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**AN OVERVIEW OF ISSUES PERTAINING TO
BIOLOGICAL DIVERSITY CONSERVATION IN MALAWI**

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GLOSSARY

ADD	Agricultural Development Districts
ADMARC	Agricultural Development and Marketing Corporation
ART	Adaptive Research Team
CIAT	International Center for Tropical Agriculture
CIDA	Canadian International Development Agency
CIMMYT	International Center for the Improvement of Maize and Wheat
CITES	Convention on International Trade in Endangered Species
DA	Development Area
DAR	Department of Agricultural Research
DNPW	Department of National Parks and Wildlife
ECLG	Ecological Consultative and Liaison Group
EPA	Extension Planning Area
FAO	Food and Agriculture Organization of the United Nations
FRIM	Forestry Research Institute of Malawi
GOM	Government of Malawi
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (FRG)
ICRAF	International Council for Research in Agroforestry
ICRISAT	International Center for Research in the Semi-Arid Tropics
IITA	International Institute of Tropical Agriculture
IUCN	International Union for the Conservation of Nature and Natural Resources
LHO	Land Husbandry Officer
MK	Malawi Kwacha
NCE	National Committee for Environment
NGO	Non-governmental Organization
NORAD	Royal Norwegian Ministry of Development Cooperation
NP	National Park
NR	Natural resources
NRM	Natural Resources Management
ODA	Overseas Development Administration.
PNRM	Plan for Supporting Natural Resources Management in Sub-Saharan Africa
PVO	Private Voluntary Organization
RDP	Rural Development Project
SADCC	Southern Africa Development Coordination Conference
SSRA	Sahel Sub-Regional Assessment
STA	Smallholder Tea Authority
SUCOMA	Sugar Company of Malawi
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WHO	World Health Organization
WWF	World Wildlife Fund

1. INTRODUCTION

Biological diversity is commonly defined as "the variety and variability among living organisms and the ecological complexes in which they occur". Diversity can be considered at the genetic, species, and ecosystem levels, although it is most commonly discussed at the species level. Maintaining diversity at all levels is critical to sound ecosystem functioning. Conserving biodiversity in Malawi is covered in three parts in this report. The questions and issues contained in the three parts are summarized below.

PART I: CONSERVATION OF BIOLOGICAL DIVERSITY IN MALAWI - WHY WORRY?

Malawi has other pressing problems to worry about, why should it be concerned with the conservation of biological diversity? The rate of growth of the population is one of the highest in the world and already it is one of the most densely populated countries in Africa. In a country whose economy is based on agriculture, the average farmer cannot grow enough food to support his own family. Crop yields are low, most inputs are unaffordable, and a significant percent of production is lost to pests and disease. There is intense pressure on the land throughout much of the country. Given this situation, how can the exclusion of people from unsettled land be justified, and what compels Government to devote scarce resources to biological diversity conservation? What is the significance of these biological resources? What are the major threats to their conservation? What efforts are underway to protect them?

PART II: CONSERVATION OF BIOLOGICAL DIVERSITY IN MALAWI - IS THERE A NEED FOR HELP, AND IF SO, ARE THERE APPROPRIATE AREAS FOR DONOR ASSISTANCE?

How can donors, especially ones with limited resources, justify spending funds to help Government address issues related to conservation of biological diversity? Considering the agricultural base of the economy of Malawi, isn't it more appropriate to assist the agricultural sector, and isn't agricultural development more relevant to the long-term development of the country than is the conservation of biological diversity? "Developed" countries can afford the luxury of parks and reserves, but is it really realistic to believe that "developing" countries can afford the same? Even if they can, should donors participate in the development of "luxury" when basic needs are currently unmet? What are the major constraints which limit success in conservation efforts?

PART III: CONSERVATION OF BIOLOGICAL DIVERSITY IN MALAWI - HOW COULD DONORS ASSIST IN THESE EFFORTS?

What can donors do to assist in the conservation of biological diversity? What might be the most effective method to provide this assistance? Do successful initiatives exist on which donors could build? How can donors coordinate their efforts to ensure that the assistance they provide is meaningful?

2. PART I

2.1 Measures Taken to Conserve Biological Diversity in Malawi Through the Development of a Protected Areas System

a) Description of the Protected Areas System

The Government of Malawi has taken meaningful measures to conserve the biological diversity of the country. The most significant effort has been through the establishment and development of a protected areas system. This system consists of five national parks and four game reserves which together comprise almost 11,000 sq km, or approximately 11% of the total area of the country. Few countries have protected such a large percentage of their area. Including forest reserves, Malawi has legally protected 20% of its total area, a significantly greater percent than the world average of 3%. Figure illustrates the distribution of these areas.

The protected area system includes examples of all major landscapes and most biotic communities found in Malawi. Table 1 indicates the major biotic communities occurring in Malawi and the percent of each community included in the protected area system. These areas contain numerous plant and animal species, many of which are endemic, i.e. they are naturally found nowhere else on earth. A list of these species is presented in the Protected Areas Master Plan for each area. The existence of detailed master plans for each protected area is indicative of the Government's serious commitment to conserve its biological resources. Few other African countries have elaborated and adopted such plans.

