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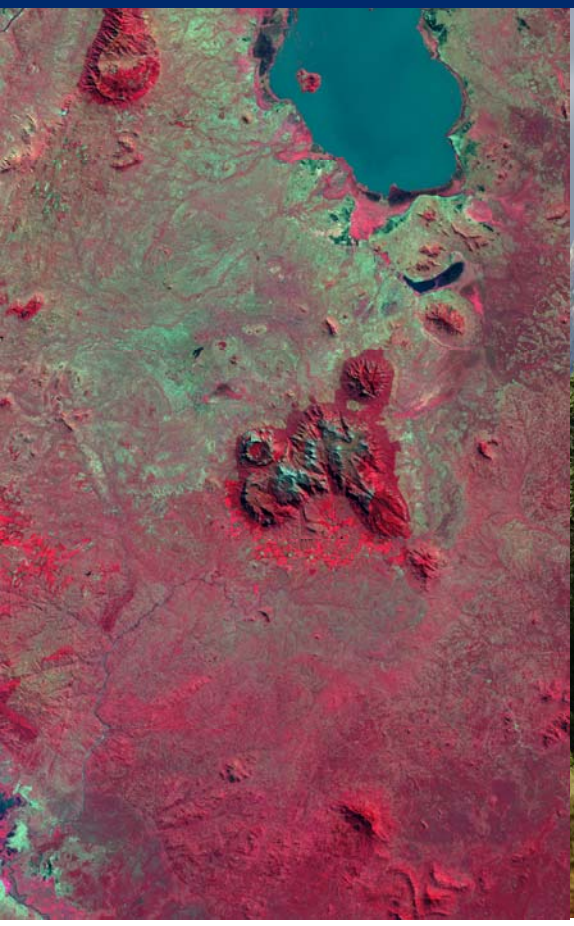
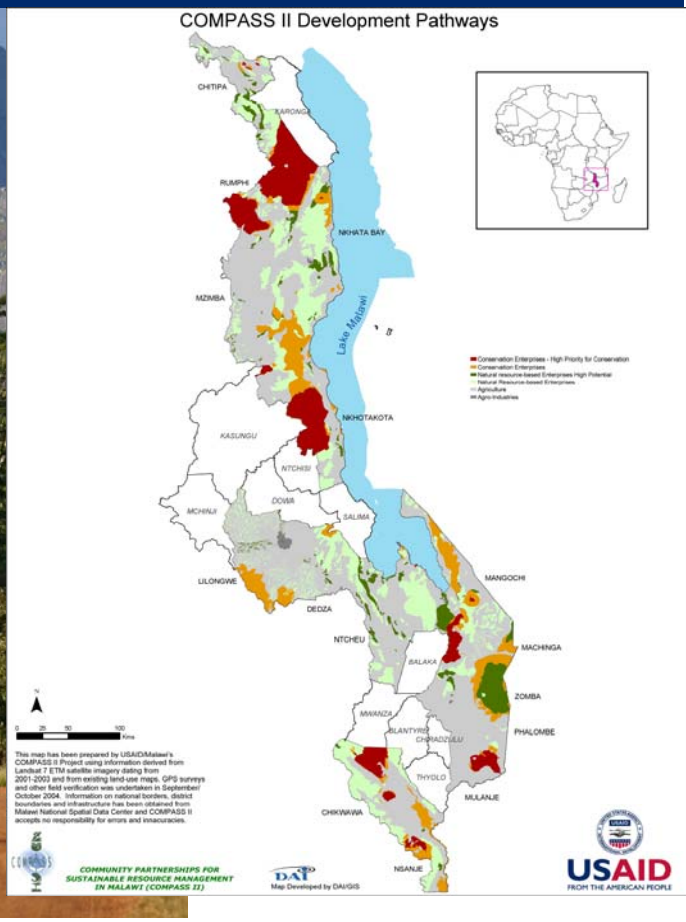
COMPASS DEVELOPMENT PATHWAYS

OCCASIONAL PAPER NO. 1
COMMUNITY PARTNERSHIPS FOR SUSTAINABLE RESOURCE MANAGEMENT (COMPASS II)





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The views expressed and opinions contained in this report are those of the COMPASS II field team and are not intended as statements of policy of either USAID or the contractor companies.

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DISCLAIMER
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ACRONYMS

BERDO	**Bwanje Environmental Rehabilitation and Development Organisation**
BVC	**Beach Village Committee**
BZDP	**Border Zone Development Project**
CARPE	**Central African Regional Programme for the Environment**
CBNRM	**Community-based Natural Resource Management**
CITES	**Convention on International Trade in Endangered Species of Wild Flora and Fauna**
COMPASS	**Community Partnerships for Sustainable Resource Management in Malawi**
DAI	**Development Alternatives, Inc.**
DANIDA	**Danish International Development Agency**
DESC	**District Environmental Sub-committee**
EU	**European Union**
GEF	**Global Environment Facility**
GIS	**Geographic Information System**
GTZ	**German Technical Assistance**
IFPRI	**International Food Policy Research Institute**
LOMADEF	**Lipongwe Organic Manure Demonstration farm**
MMCT	**Mulanje Mountain Conservation Trust**
NGO	**Non-government Organisation**
NRBE	**Natural Resource-based Enterprise**
SOVCRAFT	**South Viphya Crafts Association**
TAMIS	**Technical and Administrative Management Information System**
USAID	**United States Agency for International Development**
VNRC	**Village Natural Resources Committee**
WAG	**Wildlife Action Group**
WESM	**Wildlife and Environment Society of Malawi**

PREFACE

Development Alternatives Inc. (DAI) was contracted by the United States Agency for International Development (USAID)/Malawi to implement the second phase of the Community Partnerships for Sustainable Resource Management (COMPASS II) under Contract # 690-C-00-04-00090-00. USAID and DAI signed the contract on April 30, 2004 with effective dates of May 1, 2004 to March 31, 2009.

The contract engages DAI and its implementing partners[1] to assist USAID/Malawi in achieving progress toward the Strategic Objective of sustainable increases in rural income, and specifically the Intermediate Result of household revenue from community-based natural resources management activities increased.

The purpose of COMPASS II is to enhance household revenue from participation in community-based natural resource management (CBNRM) initiatives that generate income as well as provide incentives for sustainable resource use in Malawi. This is part of a strategy to mainstream community-based management of natural resources within a transformational development framework that progresses toward eventual graduation from developmental foreign aid, one of the USAID global operational goals for broad-based prosperity in stable, democratic countries such as Malawi. Building on solid foundations from previous investments by USAID and others of increased capacity among Malawian government and nongovernmental organizations to adopt strategies that ensure long-term economic and environmental sustainability, COMPASS II seek to accomplish three objectives:

1. To increase the decentralization of natural resource management,
2. To enhance rural communities' capacity to sustainably manage their natural resources, and
3. To increase sales of natural resource-based products by rural households.

Achievement of progress toward these objectives requires a multi-faceted approach toward devolving authority and responsibility to manage natural resources to field levels, facilitating the acquisition of skills and tools to dispatch that authority responsibly, and profiting from sustainable utilization of those natural resources as an incentive to manage the natural capital assets sustainably.

One way that the COMPASS II implementation team is working toward achieving these objectives is to build awareness among a wide range of CBNRM stakeholders about the opportunities that improved management of natural resources by communities could provide toward economic growth in Malawi. The CBNRM Occasional Paper series makes better information more widely available, highlighting some of the evolution in thinking among CBNRM practitioners in Malawi and throughout southern Africa. The series is intended to provide up-to-date information about various aspects of CBNRM, and promote wider discussions about the different approaches to field practice. It is hoped that by providing current information to audiences that may not otherwise have access to technical reports, and by stimulating discussions, practitioners in the region and beyond may be able to contribute to further improvements.

