalition launched a Greater Yellowstone Tomorrow project to plan for the future protection of the GYE through wide public debate and consultation with stakeholders. Objectives include:

1. Develop a *Blueprint for the Future* to help articulate a vision for the region and make recommendations for managing the entire GYE. Published in 1994, this report has been put forward as an "alternative vision" to the federal agency document and reflects a "...solid understanding of ecosystem functions, man's impact on these processes, and actions needed to assure long-term protection and restoration" (Glick, in press; Rawlins, 1994).

2. Organize an informed and motivated constituency to make sure that recommendations in the action plan get implemented. Various debates and meetings have taken place in the region to promote community-generated visions for the GYE.

3. Help catalyze the implementation of the *Blueprint*. The 1994 *Blueprint* calls for the adoption

of a Greater Yellowstone Conservation Act, which would designate some areas as wilderness, wildlife, and recreation areas and would protect corridors that link the GYE to other wildlife and ecosystem programs in the Rocky Mountains (Ekey et al., 1994). It also calls for protection of such critical areas as watersheds that lie outside protected areas and recommends actions on water quality and fisheries, national parks, private lands, geothermal features, and biodiversity.

Lessons Learned from the Greater Yellowstone Ecosystem

This example illustrates two distinct issues. First is how the dominant stakeholder (in this case, central government agencies) can take the lead to form a vision and plan for a bioregion that contains multiple stakeholders. The second is how assuming that the problems and challenges of planning a complex ecosystem are mainly technical can be a trap (Willcox, 1995). In the GYE, the planning challenges were primarily political, social, and economic. Commodity-extraction interests wielded more political power than public officials anticipated, both in the region and in Washington.

According to Lichtman and Clark (1994), the public agencies failed to analyze, understand, or test public values, expectations, and demands. They also failed to test the "vision" proposal with stakeholders and to initiate special educational, information, and public relations activities in the communities within and around the GYE. These analysts suggest that "It is in a policy or plan's infancy that it is possible to mitigate or eliminate obstacles most successfully" and that once a new policy initiative begins, "unpredicted responses can be much more potent, undermining the entire policy process" (Lichtman and Clark, 1994).

Even though the community recognized the importance of ecosystem management, the values of local residents are still, deep down, shaped by an historical epoch of resource extraction. A highly orchestrated minority citizen opposition was thus able to convince the larger community that this "ecosystem management proposal" was nothing but a governmental "land-grab" and a Federal "lock-up" (Lichtman and Clark, 1994).

The Wadden Sea

The Wadden Sea demonstrates how three countries established a coordinating mechanism to help them manage their respective portions of this shared biodiversity-rich and heavily-threatened North Sea coastal zone. Total national sovereignty is maintained, but the three countries negotiate and agree on common guidelines, norms, and activities in the bioregion.

Brief Description

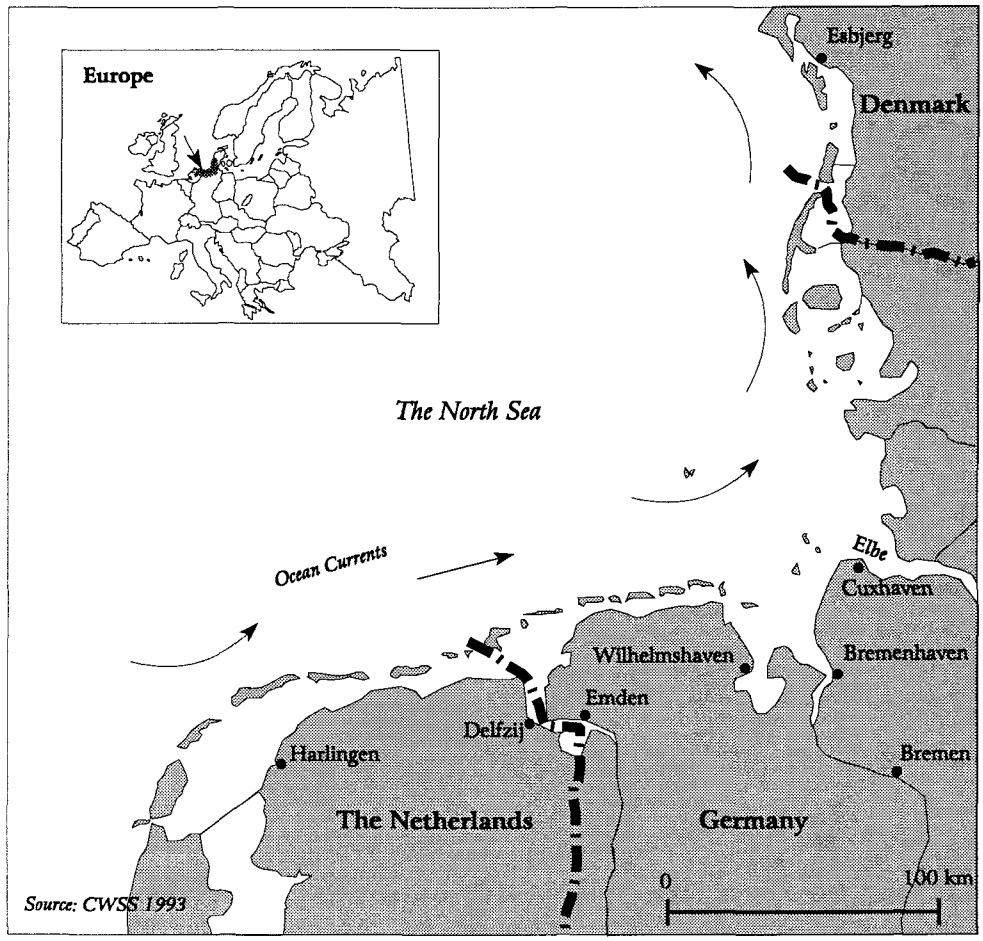
The Wadden Sea—a tidal area extending from Den Helder in the Netherlands along Germany's coast and the islands to Esbjerg in Denmark—is the largest unbroken stretch of mud flats in the world, encompassing approximately 900,000 ha (CWSS, 1991). About 30 percent of the Wadden Sea falls within the jurisdiction of the Netherlands, 60 percent in Germany, and 10 percent in Denmark. *(See Figure 2.3.)*

This sea is an important nursery for numerous North Sea fish species and the backbone of the North Sea commercial fishing industry. It is the main stopover for birds migrating from arctic breeding grounds to wintering grounds in Europe and in western and southern Africa. An estimated six to twelve million birds pass through the Wadden Sea annually.

Bordering the Wadden Sea are some of the most highly developed and populated areas in Europe, so the environment is under increasing strain from industrial and ship-borne pollution. Signs of impact include algal blooms, trash on beaches, and oil-coated sea birds and mammals.

Some 25 years ago it became increasingly apparent that traditional terrestrial and species conservation measures alone could not preserve this unique ecosystem (Enemark, 1993). Various parts of it have since been placed under comprehensive national and international legal protection.

Figure 2.3. A Tri-Country Bioregional Program for the Wadden Sea in Denmark, Germany, and the Netherlands



Challenges in Shifting to Bioregional Management

The Wadden Sea case illustrates the challenges faced when several bordering countries try to co-manage a shared cross-border ecosystem. The problem begins with differences among the three countries regarding conservation goals, institutions, and management practices.

Each Country's Distinctive Management Regimes

The Danish Wadden Sea. The Danish Wadden Sea was designated a Special Protection Area according to the EC-Bird Directive in 1983 and a Wetland of International Importance in 1987. According to the Danish Act on Nature Conservation, the Minister of the Environment can designate areas for nature conservation on the Sea and state-owned property. A Nature Reserve designation promotes conservation of the ecosystem while a Wildlife Reserve designation regulates public hunting and other recreational activities (CWSS, 1991). Yet, no general guiding management or management plan governs these areas; state and county councils each manage their own jurisdictions, taking responsibility for physical planning, water-quality management, and so forth.

Areas designated as Nature Reserve in the Danish Wadden Sea total approximately 95,000

ha. Ten percent of the Nature Reserve is closed to the public; part of this area is dedicated to scientific research (CWSS, 1991). In 60 percent of the Nature Reserve, human activities are strictly regulated. In the remaining 30 percent consisting of the North Sea and the main shipping routes, few regulations exist.

The German Wadden Sea. The German part of the Wadden Sea is managed by federal, state and district authorities. No formal agreements coordinate federal and state management. Under the Nature Conservation Act—a framework law—nature conservation is a state responsibility (CWSS, 1991) and protected areas are designated as Nature Protected Reserves or National Parks. The major part of the German Wadden Sea is designated as national park, which is managed by the Federal State governments. German national parks contain natural areas where the management objective is to preserve as many native species of flora and fauna as possible (CWSS, 1991).

The Dutch Wadden Sea. To manage its portion of the Wadden Sea, the Dutch rely on physical planning, the Wadden Sea Memorandum of 1980, amended in 1993, and the Nature Conservation Act (CWSS, 1991). From the beginning, the policy goal has been to protect and manage the Dutch Wadden Sea as part of a larger coastal and marine ecosystem. The 1980 Memorandum—aimed at protecting and developing the Wadden Sea as a natural area—is a national physical planning document for conservation and management.

Unlike the approach taken in the German Wadden Sea, where regional and local jurisdiction over the area have been curtailed, management authority over the Dutch Wadden Sea rests with adjacent provinces and municipalities. The objective is to ensure integrated planning of the area and public involvement in planning (Enemark, 1993). Additionally, a major part of the Dutch Wadden Sea has been declared a National Natural Monument under the Nature Conservation Act (CWSS, 1992), so activities that destroy or damage the protected area are prohibited. A management strategy and management plans ensure policy implementation and coordination among various sectoral interests.

Institutional Cooperation within Each Country

In the Netherlands, administration of the Sea has been divided among three levels of government. Committees coordinate policies at each level and among corresponding institutions. An Interdepartmental Wadden Sea Commission coordinates the policy of national departments while the Steering Committee of the Wadden Sea Provinces and the Federation of Wadden Sea Municipalities harmonize the activities of the three provinces and 16 municipalities (CWSS, 1991). In contrast, Germany has no coordinating committees. Denmark's Ministry of the Environment consults other ministries, county councils, municipalities, and other organizations when it amends policies or implements new ones (CWSS, 1991).

Institutional Cooperation among the Three Countries

The impetus to get the three countries to cooperatively manage the common bioregion was first articulated in a Joint Declaration of the Wadden Sea, signed in Copenhagen in 1982. Common management issues were first discussed at the Fourth Trilateral Governmental Wadden Sea Conference, held three years later in The Hague.

Although the 1982 agreement was to foster consultation and coordination among the three parties, later decisions shifted program focus out to the ecosystem as a whole and expanded the mandate of the tri-country program Secretariat to take common actions to safeguard the Sea's sustainable development (CWSS, 1991). In 1991, the 6th Trilateral Governmental Conference set the cornerstone of the program by adopting a common guiding principle—to allow natural processes to proceed in this ecosystem—and common management principles. Participants agreed to develop common ecological targets and to elaborate a common management plan for a joint conservation area.

In the Esbjerg Declaration, which lays out the guiding principle, pollution and species and habitat conservation policies are addressed, marking a clear shift from strict conservation objectives toward a more integrated ecosystem policy. At the 7th Conference, these decisions were further substantiated by agreement on the boundaries of the cooperatively managed area and on ecological targets for maintaining its physical, chemical, and biological quality (CWSS, 1994). Ecological targets will be detailed at the 8th Governmental Conference in Germany in 1997.

Lessons Learned from the Wadden Sea

The tri-country Wadden Sea program offers important lessons for those who plan to set up mechanisms to conserve biodiversity across ecosystems that extend into several countries.

First, the need for inter-governmental mechanisms can be minimal if local and national land and conservation institutions and practices are well established. Periodic inter-governmental conferences at which interested parties can formulate a common vision, goals, research, and project plans may make a legal international instrument unnecessary. In the case of the Wadden Sea, it was considered more practical to harmonize conservation and management practices within existing national legal and administrative systems (which differ considerably). As the trilateral program evolved, however, a common secretariat was installed in 1987 to facilitate political activities and implement agreed measures, collect and disseminate information on conservation measures, and study and publicize activities that could harm the natural environment in the Wadden Sea.

The relative merits of using political versus legal commitments to protect the Wadden Sea are still debated within the region. Arguably, it is easier to reach common understanding when "only" political commitments are at stake. Moreover, while legal agreements are binding, their implementation in practice may be no more certain than political commitments. In any event, even under this loose arrangement a common secretariat with a mandated program of work has intensified and professionalized tri-lateral cooperation (Folkert de Jong, personal communication, August 29, 1995).

Second, states can retain full sovereignty and maintain their unique domestic cultural style and governmental approach to management if efficient national and local management mechanisms can meet multi-country goals.

Third, the agenda to be discussed among the countries that share the ecosystem must give program goals, ways to achieve those goals, and program evaluation and compliance their due. The Wadden Sea program shows that issues as distinct as marine pollution and wildlife and habitat conservation, can be integrated into country programs, once agreed upon and specified through dialogue backed by research and analysis.

Greater Serengeti Ecosystem

Had the right steps been taken to establish cooperative management arrangements with local residents early on, the Ngorongoro case might well have emerged as a text-book example of the only protected part in the whole of Eastern Africa in which multiple land use was directed, ahead of time, to promote the dual goals of environment and development.