The Department of National Parks and Wildlife (DNPW) is the agency responsible for managing protected areas, as well as wildlife found outside of these areas. It has a total staff of 309, including game scouts, management, research, and environmental education personnel. The operating budget for the Department is approximately K 1,118,000 (US\$ 400,000). Malawi is the Southern African Development Coordinating Conference (SADCC) country responsible for coordinating activities for wildlife management and national parks.

b) What Purpose Do Protected Areas Serve in Malawi

Why protect even a single hectare of land in a country where land is one of the most critical constraints preventing further development? There are important reasons for this apparent paradox.

Malawi's parks and reserves protect many of its most critical watersheds. Degradation of these watersheds would negatively affect agricultural production, and would result in increased incidence of both drought and flooding. Nyika National Park alone for example, is the source of three major and numerous minor water catchments which flow throughout the year. Much of the agricultural production in the north depends on this flow, especially during the dry season. Another national park, Liwonde, serves to protect part of the catchment of the Middle Shire River, the most important river in the Southern Region.

TABLE 1
BIOTIC COMMUNITIES OCCURRING IN MALAWI

<u>Community Type</u>	<u>% of Malawi</u>	<u>% in PA</u>
Montane Evergreen Forest	0.26	42
Montane Grassland	4.00	23
Semi-evergreen Forest	0.81	0
Closed Canopy Woodlands of Wetter Uplands (tall <i>Brachystegia</i> spp.)	3.37	0
Open Canopy Woodlands of Plateaux (<i>Brachystegia</i> / <i>Julbernardia</i> / <i>Isoberlinia</i>)	26.06	7
Open Canopy Woodlands of Hills and Scarps (<i>Brachystegia</i> spp.)	22.86	15
Open Canopy Woodlands of Fertile Areas (<i>Piliostigma</i> / <i>Acacia</i> / <i>Combretum</i>)	4.69	0
Mixed Thicket/Woodlands of Drier Uplands	1.50	43
Mopane Woodland	1.74	32
Woodlands of Fertile Areas (<i>Adansonia</i> / <i>Cordyla</i> / <i>Acacia albida</i>)	2.25	0
Thicket/Savanna of Poorer Areas (<i>Combretum</i> / <i>Acacia</i>)	1.71	10
Woodland/Savanna (mixed species)	4.25	26
Sand Dune Vegetation	0.30	0
Woodlands of Wet Fringes (<i>Terminalis sericea</i>)	1.57	1
Grasslands-Seasonally Wet	2.75	6
Grasslands-Perennially Wet/Swamp	1.77	4
Lakes-Fresh	19.45	<1
Somewhat Saline Lakes-No outlet	0.61	0
Islands	0.03	18

*PA = Found within protected areas.

Source: J.E. Clarke and R.H.V. Bell, 1986.

Fisheries would suffer if protected areas did not exist. The Bua river, for example, runs through the Nkhotakota Reserve. It is the only remaining important spawning ground of the Mpasa or Lake Salmon, an important commercial fish. Other non-protected rivers which formerly were spawning grounds of this fish no longer support the species as a result of siltation, overfishing, or dams which prevent fish from going up river to spawn. A nascent industry in Malawi, tropical fish export would also suffer if areas were not protected. The most important habitat for Mbuna, the common term for a great variety of colorful species of Cichlid, is within Lake Malawi National Park. There is a greater variety of fish in this lake than in any other in the world, and many of them are endemic to the lake. Lake Malawi is well known to tropical fish enthusiasts around the world. Last year, approximately 34,000 tropical fish, representing 250 different species were exported from Malawi.

The lake is of obvious importance in terms of commercial fisheries. A great percentage of the animal protein consumed by Malawians is from lake fish. The protection of hippos is important to fish production in the lake as their feces supply important nutrients in the water.

Crocodile farming is a growing industry in Malawi. At present, and until there are sufficient breeding individuals at the crocodile farms, these operations are obtaining most of their eggs from outside the farms, especially from the Nkhotakota Reserve. The maintenance of protected areas is, therefore, essential to this industry and, as the crocodile is not currently protected anywhere outside of parks and reserves, these areas will be important as reservoirs in future. Without protection, extirpation of the species outside of protected areas is almost inevitable.

The national parks generate significant amounts of revenue from tourism. In addition to income generated by parks from entrance fees, substantial revenue from air travel, car rental, accommodation, and restaurants is attributable to the existence of protected areas in Malawi. Quantification of these revenues earned through tourism may assist conservation efforts by demonstrating that these result in significant revenue earnings.

Although currently untapped, the potential exists for protected areas to generate revenue from the development of research programs. Malawi has numerous sites of scientific interest and conservation value. Nyika National Park alone, for example, contains more than 120 species of orchids. No other area in south-central Africa contains as many species. Nyika's montane grasslands are of great scientific interest, especially in the study of patch dynamics and the effects of fire on these ecosystems. Mwabvi Reserve in the south is one of few remaining homes of the rare black rhino. Lengwe National Park, also in the south, contains the most northerly population of nyala in Africa. Kasungu National Park contains a healthy population of elephants. Vwaza Marsh Game Reserve contains approximately 250 species of birds. All these areas and others provide outstanding outdoor laboratories for research, as well as reservoirs of numerous plant and animal species.

As the functioning of ecosystems becomes better understood, the importance of maintaining diversity is increasingly apparent. Healthy ecosystems serve a variety of essential functions including nutrient cycling, providing clean water and air, and much more.