This document is the 1st in the Occasional Paper series. It reports on the concept of development pathways as an organizing tool to guide CBNRM investments toward those areas that present the greatest opportunities for natural resource-based enterprises relying on either consumptive or non-consumptive use of resources by present and future generations of Malawians. The author—Dr. Andrew Watson—includes illustrative examples of applying the concept as a way to identify the most viable enterprise options for a given area to demonstrate the financial and economic incentives to maintain biodiversity.

Please feel free to send comments on this title in the Occasional Paper series, or request additional copies, through the COMPASS II offices in Blantyre, or by email to compass2@dai.com.

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[1] Wildlife & Environmental Society of Malawi, Kadale Consultants, Ltd., and Spectrum Media

1 THE CONCEPT

Promoting enterprise solutions as a way of augmenting rural incomes poses a significant challenge to the parallel objective of ensuring sustainable management of natural resources. It cannot be tackled in a haphazard fashion. The goal is for natural resource-based enterprises to become economically viable and environmentally sustainable endeavors for rural communities and their private sector partners. The Community Partnerships for Sustainable Resource Management (COMPASS II) activity will resolve the conundrum of how to provide livelihood opportunities while conserving the natural resource base by targeting support to enterprises using an integrated landscape approach.

Figure 2 on the next page shows a satellite image of part of the Lower Shire valley south of Kapichira Falls, extending to near the southern end of the Elephant Marsh. It captures the rich complexity of the landscapes covering parts of Chikwawa District that include the Elephant Marsh, Lengwe National Park and the Majete Wildlife Reserve, and several small forest reserves. Evidence of human transformation of the landscape includes smallholder agriculture, sugar cane estates, and the severely deforested escarpment below Thyolo Mountain Forest Reserve.

Within this complex mosaic, there are multiple opportunities for developing the rural economy, but many intricate variables must be understood. The landscape approach is a powerful tool for understanding, designing, introducing, and monitoring appropriate interventions. The methodology integrates the key variables of traditional landscape analysis: geomorphology (the structure of the landscape), prevailing land-use patterns (the current function of that landscape), and, critically, market access (the potential for increasing the landscape's value). Combining these elements yields a sharp delineation of the types of enterprise or intervention that makes the most sense and offers the greatest potential: the "development pathway."

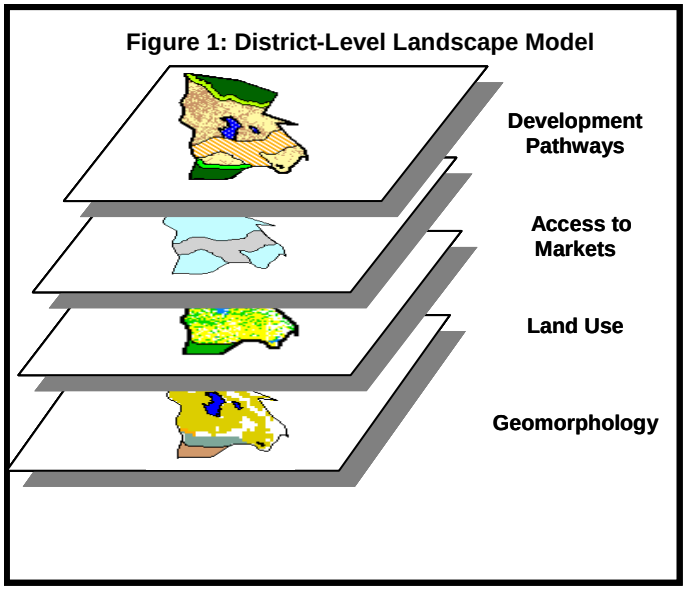


Figure 1 provides a graphic representation of this concept. COMPASS II's approach employs the technical tools of GIS that allow users to visualize and analyze complex landscape scenarios. These GIS techniques facilitate the orderly and visual management of data that have a spatial character, thereby helping the COMPASS II team and USAID plan, implement, and monitor the changes that are being promoted.

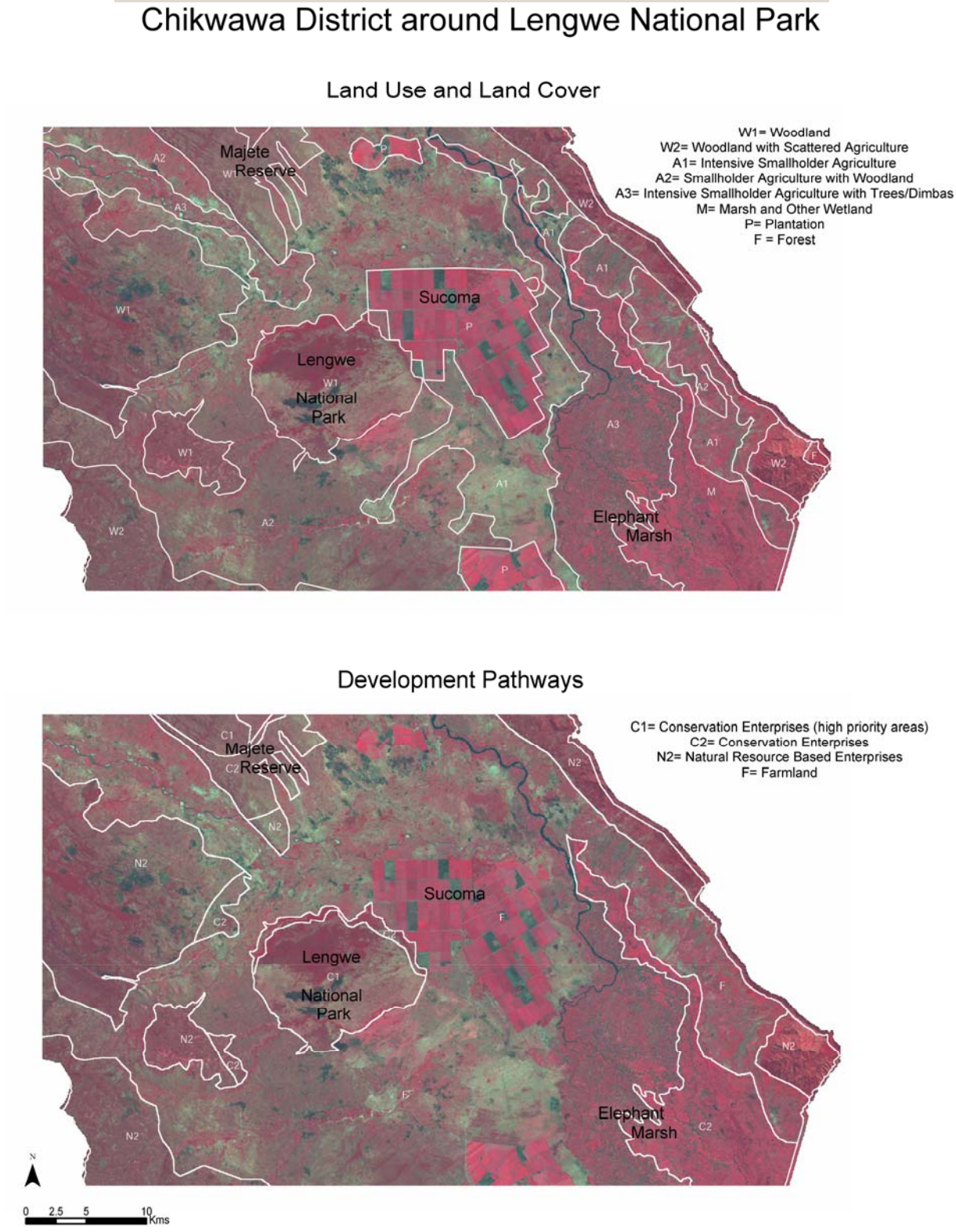
As shown schematically in Figures 1 and 2, COMPASS II has mapped different components of the physical and socio-economic landscape. These maps will now be used to target development interventions accordingly. We have drawn a distinction among four types of possible development activities:

- Conservation-based enterprises that have a minimal impact on the ecosystem (C1 and C2);
- Natural resource-based enterprises that depend on sound utilization of resources (N1 and N2);
- Agricultural-based enterprises that promote sustainable farming techniques (F); and
- Processing enterprises (not shown on figure).