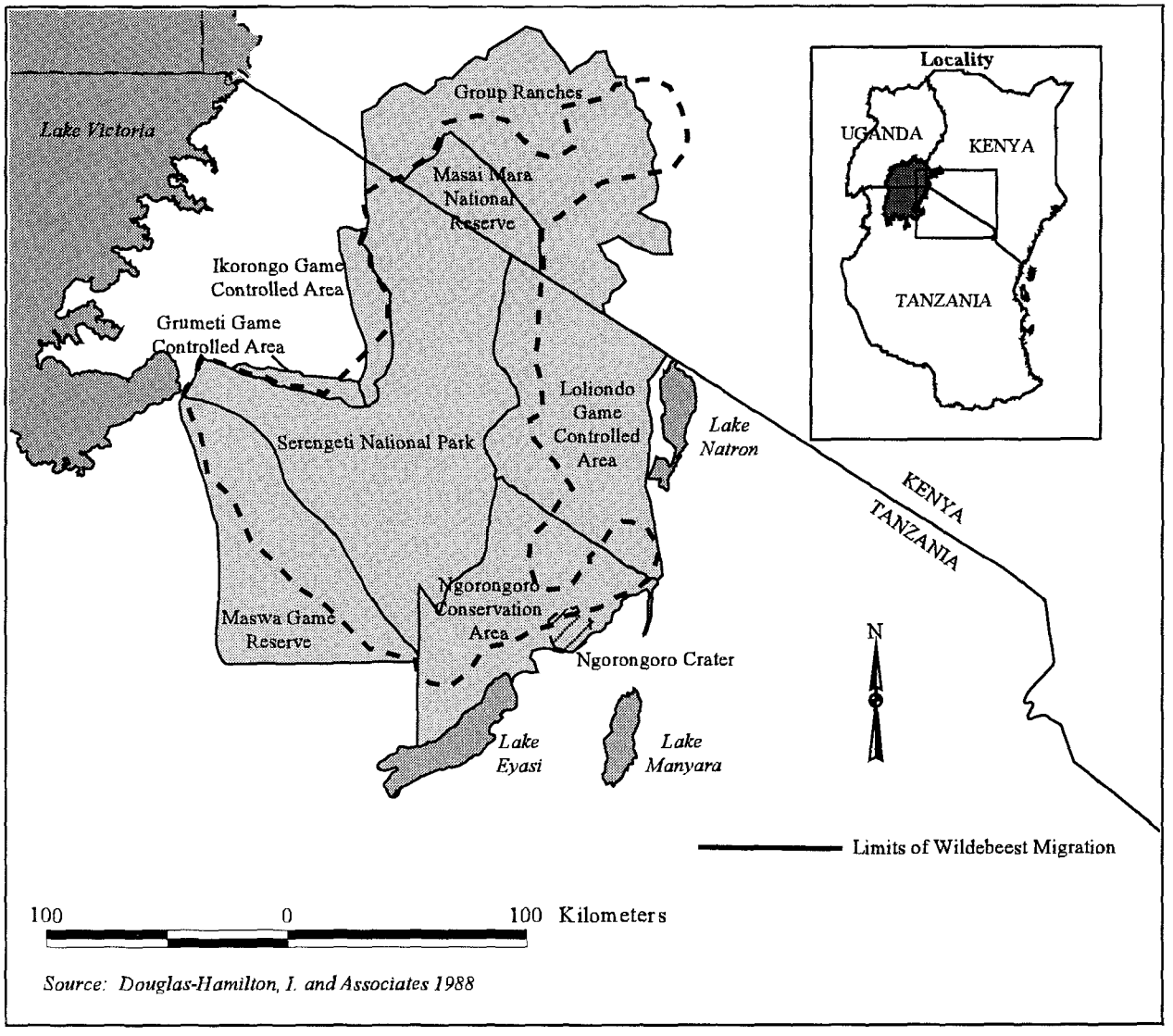
Adolfo Mascarenhas, September 28, 1994

Few examples illustrate more poignantly than the Serengeti the challenges of protecting wildlife in ecosystems encompassing the homelands of indigenous peoples. In this case, maintaining biodiversity may require striking an appropriate balance with pastoralism.

Brief Description

The Greater Serengeti Ecosystem (GSE) straddles the Kenya/Tanzania border and covers more than 60,000 km^2. As shown in Figure 2.4, the GSE is composed of Serengeti National Park (SNP),

Figure 2.4. The Greater Serengeti Ecosystem, Kenya and Tanzania, Showing Range of Wildebeest Migration



Source: Douglas-Hamilton, I. and Associates 1988

the Ngorongoro Conservation Area (NCA), the Lake Eyasi Basin, Maswa Game Reserve, the Grumeti, Ikorongo, Loliondo and Lake Natron Game Controlled Area in Tanzania together with Masai Mara National Reserve, the Loita Plains, the Isiria Plateau, and the Loita Highlands in Kenya. Fourteen distinct indigenous cultural communities reside within and use portions of this complex (Mascarenhas, pers. com. September 28, 1994; Parkipuny, 1989).

Humid forested mountains, extensive savannas, volcanic craters, and fresh water lakes make for outstanding landscape diversity. The re-

gion's Ngorongoro crater numbers among the world's largest unbreached calderas, covering over 250 km^2. Annual rainfall varies from 1,200 mm in the north to less than 400 mm in the south-eastern plains and the Rift Valley, and altitude ranges from 3,000 m in the forested mountains of the east to 1,140 m at Lake Victoria in the west (United Republic of Tanzania, 1991; Parkipuny, 1989).

For over 3,000 years, pastoralism has helped shape the region's environment, and the Masai have been on the scene for at least 500 years (Berger, 1993; Western, 1993). This complex interrelationship of human activity and ecosystem functions may suggest the need to manage this greater ecosystem as a carefully coordinated unit.

The wildlife of GSE has made the area world famous. More than one million wildebeest migrate through it seasonally along with zebra and other grazing species, with lions closely following on their heels. Kenya and Tanzania have given a major portion of this region protected area status, and special zones within them are cooperatively managed with the Masai and other local groups (Homewood and Rodgers, 1987).

The Ngorongoro Crater portion of the GSE, with its unique assemblage of natural and cultural richness, has been named both a World Heritage Site and an international Biosphere Reserve. It has become a major destination for thousands of tourists each year.

Challenges of Managing at the Whole Ecosystem Scale

The way of life of this region's pastoralists over centuries may have helped shape the Serengeti. It may have more potential to maintain diversity than either a return to uninhabited wilderness or a switch to intensive agriculture. However, competition for the area's resources, failure to coordinate the two countries' efforts, and the absence of an effective and equitable mechanism for managing the region is impoverishing the ecosystem and the local culture and inviting the erosion of biodiversity.

The Serengeti region was declared a National Park in 1940, the first of its kind in Tanganyika. This followed a series of earlier decisions from the 1920s onward by the central colonial, and later the national government, to extinguish—with the mere stroke of a pen, and without any prior warning or consultation with local residents—the traditional land and resource rights of 10,000 inhabitants (Fosbrooke, 1972).

In response to unrest by the area's pastoralists and agriculturalists, the government decided to divide the Serengeti region into two areas: a larger western section (covering 14,263 km^2) became the realigned Serengeti National Park. The eastern portion (covering 8,292 km^2) was declared the Ngorongoro Conservation Area (NCA). The 1,200 Masai who lived in the western portion were moved into the eastern Ngorongoro Conservation Area, where the new Ngorongoro Conservation Area Authority was to administer the multiple-use NCA with the needs of both settled and relocated populations in mind.

Conflicting Stakeholder Interests over the Greater Serengeti Ecosystem. Conflict has arisen over the future of the entire GSE among local people, national administrations in both countries, and international interests. On one side, national and international preservationists, along with some governmental agencies, favor relocating the local people and managing the entire area for wildlife to encourage tourism. These interests see wildlife-based tourism as the major economic strategy for this bioregion.

Apart from the moral and ethical reasons for allowing the Masai and other groups to remain in their homelands and to control their own future, the other view argues that pastoralism should be encouraged, sometimes in modified form to further biodiversity preservation. Although not all scientists and other observers agree, Masai pastoralism is generally considered compatible with the region's soils, rainfall, and vegetation (Sanford, 1983; Homewood and Rodgers, 1987). Absent pastoralism, excluding the Masai from several portions of the GSE already appears to be reducing biodiversity and accelerating environmental degradation.

Regardless of how this argument is resolved, the Masai's way of life can inform management options. In a nutshell, the Masai practice *transhumance*. They generally reside in permanent settlements, their livestock are moved closer to or away from settlement areas according to the availability of grazing range. "Home" to them is not a small, fixed place, but an area that expands or contracts as rainfall patterns, range conditions, and other livestock needs vary. Even though the Masai's goals are compatible with biodiversity goals because the group has learned to cope with drought and erratic rainfall by managing livestock over a particularly large region, the group's way of life has changed since European influences arrived a century ago, and the impact has been dramatic and long lasting.

The experience of the Masai of Tanzania's Ngorongoro Conservation Area illustrates some of the problems that arise when arrangements for managing the greater ecosystem fly in the face of local peoples' way of life and concerns. In this case, no meaningful negotiation took place between residents and authorities with differing goals (Mascarenhas, personal communication, September 28, 1994).

For example, relocated Masai agreed to move their settlements and herds again in the late 1960s—this time up out of the Crater floor and onto the rim—at the NCAA's request. But negotiations had not been thorough or focussed enough, and the impact of this decision has continued to haunt residents, managers, and policymakers alike. Traditionally, Masai moved their livestock freely in search of the fresh green flush that follows cycles of fire and rainfall. Now, they were restricted not only to the Ngorongoro Conservation Area, but also to the Crater's rim lands only. They lost grazing space and could no longer keep livestock at a safe distance from wildebeest movements—which have broadened to include the Crater rim—and the animals' new multiple-season home in the moist highlands. Now, wildebeest calving takes place near livestock, risking the spread of malignant catarrh fever to cattle. To make matters worse, calving periods are becoming longer too.

Meanwhile, livestock diseases and limits on supplies of grassland fodder and water have already caused cattle numbers to drop dramatically. The Masai have fewer animals to sell to buy grain to eat, and since grain prices are rising faster than cattle prices, nutrition problems and even starvation loom.

Help for the Masai has been discussed for years, but little progress has been made. Veterinarian services promised in the 1960s as part of a relocation decision haven't yet materialized, so tick-borne diseases persist. And road access promised to the Masai to enable them to take cattle out and bring grain on the return haul has deteriorated because government crews don't maintain these rough-terrain arteries. Even attempts by some Masai to grow enough grain on the highland rim to get back on their feet before rebuilding dwindling livestock herds have run aground on a government policy that prohibits cultivation in the moist highlands.

If the marginalization of the Masai and other peoples of the Greater Serengeti Ecosystem whose lifestyles and practices have formed part of the *de facto* management of the area reflects government policy, then how can biodiversity goals be achieved? If policies favor managing core areas as uninhabited wilderness, while converting the surrounding matrix to paddock cattle grazing and grain production, the odds for biodiversity don't look good.

Institutional Cooperation. At a landmark workshop held at Seronera in the GSE in December 1985, it was agreed that any solution to this set of issues would depend upon cooperation between conservation, tourism, and Masai interests. A Serengeti Regional Conservation Strategy (SRCS) was mandated to come to grips with the needs of the people—that is, to identify actions that would satisfy community needs without jeopardizing the region's resource base (United Republic of Tanzania, 1991).

A strategy for promoting sustainable management of the entire ecosystem complex has now been prepared under the auspices of the Ministry

of Tourism, Natural Resources and Environment, co-financed by the Norwegian Agency for International Development (NORAD) and the Frankfurt Zoological Society (FZS) with technical and managerial support from the World Conservation Union (IUCN) (United Republic of Tanzania, 1991). Its aim is to promote sustainable management of the entire ecosystem complex. The strategy recommends implementing the plan through existing government and community structures instead of creating new organizations. A Programme Coordination Unit (PCU) will be created during Phase III of the SRCS, under the overall direction of a Programme Director to be seconded from Tanzania's Ministry of Tourism, Natural Resources and Environment. The technical program will be overseen by a Chief Technical Advisor provided by IUCN.

Mr. J.J. Boshe, former academic chief officer of the East Africa Wildlife Management School in Mweka, Tanzania, provided this advice on how to manage the GSE: accept and accommodate the current combination of wildlife conservation and pastoral activities and combine both in a zoning plan; recognize the rights of occupation and use in the area; respect the local life style, culture, traditions, and values; involve the Masai in the planning and management of conservation programs; demonstrate that conservation of the areas' natural resources benefits all local communities by placing a portion of the tourist revenues into the Masai's development programs; plan and provide the communication and transportation infrastructure so local people can get essential commodities from surrounding areas; realize that if the Masai aren't allowed to use the Loliondo area to supplement their diet with agriculture, they will be forced to move into the Ngorongoro areas that are critically important for biological, scenery, archeology and other values (Boshe, 1989).

In Kenya's Masai Mara, in the northern portion of the GSE, other types of innovative institutional arrangements are being developed to foster cooperation and address equity issues. For example, a portion of revenue gained from wildlife and tourist activities is being returned to local communities. In 1987, tourism, cattle, and other activities of the Masai community in the Reserve produced revenues totaling 444 million Kenyan Shillings (Ksh) (about $11 million US dollars equivalent), or eight percent of the gross tourist receipts of the entire country. Of this sum, 26 million—23 million from tourism and 3 million from group ranches—were retained in the Mara area and Narok (administrative) District. Part of the retained funds are invested in basic socio-economic activities and community development projects, such as schools, health clinics and cattle dips. In addition, grazing fees for wildlife are paid to group ranches.

The Masai-run Narok County Council manages the Mara Reserve and the revenues it generates. The Mara Senior Warden manages the Reserve for the County Council with guidance from the Masai Mara National Reserve Management Committee (composed of representatives of the central government's Wildlife Conservation Department, the Chairman and several councilors of the Narok County Council, the Narok District Commissioner, chiefs and representatives of the neighboring group ranches). The group ranchers themselves collect fees for camping on their areas (Parkipuny, 1989).