In a natural environment, all of this is provided without human inputs. Development changes this situation. Development need not preclude ecosystems from functioning properly if it is well planned. Long-term sustainable development depends on maintaining the health of the natural resource base.

2.2 Measures Taken To Conserve Biological Diversity Outside of Protected Areas

Measures have also been taken to conserve biological diversity outside of protected areas. There is also greater emphasis in recent years on involving individuals directly in conservation. The DNPW is attempting to involve people more directly in conservation through their Education and Information Units. There are three regional sub-units. These sponsor School Wildlife Clubs, trips to national parks, talks, films and conservation-related contests. Many of the activities are supported by the Wildlife Society of Malawi, the largest conservation related non-governmental organization in the country.

The Department has begun permitting villagers limited use of resources found within protected areas. People from villages surrounding protected areas are encouraged to practice beekeeping activities within parks, and are allowed to cut grass for thatch. The intent of the program is for villagers to gain a greater appreciation of protected areas. The program is especially directed at those villagers who live on the periphery of parks. The beekeeping club from the village bordering Nyika National Park, for example, is allowed to hang their hives inside the park. They benefit from this because of the number of wildflowers in the park which attract bees and produce a special honey. They, in turn, help the park by reporting poachers to park personnel. It is in their best interest to do so because poachers often set fires that destroy their hives. Proposals are currently being considered which would also allow people to fish and collect caterpillars from protected areas on a limited basis. This would only prove successful if the resources are provided to the Department to enable them to carefully monitor this use. Currently, not enough scouts or transport are available to do this.

The National Herbarium and Botanic Gardens, a parastatal, is conducting important research to promote the conservation of biological diversity in the country. It conducts field research to document the existence of plant species both within and outside of protected areas. In addition, it investigates "new" and underutilized varieties of plants for food and medicine. The probability that a variety of plants will be purposefully conserved is enhanced by gaining a greater appreciation of their importance. Given this important task, the Herbarium is in great need of additional field staff and office space.

2.3 Legislative Measures Taken to Conserve Biological Diversity

Malawi is signatory to the African Convention on Conservation of Nature and Natural Resources (Organization of African Unity), the Convention Concerning the Protection of World Cultural and National Heritage (UNESCO), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES-IUCN). It acceded to the latter two conventions in 1982.

A number of legislative acts relate to the conservation of biological diversity in Malawi. A new comprehensive National Parks and Wildlife Act is in the draft stage and will address wildlife management both within and outside of protected areas. This act will replace all existing laws administered by the DNPW including The Game Act and The Wild Bird Protection Act, as well as the National Parks Act.

2.4 Existing Conservation Oriented Institutions

The Natural Resources College, a modern facility located outside of Lilongwe, graduated 10 students from its Parks and Wildlife Program last year. The College provides practical training to the Certificate level over a two-year period. Graduates are normally employed by the DNPW as Technical Assistants. The program has two teachers. Courses consist of wildlife management, ballistics, and biometry.

Beyond the Certificate level, there is no training available in Malawi for individuals in the wildlife and parks profession. In the past, individuals have attended institutions in the U.S., Scotland, the U.K., South Africa, and the College of African Wildlife Management in Tanzania.

Scout training courses are held at Kasungu National Park on an irregular basis. Seventy scouts were trained during the last year. Because no physical structure exists for the training program at present, the youth hostel facilities in the park are currently used for this purpose. This is unsatisfactory not only because of the conflict of use this presents, but also because there are no training materials, equipment or facilities appropriate for scout training.

2.5 Existing Threats to the Conservation of Biological Diversity

Notwithstanding efforts to conserve biological diversity both within and outside protected areas, significant threats exist which may limit the success of these endeavors. Development itself, if not planned or unwisely planned, is the biggest threat to the conservation of biological diversity. According to Government policy, all proposed development projects should be scrutinized before being approved, and if deleterious effects are anticipated, an environmental impact analysis must be conducted. Similarly, ongoing activities must be considered to ensure that deleterious effects on the environment are minimized or corrected.

The now defunct National Committee for Environment (NCE) set up by the Environmental Secretariat to discharge these responsibilities. The Environmental Secretariat has since moved from within the Ministry of Forestry and Natural Resources to become one of two units of the National Research Council under the Office of the President and Cabinet. The NCE was disbanded last year and has been replaced by the Ecological Consultative and Liaison Group (ECLG). However, to date, no regular meeting schedule has been established for the Group.

Further, the Secretariat is inadequately staffed to perform the functions it has been assigned. The addition of at least one individual fully qualified in Environmental Impact Assessment is urgently needed, along with at least one other individual to assist in monitoring actions undertaken by the various implementing organizations to ensure that the recommendations of the Secretariat and the ECLG are implemented. At present there are no means to follow up on recommendations.

The biggest existing threat to the conservation of biological diversity in Malawi and, as part of this, the sustainable use of resources, is the high population growth rate, now estimated at 3.3%. The population of Malawi has doubled over the last 20 years. The population is growing even faster than the growth rate suggests due to immigration. At least 700,000 refugees from Mozambique reside in the country. Although most depend on food aid for subsistence, some farm illegally, and all require fuelwood as well as physical space.

Population pressure is especially severe in the south which is the most densely populated part of Malawi. Although a greater amount of land remains available for cultivation in the north, few people disperse to areas outside their home areas, even when the opportunity exists for cultivating larger tracts elsewhere. Pressures from dense populations have caused people to cultivate what is normally considered non-arable land. This has resulted in environmental degradation, especially in the form of soil erosion and loss of soil fertility.