The figure also shows areas of large-scale commercial agriculture, such as the SUCOMA sugar estates. We do not anticipate any significant interventions in these areas, although potential linkages with private sector groups will be explored.

Activities that are likely to transform the landscape in protected and ecologically sensitive areas (such as the protected areas of Lengwe and Majete) will not be eligible for COMPASS II support. Nevertheless, conservation-based activities such as eco-tourism and limited harvesting of honey could be supported. In other less ecologically critical zones, various natural resourced-based enterprises could be considered, but constraints such as susceptibility to soil erosion or the accessibility of local markets would further refine what activities are appropriate in specific predetermined areas. Similarly, support for agricultural-based enterprises and processing enterprises will be limited to geographical areas where opportunities are greatest and environmental risks are lowest.

Figure2: Illustrative Landscape Approach



The landscape approach offers a powerful tool to assist in the planning and analysis of natural resource management and environmental issues at the district level. As such, it meshes perfectly with the GIS support provided by COMPASS I, using the same techniques of data acquisition and mapping. Most importantly, it enables the visual presentation of complex data, which greatly facilitates local decision making.

2 APPROACH

In order to map potential development pathways efficiently, COMPASS II staff first used recent satellite imagery to determine current land use patters and land cover in the 15 districts being targeted. This land-use baseline identifies natural ecosystems that represent the highest conservation priorities and the best opportunities for promoting sound natural resource management. The baseline also shows areas where human pressures on the resource base are highest and areas where intensive agriculture has resulted in the conversion of natural ecosystems into farmland. These patterns of land use are all key factors that will aid COMPASS II prioritize and tailor the types of interventions that will best support conservation objectives and promote sustainable increases in rural livelihoods through sound natural resource management.

Land-use mapping was accomplished using LANDSAT 7 Environmental Thematic Mapper + imagery obtained from a variety of sources including data used in COMPASS I's Geographical Information System training activities. The images date from between September 2001 and May 2003 and are cloud-free in all but one or two small areas. Table 1 provides the detailed information on the images used to map each target district. The images have been processed using spectral bands 2, 3 and 4 to develop false color composites that facilitate the differentiation of landforms, vegetation cover and land-use patterns. Individual districts were mapped at scales of between 1:100,000 and 1:250,000 using visual interpretation techniques. The cartographic information was then digitized and converted to a standard scale and projection to facilitate rectification across district boundaries and between adjacent LANDSAT scenes in those cases where composites were not available for specific districts (Chitipa, Rumphi, Nkhata Bay, Nkhotakota, Lilongwe, Mangochi and Nsanje).

Table 1: Satellite imagery used for baseline mapping

District	LANDSAT 7 Scene(s)	Date Scene Acquired
Chitipa	Path 169 Row 67	9-10-2001
Rumphi	Path 169 Row 67	9-10-2001
	Path 169 Row 68	5-11-2003
Nkhata Bay	Path 168 Row 68	8-31-2000
	Path 168 Row 69	4-18-2003
	Path 169 Row 68	5-11-2003
	Path 169 Row 69	5-11-2003
Mzimba	Path 168 Row 69	4-18-2003
	Path 169 Row 68	5-11-2003
	Path 169 Row 69	5-11-2003
Nkhotakota	Path 168 Row 69	4-18-2003
	Path 169 Row 68	5-11-2003
	Path 169 Row 69	5-11-2003
Lilongwe	Path 168 Row 70	6-2-2002
	Path 169 Row 69	7-21-2000
	Path 169 Row 69	5-11-2003
Dedza	Path 168 Row 70	6-2-2002
Mangochi	Path 167 Row 70	5-26-2002
	Path 168 Row 69	4-18-2002
	Path 168 Row 70	6-2-2002
Ntcheu	Path 167 Row 70	5-26-2002
	Path 168 Row 70	4-18-2002
	Path 168 Row 71	5-4-2003
Machinga	Path 167 Row 70	5-26-2002
Zomba	Path 168 Row 70	5-26-2002
Phalombe	Path 168 Row 70	5-26-2002
Mulanje	Path 168 Row 70	5-26-2002

District	LANDSAT 7 Scene(s)	Date Scene Acquired
Chikwawa	Path 167 Row 71 Path 168 Row 71	5-26-2002 5-4-2003
Nsanje	Path 167 Row 71 Path 167 Row 72	5-26-2002 5-26-2002

Having established this baseline, the land use and land cover units were ascribed specific "development pathway" classifications and supplementary criteria such as protection status (as National Parks, Wildlife Reserves and Forest Reserves), environmental fragility and access to markets (using information on road networks) were used to refine the maps to meet COMPASS II's needs. Additional layers of data have been obtained from sources such as the poverty baseline prepared by the National Statistical Office and IFPRI and from field assessments undertaken by the COMPASS II team in conjunction with partner organizations in the districts.

3 LAND USE AND LAND COVER UNITS

COMPASS II consultants and staff developed a simple, utilitarian classification system that was conceived and designed to allow ready translation of land use and land cover to the different categories of development pathways (see Annex 1). This notwithstanding, it was acknowledged that a degree of flexibility was warranted in defining the development pathways because the full suite of conservation and development options that COMPASS might support is yet to be finalized. For this reason, land use and land cover were mapped to a higher degree of detail than might at first appear warranted. For example, evergreen forests, montane grassland and woodland in protected areas are all likely to fall in the category of "conservation area". Nevertheless, the units are ecologically distinct and may therefore represent different development opportunities. Hence, they have been mapped as different units. We have not taken this concept to the next step, which would be to distinguish different types of woodland (miombo, acacia, mopane, etc.) or evergreen forest (montane, riverine, lowland, etc.). If such differentiation is warranted at a future date, other supplementary sources of information are available to accomplish this (for example, the vegetation map developed by Shorter, 1989, or the land cover maps prepared by the World Bank Malawi Energy 1 Project, 1993, which distinguish woodlands according to topographic considerations).

Forest (F) – comprises evergreen and semi-deciduous forests ranging from the montane forests of the Misuku Hills, Mount Mulanje and other highlands generally occurring at elevations of more than 1,800 m to lowland forests such as those along the lakeshore in Nkhata Bay District (at about 500 m) and in the Malawi Hills of Nsanje District (at about 750 m.). The unit also includes larger tracts of dense riverine forest that can occur at almost any elevation. It should be noted that the smallest units that have been mapped are at least 100 ha in size, so in some areas many small pockets of forest are not shown. For example, the many patches of montane evergreen forest that occur in valleys on the grasslands of the Nyika Plateau are not mapped as discrete units since most are too small to be represented at scales greater than 1:250,000.

Grassland (G) – comprises natural, montane grasslands that are typically found at elevations of at least 1,600 m. The unit can also include smaller patches of evergreen forest (as described above) and often incorporates rocky outcrops ranging in size from boulder fields to enormous granitic domes notably those surmounting the Mulanje Massif and those around Dedza.