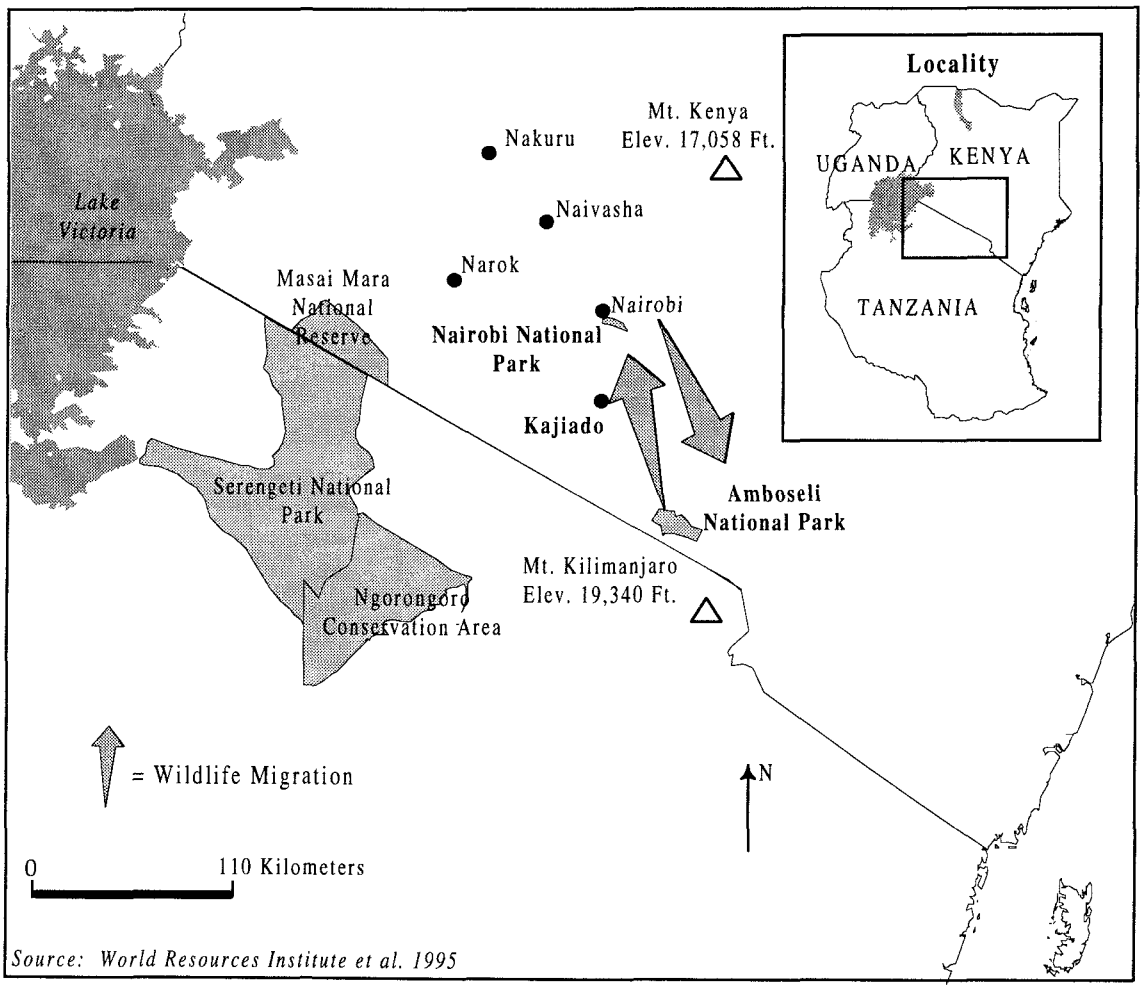
Kenya's Kajiado District and the Amboseli National Park, located East of the Serengeti, afford experience and insights into how conflicts like those observed in the Greater Serengeti are being resolved under quite similar circumstances.

In 1974, an area around the Amboseli swamp was declared Amboseli National Park. *(See Figure 2.5.)* Within a few years, the program was expanded to cover the migration route of wildlife from Amboseli northward to the Nairobi Park (Western, 1994).

The Kajiado Wildlife Management Project was developed and run from 1971 to 1977 to manage the entire bioregion and to bring direct tangible benefits to the Masai—wildlife protection in the two parks, species management, and compensation to ranchers (Western, 1994; Parkipuny, 1989).

The Project developed three key types of incentives and rewards. First, it helped group

Figure 2.5. Kajiado District, Amboseli, and Nairobi National Parks, Kenya



ranchers organize hunting concessions and allowed game cropping on their lands. Second, it helped group ranchers identify potential camp sites to attract paying visitors from Amboseli, Tsavo, and Chyulu Parks. Third, it carried out regular wildlife counts and assessments of the range resources used by wildlife to determine grazing fees.

The Government of Kenya negotiated agreements with the resident Masai on several key issues. For example, the Masai of Amboseli agreed—albeit reluctantly—to relocate their settlements and livestock outside the Park boundary, and the Government promised to provide the Masai with a watering source for the people and their livestock there. Access to water and pasture lands in the dry season was a sore point. Most natural watering sources had already been absorbed into East Africa's national park system, where human use or occupation (including livestock grazing) are excluded (Berger, 1993). The government also promised to provide the Masai with important social services and to assist them in developing hunting-based tourism on their lands.

Initially, the wardens and the Masai cooperated. However, over the years, pipelines and boreholes outside the parks were not maintained by the government as promised, so water sup-

plies were inadequate. Such unfulfilled promises left local Masai little alternative but to drive their herds illegally into the park for water. Parkipuny (1989) notes that despite its popularity among the resident Masai, the Kajiado Project was abandoned by government and its international collaborators for reasons that are not entirely clear.

The shift from common land pastoralism to privatized group ranches did have its drawbacks. For example, Masai ranchers consider the ranches too small. Domestic herds can no longer be moved in response to drought, rainfall, and pasture flush, so if rainfall happens to pass a ranch by, it will face economic disaster. Finally, with the introduction of fenced boundaries, and the practice of individual or group, rather than communal property rights, the traditional system of reciprocal grazing and water arrangements among Masai groups has eroded (Berger, 1993).

The key incentives that enabled the program to attract the participation of government and the Masai—wildlife management revenues and grazing fees for wildlife—were eliminated when the Fund that covered these expenses was exhausted in 1977. The program was further undermined when hunting was totally banned that same year, eliminating both game cropping and hunting concession fees (Parkipuny, 1989).

According to Dhyani J. Berger, forces at work in the Kajiado region are fragmenting the landscape. Historically, people and wildlife used the entire greater ecosystem as a single large-scale unit. Within it, their movements were synchronous with rainfall patterns and other ecological conditions. Today, the land is divided into five increasingly independent sub-systems of use and ownership: small holdings, individual ranches, irrigated patches, group ranches and national parks (Berger, 1993).

As Berger notes, the Wildlife Extension Project (WEP) was initiated in 1991 on the assumption that people would contribute to conservation if they participated in conservation activities and benefitted from them (Berger, 1993). Indeed, the central principle of the project was that successful coexistence of people and wildlife would necessitate the organization of informed and empowered communities and broad public participation in conservation affairs (Berger, 1993). To meet this implied goal, Berger established a "wildlife extension" (WEX) program. The first step was conducting an information survey—one-day data-gathering workshops on each of 14 group ranches. The 131 individuals who participated were also invited to send representatives to a follow-up workshop where survey results were reported and important issues discussed in greater depth (Berger, 1993). This exercise uncovered the need for action to address many issues: wildlife damage to crops and pasture; difficulties in getting compensation and collecting hunting fees; wildlife as a reservoir of disease; conflict with the Wildlife Department; disputes over grazing, watering and park boundaries, poaching, and fear of armed poachers; lack of local benefits from wildlife tourism; and, the negative effect of tourism on local culture (Berger, 1993).

As a matter of some urgency, the WEX group decided to install solar electric fences to exclude wildlife from cultivated areas while still allowing it access to key watering sites. Also, members of the Olgulului Group Ranch joined a WEX-organized educational tour to Laikipia, where a women's cooperative used a solar-electric fence to keep elephants out of their maize plots. They interviewed the farmers to learn how to construct and maintain the fence (Berger, 1993). Later, at a community meeting, WEX participants from the Olgulului Ranch decided to install the electric fence, though a dispute over common borders had to be settled first. About two years after the initial survey, the Olgulului Ranch had raised Ksh 30,000, collected 200 fence posts, and ordered 400 more. The Kenya Government and Wildlife Conservation International provided technical support and solar equipment. Now the community is maintaining the fence (Berger, 1993).

Lessons Learned from Serengeti, Mara, Kajiado, and Amboseli

As Berger highlights, problems that are to be solved through community action must be dealt

with promptly. For example, the two years it took from the time the wildlife damage to crops was identified until the moment action was taken may be more time than is usually available to fix a management problem.

From the Kajiado Wildlife Management Experience, Parkipuny extracts the following lessons:

- Keep the scale of the project practical;
- Make sure that the project target group has a unity of purpose and think of themselves as members of a cooperative venture;
- Start any efforts to organize and promote benefits to community groups with training and community mobilization;
- Integrate new wildlife activities with those of other institutions and groups active in the area; and
- Recognize that how local people feel about wildlife depends on how secure their livelihoods are.

Looking back on Kenya's policy of granting ownership rights over national reserves to county councils and to the payment of compensation, hunting, and grazing fees to group ranches, Parkipuny concludes that such benefits can mean little in actual practice (1989). Problems will arise if there is no consistent, concrete management system designed to ensure that innovations are implemented within an efficient sustainable framework. Also, as undeniable as the current need for external initiatives and financial support are, a shift is needed away from initial dependence on external resources to increasing reliance on direct earnings generated by tourism and wildlife (Parkipuny, 1989).

In Parkipuny's view, the "...conservative, insular and fragmented approach to protection of biological resources is leading to a dead-end." He argues that planned and integrated management is needed—management that harmonizes the conservation of biological resources with efforts to "uproot poverty and backwardness among the local human communities" of the Greater Serengeti Ecosystem—and proposes adopting the biosphere reserve concept in this region (Parkipuny, 1989).

From the evidence it is not clear whether a compromise solution can include both Masai and other peoples and biodiversity conservation in the same space. Certainly, at the one extreme are cases and spaces where biodiversity protection and restoration will be best served if kept free from grazing by domestic animals. Yet, including intensive agriculture and domestic livestock paddocks in the general matrix of the ecosystem is not likely to retain much taxonomic, genetic, or ecological diversity. But the option of working with the Masai and other peoples ought not to be lost too quickly since good co-managers are hard to find.

Great Barrier Reef Marine Park

The mandate for the Great Barrier Reef Marine Park is to protect the marine and coastal environment while fostering appropriate uses of the area's resources (*The Great Barrier Reef Marine Park Act of 1975*). The Great Barrier Reef Marine Park Authority's implementation of this mandate demonstrates a balance between a strong catalytic role by government and a commitment to promoting partnerships with other institutions.

The Great Barrier Reef Program in Brief

The Great Barrier Reef extends along approximately 2,300 km of the eastern coast of Queensland. *(See Figure 2.6.)*

The world's largest system of corals and associated forms, it is also the largest known marine repository of biodiversity (French, 1991).

It is diverse in both the sizes and types of islands and reefs found and in the number and variety of organisms it supports. The Reef includes approximately 3,000 individual reefs, 350 sand cays, and 600 continental islands. Its ecosystem

supports approximately 400 species of coral, more than 1,500 species of fish, and populations of Indo-Pacific invertebrates, birds, turtles, dugong, whales, and dolphins (Great Barrier Reef Marine Park Authority, 1993). The Great Barrier Reef Marine Park, an area of 344,000 square kilometers, was given World Heritage listing in 1981.

Tourism is a major activity in the Great Barrier Reef, contributing in excess of $1 billion (Austr.) annually to the Australian economy. An estimated $300 million (Austr.) is spent annually at island resorts and on commercial and private boating. Mining (sand, coral, possibly petroleum), fishing, and shipping also could bring in revenue if developed. Under the previous regime—within adequate controls that were not scientifically based—these uses were already damaging various parts of the Reef.

Challenges to Managing a Large Marine Ecosystem

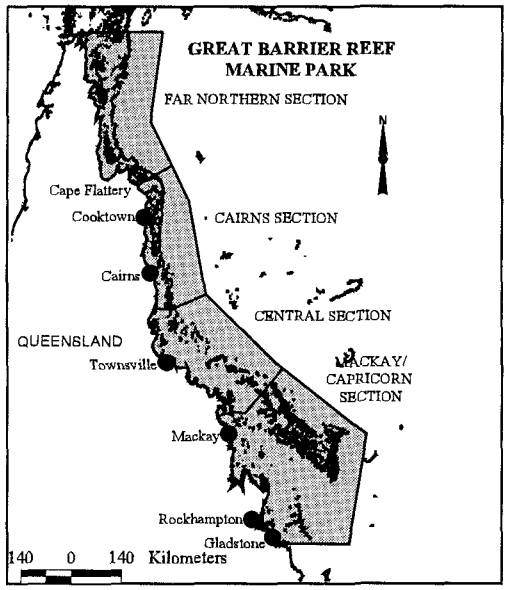
Establishing the Capacity to Manage a Large Coastal-Marine Ecosystem. Legally, Australia's terrestrial and coastal areas are under the jurisdiction of the States, so State and central, or Commonwealth-level institutions must be involved in any comprehensive effort to manage marine ecosystems. Besides that of working together, these collaborators face two major challenges.

First is rapidly-growing tourism. Already by 1988, Australians were making about 141,000 visits annually to the Great Barrier Reef region. In that year, tourists (both local and foreign) spent about $175 million (Austr.) in the area (Alcock et al., 1991). People journey to the Great Barrier Reef to view the coral from special bottom-viewing vessels and to fish, collect shells, and dive. Several of these activities are potentially harmful to the ecosystem (Alcock et al., 1991), especially visits to the reef on pontoon boats. In 1988, the number of hotel rooms in all of Queensland rose 11.5 percent while the number of rooms available in the island resorts increased by 21 percent. Australians visit mostly during the winter months on weekend or extended weekend trips, while overseas travelers visit all year long. Now, more than 1 million people visit the Great Barrier Reef annually, so managers must limit them to particular sites.

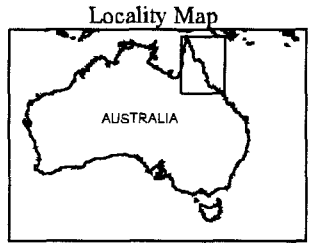
The second major challenge has been dealing with the crown-of-thorns starfish—a voracious echinoderm that has been decimating entire reef areas, putting the tourist industry and the reef itself at risk. Field and laboratory experiments suggest that the crown-of-thorns outbreaks may be tied to water quality: the survival of starfish depends on food availability, and nutrient levels may skyrocket as coastal run-off increases.

The organization that must deal with these challenges is flexible. The Great Barrier Reef Marine Park Authority is a Commonwealth statutory body consisting of a full-time Chairman and two part-time members. The Authority is also an adjunct of the Ministry of Environment, Sport and Territories (Great Barrier Reef Marine Park Authority, 1993). Besides assuming managerial authority and responsibility, the Park Authority is the principal advisor to the Commonwealth Government on the care and development of the park. Some 150 Park Authority staff provide for the protection, wise use, understanding and enjoyment of the Great Barrier Reef through the maintenance, development and protection of the Great Barrier Reef Marine Park. All but ten (who work out of Canberra) are stationed at the Townsville office. The Townsville headquarters of the Park Authority also operates the Great Barrier Reef Aquarium to enhance community understanding and appreciation of, as well as experience with and support for, Reef conservation, the Park, and the Authority, so technical staff are near the Reef. The Canberra office provides advice to the Minister, supports the Great Barrier Reef Ministerial Council, and liaises with the Ministry for Environment, Sport and Territories, Parliamentary Committees and other departments and organizations based in the capital (Great Barrier Reef Marine Park Authority, 1993). The key divisions of the Authority are Education and Information, Environmental Impact Management, Corporate and Strategic Projects, and Administration and External Services.