By the year 2005 it is projected that all available agricultural land in Malawi will be under cultivation. It can be expected that farmers and decision makers will view protected areas as "unused" lands waiting to be cultivated. Much of the land now protected by law is, however, unsuitable for cultivation. Studies show that even if all of the land which is currently protected were opened up to cultivation, this would only relieve cultivation pressures for an additional four years. At that time, the country would face the same situation, greatly exacerbated, and many species of plants and animals would have been decimated.

Also as a result of intense population pressure, fuelwood is becoming increasingly scarce. The Government has responded to the need to provide more fuelwood, but has done so at the expense of maintaining a diversity of trees. The Department of Forestry has been successful in promoting tree planting, but a disproportionately high percentage of these trees is comprised of only one species. Large areas of indigenous woodland have been cleared and replanted with faster growing exotics, especially Eucalyptus. Such a preponderance of so few species is dangerous. The risk of disaster from an outbreak of pests or disease is greatly magnified by this lack of diversity. Given the current and anticipated shortage of fuelwood, it is necessary to emphasize fuelwood production, but several measures could be taken to ensure that biological diversity is not sacrificed while these needs are met.

The Forestry Department could promote the planting of a diversity of fast growing species. Extension could be provided to teach villagers how to manage indigenous woodland on a sustainable basis to enable them to obtain not only fuelwood but a variety of other forest products including medicinal plants, mushrooms, and grass for thatching. Greater emphasis could be placed on energy conservation and alternative fuel sources.

Illegal and uncontrolled hunting of wildlife has caused certain populations to decrease significantly within protected areas. This, as well as population pressures, has resulted in a scarcity of wildlife outside of protected areas. All forms of hunting, except for crocodile hunting, were banned in 1988 in an attempt to allow populations to recover. In many areas, however, there is no longer appropriate habitat for wildlife populations to become reestablished. The DNPW, responsible for wildlife management throughout the country, is critically short staffed. Of its total manpower requirements as estimated in 1983, only 60% of the posts are filled. Even if all posts were filled, the total estimated requirement of 514 is now considered to be far too low. With so few staff it is impossible to carefully monitor hunting should it ever be reinstated, and unrealistic to assume that poaching can be effectively curtailed. Scouts typically are responsible for patrolling large areas, a task made more difficult by existing transport constraints.

3. PART II

There is an important distinction between the words warranted and justified. Conservation of biological diversity is warranted on its own merit. Nevertheless, the human race now requires that the existence of each species be justified in human terms. Thus, donor aid to conservation efforts often requires detailed justification. Donor assistance to Malawi in this area can be justified on the basis that Government has given conservation considerable priority (as explained in Part I), and donor assistance should normally reflect Government priorities.

Although Government has given priority to conservation, it has given a greater amount of resources to development of the export agricultural sector. This seems logical in a country in which the economy is based on agriculture. However, the productivity of the agricultural sector is based largely on the health of the natural resource base. The natural resource base is, in turn, based on sound ecosystem functioning, a direct result of biological diversity conservation. Therefore, protection and improvement of the natural resource base is a vital part of the task of improving the long-term productivity of the agricultural sector.

Perhaps because until recent years the need for efforts specifically directed at biological diversity conservation was minimal, the notion seems to have evolved that conservation "happens" on its own with little external intervention. This notion is inaccurate. Required inputs may not be as costly or extensive as they may be for agricultural development, but they are nevertheless essential. Additional funds are needed by the Department to effectively execute the responsibility it has been given by Government.

4. PART III

Due to intense land pressures resulting from rapid human population growth throughout much of the country, most of Malawi's natural biological diversity is now found only within reserves. Much of the future success of conserving biological diversity in Malawi is, thus, dependant on the **maintenance of established protected areas**. Malawi has succeeded in protecting many of the critical watersheds on which its agriculture-based economy depends. It has also succeeded in conserving numerous plant and animal species endemic to the area as well as many that are rare, threatened or endangered, and has done this with very limited resources.

These accomplishments, however, cannot be maintained given the resources currently allocated to those agencies responsible for natural resource management in the country. Successes in natural resource management require **continual management, research, and monitoring efforts**. Without these, success is temporary at best. Striving for only temporary success in the management of natural resources is equivalent to accepting failure. Without long-term management, otherwise renewable resources may be rendered non-renewable. **Long-term successful natural resource management must be the goal of any serious attempt to conserve biological resources.**

A number of promising natural resource and biodiversity conserving initiatives have been identified in Malawi. Some of these successes are listed below:

- 4.1 Promising Initiatives Which Promote Conservation of Biological Diversity through Either Total Protection or Sustained Use of Natural Resources
 - 1) Private small-scale enterprise based on sustainable use of natural resources found within protected areas
 - a. Beekeeping clubs have been established throughout the country, although most operate in the north.
 - 2) Enhancing environmental awareness of youth and promoting their participation in conservation
 - a. Information and Education Units of the DNPW are sponsoring school and village Wildlife Clubs, films, talks, visits to parks, rallies, contests and other activities. There are now 98 school Wildlife Clubs and another 119 village Wildlife Clubs in the country.
 - b. Youth hostels have been constructed in most parks and some game reserves.
 - c. A conservation newsletter entitled "Nantchengwa" is being distributed to every primary and secondary school in the country through The Wildlife Society of Malawi. The wildlife journal "Nyala" is also

published by the Society. The Society sponsors many of the school visits to parks, as well as the construction of youth hostels such as those in Lengwe, Kasungu, and Nyika national parks, and the one being built in Nkhotakota. In addition, it conducts limited wildlife inventories.