Woodland (W1) – this unit is ecologically very varied and comprises all the main types of woodland found in Malawi. It includes the acacia woodland and deciduous thicket of the Shire Valley and parts of the Lake Malawi lakeshore as well as the mopane (*Colophospermum mopane*) woodland that occurs throughout much of Liwonde National Park and parts of Vwaza Wildlife Reserve. The majority of the unit comprises different types of broad-leafed deciduous woodland (miombo), which is the natural vegetation cover of most of the country. It includes both the drier "thengo" woodland characteristic of the flat to rolling plains bordering the Rift Valley at about 1,200 m. above sea level and the "misuku" (*Uapaca kikiana*) woodland that is typical of the escarpments and hills bordering the floor of the rift. Both types are characterized by a dominance of *Brachystegia* and related tree species. The woodland unit also includes a few residual patches of acacia/bauhinia woodland that remain in parts of Lilongwe District and patches of terminalia (*Terminalia* spp.) woodland found to the west of Lake Chilwa and Lake Chiuta in Zomba and Machinga Districts. Most of these specific areas of woodland in Lilongwe, Zomba and Machinga Districts have now been converted to agriculture. Small, scattered pockets of agriculture many occur in the W1 unit but generally these will comprise less than 10% of the area. The impact of fuel-wood harvesting is minimal.

Woodland with Scattered Agriculture (W2) – comprises the same types of woodland described above (W1) but the natural vegetation has been partly degraded as a result of scattered smallholder agriculture and/or harvesting of fuel wood and timber. Generally, the agricultural areas comprise between about 10 and 50% of the area. Degradation of the woodland through cutting of trees for timber and fuel can be severe but scattered areas of trees, brush and grasses predominate rather than smallholder agriculture.

Marsh and other Wetland (M) – comprises all those areas which are waterlogged for most of the year. On the satellite images, there is a strong indication of high chlorophyll content even at the height of the dry season (September). The unit often includes small bodies of open water but ecologically it comprises reeds and grasses including the extensive papyrus swamps around Chia lagoon in Nkhotakota and the taipha swamps of Lake Chilwa. Many of these wetlands are bordered by areas of smallholder irrigated agriculture

(unit A3) and even extensive plantation agriculture as in the case of the Dwangwa sugar estates around the Unaka Lagoon in Nkhotakota District.

Dambos (D) – are seasonally flooded grasslands along watercourses in predominantly flat landscapes. In geomorphological terms, they are alluvial floodplains that bordering seasonal streams and small rivers. These grasslands are often used as grazing areas for cattle and in more heavily populated areas (such as parts of Lilongwe District) they have been widely converted to "dimbas" – smallholder gardens that are often irrigated for growing off-season maize and vegetables. Extensive conversion of dambos for agriculture creates the A3 unit.

Intensive Smallholder Agriculture (A1) – comprises areas that are typically 80% to close to 100% agricultural land either under crops or recent fallow (not advanced secondary woodland). Most areas are under staple food crops such as maize, millet and cassava or cash crops such as smallholder tobacco. The unit may also include areas of grazing land particularly along dambos and small pockets of woodland on hills or along streams and rivers or surrounding graveyards. Small woodlots of exotic species such as pine (*Pinus eliotii* and *P. patula* as well as other species.), eucalyptus and gmelina (*Gmelina arborea*) are fairly common. In many areas, certain tree species are conserved or planted for their fruits or their value as medicinal plants. Mango trees (*Mangifera indica*) are especially common in agricultural areas throughout the country.

Smallholder Agriculture with Woodland (A2) – is a transitional unit between A1 and W2. It comprises between about 50% and 80% agricultural land under smallholder farming and between 20% and 50% indigenous woodland and/or dambos or grassland. In some cases the woodland may be old fallow areas that have regenerated secondary woodland. This is particularly widespread in the Northern Region where slash-and-burn millet cultivation is common on hillsides. As in the case of the W2 unit, many of the residual woodland areas are exploited for building materials, fuel-wood and non-timber forest products such as thatch-grass, mushrooms and medical plants.

Intensive Smallholder Agriculture with Trees and *dimba* gardens (A3) – comprises areas where moisture conditions allow dry season cropping (with or without irrigation) and where trees are planted or conserved as agroforestry species. *Dimba* gardens are common. Tree cover can be significant and typically comprises planted fruit trees, especially mangoes, or conserved indigenous species such as *Faidherbia albida*, which is prized for its nitrogen-rich leaf litter that improves maize yields. Indigenous trees may also be protected for their fruit (for example, baobab – *Adansonia digitata*) or their medicinal or cultural value. Along watercourses, indigenous riverine species such as *F. albida*, *Ficus* spp., *Syzygium* spp. and *Trichilia emetica* (Natal Mahogany) are often conserved while favored timber species such as *Khaya anthoteca* (*nyasica*) have been felled.

Plantations (P) – comprise areas of medium to large-scale "industrial" crops that are farmed commercially. They include tree crops such as pine (*Pinus* spp.) for timber, eucalyptus for timber and fuel-wood, rubber, tea, coffee and macadamia. Seasonal crops include large-scale irrigated rice and sugar and tobacco grown on commercial estates. Smallholder tobacco as well as out-grower sugar, macadamia and tea areas are not included in the unit: they generally fall within the A1 unit.

Urban Areas (U) – comprise the larger towns and cities. In the 15 COMPASS target districts Mzuzu, Mzimba, Nkhotakota, Lilongwe, Dedza, Mangochi, Zomba, Mulanje and Nsanje are represented.

4 CHARACTERISTICS OF TARGET DISTRICTS

COMPASS II has identified 15 districts in which the project will focus its development efforts (see Figure 3). Nine of these districts fell within the scope of COMPASS I work, and strong relationships have been built with district authorities, traditional authorities, communities, and NGOs. The experience gained through these ties represents an invaluable asset for moving to the next stage in the development process: supporting decentralized management of natural resources and providing support services that promote sound natural resource management, leading to significant increases in household incomes in rural communities. In each of the three regions of Malawi, a fourth district has been added where we have determined that there is considerable potential for promoting economic growth through the commercialization of natural resources and where there is demonstrable commitment from the district authorities, local communities, and locally-based NGOs to participate with COMPASS on implementing sound development initiatives. We are especially cognizant of the need to work with local partners that acknowledge the need to move away from community project-based approaches that often reinforce dependence on donors and outside support services that are no longer accessible once external funding ends. In essence, districts have been selected where there is good evidence that COMPASS II can help kick-start development initiatives that will generate benefits that are tangible and socially equitable and will be sustainable in both economic and ecological terms.

More than 80 % of the total area protected as national parks and wildlife reserves and about 75 % of the 26,000 Km^2 of Malawi's total forest coverage (on state-owned and customary land) falls within these 15 districts. Table 2 presents detailed information on the geographic, ecological, and institutional characteristics of each target district.

Within each target district, the selection of communities COMPASS II works in will be based on a careful assessment of the potential for successful interventions. The assessment will take into account the local access to high-value natural resources, accessibility of markets for the natural resource products, level of commitment of the communities, and availability of support services through partner organizations. This complex array of criteria can be efficiently analyzed only by using a rigorous methodology and appropriate tools: the landscape approach meets these requirements. It represents the state of the art for targeting development activities in such a way that optimal economic benefits are realized in tandem with sound environmental conservation. This ambitious undertaking will be constructed on the foundation provided by the COMPASS II TAMIS, linked to a geographic information system.

4.1 NORTHERN REGION

4.1.1 Chitipa

Although this district has not benefited greatly from government development initiatives, DANIDA's support until early 2002 helped establish a framework for decentralized environmental management at the district and community levels. COMPASS II will build on this work through support from the Mzuzu office's training and enterprise development staff. The district has a strong history of community activism and ownership of development initiatives, as was evidenced by a recent study in the Misuku Hills undertaken by ActionAid. The Misuku Hills Forest Reserve (in fact, three discrete tracts of evergreen forest) has a potential for eco-tourism because it harbors rare and endangered species of flora and fauna. The Spot-Throat Modulatrix (*Modulatrix strictigula*) (a bird found only here and in western Tanzania) and the Green Tree Viper, among other species, are noteworthy. Opportunities for increasing honey production and working with the Smallholder Coffee Farmers' Trust on linkages between rural producers and national markets offer considerable potential for growth.