Figure 2.6. Great Barrier Reef Marine Park, Cormorant Pass Section, Australia, Showing Management Zoning

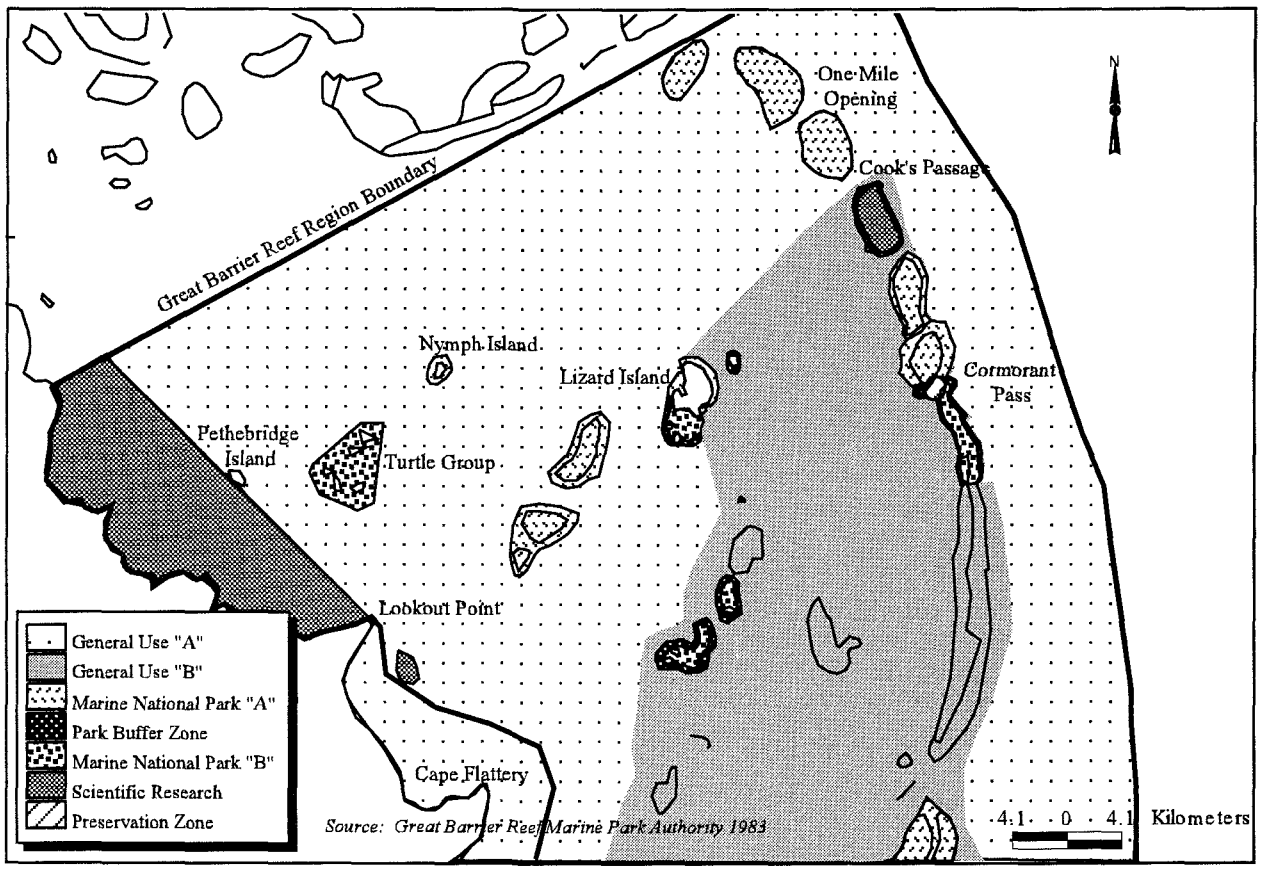


Source: Great Barrier Reef Marine Park Authority 1992



Zoning Categories and Related Activities

Zone	Bait netting and gathering	Camping	Collecting (recreational--not coral)	Collecting (commercial)	Commercial netting (see also bait netting)	Crabbing and oyster gathering	Diving, boating, photography	Line fishing (bottom fishing, trolling, etc.)	Research (non-manipulative)	Research (manipulative)	Spear fishing	Tourist and education facilities and programs	Traditional hunting, fishing and gathering	Trawling
	Activities													
General Use "A"	Yes	Permit	Limited	Permit	Yes	Yes	Yes	Yes	Yes	Permit	Yes	Permit	Permit	Yes
General Use "B"	Yes	Permit	Limited	Permit	Yes	Yes	Yes	Yes	Yes	Permit	Yes	Permit	Permit	No
Marine National Park "A"	Yes	Permit	No	No	No	Limited	Yes	Limited	Permit	Permit	No	Permit	Permit	No
Park Buffer Zone	Limited	Permit	No	No	No	No	Yes	Limited	Permit	Permit	No	Permit	Permit	No
Marine National Park "B"	No	Permit	No	No	No	No	Yes	No	Permit	Permit	No	Permit	No	No
Scientific Research	No	No	No	No	No	No	No	No	Permit	Permit	No	No	No	No
Preservation Zone	No	No	No	No	No	No	No	No	Permit	Permit	No	No	No	No



Its approach to controlling starfish outbreaks illustrates how the Park Authority works. Individual starfish have to be collected or injected with copper sulphate, and once an area is cleared, other members of the same species often migrate into the control area (Gladstone, 1991). These measures are prohibitively expensive and successful only in limited areas. Moreover, it is almost impossible to find every starfish hidden beneath the coral or in crevices. Only if a starfish outbreak is allowed to run its course will they die, but much of the coral gets eaten first.

Given the difficulty and expense of wide-scale eradication, many scientists agree that starfish outbreaks should be controlled in small or isolated areas with great research and recreational value. Meanwhile, efforts are underway to determine if the connection between human activities and crown-of-thorns starfish outbreaks is definite, and research is being conducted to develop methods more environmentally friendly than using copper sulphate to control the starfish locally.

Stakeholder Involvement. More generally, success of the Authority's programs depends heavily on public support and participation. The same 1975 Act that established the Park and the Park Authority also established the Great Barrier Reef Consultative Committee, which represents a

wide cross-section of public and private interests and expertise, including tourism, fishing, science, conservation, Aboriginal and Islander communities, and local government (Great Barrier Reef Marine Park Authority, 1993). Through this Committee, user groups participate in decision-making related to the Reef, park managers come to a better understanding of users' attitudes and values, and information is collected and shared.

Serious conflicts over the use of the Reef arose in the 1960s, when proposals to drill for oil and mine limestone from the Reef were first made. The democratic process revealed that Australians were willing to forego potential revenues from mineral resources to preserve the Reef's uniqueness, biodiversity, beauty and grandeur (Alcock et al., 1991).

Two main instruments have been developed to help manage and reduce such conflicts. First, the Authority zoned the Park for multiple uses—a careful and time-consuming process of public consultation. Initial zoning of the Great Barrier Reef Marine Park was completed in 1988. In the preservation and scientific zone, entry is strictly limited; Marine National Park zones allow scientific, educational, and limited recreational activities; and recreational and commercial fishing are permitted in the General Use zone. *(See Figure 2.6.)* Thereafter, the Authority is committed to reviewing zoning and management plans for each section of the Marine Park every five to ten years. Under this zoning scheme, tourism is permitted in 99.8 percent of the Park: only in preservation and scientific research zones is it restricted.

A government regulation enables the Authority to declare Reef Appreciation Areas or Special Management Areas in up to 20 percent of a particular reef area where damage is found or anticipated (Alcock et al., 1991). In such areas, tourists cannot remove anything from the reef.

Second, the Park Authority is in constant dialogue with private enterprises that use the Reef, an approach which sometimes substitutes for regulations and control. Although all stakeholders know that the Park Authority can apply significant "big stick" management interventions, providing good information about how the ecosystems work and on how private interests can protect long-term business opportunities by protecting the resource appears to have been more effective than mandatory compliance. In the case of tourism, the Park Authority works closely with tourist boat operators and guides to engender their commitment to long-term environmental protection and good business practice. Tourists are advised that they are visiting an important protected area and they are warned not to touch or remove coral or other marine life. Trash is strictly controlled.

As for bringing commercial sport fishermen on board, the key has been helping them understand the ecological requirements of the large game fish upon which their business depends. They have agreed to refrain from fishing and entering breeding zones, and they patrol their own members and impose stiff sanctions on violations—which saves the Park Authority patrolling expenses.

A third example of how consultation and cooperation can stave off conflicts with stakeholders is the Park Authority's work with the shipping industry. Large ships carry petroleum and other cargoes around Australia's east coast, passing through portions of the Reef. The industry (through the Australian branch of the International Maritime Organization) and the Park Authority have now established a system whereby highly trained pilots are taken on board to guide the ships through particularly sensitive waters.

Institutional Cooperation. The GBRMPA had to be carefully planned and administered to work with state-level mandates, promote self-interested and appropriate private enterprise, and protect the overall ecosystem. While the Park Authority was established at the Federal level, actual management activities have been carefully designed to take state-level mandates and capabilities into account. Thus, day-to-day management of the Park is undertaken by Queensland government agencies. The "Emerald Agreement" between the Prime Minister and the Premier of Queensland, which triggered the formation of the

Great Barrier Reef Ministerial Council, has improved the Marine Park Authority's ability to carry out its functions in cooperation with the Queensland Government, local authorities and the public (Great Barrier Reef Marine Park Authority, 1993).

Lessons Learned from the Great Barrier Reef Marine Park Authority

On reviewing the past performance of the Authority, Mr. John Whitehouse, solicitor and former Director of the NSW National Parks and Wildlife Service (Great Barrier Reef Marine Park Authority, 1994b) concluded that "... a continued Commonwealth role in the protection and management of the Great Barrier Reef is necessary and justified, that the model of a large multiple-use marine protected area is appropriate for the Great Barrier Reef Region, and that the GBRMPA has proved and continues to be a highly successful, efficient and effective agency in performing its role in the protection and management of the Great Barrier Reef Marine Park." Yet, numerous challenges still remain for the Park. Research is needed to more accurately assess the impacts of fishing, commercial run-off from the mainland, and increases in the number of tourists who visit the area annually (Alcock et al., 1991). Greater cooperation is also needed among government officials, private interest groups, scientists, and the public. These and other changes are called for in the 1994 Strategic Plan for the Reef (Great Barrier Reef Marine Park Authority, 1994a). *(See Box 2.2.)*

Box 2.2. Strategic Vision Plan of the Great Barrier Reef Marine Park Authority, Australia

By 1998:

- Management will ensure conservation through sustainable use and maintenance of biodiversity;
- The community will use the area responsibly as a result of education, commitment and contribution of ideas and resources;
- Accurate and timely information will be available to support management;
- Integrated planning will ensure the maintenance of a healthy ecosystem;
- The interests of Aborigines and Torres Strait Islanders will be recognized and accommodated;
- Management will be cost effective and emphasize participation and consultation; and
- Appropriate and complementary legislation and processes will be in place.

Source: GBRMPA, 1994a

Three more specific lessons also deserve mention. First, capacity for managing these large and complex areas can be built through cooperation with other agencies already in the region. In the GBRMPA, Queensland's National Park Service already had the capacity to provide protection services to the Reef.

Second, powerful authority may be best used indirectly—to provide incentives to stakeholders to cooperate. In this case, once informed, several user communities collaborated to preserve the ecosystem. Fishermen have refrained from fishing in nursery grounds, tourism controls visitor impacts, and shippers voluntarily accept Park Authority pilots on board.

Third, a powerful agency of central government can foster cooperation and action by pre-existing state and local governments and agencies. Through careful negotiation, an enlarged understanding of the perspectives of regional stakeholders, and provision of information and educational materials, the Park Authority promoted widespread cooperation among institutions with mandates in the region.

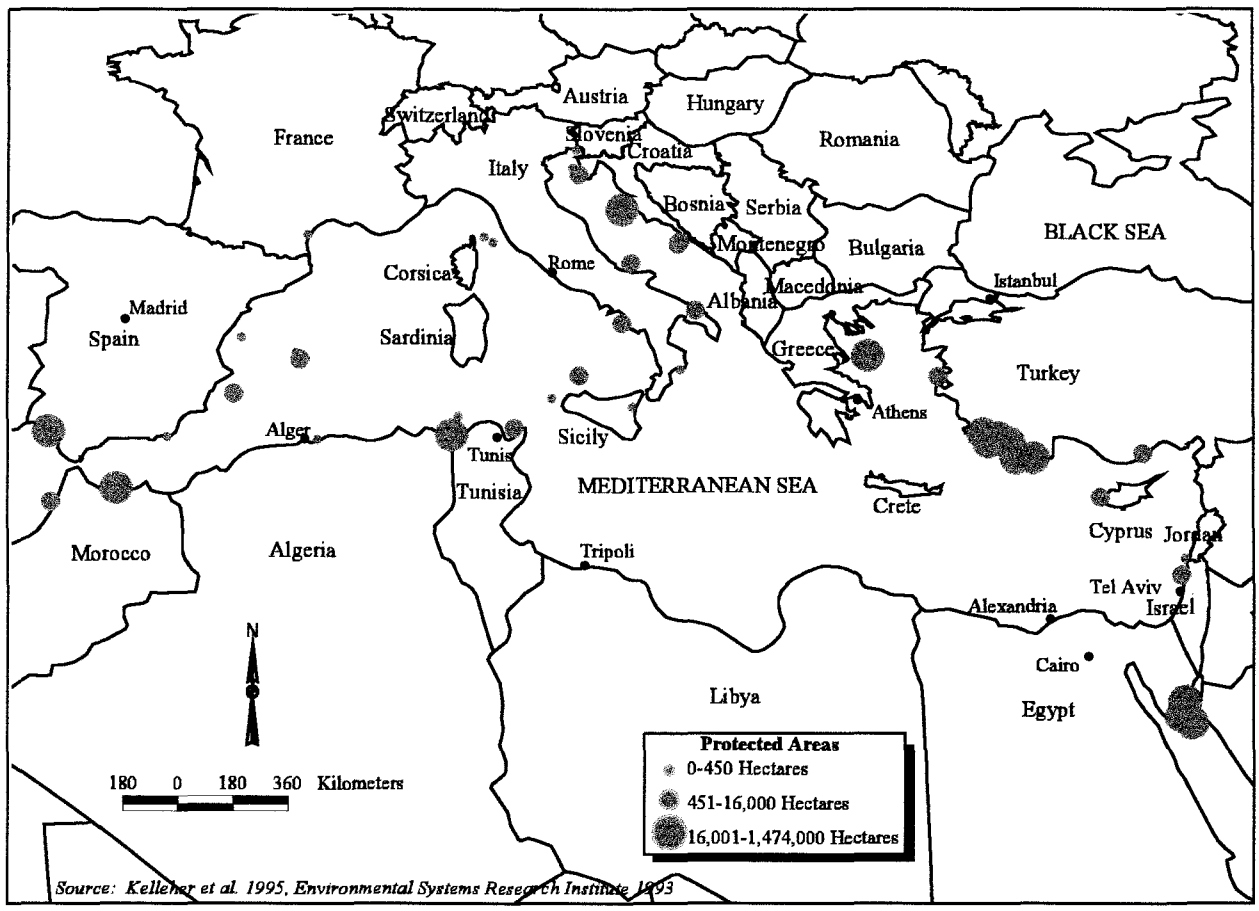
The Mediterranean Regional Sea

The regional planning and negotiation effort that produced the so-called Med Plan illustrates how states that share a major sea and coastal ecosystem can forge a cooperative arrangement. While the initial focus was on pollution control, this same framework could perhaps be used to manage biodiversity and biological resources in the region. The results speak for themselves: through careful planning and management, regionally coordinated pollution-control efforts defused potentially great conflicts over critical habitats for wildlife, fishing areas, tourist beaches, and industrial areas.