- d. "A Tree For Every Child" project which will begin this year through the Department of Forestry.
- e. Department of Forestry "Learning by Earning" project which will begin this year.

3) Natural resource-related tourism

- a. Provisions have been made for visitor activities such as trout fishing, trails, walking safaris and night game viewing in some parks.
- b. Provisions have been made in some parks for visitor education through Visitor Information Centers.
- c. Visitor accommodations of various types are provided in many parks.
- d. The number of Malawian visitors to parks has significantly increased over the last few years although, in comparison with foreign visitors, the number is still low.

4) Developing alternative fuel sources and energy conservation

- a. A cookstove which uses maize husk instead of firewood has been developed by a private individual in Lilongwe.
- b. Solar water heaters are used for visitor accommodations in some parks.
- c. A tobacco drying technique which reduces fuelwood requirements by up to 50% has been developed through the Department of Forestry's Wood Energy Division.
- d. Fish drying techniques which conserve fuelwood have been developed through the Department of Fisheries.

5) Law enforcement activities to protect natural resources from agricultural encroachment, poaching, and other undesired impacts

- a. The borders of some protected areas which are most vulnerable to agricultural encroachment or wildlife damage have been fenced with solar-powered fencing. (Kasungu and Lengwe National Parks).

- b. Use of a new solar powered radio communications system has been extremely effective. Radio communication exists, however, only between protected areas not within them.
- 6) Research and management activities to conserve biological diversity
- a. Efforts are underway to increase the awareness of international research centers regarding the scientific importance of biological resources and systems in Malawi.
 - b. Research and management activities are underway to protect critical watersheds and waterways by DNPW, the Department of Forestry, Ministry of Agriculture.
 - c. Important activities are being undertaken by the National Herbarium that are designed to enhance awareness of underutilized varieties of plants and investigate new ones for food and medicine, and to quantify existing botanical diversity within and outside of reserves.
 - d. Rare, threatened and endangered species of plants and animals are being listed by the Department of Forestry and protected from cutting.
 - e. Beginning in 1988, DNPW banned all hunting of wildlife except "vermin" at least until censuses are conducted to determine the status of various wildlife populations.
 - f. Controlled burning is routinely practiced in most parks as a management tool.
 - g. Research on Nchila which is being conducted at Domasi Experimental Fish Farm may assist in recovery of the Lake Malawi population.
 - h. Research on Mbuna in Lake Malawi has helped to promote conservation of these species.
 - i. Research on numerous food fish in Lake Malawi may promote their sustainable use.
- 7) Permitting local community use of natural resources found within protected areas
- a. Grass harvesting is allowed in many protected areas.
 - b. Fishing in Lake Malawi and Liwonde National Park is currently being considered. The potential for success exists only if use is strictly controlled and monitored.

- c. Caterpillar collecting in Kasungu National Park is currently being considered.
 - d. Dead wood collecting is permitted in Lake Malawi National Park and in forest reserves.
- 8) Small-scale enterprises based on sustainable use of natural resources found outside protected areas
- a. A small-scale enterprise has been developed to make wine from wildflowers in Zomba.
 - b. Fish farming is becoming more popular with small landholders.
 - c. A variety of wild plants are used for medicines.
- 9) Enhancing environmental awareness of local communities bordering protected areas and of decision makers
- a. Efforts are underway through the Environmental Secretariat to increase environmental awareness through meetings with various District Development Committees. Several meetings have already been held, and funding proposals to sponsor additional ones have been developed.
 - b. A proposal has been developed to hold a seminar on environmental awareness for national policy decision makers. The proposal was developed by the Environmental Secretariat.
 - c. Limited efforts by Information and Education Units of the DNPW. As of yet, the DNPW is finding it difficult to reach populations other than school groups.
 - d. A full page of the national newspaper "Daily Times" is often devoted to environmental issues.
- 10) Protecting crops from wildlife damage
- a. Phase 1 of a six-year project financed by UNDP entitled "Wildlife Management and Crop Protection" has recently begun through the DNPW.

- 11) Collaboration between private sector, Government, and indigenous conservation related Non-Governmental Organizations in conservation efforts
 - a. Relations between the Sugar Company of Malawi (SUCOMA) and Lengwe National Park have been very positive. SUCOMA has benefitted from the nyala provided to them by the park for their Experimental Nyala Feedlot, and Lengwe National Park is benefitting from their association by the provision of free electricity, water, and medical services.
- 12) Small-scale farmer activities which promote biodiversity conservation
 - a. Some small-scale farmers are cultivating numerous varieties of maize, mango, banana, rice, cassava, and other food crops within their limited land area.
 - b. Some farmers are constructing contour marker ridges on steep slopes to retard soil erosion.
- 13) Commercial enterprises based on sustainable use of natural resources outside protected areas
 - a. Crocodile ranching at the Dwangwa Sugar Co. close to Mangochi is a promising enterprise and has the potential to become sustainable. At present, they still obtain most of their crocodile eggs from outside the ranch but the operation is economical, with 3 ha of crocodile farm generating as much revenue as 120 ha of sugarcane.
 - b. Game ranching at SUCOMA. As yet, this cannot be considered a commercial enterprise because the nyala are not being culled, but breeding success has been good thus far and the original herd of 12 nyala obtained from Lengwe National Park has increased considerably.
 - c. The tropical fish export company at Salima is turning a profit. Although this operation has potential for becoming sustainable, at present it cannot be considered so because it has no breeding facility. It acquires all of the fish it exports from the lake and reintroduces none. A breeding facility is planned, however, and the ground has been broken for the new building. Approximately 250 species are exported. The total number of tropical fish exported during the 1987-1988 year was approximately 34,000. The operation realized significant profit in 1988.