Much of the district is under agriculture (A1 and A2) and much of the miombo woodland on hills is severely degraded. Nevertheless, the woodlands east of Misuku as well as in the Mafinga Hills and Musisi Forest reserves are largely intact. Along the Songwe River, which marks the border with Tanzania, the potential tree-seed oil species *Trichilia emetica* (Natal Mahogany) is plentiful.

Table 2: COMPASS II target districts—2001 baseline data

District	Area (km²)	Population (1000s)	Total Forest Area (km²)	Parks (1,000s Ha.)	Number of Traditional Authorities	Number of Villages	Number of VNRCs	Number of BVCs	Number of NGOs	Membership of DESCs	Number of Wildlife Clubs	Number of Farmer Clubs
Chitipa	4288	127	1629	c. 100	5	270	111	6	10	13	-	-
Rumphi	4789	128	2107	c. 310	3	498	115	-	10	14	-	-
Nkhata Bay	4089	165	2372	-	10	276	30	16	11	12	50	-
Mzimba	10,430	524	2608	-	9	1642	320	-	14	17	65	487
Nkhotakota	4259	229	2215	180	3	432	181	50	6	15	50	-
Lilongwe	6159	906	985	-	13	1895	572	-	10	19	204	443
Dedza	3624	471	797	-	7	907	125	26	13	15	19	-
Ntcheu	3424	371	342	-	8	773	202	-	12	15	1	-
Mangochi	6273	584	2384	9	8	737	170	98	8	15	50	417
Machinga	5964	354	954	34	10	1198	185	17	12	15	26	-
Zomba	2580	481	181	-	6	1049	69	18	11	15	230	491
Phalombe	3450	232	414	-	2	375	86	2	5	16	2	-
Mulanje		428		-	6	423	64	-	12	14	7	184
Chikwawa	4755	357	1569	158	6	593	275	8	11	14	24	-
Nsanje	1942	195	660	14	9	513	112	40	10	16	4	-

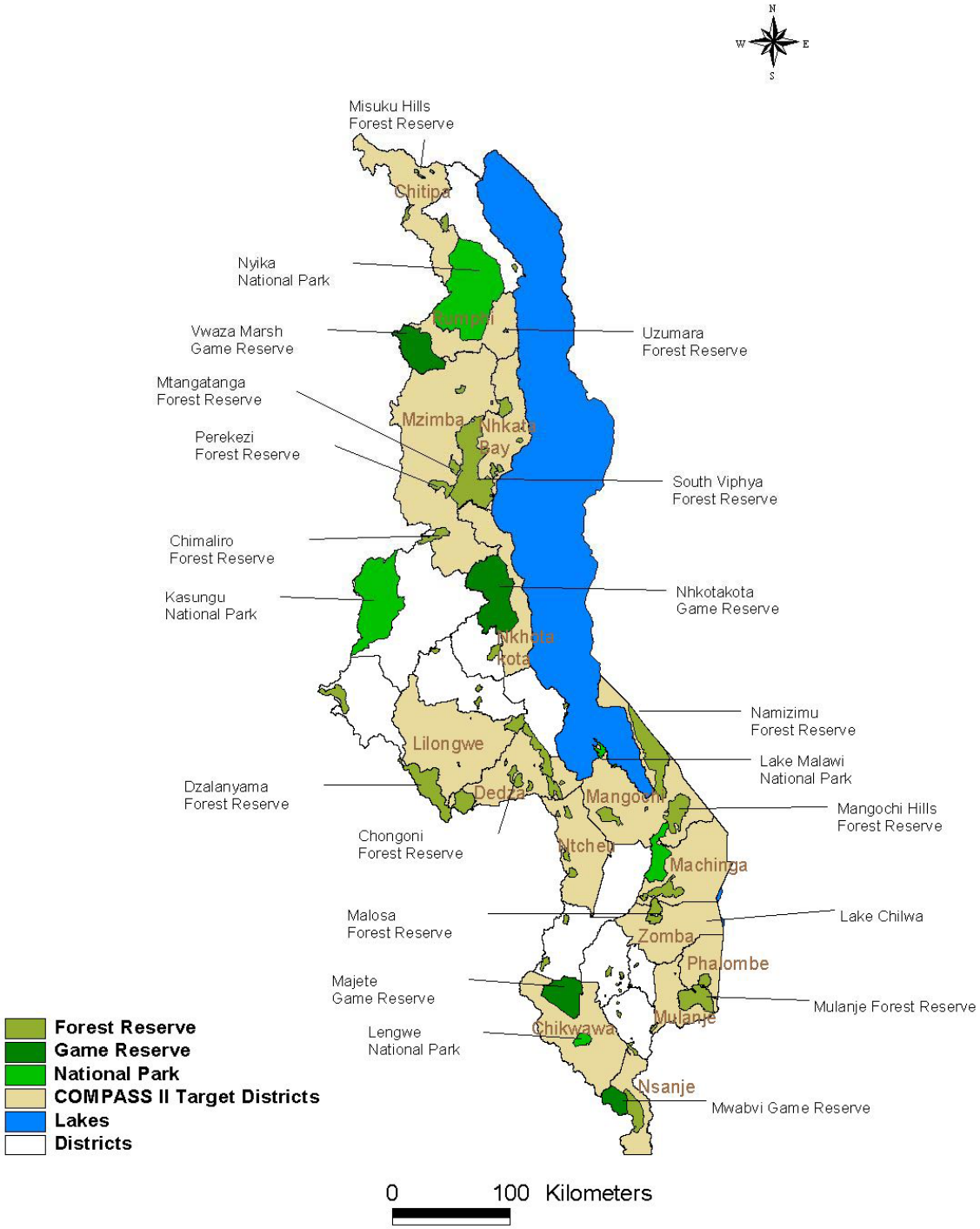
VNRCs = Village natural resource committees (wildlife sector) and include village natural resource management committees (forestry sector)
BVCs = Beach village committees (fisheries sector)
DESCs = District environmental sub-committees

4.1.2 Rumphi

In recent years, this district has been the focus of the work of GTZ's Border Zone Development Project (BZDP), and considerable effort has been devoted to creating and supporting natural resources-based enterprises (NRBE). Unfortunately, results have not met expectations despite there being enormous scope for honey and mushroom production from extension tracts of miombo woodland in and around the main protected areas. One reason for this appears to be the community development approach espoused by BZDP. Under COMPASS I, DAI implemented a program of public awareness and training related to co-management of natural resources around Nyika National Park and Vwaza Wildlife Reserve. All the traditional authorities and representatives from hundreds of communities have benefited. There has been a marked shift in public opinion that augurs well for using participatory techniques to help initiate activities that promote sound development without relying on a micro-project-based approach that more often than not promotes donor dependence. The Nyika–Vwaza Association, a formally registered community trust, has already benefited from COMPASS I support and represents an excellent opportunity to engage rural communities in development activities through a local institution. COMPASS I helped promote community tourism activities around Vwaza.

Although Nyika and Vwaza make up a large portion of the district, other smaller protected areas are ecologically important and hold potential for natural resource-based rural development. The evergreen forests of the Uzumara Forest Reserve and Chimaliro forest, for example, harbor rare species of birds and trees that are potential attractions for eco-tourists. The surrounding areas also offer considerable scope for commercial production of indigenous fruits including masuku (Uapaca kirkiana) and mabola plum (Parinari curatellifolia).