The Mediterranean Regional Sea Program in Brief

For very compelling ecological, social and economic reasons the Mediterranean should be managed at a bioregional level. It is an almost entirely enclosed sea *(see Figure 2.7)* whose waters are renewed every 80 to 90 years from the Atlantic through the Strait of Gibraltar. While it represents only 0.7 percent of the total surface of the world's

Figure 2.7. The Mediterranean Action Plan Fosters Cooperation Among the Basin's Coastal States, Including the Coordination of the Bioregion's Protected Areas



seas (UNEP, 1991), this region saw the rise of Western civilization, including the empires of Egypt, Carthage, Greece, and Rome, and the cultural-religious origins of Judaism, Christianity and Islam. Twenty percent of the world's oil travels through the Mediterranean Sea. Over 100 million tourists flock to its shores each year (UNEP, 1991). Mediterranean tides are too weak to disperse pollutants well, and so the pollution stays mainly near the coasts. Looking beyond the sea and its coasts, the greater Mediterranean region features an array of mountain ranges and watersheds that were once covered by vast forests. After thousands of years of human intervention and destruction, little of the original forest types remain (UNEP, 1991).

When, in the early 1970s under UNEP auspices, the Mediterranean countries began searching for common issues around which to develop a basin-wide program, biodiversity *per se* was not yet an international issue. Rather, marine and coastal pollution was what all countries considered the premier problem. Now the strong link between the protection of biodiversity and sustainable use of biological resources on the one hand and the control of coastal and marine pollution on the other is coming to the fore.

Consequences of Establishing a Basin-wide Program

Management Capacity. Right from the start, policy-makers in the Mediterranean seldom agreed on how rapidly to develop pollution controls and how stringent to make them. The industrialized countries favored introducing strong pollution controls immediately, and most had the capacity to do so. In contrast, developing countries preferred to wait until they were more industrialized and the pollution problem became more evident before taking action, especially since they lacked the scientific and technological capacity to address pollution control at that time.

In general, the region's developing countries believed that environmental management would necessarily come at the expense of economic development, and common concern over the environmental health of the Mediterranean was sometimes overshadowed by disagreements over who should pay to control pollutants. Meanwhile, foreign policy, science, and non-governmental civic groups entered the debate with another set of goals and perspectives. Haas (1990) suggests that foreign-policy officials had national environmental agendas to fulfill and that scientific researchers were mainly looking for grant money for research projects.

Apart from lacking a common vision, the Mediterranean countries worried about obtaining a fair share of the benefits anticipated from entering into cooperative agreements. Many initially assumed that there would be a bias in the location and distribution of rewards. Indeed, Algeria so strongly opposed control of industrial pollution in its waters and coasts that a UNDP report assessing pollution in Algeria's harbors was rejected by the government. This type of response typified developing-country attitudes toward unilateral proposals put forward by the regional powers. (To set the historical record straight, Algeria did accept the Med Plan once its own national marine scientists reported similar conditions.)

Stakeholder Involvement. To build partnerships in the Med Plan, UNEP promoted a coordinated program based on political compromise and scientific consensus. It created national alliances between scientists and NGOS who, in turn, advised their respective governments. Even though various players remained ideologically opposed or indifferent to the emerging vision for the region, the partnership began to work thanks partly to UNEP's broad reach and open process (Haas, 1990). The trick was satisfying all parties' short-term interests while working incrementally toward long-term goals.

The key activity centers of the Plan were dispersed among partner countries. Regional Activity Centers (RACs) to coordinate and support the Mediterranean Plan Coordinated Pollution Monitoring and Research Programme (Med Pol) were established in France, Yugoslavia, Greece, Malta, and Tunisia. A legal depository office was established in Athens, set up with a regionally mixed staff. Lead laboratories for research and monitoring were set

up in Algeria, Egypt, France, Italy, Malta, Turkey, and Yugoslavia. Arguably, some of these measures were undertaken to placate countries that hung back at first. Countries such as Libya and Syria, which did not initially participate in the Plan, received no direct benefits. This approach had its price: Haas (1990) argues that some laboratories did not perform as well as had been expected. But most developing and developed countries agreed with UNEP that involving all stakeholders was essential, even at the price of some loss in initial quality.

In countries where the access and influence (political power) of marine scientists and other technicians was consolidated, governments adopted more comprehensive environmental legislation and policies, and they have reportedly become more engaged in Med Plan meetings. On the other hand, in countries where scientists and technicians were still struggling for access and recognition, efforts to control marine pollution have been much weaker. The strongest supporters of the Med Plan have typically been the countries in which local scientists and technicians wield some power (Haas 1990)—among them, Algeria, Egypt, France, Greece, and Israel. In the countries where this community is weaker, the objectives of the Land-Based Sources Protocol, for example, have not been integrated into national policy even though the instrument has been signed and ratified.

Institutional Cooperation. In 1975, the 16 coastal countries of the Mediterranean, plus the European Union, negotiated and implemented the Barcelona Convention, which called for the launch of the Mediterranean Action Plan following its adoption by the governments. The Med Plan consists of four main components: integrated planning for resource development and management in the Mediterranean Basin, a coordinated pollution research and monitoring program, a framework convention and related protocol (with technical annexes) for protecting the Mediterranean environment, and institutional and financial structures for the action plan (Haas, 1990).

Developed under the auspices of UNEP's Regional Seas Programme, the Med Plan stands out as one of the most successful examples of this ambitious United Nations program to control marine pollution in ten of the world's seas (Haas, 1990). Under the Plan, the region's governments coordinate their approaches to control pollution from a growing number of sources and pollutants. They jointly carry out research and monitoring, and then develop and share methods, techniques, and practices to reduce pollution.

To operationalize the planning under the Med Plan, the French Government developed the Blue Plan. Nominally accepted by governments in 1975, it aims to develop a systematic view of the entire ecosystem for the first quarter of the 21st century. Scientific cooperation was intended to create a pool of information for regional planners and to sensitize them to links between sectors. Unfortunately, most governments ignored the Blue Plan, and refused to financially support this scientific work which few understood. According to Haas (1990), no broad scientific coalition pushed the Plan.

More generally, of course, the commitment of a country to pollution control is reflected in its monetary outlays. Data on marine pollution-control projects in the Mediterranean region are inconsistent, but new municipal sewage-treatment plants and sewerage systems are springing up around the region. Haas (1990) considers this construction, along with oil-spill contingency plans, the Med Plan's brightest legacies.

Lessons Learned from the Mediterranean Action Plan

Several indicators of success for the Med Plan have been noted:

- Most Med Plan countries now have established ministerial environmental coordination and regulatory bodies.

- The Mediterranean countries have developed domestic legislation to control marine pollution, especially oil pollution and offshore dumping. However, few efforts are closely compatible, arrangements vary widely from country to country, and legislation in

developing countries isn't on the same schedule as that in developed countries.

- Although direct measures of water quality are lacking, regional scientists now assert that the water quality in the Mediterranean is better with the Med Plan in place than it would have been without it.

- Scientists also believe that the level of pollution has remained relatively constant, even though population growth has been tremendous since the Plan came into force.

From this first regional sea exercise, Haas (1990) suggests that the UNEP program has learned the following lessons:

- Regional action is an effective way to conserve large marine ecosystems, but such efforts must contribute to both environmental conservation and economic development;

- Regional governments should define their own ecosystem boundaries and overall problems;

- Basic information and research assistance can be obtained from a number of established international and national institutions;

- National technical capacities should be reinforced wherever possible; and,

- The scope of regional programs should be limited. (UNEP's later regional seas programs focussed mainly upon oil pollution.)

Three broad lessons can be drawn from the Mediterranean experience too:

First, multi-country management programs can be established, identifying common goals and perspectives to foster ecosystem-wide cooperation and action, especially in marine and coastal regions. Joint efforts to control oil pollution paved the way for political, managerial, scientific, and technological cooperation on other challenges.

Second, in a multi-country ecosystem management program the scientific and technological capacity may differ significantly among the cooperating parties. Partly as a result, perspectives on goals and means for action will differ too. In the Mediterranean, countries were given time to establish or strengthen domestic capacities and local scientists and technologists to advise their own governments and partner institutions.

Third, while intuitively an ideal ecosystem-management program should embrace broad goals and activities, experience suggests that initial cooperation should focus on two or three common concerns and interests.

CAMPFIRE Program, Zimbabwe

Zimbabwe's innovative CAMPFIRE program (Communal Areas Management Programme for Indigenous Resources) seeks to establish a new relationship between local communities and wildlife resources, and a new balance in the authority and responsibility among the Central government's Wildlife Department, District government administration, and rural communities. Its most fundamental principle is that benefits should go to those who pay the financial and social costs of tolerating wildlife and who therefore act as "wildlife producers" in communal lands. Creating community proprietorship over wildlife and other natural resources, CAMPFIRE basically replaces an open-access situation in which wildlife was over-exploited and undervalued.

While it is still early to measure the economic or ecological results of the CAMPFIRE program, indicators of community benefits and changing attitudes are encouraging (Zimbabwe Trust, 1990). CAMPFIRE tries to conserve biodiversity by building biological resources into development practice in communally-held landscapes that extend beyond protected areas.

The CAMPFIRE Program in Brief

CAMPFIRE aims to improve the community's life, while maintaining the resource base. Its three-

pronged approach includes: a) identifying potential financial benefits that rural communities can derive from managing wildlife populations carefully; b) restoring the perception that wildlife is a valuable resource rather than a nuisance; and c) creating a powerful incentive for rural people to manage wildlife in conjunction with conventional subsistence agriculture to conserve natural ecosystems.

Consequences of Shifting Wildlife Management to a Regional Scale

The CAMPFIRE program rests on interlinked premises. Ecologically, indigenous wildlife preserves are likely to be the most appropriate land use in marginal areas. Economically, markets for wildlife-related goods and services need to exist when the program starts or be easily developed; they should provide returns greater than those for agricultural products or resource extraction.

Management Capacity. The Wildlife Department retains ultimate authority over wildlife resources on communal lands and can intervene where management proposals harm wildlife resources. Short of that extreme, however, rural communities are in charge of wildlife utilization and share directly in the benefits. The local governmental Rural District Council plays a key role too, offering advice on communal project design, auditing, and final project review. Community-based programs use indigenous resources rather than imported technology. In the Beitbridge community, a committee was set up to manage the projects. This required drawing up a constitution to formally organize the enterprise. The Council also set up a bank account to administer project funds and savings.

Stakeholder Involvement. It was agreed early on that projects must evolve from informed decisions taken by the rural communities themselves and noted that a legal and policy vacuum would impede progress, while a revamped legal and policy framework would clarify the "ownership" of what has hitherto been regarded as a common resource (Zimbabwe Trust, 1990). In the past, middle government levels typically siphoned off most of the revenue, leaving little for local distribution (Child and Peterson, 1991), so community "trusts" were established to involve participants in decision-making, management, and benefit-sharing. These trusts also promote information sharing and training activities.

Operating Scale. Within the larger CAMPFIRE program, the Beitbridge District example illustrates an effective operating scale for a bioregion. Consultation in February 1991 between Wildlife Department staff and the community led to the decision that the most appropriate unit of management was the "producer community"—a small, homogenous rural group of no more than 150 households. A group this size can manage its affairs in an open and accountable way and, because they participate directly in the management and harvesting of their wildlife, its members enjoy a fair share of the benefits (Child and Peterson, 1991).

Starting in June 1991, communities were given the responsibility for managing their water, grazing, timber and wildlife resources sustainably and the opportunity to benefit from their utilization. In a redistribution of power, the CAMPFIRE program grants "appropriate authority" to Rural District Councils once they signify their willingness and readiness to assume responsibility. District councils, in turn, devolve responsibility to smaller units, such as Wards (with 2,000 to 10,000 inhabitants each) and Villages—vital since serious poverty plagues the project communities and most participants lack access to health, education, water, and other facilities.

Institutional Cooperation. The Zimbabwe experience demonstrates how governmental agencies at the central and local levels can cooperate with rural communities to catalyze new creative approaches to resource management and benefits sharing. The rural communities employed pre-existing District and Ward Committees to convene members, take decisions, and manage the distribution of benefits. These grassroots institutions create a moral, if not a legal, sense of community wildlife "ownership." If individuals or communities simply stand by passively in a process that

eventually bestows benefits on them, CAMPFIRE would merely substitute one form of dependency for another. Instead, CAMPFIRE projects enable rural communities to articulate their own needs and to take full responsibility for all aspects of wildlife management. Ultimately, CAMPFIRE will be accepted by poor rural communities only if it is based on sound ecological research rather than aesthetics, global ecological principles, personal biases, or research hypotheses.

Allocating Benefits. Output-based rewards are returned to CAMPFIRE producers, just as they are for crop farmers or livestock herders. Indeed, passing income to the local (ward) level and allotting less than 10 percent of overheads to the Council level has profound effects (Child and Peterson, 1991). The Ward could distribute the funds as cash, invest them in community projects, or both.

In Chikwarakwara (Child and Peterson, 1991), the community decided to spend $5,000 on finishing the school and accommodations for the teachers and $25,000 on a grinding mill to be managed by a 149-member co-op, while paying out the remaining half to individual households. Each household could, if the majority decided, keep all the income from wildlife. Each was handed all of a $400 share to be distributed according to a majority-determined plan stressing human development and education rather than buildings, roads, and clinics. Each family contributed $30 to the school fund. Paying out the income from wildlife in cash made the links between productive efforts and earlier planning decisions clear to all.