- 14) Promoting management of village forest areas of indigenous woodland by Village Action Committees
 - a. The policy at least exists to do this, although greater efforts could be taken to promote indigenous communal woodland management.

4.2 Constraints which Prevent Promising Initiatives from Becoming More Successful

The major constraints within the Department of National Parks and Wildlife to becoming more successful include: 1) lack of funds for fuel; 2) shortage of working vehicles; 3) shortage of staff; 4) lack of equipment; 5) insufficient training; and 6) insufficient information exchange and coordination between the various sectors responsible for natural resource management.

4.3 Conclusion

It is important to note that many of the promising initiatives identified above which promote conservation of biological diversity also have a direct impact on the affected farming population in the region. This impact may be manifest in changed farmer incomes, sometimes lowered and other times increased. The extent to which farmer incomes change as a result of an intervention can be determined only after careful financial analysis of the initiatives from the farmer perspective. Such analysis is beyond the scope of this report, but should be carried out in a (recommended) Action Program.

Needless to say, there are a multitude of diverse activities that have the potential to preserve biological diversity and improve the lives of small farmers. Donor assistance would be appropriate, in the form of projects, grants or PVO assistance, in many of the above-mentioned areas. Annex I contains a partial listing of possibilities for specific donor support. The main Natural Resources Management Assessment also contains recommendations for activities that support the maintenance of biological diversity. An Action Program and Plan, by exploring some of the important economic issues, would further elaborate areas for donor assistance.

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6. Scope of Work and Team Composition

MALAWI NATURAL RESOURCES MANAGEMENT ASSESSMENT

Objectives and Purpose

1. Assist USAID/Malawi to prepare for future natural resource management and biological diversity programming and the future Action Program/Action Plan.
2. Identify, document and assess improved NRM and biological diversity practices by farmers, foresters, and others involved in land and related natural resource based activities.
3. Identify and assess key NRM and biological diversity issues most likely to need attention in the near future.

Final Product

The final product of the Malawi NRM Assessment Team will be a report that assesses Malawi's NRM and biological diversity successes and priority concerns. The report will include the following:

- Identification and documentation of successful NRM and biodiversity interventions.
- Identification of important policy issues
- Tentative recommendations to further cooperation between donors and NGO community in NRM and biodiversity efforts.
- Biodiversity and tropical forestry assessment to satisfy Sections 118 and 119 of the Foreign Assistance Act.
- Other NRM related issues depending on Mission needs and time available.

Scope of Work

For the NRM Assessment each team member has tasks which are common to all of the team members; these are:

Before departing the US the team members should: 1) obtain and review relevant reports and publications in Washington, D.C. before departure; 2) meet people from AID, contractors or other donors who have worked previously on natural resources and related issues in Malawi; and 3) make a preliminary list of people, organizations, projects and places to visit while in Malawi.

Upon arrival in Malawi the NRM Assessment Team members will: 1) participate in meetings with USAID/Malawi personnel, GOM officials, PVOs and other bilateral agencies to determine priority NRM issues; 2) identify a range of sites to visit that represent promising NRM initiatives

While in the field and during interviews with government, donor and PVO and NGO personnel team members will: 1) interview farmers, foresters and those involved with land based activities and project personnel and give particular attention to attitudes towards natural resource issues; 2) review government policies, regulations, international treaties, and effectiveness of laws; that relate to natural resource issues; 3) assess extension, training and communications activities that relate to natural resource issues.

In the report preparation phase the NRM team will: 1) work with team to analyze and synthesize findings of field work; 2) prepare a final report which describes the results of the field work and highlights the salient points.

The scopes of work particular to the discipline of each NRMS Team member are:

Social Forester: 1) determine priority NRM and social forestry issues, 2) identify sites to visit in the area of social forestry, agroforestry and fuelwood; 3) during interview pay special attention to attitudes towards trees and tree products, forestry regulations, extension strategies and gender issues in forestry 4) review forestry regulations which affect smallholder tree production and utilization.

Biodiversity Specialist: 1) determine the priority ecological and biodiversity issues in Malawi; 2) visit sites that represent promising biodiversity initiatives; 3) during interviews focus on projects and activities affecting biological diversity both in and outside of protected areas, including species selection for agriculture and forestry projects and human interactions with wildlife; and 4) review existing GOM and donor policies affecting wildlife.

Agronomist: 1) determine the most important issues in subsistence and cash crop production that relate to NRM issues; 2) visit sites and conduct interviews which focus on NR issues such as soil erosion, water management, sustainable production, agroforestry, soil fertility depletion and agricultural chemical use; 3) review existing government policies that relate to both food production and NRM issues.