Figure 3: Compass II target districts and Protected Areas



4.1.3 Nkhata Bay

This district is already a focus for considerable low-budget tourism development especially along the shore of Lake Malawi. Although potential investment is limited by macro-economic constraints, there is considerable scope for engaging in small-scale eco-tourism that engages local communities. The hills adjacent to the lakeshore are mantled with the only remaining lowland evergreen forests in Malawi (the Malawi Hills Forest Reserve in Nsanje District having been destroyed over the past few years). COMPASS I supported community honey production in the Chisasila Forest, and there is additional potential and capacity in other forest and woodlands on both customary land and in protected areas. Important tracts of miombo woodland offer scope for commercialization of indigenous fruit products and wild mushrooms. Several NGO partners are active in the district, including the Evangelical Lutheran Development Programme which received support under COMPASS I. Small-scale tourism operators also represent important potential partners.

Extensive miombo woodlands mantle much of the escarpment between the evergreen forests of the lakeshore and the grasslands of the Viphya Plateau. In many areas, large tracts of woodland have been clear-felled for agriculture on marginal land throughout this area. There are good opportunities for COMPASS II to work with the local authorities and local communities to arrest this trend through promoting economically viable natural resource-based enterprises that encourage sound management of woodland on customary land as well as in the forest reserves. Opportunities for COMPASS II to work with private sector interests around the tea and coffee plantations of Kawalazi and the pine plantations of Chikangawa offer considerable scope for fruitful collaboration.

4.1.4 Mzimba

This is the largest district in Malawi and an area of strong traditional leadership, under Nkosi ya Makosi M'mbelwa, the Angoni Paramount Chief. The district is also regarded as harboring the best remnants of mid-altitude miombo woodland that formerly mantled much of the broader region extending into eastern Zambia. This type of woodland has important communities of flora and fauna that have a high potential for commercialization through sustainable harvesting of plants and promotion of eco-tourism. The Perekezi and Mtangatanga Forest Reserves are home to a diverse array of unusual birds and flora that attract visitors from around the world. Baseline studies of wild mushroom production from the Perekezi woodlands have demonstrated an enormous potential for sustainable harvesting of a variety of species. Many of these are already harvested for very local markets, but there good opportunities to access markets further away, especially if post-harvest processing techniques (such as solar drying) are introduced. COMPASS I supported several small-scale community enterprise development efforts through the South Viphya Crafts Association (SOVCRAFT). Through this support, COMPASS identified constraints to community enterprise development and started providing an array of capacity-building and business development services to increase the viability of these NRBEs. Other potential partner organizations in the district include World Vision International, which received COMPASS I support for the Kayezi Area Development Project in the north of the district, south of the Vwaza Wildlife Reserve.

COMPASS II could also provide support co-management efforts in the Chimaliro Forest Reserve, which lies partly in Mzimba District and partly in northern Kasungu District. This is one of only two state-managed forests where local communities have successfully negotiated co-management agreements with the Department of Forestry (as of 2003). Although at present the agreements are very weak, providing few incentives for the local communities to engage in genuine forest management, they are a potential model for decentralization of community-based natural resource management.

4.2 CENTRAL REGION

4.2.1 Nkhota Kota

This district includes one of the largest tracts of protected woodland in Malawi, the Nkhotakota Wildlife Reserve, which covers 1,800 square kilometers. The reserve is home to 2,000 elephant and herds of buffalo and several prides of lion, as well a host of other mammal species and birds. In addition, the reserve is bisected by the Bua River, which is one of the most-important spawning sites for the *mpasa* or Lake Salmon (*Opsaridium microlepis*), an important species commercially for local fishers and potentially a source of revenue from sport fishing. To date, tourism development in the reserve has been negligible, in part because the Department of National Parks and Wildlife has been reluctant to privatize development activities. This has now changed with the granting of at least one tourism development lease. The occurrence of Sleeping Sickness (*Tripanosomiasis*) in parts of the reserve also represents a serious constraint to future development. Nevertheless, the extensive miombo woodlands are exploited to a limited extent for bee-keeping and harvesting of a variety of non-timber forest products.

Under COMPASS I, efforts to expand such initiatives through the grant program were hampered by organizational constraints within communities and by an absence of linkages to markets. It was noted in 2002 that much of the honey produced for sale in the district was being collected by the Department of National Parks and Wildlife but rather than being transported to markets in Lilongwe and elsewhere was being stockpiled at the department's district office. We recognize that such inefficiencies can best be overcome through direct engagement of the private sector in such initiatives. Nkhotakota District also received COMPASS I support for an innovative community activity that led to the creation of a large fish-breeding sanctuary on Lake Malawi. The collaboration of local fishing communities, the traditional authority (Chief Kanyenda), the Dwangwa Branch of the Wildlife and Environmental Society of Malawi, the private sector through the Dwangwa Sugar Corporation, and the Nkhotakota District Fisheries Department has created a model others can emulate.

The recent award of USAID funding to Total Land Care for land conservation efforts around Chia Lagoon provides another opportunity for COMPASS II to collaborate on potential community natural resource management initiatives. In addition to their important fisheries, Chia Lagoon and Lake Chikukutu have significant wildfowl populations that are potential assets for tourism.

4.2.2 Lilongwe

The importance of this district to COMPASS II is two-fold. First, the city of Lilongwe is the main market for many natural resource and agricultural products from the Northern and Central Regions and, therefore, an important base for buyers and entrepreneurs. Second, the Dzalanyama Forest Reserve, south of the city, has some potential for small-scale tourism development and for establishing NRBEs. The miombo woodlands and small pockets of evergreen forest of Dzalanyama cover almost 1,000 square kilometers, although portions are leased for ranching. There are small but important populations of rare and unusual bird species that attract foreign visitors, and there is scope for harvesting of tree seeds for oil production though the viability needs to be carefully assessed. Privatization of the Forestry Department Guest House in Dzalanyama and of the management of the Lilongwe Nature Sanctuary by the Department of National Parks and Wildlife represent genuine opportunities to encourage investment in eco-tourism that COMPASS II can build on. Kadale Associates' recent work on the Growth Strategy for Malawi pointed out that the tourism sector has long been ignored by the government as an area for promoting economic growth. The new strategy includes action items that should lead to removal of many constraints that have hindered the sector.

Thuma Forest Reserve, which straddles the border between Lilongwe and Salima districts is another important asset for commercializing sound natural resource management. Tuma is one of only two or three areas outside of National Parks and Wildlife Reserves that harbors Elephant and Buffalo. The management of the forest reserve was privatized in 2002 when the Department of Forestry awarded a management lease to the Wildlife Action Group (a Malawian NGO). Efforts are now underway to involve local communities in management activities such as the sale of wild-harvested bamboo. Eventually, it is anticipated that the

Wildlife Action Group may lease tourism development rights to private sector entities. This approach is very much in keeping with the conservation and development model espoused by COMPASS II.

4.2.3 Dedza

The district has several forest reserves, including the important Chongoni Mountain Reserve, which protects sub-montane evergreen forest as well as surrounding miombo woodlands. COMPASS I worked with the National Initiative for Civic Education in Dedza on two small-grant activities that implemented activities to reduce the reliance of local communities of fuel wood harvesting from the reserves. In addition to promoting community and private woodlots and the manufacture of fuel efficient stoves, the small grant projects also introduced bee-keeping and other income generating activities to 30 communities. Under COMPASS II, the DAI Team will build on these earlier initiatives by strengthening partnerships with the National Initiative for Civic Education and Concern Universal, which has also been very active in the district.

High population densities and limited local efforts to promote community-based management of natural resources, will undoubtedly hinder COMPASS II efforts in Dedza. Nevertheless, the extensive woodlands mantling the escarpment west of the rift and the Kirk Range are genuine assets upon which the project can help build an effective CBNRM program.