In the decision-making process, government provided technical advice but rarely exercised its veto power. Government representatives helped community members debate the costs and benefits of various options that the people themselves had identified for using the cash. Interestingly, the community decided not to spend the remaining funds since they couldn't see a third "good investment" and saw the value of keeping some cash on hand. Child and Peterson concluded from these and other examples that "given the chance, rural communities act with maturity and wisdom" (Child and Peterson, 1991).

Lessons Learned from CAMPFIRE

In 1991, the CAMPFIRE Association of Zimbabwe analyzed the lessons learned from the program, paying particular attention to ways to shift resource management and utilization authority from central authorities to local communities. The findings:

- No new organizations were needed. CAMPFIRE fits into existing local government hierarchical structures—the Ward Development Committee, district council, and central government. The chairpersons of this Committee are, in turn, members of the Council.

- Community-based common property allocation systems represent low-cost socially sound alternatives to state interventions. They help the community bolster resource management and defend their interests against outside influences.

In terms of the three key issues addressed in this study, CAMPFIRE provides several important lessons:

First, the capacity to manage wildlife resources is a function of social organization and governance. By shifting authority and responsibility to rural communities, the benefits of harvesting and using wildlife were fairly distributed.

Second, even as rural communities take on more authority and responsibility for achieving biodiversity management goals, government's role remains significant. Far from merely "handing over and washing its hands" of wildlife, Zimbabwe's government struck a balance between sharing power and retaining public trust and accountability. The key was a partnership between the Wildlife Department and the producer communities.

Third, the best scale for managing biodiversity may be local rural communities and their surrounds—even though wildlife habitat and movement extend outside this area. The Zimbabwe example shows that reaching the individual and family unit with incentives to participate in

wildlife management requires organizing at the village and community level.

Fourth, not surprisingly, a good way to promote cooperation and rural dwellers' involvement in biodiversity management is to include them in planning, project implementation, and the distribution of income. The Zimbabwe example demonstrates how community members share income and allocate some of it to projects of common interest and to savings. In all three activities, the individuals help choose between present and future benefits.

Fifth, the CAMPFIRE demonstrates two additional factors central to spurring local participation in the program (T. N. Maveneke, pers. com., April 21, 1995 and September 6, 1995). One is social status. Local leaders, game guards, scouts, bookkeepers, and others all gain status from this type of work. The other is reinforcing traditional knowledge. People are motivated when their norms such as totems, traditional medicines, and sacred areas are explicitly recognized and involved in the program.

North York Moors National Park, U.K.

The North York Moors National Park exemplifies an approach to achieving the long-term maintenance of the ecological and species diversity of a bioregion through public/private cooperation. As with CAMPFIRE in Zimbabwe, this program works on the principle that conservation efforts should be rewarded. Essentially, local farmers who hold private property rights enter into formal agreements with the national parks agency to manage their estate in a way that restores and maintains the array of habitat types in the bioregion's matrix. In exchange, they receive direct economic benefits.

Brief Description of the North York Moors

North York Moors National Park, like other UK national parks, is managed to conserve the landscapes and natural beauty of selected regions of the country and to foster the public's enjoyment of these landscapes in ways that are compatible with conservation. Under IUCN's classification of protected areas, the United Kingdom's 11 national parks are "Protected Landscapes" (IUCN, 1994a). The UK national park designation restricts the use of land and fosters the maintenance of the landscape's cultural and natural features. These landscapes reflect 2,000-10,000 years of human culture but also represent the most outstanding remaining examples of the nation's biodiversity.

The Park covers 1436 km^2 in northeast England, featuring forest, moorland, and farms. Once heath, 25 percent of the park area has been planted with non-native conifers. Moorland covers 35 percent and farmland covers 40 percent. Its National Park status notwithstanding, the Moors bioregion is mostly privately owned.

Mechanisms for Managing at the Bioregional Scale

Park managers and ecologists have identified a variety of problems arising from modernizing trends in farm practices. Most significantly, the drive to increase agricultural production has affected the Park. Key influences are the draining of wetlands, the reseeding of areas with more productive grass species, the clearing of woodlands, and the plowing ("reclaiming") of moorlands for conversion to croplands, increased use of fertilizer and sprays, and a loss of farm labor (P.J. Barfoot, pers. com. September 7, 1995). Park managers are addressing these challenges site by site.

Removal of the traditional hedgerows between fields, forests, and moorlands is one serious problem. Once a vital component of the overall ecosystem, they provide habitat and corridors between habitat types. But farmers remove them because they have received incentives to expand their fields and because maintaining a hedgerow is time-consuming and costly. Since the early 1980s, however, local farmers have been working with the Park authorities as co-managers to restore and maintain the hedgerows on their own lands. These conservation activities complement food production and other farming work.

On another conservation front, the National Park Authority broadened its wildlife conservation efforts in 1993 by promoting measures to return some farmlands to other kinds of habitat so as to balance the overall patchwork of habitat types in the landscape (Statham, 1993). Co-manager farmers restored traditional farming methods to maintain particular habitat types.

In 1988, the Experimental Farm Conservation Scheme started on six farms in various locations with three-year agreements (Statham, 1993). The scheme proved popular with local farmers and achieved the desired results at a modest price. Within a year, proposals to expand this program to a wider geographic region were made. To start, the National Park Authority met with stakeholders from the wider region—among them, the National Farmers Union, the Council for National Parks, the Ministry of Agriculture, the Department of the Environment, two government advisory bodies, and local farmers and landowners. The objectives were to conserve important habitats and landscapes, create alternative income for participating farmers who might otherwise be forced to intensify farming, and create local employment opportunities by turning increasingly to traditional labor-intensive operations, erecting fences to keep domestic livestock out of woodlands, rebuilding drystone walls, and regenerating hedges (Statham, 1993). Under the Scheme, farmers are also required to protect historic and archaeological features.

Implementation of this larger Farm Scheme was held up for a short time pending adequate funding, but was under way by 1990. Funds came through a National Park Support Grant (a mixture of central and local government monies). Upper Farndale was chosen as the initial target area. Because they had recently been sold to resident tenants, many of the farms were run down and under-capitalized but had enormous conservation potential. In the project's first 18 months, all the farmers in Upper Farndale entered the Scheme and 11 agreements were drawn up covering 750 ha (Statham, 1993).

During 1990 and 1991, the Agricultural Department and Advisory Service (ADAS) assessed the socio-economic status of the first 11 farms to join the Scheme. It determined that the payments of UK£3,000 (approx. US$4,800) to each farm from the Scheme are becoming an important source of income and will help those farmers retain and, in some instances, employ more labor (Statham, 1993). Most of the 11 farms had incurred losses in 1990 and 1991—on the order of £7,350 in 1990 and £2,600 in 1991 for each farm, though their general finances had improved by 1992 (no figures available). Some of this difference can be attributed to Farm Scheme payments.

The average cost to the National Park Authority of this project is approximately £3,400 per agreement, including capital grant aid. The total budget available for this project for 1993/94 was £360,000, including £23,000 for staffing and administration costs. This amount allowed the Park Authority to undertake approximately 100 such agreements in that fiscal year. For the 1995/1996 financial year, the budget is £420,000, enough to cover roughly 130 whole farm management agreements covering approximately 7,000 ha (P.J. Barfoot, pers. com. September 7, 1995).

A Farm Scheme agreement is developed in four steps:

1. A survey of the farmer's land;

2. Negotiation of the content of the agreement;

3. A mapped record of all features and habitats deemed valuable, including an assessment of their condition and management requirements; and

4. The division of the land into three categories: Conservation Grade, Conservation Woodland, and Improved Land.

All aspects of the Scheme are discussed with the farmer, and latitude in bargaining over the detailed content is considerable.

Before joining the program, the farmer receives an estimate of the first year's payment available through the Scheme and an indication of the

conditions of that payment. Annual payments for the agreement are made in advance, and the first payment is made once the contract is finalized. Improvements are programmed over the five-year period of the Scheme and annual payments related to them are made the year following completion. In short, the more improvements, the more farm income. Some flexibility is allowed, but the management agreement is a contract, and failure to complete improvement works, or to maintain features and manage habitats in accordance with the conditions of the Scheme, is considered a breach of that contract (Statham, 1993).

The Park Authority maintains contact with the farmers throughout the agreement and offers advice and help with grant claims. At the end of each year, each farm's compliance with the agreement is evaluated and the following year's payments assessed. The Park Rangers are involved from the very beginning, helping settle agreements and helping the farmer maintain public footpaths and trails.

More concrete conclusions on the success of the Scheme will not be possible until comparative data is available. But the Scheme has succeeded in suspending habitat loss and improving some of the habitat types and landscape features, including woodlands and hedgerows. "Improvements in the first two years of the Scheme included 15.2 ha of woodland enclosed, 1.9 km of hedge regenerated and 17.2 km of drystone wall brought into good repair" (Statham, 1993). Also, the Park's benefits to the local communities have been widely acknowledged and the needs to marry conservation goals to tourist activities accepted.

A program of long-term monitoring has been set up to assess the Scheme. Results so far allow a few preliminary conclusions: the Scheme was well received by participants; it will have a beneficial economic effect on the individual farms; it will allow the option for hiring outside labor; and it should have an immediate and long-term impact on local and non-local employment. A survey of the Upper Farndale indicates that the Scheme has created at least 2 full-time job equivalents.

Ultimately, the National Park Authority hopes to extend the program to include all hill farming areas within the North York Moors National Park. This extension would involve approximately 520 farms covering 35,000 ha and would require future funding of around £2.2 million annually. Realistically, the Park Authority is unlikely to obtain this level of funding in the near future, however, so the Farm Scheme will have to be carefully targeted to the most sensitive and important areas.

Funding is obviously an important factor in the future of the Farm Scheme and other programs like it. One possibility is getting the Moors designated an Environmentally Sensitive Area (ESA), a government designation that comes with payments and subsidies averaging £3–4 million per area (Statham, 1993). Another option is raising costs to area visitors (through, say, taxes on accommodations) but the idea has not been well received, and since many visitors seek accommodations outside the Park, an accommodation tax scheme would involve drawing arbitrary boundaries around the Park catchment area (Statham, 1993). Nor is collecting entrance fees particularly practical since numerous roads and footpaths go into the Park. For these reasons, a subsidy from state funds is seen as the most fair and administratively efficient option.

Lessons Learned from the North York Moors National Park

The North York Moors example brings into this discussion the experience of a northern developed country where the landscapes of value to biodiversity conservation are found in a countryside that has been under human influence for millennia. The core areas are small. The option is to expand the program area by collaborating with private residents in the matrix lands around the core sites.

First, in highly developed landscapes, where modern agriculture and pasture regimes dominate the landscape outside of small remaining wildland core areas, biodiversity goals can be addressed through cooperative co-management

programs with resident farmers and other resource-using neighbors.

Second, incentives can be employed to enable neighboring residents and resource users to build conservation activities into their regular land-management work. Their labor, investments, and foregone land-use opportunities can all be remunerated.

Third, cooperative arrangements have to be developed, managed, and monitored at the micro on-farm level to be meaningful to the farmer. Similarly, the terms of compliance must be crystal clear.

Fourth, the scale of cooperative programs in the matrix of the landscape can be adjusted according to the availability of funds to purchase services, and priorities set among the most important sites warranting restoration and management.

The Hill Resource Management Program, India

Neither a bioregional program nor one focussed upon biodiversity, this rural development experience from India nevertheless demonstrates how important the timing of action and investment is to program success and shows that if local development needs are kept in mind, biodiversity can often be packaged into the program with little added effort.

The Hill Resource Management Program in Brief

In the mid-1970s, the central Soil and Water Conservation Research and Training Institute in Chandigarh initiated studies of erosion in that region, in collaboration with the Ford Foundation (Poffenberger, 1990). While this program was being developed, rapid economic development was afoot. Green-revolution efforts expanded food supplies, tube wells made more water available, and local produce markets were established. Off-farm employment in industry helped many rural men find new sources of income and reduce their dependence upon produce from marginal lands. The commercialization of dairy production encouraged animal keepers to shift from open-grazing goats and cows to stall-fed water buffaloes.

The growing commercialization of agriculture in the region stimulated farmers to expand access to water resources for their crops. In turn, this stimulated the development of micro-reservoirs and irrigation structures and the improvement of water catchments.

With growing markets and pressures to shift toward commercial production, the need for water began to create serious erosion problems in the city's main reservoir—the Sukna Lake in Chandigarh City. In response, the Hill Resource Management Program was designed to increase productivity, make the distribution of benefits more equitable, and spur effective resource conservation in the region.

Simple technology was used to construct earthen dams in micro-watersheds to create reservoirs for local water supplies. The supplemental irrigation provided farmers with opportunities to intensify cropping patterns and livestock raising. However, when livestock were grazed too close to the new reservoirs siltation speeded up, so it soon became obvious that the livestock would have to be kept away from vegetated catchment areas.

To manage the new water resources and control grazing, Irrigation and Forest Protection Societies (later renamed Hill Resource Management Societies) were established. Some developed irrigation-distribution systems, got grass-cutting leases from the Forest Department, and generally boosted family income from both agriculture and animal husbandry impressively.

Thus, two types of time-scale issues arose. First, growing commercial markets for local goods reduced pressure to use marginal upstream catchments for farming, grazing, and woodcutting so plant succession could proceed in

the catchments. Gradually, as a by-product, impoverished scrub communities were replaced by evermore diverse habitats.

Second, growth in commercial markets for local goods increased demand for water for agriculture. This stimulated development of a cooperative project between the program and the Forest Department to build small dams to store and supply water. One surprise was the impact on rural stakeholders of an increasingly efficient capacity to build dams. With experience, these micro-dams were built ever more quickly and more efficiently. As the rate of dam construction increased—sometimes several dams were built at once—the costs of materials, labor, and administration fell further. Eventually, the rate of dam-building outpaced the capacity of local rural communities to maintain the dams and soils and to establish equitable water-distribution mechanisms. In short, engineering outpaced social development, and the expanding geographic scale of the program got out of kilter with the time needed for social adaptation.

Early signs of failure included rapid sedimentation of the dams, social conflict triggered by inequitable distribution of water, a reduction in the useful lifespans of the dams, increased dam-maintenance costs, and reduced output of stored water. As these impacts were appreciated, the approach shifted, and future dam construction was scheduled through such community-based mechanisms as the Hill Resource Management Societies, to better align the pace of construction with that of social adaptation.

Lessons Learned from the Hill Resource Management Program

The Hill Resource Management Program of India shows several lessons of importance to bioregional management.

First, the development of new and more efficient tools and facilities for resource management must be accompanied on a timely basis by the formation of adequate and consistent local social and institutional mechanisms. These are needed to ensure the necessary adaptation and maintenance of innovations and to enable stakeholders to benefit from them. Failure to maintain this balance can negate the value of the innovations.