Malawi NRM Assessment Team Composition

There were three members of the Malawi NRM Assessment Team: Ms. Karen McKay (M.S.), social forester, Ms. Virginia Ravndal (M.S), biodiversity specialist, and Mr. Chris Seubert (Ph.D.), soil scientist/agronomist and team leader.

Karen McKay is a social forester and core member of the NRMS Project staff, who is familiar with the forestry, agroforestry and forest policy aspects of NRM Assessments as well as natural resource information systems. She worked for two years in the Central

African Republic and worked with the NRMS Project field team on the recently completed NRM Action Program and Action Plans in Mali.

Virginia Ravndal is a wildlife management and ecology specialist who has worked in Latin America and Africa in the sustainable use and conservation of animal and plant resources. her work has included studies of forest ecosystems, wildlife monitoring, environmental education, as well as environmental policies and regulations.

Chris Seubert, an agronomist and core member of the NRMS Project staff, has a broad and varied long-term experience in Africa, particularly in Swaziland and Zimbabwe. He has also worked on short-term assignments in Burkina Faso and Nigeria, as well as a recent NRM Action Program and Action Plan for The Gambia. His work has included jungle clearing techniques, farming systems research and extension, crop and soil modeling, soil erosion and land capability studies and micro-computer training.

Annex I

Possibilities for Donor Assistance in the Conservation of Biological Diversity and Natural Resource Management

It is apparent from the extent of assistance required to ensure wise management of natural resources in Malawi that neither the Government alone nor any single donor will be able to meet all of the needs. Indeed, the Government may wish to seek the involvement of a variety of donor agencies as this would ensure greater stability in terms of assistance. It would be advisable for each interested donor to concentrate on one type of assistance within the general area of biological diversity conservation.

The major types of assistance required, as identified in this assessment, are listed below followed by some more specific, but as yet undefined, project ideas. It is recommended that a donor round table be held to discuss specific interests. The various Government departments most directly concerned (i.e., the Department of National Parks and Wildlife, the Department of Fisheries, and the Department of Forestry), interested donor agencies, and the Wildlife Society of Malawi should all be represented at the round table meeting. USAID should consider sponsoring such a meeting, perhaps together with UNDP.

- 1) Assistance to Promote Environmental Awareness
 - a. Provide a mobile unit equipped with film and slide projector and informative materials for distribution. The mobile unit should be staffed by a Roving Environmental Information Officer trained in environmental education. The unit should be part of the Education and Information Unit of the DNPW and, although it could be based at Headquarters, it should spend most of its time on the road.
 - b. Provide new film and slide projectors for the three regional Information and Education Units of the DNPW.
 - c. Sponsor the production of two new films pertaining specifically to environmental issues in Malawi. One film should be targeted at villagers. It should deal with the importance of conservation in Malawi and should explain what specific realistic actions villagers can take to promote conservation. Another film should be targeted at decision makers and development planners. This film should highlight the linkages between the

various sectors which affect conservation and should detail considerations regarding environmental effects of development.

- d. Sponsor occasional seminars to educate national policy decision makers on the relevance of conservation to sustainable development.
- e. Sponsor meetings to bring traditional authorities from various districts and regions together to discuss the environmental problems that confront them and possible solutions.
- f. Provide relevant environmental education materials to secondary schools.
- g. Provide a minibus for each Education and Information Unit to take school and village groups on field trips.
- h. Provide a photocopier and other production equipment and materials to the Education and Information Unit at Michiru Mountain Conservation Area. This is the designated Production Unit responsible for distributing guide booklets to the national parks and producing T-shirts and other items for distribution.
- i. Construct a Student Hostel and an Environmental Center at Michiru Mountain Conservation Area.
- j. Initiate a scheme to involve the private sector in conservation activities, meanwhile promoting youth activities in this area. A scheme based on the same principle as that of the Carlsberg tree planting one could be initiated. The sugar companies, for example, which apparently have some interest in natural resource management (Dwangwa Sugar Corporation has a crocodile ranch and SUCOMA has an nyala feedlot) could be approached to determine their interest in sponsoring a scheme whereby tokens placed inside their sugar bags could be exchanged for free entrance to a national park. If a number of such tokens were accumulated, either by individuals or by a village, the prize might be free transport to the nearest park. The transport could be provided by the DNPW Education and Information Units and the fuel could be provided by the Sugar company.

2) Assistance to Strengthen Institutions

a. National Herbarium

Construct additional office and laboratory space for the National Herbarium, as well as a facility that could be used for educational purposes, especially for school group visits.

Provide a scanning electron microscope to the National Herbarium for its own use as well as for use by the University and the country at large.

Assist with the development of the proposed botanical gardens in Zomba, Mzuzu, and Lilongwe.

Provide funding for additional field staff to do botanical surveys of protected and non-protected areas.

Sponsor the development of informative posters for farmers concerning important underutilized plant species. These could be distributed through existing Agricultural Extension Services.

b. Natural Resources College

Provide assistance in curriculum development for the Natural Resources Management Department, especially for the development of the Parks and Wildlife program.