4.2.4 Ntcheu

As with Dedza, Ntcheu was also a COMPASS I focal district. COMPASS I worked with four organizations in Ntcheu, including LOMADEF (the Lipangwe Organic Manure Demonstration Farm), BERDO (Bwanje Environmental Rehabilitation and Development Organization), and the Department of Forestry, on a variety of small grant projects and capacity-building initiatives. Although high population densities have reduced the forest cover to just a few small hilltop reserves, these remain important sources of economic goods for local communities. Thus, there is considerable opportunity to build community commitment to improved natural resource management, especially when community members derive tangible benefits from their activities. Of particular importance is the work of the EU's Social Forestry – Training and Extension Project, which ended in 2003. Several communities in Ntcheu have now gone through the process of assessing the value and productivity of woodlands in village forest areas and have worked with the Department of Forestry to prepare management plans. In turn, the Department has expedited a process of approval of these plans at the village, traditional authority, and district levels that represents that best model to date for devolving the forest management approval process from the central authorities to the Districts. COMPASS II will build on this work and will enlist the support of the NGO, Training Support for Partners, which has been providing capacity-building support to the department.

Ntcheu district has several small forest reserves, some of which harbor important remnants of montane evergreen forest (for example, Mwai Forest Reserve). However, population pressure is very high and several reserves have been severely degraded in recent years.

4.3 SOUTHERN REGION

4.3.1 Mangochi

Important natural resource management activities are underway in Mangochi, and COMPASS II is looking to support and complement these efforts. Under COMPASS I, DAI assisted the Department of National Parks and Wildlife to rehabilitate the environmental education center at Cape Maclear in Lake Malawi National Park and to reinvigorate its public awareness efforts. COMPASS II will work with the Chembe Trust, the first legally registered community trust in Malawi, to negotiate clear co-management agreements with the DNPW that will enable the community to engage with private developers working in the tourism sector. COMPASS I also provided support to the Department of Fisheries to develop the *Save the Chambo Campaig*n, which received the Cabinet Committee on the Environment's endorsement on July 23, 2003. In conjunction with GTZ's Natural Aquatic Resource Management Programme, DAI helped prepare guidelines for developing participatory fisheries management plans that will initially focus on Lake Malombe and the south-

east arm of Lake Malawi (both in Mangochi District). Mangochi District also covers three important forest reserves—Phirilongwe, Namizimu, and Mangochi Hills. The last of these has recently been incorporated as an extension to Liwonde National Park in Machinga District. The COMPASS II team will help establish agreements with the private sector that will catalyze efforts to increase honey production, mushroom harvesting, and processing of indigenous fruits from the miombo woodlands. The Wildlife and Environmental Society's field office in Monkey Bay will be an especially valuable asset in this effort because it is already involved in the promotion of honey and fruit juice production.

Mangochi district's track record at protecting values natural resources is weak. Lake Malombe's Chambo fishery was worth over $1 million annually until the mid-1990s. Now this fishery is non-existent though other less valuable species are being fished. Similarly, large areas of the Namizimu Forest Reserve have been logged or converted to agriculture in recent years because of lack of policing. If COMPASS II is to work in the district, the local authorities will have to make a strong commitment to improving this situation.

4.3.2 Machinga

With the bulk of Liwonde National Park falling in this district, Machinga has enormous potential for eco-tourism development. Liwonde is the only protected area in the broader region (including eastern Zambia) that contains "The Big Five" (lion, elephant, rhino, buffalo, and leopard). COMPASS I supported efforts to develop community-based tourism around Liwonde (Njobvu Cultural Lodge) and also provided grants for a wildlife extension program and for community involvement in elephant control. COMPASS II hopes to build on these linkages with local communities and organizations such as the U.S. Peace Corps and the Department of National Parks and Wildlife to promote a still broader range of development activities. The Machinga and Liwonde Forest Reserves are important sources of high-value hardwoods for the curio trade and for wild mushrooms that are harvested during the rainy season. The DAI Team recognizes that there are excellent opportunities to formalize and build these small-scale enterprises through linkages with the private sector in Malawi such as Take Care (curios) and Tambala (food processing) as well as regional trade organizations such as PhytoTrade and ComMark. The district's recent efforts to use legal provisions to evict squatters from Liwonde Forest Reserve, where large tracts of forest and indigenous grassland have been converted to agriculture, is an encouraging example of the how the "Rule of Law" must prevail for sound natural resource management to succeed.

Machinga is also one of the three districts that share Lake Chilwa. Under COMPASS I, DAI has supported efforts to develop participatory fisheries management on the lake, which is Malawi's only Ramsar site and supports one of the most productive lake fisheries on earth. These efforts came to fruition in early 2003 when by-laws and fishing regulations developed by representatives of all 50 beach village committees on the lake were signed into law by the Director of Fisheries and the Minister of Natural Resources. COMPASS II expects to continue these efforts through working with communities to establish and register the BVC and Fisheries Association constitutions for Lakes Chilwa and Chiuta. This will empower the fishers to negotiate stronger, more equitable management agreements with the Department of Fisheries and will open the door to establishing commercial agreements between the fishers and the private sector.

4.3.3 Zomba

COMPASS I support to activities in this district included a grant to the Mwaiwathu Fisheries Management Association on Lake Chilwa. Although the direct impact of this on community policing of the lake fishery remains to be seen, the grant helped increase awareness about opportunities for participatory fisheries management and also catalyzed broad support for promoting genuine implementation of the provisions of the Fisheries Management Act. In addition to engaging fishing communities in the debate on regulations and institutional arrangements, the initiative help forge strong collaborative linkages among COMPASS, the National Aquatic Resources Management Programme, DANIDA's Lake Chilwa Wetland Management Project, and the Department of Fisheries. The synergy that was achieved should strengthen further work on Lake Chilwa, and the model can be used to forge similar collaborative efforts. COMPASS I worked with the Chilwa fishing communities to develop a blueprint that will help the BVCs and the Fisheries Association develop constitutions that will formalize their legal status. COMPASS II hopes to continue this work, which has already helped the Government of Malawi meet conditionalities for the disbursement of NATURE

Program Non-Projectized Assistance. COMPASS II will also engage with the Lake Chilwa Bird Association, whose member communities have developed community constitutions with a view to becoming legally registered trusts. An opportunity exists to collaborate with the Danish Hunters' Association, which is exploring ways in which it can support such initiatives in Malawi.

4.3.4 Phalombe

Phalombe is the third of the districts that share Lake Chilwa and will therefore benefit from COMPASS II efforts to establish a rigorous legislative framework for co-management of the lake fishery. In addition, Phalombe is one of two districts that border the Mulanje Mountain Forest Reserve. With the Mulanje Mountain Conservation Trust now fully operational and funded through the World Bank and GEF, there is enormous potential for collaboration. COMPASS I assisted the Mulanje Mountain Conservation Trust (MMCT) to deliver eco-tourism training to its own staff, mountain guides and personnel of the Phalombe District Forestry Office. COMPASS I supported efforts to build GIS capacity within MMCT, and further direct support may be warranted if COMPASS and MMCT collaborate on implementing an ecological monitoring program for the area.

4.3.5 Mulanje

Mount Mulanje is one of the jewels in the crown of Malawi. With the Nyika Plateau in Rumphi and Chitipa districts, Mount Mulanje is one of the most important islands in the afro-montane archipelago that stretches from the Cape Peninsula of South Africa through Lesotho, Swaziland, and eastern Zimbabwe to Malawi and then northwards flanking the Great Rift Valley to Ethiopia. Mulanje is home to Malawi's national tree, the Mulanje Cedar (*Widdringtonia whytei*), which occurs only in the montane forests of the massif. A profusion of rare and endangered species plus the dramatic mountain landscape make this one of the most important sites for eco-tourism development in Malawi. In addition, there are several strong possibilities for local communities to formalize commercial activities in the timber and non-timber sectors. Earlier baseline studies by Konstant identified a number of potential products, but COMPASS II will help validate these by assessing market potential and analyzing value-chains to remove constraints and build on opportunities. COMPASS II staff will work closely with MMCT to ensure that support is provided in a targeted manner that helps both efforts achieve their respective goals.