Second, biodiversity programs must adapt to changes that occur in the landscape, some of which are brought about by project activities themselves. Thus, monitoring for economic, social, and environmental change is a key component of such programs. In the Hill Resource Management Program case, by establishing economic opportunities elsewhere, what appeared to be an impossible task—to re-vegetate upstream catchments—became easy in the context of a broader conservation and development program. On the other hand, once new water-storage and distribution facilities started proliferating, the beneficiaries were unable to negotiate and adjust social and institutional norms and practices fast enough.

III. Guidelines for Bioregional Management

In this Chapter:
- *what is the right scale?*
- *twenty guidelines*
- *issues to be weighed in the balance*
- *does bioregional management improve biodiversity's chances?*

Increasing biodiversity's chances through bioregional management means finding answers to three fundamental questions:

- how to create the capacity to manage more complex and integrated programs,
- how to meaningfully involve all stakeholders, and
- how to build up and link established institutions, or, if needed, create new ones.

Confronting these challenges will require policies and approaches that foster new balances among often-conflicting factors, such as the redistribution of responsibility and authority among central and local entities. Guidelines derived from examples in Chapter II should help.

What is the Right Scale?

In bioregional management, there is no one single right scale at which to work. A bioregion of several tens to hundreds of thousands of hectares is appropriate for some ecosystems that comprise mountain slopes and whole watersheds. A few thousand hectares may be enough to manage or restore some habitats or to protect, say, specific strains of wild rice. At each scale, different tools and capabilities will be needed to help meet management objectives. Stakeholders and institutional jurisdictions may vary as well.

To be practical, communities, residents, resource managers, and government agencies will want to define the bioregion in terms that most residents and resource-dependent people think of as home. This space will be subdivided into areas that correspond to specific watersheds, habitat types, the home ranges of certain species, timber-supply sheds, development zones, and the like.

Setting the scale of the project is essential to reaching shared individual and institutional goals. Dialogue, scientific trial and error, and adaptation over time are the best way to determine a bioregion's boundaries. Any institution, organization, or individual able to help assess, plan, or implement a bioregional program should be made a partner in the effort. So should neighbors in the matrix who control or have an interest in old-growth or forest regeneration, upstream catchments, critical wildlife habitat, dispersal areas for large mammals, cultural or historical shrines, or resources and sites key to the regional economy, settlements, and infrastructure. Anyone in a position to halt or harm the program by, say, misusing resources, diverting water or wildlife movements, over-harvesting timber or wild fauna, setting inappropriate fires, etc., should also be invited into the program. By the same token, any abused parcel of land that affects other critical habitats negatively—

through erosion, for example—belongs in the program.

Thus, the right scale is determined by dialogue and informed by science, technology, information, and social considerations. There will be one scale that is most ecologically viable, economically practical, and socially convenient for the overall program. Nested within will be other scales suitable for work on specific objectives, such as the restoration of stream flow in a river catchment, retaining old-growth habitats, genetically improving varieties of grains to enhance local economic and food security while reducing pressure on wildlands from the region's poor, etc. Similarly, working with migratory species, air- and water-quality issues, trade in endangered species, timber certification, and seed exchange for research and development will require agreements and negotiation with international organizations on a global scale.

Guidelines to Meet the Challenges Facing Bioregional Management Programs

Challenge to Build Capacity

Grappling with whole ecosystems, managers face a daunting challenge. They must develop the capacity to plan, encourage, coordinate, and implement the many tasks and functions associated with the protection and use of biodiversity, and forests, soils, seas, and other biological resources. Typically, this means protecting wildlands; systematically collecting and cataloging flora, fauna, and microbial life; establishing and maintaining *ex situ* facilities for storing key genetic resources; restoring impoverished sites and critical habitats; fostering biodiversity education in local schools and universities; promoting research on using biological resources sustainably; establishing policy incentives and financial mechanisms to support and foster optimal land use practices; and encouraging and testing technological improvements for conservation and development work in the region.

In most of the examples presented in Chapter II, institutions already located in the region had most of these tools and capacities. What they lacked were policies for integrating existing programs and the skills to catalyze a multi-shareholder planning and implementation process. In a few cases, however, new institutions had to be established to provide missing skills and knowledge.

1. **Develop leadership for the bioregional program.** Who convenes interested parties in a bioregion? Who gets to know the residents and resource managers and users? And who formulates a vision and plan for a bioregional program? Ideally, a well-respected local individual or organization already has leadership capacity and knows the community and its resources.

Several policy options for cultivating such local leadership emerge from the profiles of Chapter II:

First, where various jurisdictions and levels of government converge in the bioregion, a new institution can be established to integrate capacities and skills and to implement a regional cooperative program for protecting and controlling the use of natural resources. A prime example of this option is the Great Barrier Reef Marine Park Authority (GBRMPA). GBRMPA also realized, however, that no single new agency could effectively exercise authority over 344,000 square kilometers of open sea, reefs, atolls, islands, and coastlines that make up the Reef complex. Even with aircraft surveillance, local contact would be required to inspect and assess human activity, so the Commonwealth central authority (GBRMPA) formed a legal partnership between GBRMPA and the Queensland State government to handle day-to-day management of the coastal and marine territory already under state jurisdiction. This Emerald Agreement, as it is called, avoided duplication in establishing and financing a new Commonwealth protection service for the Reef, and the Queensland Park Service's capacity to protect resources expanded as a result. GBRMPA established similar partnerships with local universities and research centers to cover aspects of the Authority's research and educational agenda.

Second, as in the multi-country cases of the Wadden Sea and the Mediterranean, new institutional mechanisms were established to convene the constituents, foster dialogue and debate, and help formulate common goal statements and get agreement on programs.

Third, in the national programs of CAMPFIRE in Zimbabwe and North York Moors National Park in the United Kingdom, public resource management organizations reached out to area residents to form new co-management arrangements for wildlife management (in the first case) and habitat restoration (in the second).

Policy-makers should not underestimate the importance of leadership style and legitimacy. For example, where a few powerful governmental agencies dominate the landscape, it might be all too easy to simply enlist them to take over the effort. However, their leadership can overwhelm other stakeholders, blocking cooperation in building a bioregional program. In the Greater Yellowstone Ecosystem (GYE), the bioregion's two dominant stakeholders—the U. S. Forest Service and the U. S. National Park Service—prepared a "vision statement" that prescribed goals and activities for the entire bioregion. Whatever the proposal's merits or deficiencies, employing a top-down, closed-door approach—albeit with public hearings after the fact—alienated other regional stakeholders and national interest groups whose contributions are essential to the bioregion's successful management. The approach effectively short-circuited the debate, failed to integrate capabilities, roles, and functions, and generated more divisive and lingering controversy. Broader-based stakeholder processes—essentially bottom-up and non-governmental—are now under way, including that of the Greater Yellowstone Coalition, though the relative success of working through non-governmental leadership has yet to be evaluated.

2. **View management as a social and governance issue.** All too frequently, planners and managers presume that defining and implementing bioregional programs are technical and professional matters. If, this logic goes, the scientific facts are clear, the best technologies are selected, and control and leadership are given to a professional agency of government, a bioregional management program will take off in the right direction. But the approaches to bioregional management reviewed in Chapter I and the examples in Chapter II show the importance of both according high priority to science, data, information, and appropriate technology and focussing on social and governance issues.

The cultural and organizational characteristics and values of the Masai of Serengeti, fishers of the Barrier Reef, farmers in the North York Moors, ranchers in Yellowstone, and rural communities in Zimbabwe and India all had to be taken into account as a management program was defined, planned, and implemented. Most significantly, how authority and responsibility are distributed among levels of government and between public and private interests is a central issue in promoting cooperation and mobilizing skills and capacity.

3. **Use authority to foster cooperation.** It is idealistic to expect constituents to work together as a tight band of well-meaning stakeholders. Indeed, experience suggests that a measure of authority to provide "backbone" to the effort is both needed and appreciated. Some regulation and regulatory authority may be required to ensure that certain minimum goals, standards, and criteria are met. The exact balance of authority and the relative use of intervention will depend upon local circumstances.

In La Amistad in Costa Rica, regional constituents asked government to established a Commission to ensure follow-up on activities agreed to by all parties. Without this "big stick," hours of dialogue, debate, and negotiation could have become hollow exercises in paper democracy. Similarly, the Great Barrier Reef Authority's power to intervene and protect resources has enabled it to foster cooperative arrangements with resource user communities, even though it has never had to exercise that power.

4. **As needed, redistribute power over land and resources to develop authority and**

responsibility in the bioregion. The CAMPFIRE example illustrates an issue fundamental to all the examples presented: how can central governments share or redistribute authority and responsibility over biodiversity and biological resources to (a) remove the "open access" problem, (b) establish incentives for local residents to take on responsibility for biodiversity protection and management, (c) foster a fair sharing of benefits from the use of those resources, and (d) place the authority to protect, control and use, closer to the ground?

In many parts of the world, central governments wrestling with budget cuts and personnel quotas appear to be having ever greater difficulty exercising this power adequately. In Zimbabwe, power over wildlife resources is being shared with local governments and community groups. As a result, evidence suggests, the already strong public commitment to conservation in that country is now spreading to rural communities directly involved in management and benefit sharing.

5. **Identify and assess the capacities of organizations and individuals in the bioregion and fill in the gaps.** Wadden Sea countries possess the capabilities needed to manage their own in-country programs. But they couldn't integrate the tri-country bioregion until they formed an international commission and staged an international conference to convene multi-country dialogues on issues, identify options, and forge consensual work programs with corresponding targets and responsibilities.

In the Serengeti, the Tanzanian Government established the Ngorongoro Conservation Area Authority to forge a bioregional program among the several public agencies, communal groups, and private interests in the region. But though this Authority has identified the elements of a cooperative stakeholders' agreement, it has yet to mobilize the local skills and capabilities needed to provide the veterinarian services, road maintenance, and health facilities it has promised in the region.

In La Amistad, the early analysis of local skills and capabilities identified a lack of capacity to inventory the Talamanca region, which is huge and both biologically and topographically complex. In response, the La Amistad Biosphere Reserve initiative joined forces with other voices calling for the establishment of what is now INBIO, the National Biodiversity Institute of Costa Rica. Now INBIO works with local stakeholders to systematically inventory the Talamanca bioregion.

In India's Hill Resource Management Program, two important steps were taken to establish capacity—one technical and one social. First, the program cooperated with the state to build the small water-storage dams throughout the bioregion. Second, and almost too late, the community established the Hill Resource Management Societies to help local communities take better advantage of the water now available and to protect catchment structures being trampled by cattle.

6. **Use and build upon existing capacity wherever possible.** Rather than building a large regional supra-structure of institutions, the Mediterranean program reinforced local and national scientific technical capacity. Some countries helped others train personnel, construct facilities, secure funding, and establish databases, computer services, and other infrastructure. Similarly, the Barrier Reef program strengthened universities, state agencies, and research centers in the region.

Less emphasis was given to capacity development in other bioregions. Yet, techniques for tourism management were developed in the Barrier Reef, calls by the Commission and Conference for analysis and the implementation of studies on the Wadden Sea were answered, and new approaches were taken to wildlife restoration and harvesting in Zimbabwe and to water-storage facilities in India.

7. **Build the capacity to handle change.** Changing attitudes among constituents, shifts in the greater economy, and environmental change mean that the context of any bioregional program is in flux. The capacity to anticipate such changes and to respond appropriately is thus critical to bioregional management's success.

The Indian water-conservation program illustrates how economic growth enabled people to find jobs elsewhere and to abandon upstream catchments to vegetative regeneration—a plus for habitat diversity. Still, these shifts took time, and engineers had to re-program their efforts, effectively slowing down the construction of water-catchment dams while communities prepared local agreements on livestock management and the use of the new water resource.

The Costa Rican case illustrates the need to weave preparedness for natural disasters into the bioregional management program and budget—in this case, hurricanes and earthquakes. However inevitable, such setbacks are unpredictable and can devastate biodiversity programs otherwise.

Challenge to Foster Stakeholder Participation

By reaching out beyond core areas, policy-makers, managers and community leaders are faced with the challenge of involving private land-owners, farmers, foresters, tour operators, indigenous communities, municipalities, state agencies, corporations, and other interests in bioregional management. Already, protected areas such as those in IUCN's categories V and VI (shown in Box 1.1), including the Great Barrier Reef Marine Park, have developed considerable expertise in this form of outreach, as discussed in Chapter II. In general, many more restricted wildland core sites managed as IUCN's categories I–IV are working with adjacent communities and regional development programs.

Also, some stakeholders live at some distance from the site, and future generations—whose welfare, livelihoods, and environment will depend partly on decisions made today—also need representation. In this context, governments may have a stakeholder role to play—in representing the public interest in the bioregion, even if little or no public land is involved. This is especially true where ecological processes and functions or species and genetic traits need protection.

As noted, unless stakeholders become full partners in planning and implementing bioregional management programs, one group or another is likely to find its self-interest obstructed and to pursue other goals that may not be in the common interest. In a worse-case scenario, competing stakeholder groups can become totally disempowered and leave the greater community, taking with them knowledge and other contributions.

8. **Leaders, planners, and policy-makers should get to know the stakeholders, their concerns, interests, and perspectives.** The evaluation of the Yellowstone example points to the failure of an early attempt at ecosystem management, mainly because too little effort was made to know and understand the region's peoples. In contrast, the Great Barrier Reef program dedicated considerable time to meeting with key stakeholder groups, articulating their views, and defining the issues to be examined together. The launch of the Mediterranean program almost failed for want of cooperation until the issues as seen through the eyes of each country were seriously explored.

9. **Initially, focus tasks on a few issues of interest to the widest possible set of stakeholders in the region.** Although the aim of bioregional programs is to comprehensively secure biodiversity and the region's ecosystems, experience suggests the need to begin simply, limiting the program to one or a few issues of common concern. Gradually, programs can grow to embrace a more comprehensive list of the region's issues and opportunities and the stakeholders' vision for the future.

The Barrier Reef began by addressing such specific issues as tourism's impact upon the reefs, sport fishing's effect on fisheries, mangrove protection, and control of the crown-of-thorns threat. Through a step-wise process of dialogue and collaboration with user groups, the Authority's technical and managerial competence won recognition, and its role as partner was accepted by stakeholders throughout the region.

CAMPFIRE focussed on mechanisms to engage communities and individuals directly in

decisions on how income from wildlife can be distributed. North York Moors began with the restoration of hedgerows. In contrast, in the Yellowstone, the public agencies jumped prematurely into comprehensive planning and the formulation of an overall vision for the region, raising many issues at once and making it difficult to get a diverse community to agree upon a discrete set of actions.