Provide qualified instructor in Parks Management to the Parks and Wildlife program.

c. DNPW Scout Training Facility

Provide for the construction of a scout training facility at Kasungu National Park. Facility should include large classroom equipped with desks and chairs, blackboards, field guide reference books, generator, overhead projector with spare parts, spotting scope, range finder, compass, and other equipment to be used for training.

d. DNPW Research Unit, Kasungu National Park

Provide research equipment including camera, dissecting microscope, drying oven, balance, portable computer and printer to the Research Unit.

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3) Assistance in Human Resource Development

- a. Train a DNPW Public Relations and Information Officer for each of the three regional offices.

Provide for training of 2 Malawians in environmental impact assessment to be part of the Environmental Secretariat.

Sponsor an Environmental Educator to come to Malawi for four months to train teachers at the Teacher Training College in environmental education techniques and to develop appropriate environmental education materials for primary and secondary schools in Malawi.

Provide for the professional development of DNPW personnel, especially at the B.Sc. and M.Sc. levels.

Provide for an expert beekeeper to train both Agricultural Extension Agents and DNPW personnel in apiculture, honey processing, candle making, and honey packaging.

Sponsor training workshops for women living near protected areas who wish to begin small-scale enterprises such as honey packaging, production of honey jar labels, production of hand painted postcards, candle making, and other activities.

4) Assistance With Providing Materials, Equipment and Literature for Protection of Resources Through Research, Management, and Law Enforcement Activities

- a. Establish a reference library for the DNPW and provide for subscription to various important journals related to parks and wildlife management in Africa. Provide each protected area with copies of relevant field guides, and major ecology, conservation biology, and wildlife management texts.
- b. Provide field equipment to the DNPW including portable tents, sleeping bags, compasses, binoculars, portable cots, walkie-talkies, rucksacks, boots, first aid kits, spotting lights, flashlights and batteries, spotting scopes, raincoats, handcuffs.
- c. Purchase solar-powered fencing to extend existing fence in Kasungu and Liwonde National Parks. In

Kasungu, the existing 32 km of fence should be extended another 98 km to increase its effectiveness.

- d. Provide materials for constructing beehives including nails and top matting to beekeeping clubs.
- 5) Transport Assistance
- a. Establish and stock a DNPW spare parts shop at the Mechanical Unit in Kasungu National Park for use by the Department.
 - b. Provide a new patrol boat and trailer to Lake Malawi National Park, and a propeller for the existing boat.
 - c. Provide 4-wheel drive vehicles, motorcycles, trucks, lorries to the DNPW.
 - d. Provide a fixed-wing aircraft to DNPW to conduct wildlife censuses and curtail encroachment into protected areas.
- 6) Assistance to Enhance Public Relations and Public Involvement in Conservation Related Enterprises
- a. Provide start-up funds for a private small enterprise to make maize husk stoves and provide for extension to introduce stoves to villagers.
 - b. Provide start-up funds for private small enterprise to make beekeeping gear including protective clothing and smokers.
 - c. Employ a Malawian beekeeper to conduct a public relations campaign on behalf of the DNPW to inform villagers of the benefits of beekeeping and to assure them of how profits will be distributed.
 - d. Provide start-up funds for the development of a private small enterprise to package honey. The enterprise should be managed by women living in protected areas. Provide jars, labels, paints and other required materials for packaging.
 - e. Provide start-up funds for the development of private small enterprise within protected areas to make beeswax candles. This could also be an activity for women living near protected areas.

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- 7) Assistance to Promotion of Natural Resource-Related Tourism
- a. Construct youth hostels in protected areas which currently lack this type of facility.
 - b. Equip existing youth hostels with additional cooking gear and cots.
 - c. Establish visitor information centers in all parks where these do not already exist.
 - d. Assist with infrastructure development of Vwaza Marsh Game Reserve to permit its promotion to the status of national park.
 - e. Finance additional printing of out-of-print brochures and books regarding protected areas in Malawi or wildlife and plants. Provide parks with stocks of these materials for sale at either the Visitor Information Centers or at park entrance gates. Assist Department of Information in developing improved tourist-oriented materials concerning Malawi's natural resources.
- 8) Assistance to the Development of Policy, Legislation and Administration
- a. Sponsor the formulation of a comprehensive national environmental policy and strategy for Malawi.
 - b. Provide short-term assistance for an expert in natural resource legislation to review existing legislation related to natural resource management and to make recommendations for revision.
 - c. Provide for update of Protected Areas Management Plans.
 - d. Provide for the publication of a monthly bulletin to enhance information exchange between the various sectors involved in natural resource management and to allow for improved follow-up on recommendations made by the Ecological Consultative and Liaison Group (ECLG) through closer monitoring of actions taken by each sector.
- 9) Staffing
- a. Environmental Secretariat

Provide an expert in environmental impact assessment to the Environmental Secretariat to assist in evaluating potential environmental impacts of proposed and ongoing development projects. This individual should be retained until such time as a Malawian national is fully trained in this capacity.

b. The Wildlife Society of Malawi

Provide an environmentalist with fund raising, proposal development, and administration expertise to develop natural resource conservation-related project proposals in appropriate formats for various donor agencies and to engage in fund raising activities in the private sector.

10. Infrastructure Development Assistance

- a. Construct office for DNPW Lake Malawi National Park staff.
- b. Upgrade staff accommodations and medical dispensary facilities in protected areas. Provide cold storage facilities for medical supplies which require refrigeration.
- c. Upgrade existing roads by raising and gravelling them in areas where these are impassable during the wet season.