10. **Link conservation and restoration activities with socio-economic development goals in the bioregion.** Goals to conserve biodiversity can hardly be separated from the needs and perspectives of local constituents. Considerable literature documents how the inequities inherent in top-down programs for resource protection prepare the ground for conflict, resource impoverishment, and the loss of livelihoods. The challenge is thus to integrate development with conservation goals and measures. The Amboseli and Kajaido examples demonstrate how, through sensitive and open dialogue—in this case, with local Masai residents and ranchers—it is possible to start a well-focussed regional program with activities that first address stakeholders' perceived needs. Building fences to help protect gardens and rangelands from migratory wildlife preservation inspired confidence in the program.

In several other cases, a lack of early focus on the needs of stakeholders has hampered progress. For example, the Yellowstone program initially gave short shrift to the problems of local ranchers and loggers—social and economic analysis would have helped. In the Serengeti, more attention should probably have been given to the concerns of pastoralists, including cattle-disease control, transportation, and personal health. In these and other cases, a preoccupation with wildlife appears to have predominated the regional programs.

11. **Give local residents and communities access to decision-making processes and the skills needed to participate fully in the development and implementation of democratically managed bioregional programs.** In the Greater Serengeti Ecosystem, a dominant stakeholder group—the Masai pastoralists—whose practices have been associated with the development and maintenance of the ecosystem for centuries, have been left out of program planning, implementation, and management. Even past agreements to provide human health facilities and road maintenance, for instance, have not been honored, putting pastoralism's very future at risk. Government policies that encourage plowed agriculture around the periphery of the Greater Serengeti Ecosystem and provide incentives to settle lands and convert communal reserve lands and group ranches to private holdings also make it hard to conserve wildlands and biodiversity.

The experience of the indigenous peoples living in the La Amistad Biosphere Reserve demonstrates how barriers to involvement in biodiversity planning and implementation can be overcome. When government agencies failed to provide access to planning activities, the La Amistad indigenous peoples joined forces with church groups to form their own NGO, which now offers them training in the skills needed to participate and negotiate in planning exercises.

While stakeholders along the northern shore of the Mediterranean Sea were dealing with a developed-country agenda (environmental degradation, habitat and species loss, etc.), countries along the southern shore were addressing developing-country issues (employment, nutrition, housing, institution building, etc.). Even though conventional wisdom dictates that a bioregion should be defined to embrace stakeholders with homogenous expectations, managing the Mediterranean bioregion meant working with a particularly large and heterogenous set of communities. The Mediterranean Action Plan provided a means by which the countries could select one topic of common concern—oil pollution, as it turned out—and helped the North African countries, through information exchange and skills development, to participate fully in work on this initial issue.

Few examples show more discouraging and encouraging results than the Amboseli. After the government policies to stop hunting came into force, internal funding for compensation incen-

tives dried up. But the WED program opened up opportunities for Masai ranchers to participate fully in planning discussions and to set an action agenda that reflected their perspectives.

12. **To keep negotiations fair, give all stakeholders information of equivalent value.** In most of the examples, one or more potential partners lacked key information about the resources, land use, economy, ecology, and other dimensions of their region. Some information was technologically inaccessible, requiring training in advanced computer use, Geographic Information Systems (GIS), etc.

Perhaps uniquely, the Great Barrier Reef worked from a scientifically established information base right from its beginning, regularly issuing maps, data, and carefully prepared information for the public. As a result, the program's constituency is relatively well informed, public debate on oil and mineral exploration (which was turned down by the public) has been vigorous, and the reef's many visitors receive an education.

13. **Give stakeholders incentives to get involved in and committed to bioregional programs.** Even where interest in conservation is great and volunteerism ensured, few stakeholders can afford to do more than attend a few public meetings or respond to questionnaires. To get them to alter farming, fishing, logging, or tourism practices, for example, or to restore habitats on private lands may require compensating them for time, expenses, or alternative uses of resources—at least until markets more accurately reflect true costs and prices and thus elicit rational cooperative behavior and activity.

In the North York Moors, neighboring farmers in the bioregion's matrix were offered contracts to restore and maintain hedgerows on their lands and to restore certain habitats. Remuneration was high enough to sustain cooperation in the program. Presumably, these payments were efficient since they re-established appropriate habitat for less than it would cost to buy new land and hire workers. Here too, a pay-for-services approach can jump-start cooperation on other issues.

In the other bioregional programs discussed in Chapter II, different types of incentives were established to encourage stakeholder involvement. In La Amistad, stakeholders got the chance to plan and secure livelihoods over a longer time span than before. In CAMPFIRE, gaining a share of the income and seeing improvements in community services turned the tide of participation. The Great Barrier Reef program eliminated hassles for tour operators by developing strong voluntary codes of conduct to protect and maintain the reefs and coastal areas. In the Mediterranean, shared science, technology, and information helped all parties in the clean-up of everyone's backyard.

14. **To foster involvement and commitment, ensure that individual and group stakeholders receive a fair share of the benefits.** The Zimbabwe experience with CAMPFIRE illustrates what happens when coins of income are literally placed on the communal table and those present are allowed to decide what constitutes a "fair" share. Similarly, the North York farmers received a fair price for their labor and expenses, giving the program a sure footing.

On the other hand, the Masai are still awaiting their due. In both the Tanzanian and Kenyan sectors of the Greater Serengeti Ecosystem program, many people who have basically delivered on their side of the deal are still waiting for the benefits promised.

15. **In areas of multiple jurisdictions, try to develop coordination mechanisms that do not immediately challenge nations' existing mandates or sovereignty.** In all the examples cited, various jurisdictions were already in force. Some twenty-eight distinct public and private entities had jurisdictional responsibilities in the Talamanca mountains when Costa Rica established its portion of the one-million hectare bi-national La Amistad Biosphere Reserve it co-sponsors with Panama. In the Mediterranean, the coastal nations have sovereignty over portions of the terrestrial, coastal, and marine components of that ecosystem.

Clearly, mechanisms can be designed to convene a bioregion's constituents, explore issues

and potential answers, and promote appropriate action without challenging their sovereignty. The Biosphere Reserve approach leaves intact the authority of public agencies and private property rights in the Talamanca. The Med Plan fosters project activities to address oil pollution within each country and establishes cooperative research and monitoring activities at new centers around the region.

16. **Honor all commitments that result from negotiations.** Evidence from the Serengeti, Amboseli, La Amistad, and Yellowstone suggest that various commitments made by government agencies ring hollow several months and years later. Potential partners in the region stood ready to negotiate and implement agreed-upon activities, but government was unable to deliver. Why? In La Amistad, government policies changed, cutting off personnel and budgets. In Amboseli, pumps at the watering facilities were not maintained, forcing pastoralists to return into the National Park with their herds. In such cases, cynicism sets in—a further obstacle to progress in future.

17. **Promptly implement projects that respond to community needs.** Government agencies and regional organizations must quickly implement projects agreed upon by the communities whose livelihoods and security are affected by a bioregional management program. This need opens up an important niche for cooperation by non-governmental organizations, which can often move funds and carry out activities faster than public agencies required to rely on public works, abide by national budgets, and follow detailed procurement procedures can.

In the Amboseli example, the Wildlife Extension (WEX) project helped procure and install the fencing needed to protect gardens and fields from marauding wildlife in short order after the ranchers had waited two years for government action.

Challenge to Establish Cooperative Arrangements Among Institutions

Initially, every bioregional management program described here found that the ecosystems of interest were already occupied by an array of public and private organizations and institutions. Perhaps the most complex was Costa Rica's La Amistad Biosphere Reserve, but the political landscapes of the Wadden Sea and Mediterranean programs were also dotted with national and international structures.

Along with formal organizations, communal institutions already operating have an important role to play in bioregional management. The indigenous peoples of La Amistad, the Masai, and other peoples of the Serengeti, Amboseli, and Kajaido, and the ranchers of Yellowstone—all have strong notions about social behavior, land use, and the role of government that must be reckoned with if regional management initiatives are to succeed.

18. **Don't hesitate to rely on short-term financial support from external sources for bioregional programs initially, so long as it is replaced in a timely manner by a sustainable flow of resources.** Non-governmental support, debt-for-nature swaps, and other forms of financial support can be particularly helpful where governments require several years to get a new budget line funded. That said, however, the cases of La Amistad and Amboseli and Kajaido illustrate the pitfalls of relying for too long on short-term external support. In both, programs were halted and local incentives proscribed while alternative sources of funding were sought.

Many countries are now setting up "environmental funds" in which grants and contributions from international, national, and private sources are held in trust and capitalized. Such approaches hold out the possibility of long-term planning and program security. Commitments made to stakeholders can thus be honored and incentives continued indefinitely (IUCN, 1994c; IUCN, 1994d).

19. **Establish cooperative management options with and among stakeholders.** A cardinal rule of ecosystem management is that people with interests in a bioregion are not simply to be placated with marginal give-aways or menial

jobs, but are understood to be partners. Nor are they simply occupants of so-called "buffer zones" to be accommodated just to minimize negative impacts on core zones. Indeed, their patches of forest, farm, and coastal area are vital cogs of the greater ecosystem, and many of the resources they control are as important as the core areas themselves to the ecosystem's overall function and health.

Cooperation between public agencies and private parties hinges on how well government's authority to protect the interests of society at large are balanced with the need to join forces with local interests. The sport fishing boats operating in the Great Barrier Reef now police their own community members to protect the nursery grounds of the fishery. CAMPFIRE communities work with government to prevent poaching of an animal worth more alive than dead to the group coffers. North York farmers manage their own patches of the whole Moors ecosystem but follow guidelines developed communally.

20. **Adjust the design and delivery of technology to allow for the space and time necessary for communities and institutions to adapt.** The Indian Hill Resource Management program illustrates why technology and innovation have to be introduced carefully and adjusted to local social and institutional circumstances. Once the engineers building the small reservoirs joined forces with community leaders to pace the program so that the community could more easily adapt these welcomed facilities, participants began keeping their livestock off the new reservoir walls and agreed on ways to use and share the new resources. As a result, both the productivity and the sustainability of the investments increased.

This analysis suggests eight issues that policymakers and managers need to weigh in the balance if their goal is to promote bioregional management. *(See Box 3.1.)*

Finally, there remains the question, does bioregional management increase the odds for long-term maintenance of our biotic wealth? Indirectly, we can say yes, as suggested by the subjective indicators listed in Box 3.2.

The examples examined in this study, however, have yet to be rigorously evaluated for their impact on biodiversity conservation. Steps to monitor and assess results, and the use of objective indicators to gauge progress have been initiated only recently (Amazon Treaty Secretariat, 1995; Reid et al., 1993).

Furthermore, it is methodologically impossible to credit positive achievements as the result of a bioregional program in the absence of witness cases where under similar ecological, economic and social circumstances, no bioregional type action is taken. So, with a cautious eye to what has been learned from our examples, we conclude that bioregional management can bring together necessary skills and capacity, build a coalition of neighbors and resource users who share ecosystems, and forge partnerships among institutions and organizations. In short, it can set the stage for forward movement.

Box 3.1. Issues to be Weighed in the Balance

1. **Scale.** Seek a balance between larger scales that permit analysis and the implementation of policies to protect and utilize whole ecosystems and the smaller scales at which managers must deal with the problems and issues of communities, resource users and managers, and residents whose livelihoods are at stake. Thus, a bioregional program will feature work at various scales simultaneously. Each level may well require different types of skills and capabilities, different partners, and different kinds of collaboration.

2. **Power and Authority.** Balance authority and responsibility between central, regional, and local levels of government and private entities. In most instances, however, some level of central authority will be required to represent society as a whole, as well as future generations, and to oversee compliance with appropriate standards and norms. Neither extreme of totally central or entirely community management appears to be ideal or practical.

3. **Focus.** While analyzing global and regional ecological, economic and social issues to define the bioregion and its program of work, keep the focus on issues of common concern to all interested local parties.

4. **Conservation/Development.** Balancing conservation and development goals keeps bioregional programs relevant to local residents and resource-dependent people and industry. A preoccupation with conservation alone can alienate potential partners and isolate the area from the regional economy.

5. **Funding.** Welcome international funds to support the launch of bioregional programs, but shift the balance of funding as soon as possible to a mix with internal sustainable funding sources.

6. **Sovereignty.** Establish cooperative arrangements among central, regional, and local government entities, and private interests that respect national and institutional sovereignty and existing mandates. Centralized command-and-control approaches to natural resources management and ownership will have to gradually give way to co-management and co-finance arrangements.

7. **Time and Adaptability.** The time needed to develop new ideas and techniques should be balanced with that required by managers, communities and other interested parties to adapt their respective social norms and resource use techniques. Some of the cycles of nature, like migration patterns, are predictable, so managers can easily prepare for them. But others—such as natural disasters—strike unannounced, while still others occur over intervals too long to fit into even long-range plans. Bioregional programs need to anticipate and prepare for natural disasters and humanitarian assistance demands while dealing with normal daily projects and activities.

8. **Old versus New Institutions.** Where preexisting institutions can be adapted to lead, or contribute specific capabilities to the bioregional program, then on balance, their reform may be more efficient than the formation of new organizations. Alternatively, where established bodies cannot or choose not to evolve, or where needed skills and capabilities are not available in any existing institution, then a new body may be justified to fulfill that role.

Box 3.2. Preliminary Conclusions on the Impact of Bioregional Management on Biodiversity Conservation

1. Where bioregional programs are underway, a larger and more complex pool of skills and tools are serving to help protect, restore, inventory, collect, study, appreciate, utilize and educate about the region's biotic wealth.

2. Greater numbers of individuals and groups have become involved in charting the region's future and in reconsidering how their own livelihoods need to be harmonized with the region's resources.

3. Established public and private organizations and landowners in the regions are negotiating new agreements to promote cooperative planning and implementation, including co-management and co-finance options.

4. Participants demand, and learn to employ data, information, and local, traditional and scientific knowledge in decision-making.

5. Stakeholders develop the skills and access needed to participate in planning and management activities in the region.

6. The need for careful protection and management of selected sites for their ecological functions is understood and accepted, while at the same time greater emphasis is given to improvements in the sustainable utilization of biotic resources, and the equitable sharing of costs and benefits.

7. Over time, bioregional programs give greater emphasis to policy, legislative and administrative considerations, and place increasing weight upon social, cultural and economic factors. Easy technical and expert fixes are gradually held suspect.

8. Participants favor incentives and other positive mechanisms to foster their cooperation in regional programs; they also recognize the role of governmental agencies and regional authorities to provide long-term continuity, support, and commitment to the aims of the program and national goals.

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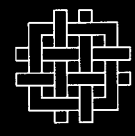

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