Opportunities to work directly with tea companies and estate owners on improved forest management are already being explored. The potential to use GDA-type agreements to finance such initiatives appears to be strong as does the possibility of leveraging funding through carbon credits or similar initiatives.

4.3.6 Chikwawa

Considerable time and effort have been invested in promoting co-management of natural resources in the district. The World Bank's Lower Shire Protected Areas Project built a conceptual framework for co-management of wildlife that evolved into a new wildlife policy in 2000. This notwithstanding, COMPASS I efforts to facilitate the negotiation of co-management agreements met with initial resistance from the department. Efforts to involve local communities in monitoring wildlife in and around Lengwe National Park have not progressed. This has gradually changed; in 2002 COMPASS developed an enterprise development training manual for communities around Lengwe, and in 2003, the project helped provide board management training to several community trusts and to Department of National Parks and Wildlife staff.

Lengwe National Park and Majete Game Reserve offer considerable scope for developing tourism in the district. Although Majete has suffered from rampant poaching, the recent privatization agreement for management of this reserve includes plans for restocking with large mammals. In the area around Lengwe, COMPASS provided support to the new community trusts and will continue providing assistance in community enterprise development that was initiated in collaboration with the World Bank's Lower Shire Protected Areas Project. One area of particularly high potential is extraction of oils from various tree species. COMPASS supported International Eye Foundation through a small grant to provide training and other

support to communities for extracting oils from neem (*Azadirachta indica*) and moringa (*Moringa oleifera*). In addition, the Lower Shire valley has an abundance of marula (*Sclerocarya birrea*) and baobab (*Adansonia digitata*), which are also sources of high-value oils.

The Lower Shire Protected Areas are particularly critical for the conservation of several rare and endangered species. This in itself adds considerably to their potential as eco-tourism sites. COMPASS I supported innovative eco-tourism ventures such as the privatization and rehabilitation of the tourist facilities in Lengwe and the renovation of the environmental education center. In the case of the tourist facilities, COMPASS support was tied to brokering deals between the developer and local communities that would benefit from employment, a market for agricultural and natural products such as thatch grass, and a revenue-sharing scheme.

Outside of the protected areas, there are important tracts of mopane and miombo woodland along the border with Mozambique. These areas are remote from the main population centers, so market access is poor. Nevertheless, several tree species of potential commercial value are found in abundance (including gum-bearing *Sterculia* spp.).

4.3.6 Nsanje

Mwabvi Game Reserve is one of the smallest wildlife reserves in Malawi but harbors many rare species. It was the last place in Malawi to have a wild population of Black Rhinoceros, though this was extirpated in the mid-1990s. Lying near the southern tip of Malawi close to where the Shire River meets the Zambezi, many regionally endemic species from the eastern coast of southern Africa are present here. As such, the reserve presents an opportunity for local communities to benefit from the development of eco-tourism. COMPASS I assisted six newly registered community trusts to frame a strategy to negotiate co-management agreements with the Department of National Parks and Wildlife. COMPASS II hopes to help finalize these contractual agreements and assist the communities in implementing their development initiatives. Baobab (*Adansonia digitata*) and marula (*Sclerocarya birrea*) trees abound in the area, and opportunities for production of oil from the seeds are significant once organizational constraints are addressed within the communities. The woodland along the Mozambique border between Mwabvi and the Malawi Hills is still intact and harbors many of these species.

An especially unusual opportunity is the possibility of communities negotiating access to crocodile-hunting quotas. Under COMPASS I, DAI convened meetings of local traditional authorities and government and NGO stakeholders to examine the possibility of the Department of National Parks and Wildlife "donating" to local communities some of the 200 per year crocodile-hunting permits allowed under Malawi's CITES agreement. If this comes to fruition, local communities could sell the licenses to hunters or use them themselves to benefit from a portion of the $20,000 per year that sales of crocodile skins have generated in recent years. Much of the Elephant Marsh (Chikwawa district) and the Ndindi Marsh (Nsanje district) has already been converted to agriculture. The remaining areas are important wildlife habitat for fish and waterfowl (and a few hippopotamus) that might be managed in a way that generates income for local communities.

It should be noted that many of these units are transitional in nature and the visual interpretation methods used to develop the land-cover map are prone to variations among interpreters. For these reasons, we do not regard these maps and data as an appropriate baseline for monitoring future changes over time or for comparing these data with past land-cover assessments.

Table 3: Area of land use and land cover units mapped in each COMPASS II target district (reported in square kilometres[2])

District	F	G	W1	W2	M	D	A1	A2	A3	P	U
Chikwawa	2	-	1347	1224	148	-	314	1402	304	149	-
Chitipa	45	420	958	929	-	34	1161	602	90	10	-
Dedza	-	-	854	379	128	348	759	791	365	120	5
Lilongwe	-	-	748	99	-	635	3718	596	23	215	166
Machinga	-	-	711	201	671	149	1463	85	247	-	-
Mangochi	-	17	1650	1362	80	18	2094	761	396	60	7
Mulanje	117	222	114	-	-	-	513	-	846	191	-
Mzimba	-	137	1897	1240	113	254	5193	1164	323	239	25
Nkhata Bay	214	474	1174	519		5	226	776	107	701	-
Nkhotakota	-	167	2091	429	79	55	858	310	219	100	3
Nsanje	32	-	343	527	327	-	325	328	79	-	2
Ntcheu	-	-	479	194	-	34	1519	839	111	44	-
Phalombe	-	-	104	-	134	-	690	60	343	-	-
Rumphi	340	1228	1641	457	27	8	577	227	23	122	-
Zomba	4	7	81	11	185	-	1450	22	482	169	10
Total Area	**754**	**2672**	**14192**	**7571**	**1892**	**1540**	**20860**	**7963**	**3958**	**2120**	**218**
Unit as % of Total	**1**	**4**	**22**	**12**	**3**	**2**	**33**	**12**	**6**	**3**	**0**

[2] Areas of lakes and other water-bodies are not included.

5 DEVELOPMENT PATHWAYS

The development pathways that COMPASS II will use to target and prioritize its field-level interventions have been identified using a variety of criteria including current land cover, ecosystem health, conservation priority, conservation status, environmental fragility, the types of natural resources available and access to markets.

Using these criteria, we have identified 4 main categories of development pathway (see Annex 2).

Conservation enterprises (C) are non-extractive and minimally disruptive. They include ecotourism, low-impact harvesting of arboreal species (for seeds, medicine, or honey), environmental services (such as water quality control), and scientific or educational functions that depend largely on preservation and conservation. We believe that some areas of exceptional importance for biodiversity or species conservation may warrant a higher protection status than others. Hence we have mapped key areas as C1 and others as C2 when careful exploitation of the natural resource base is possible.

Natural resource-based enterprises (N) include sustainable fishing and extraction of timber, non-timber forest products, essential oils, and grasses. NRBEs also encompass certain agroforestry activities and can include household and local processing to add value, such as making hardwood curios. Criteria such as environmental fragility (such as steep slopes) and access to markets play an important role in determining what types of natural resource-based activities are appropriate in different areas. We believe that two classification categories are warranted: N1 for high-potential areas where market access is good and environmental fragility is low and N2 where market access is difficult OR the environment is so fragile that even low-impact development activities present a potential threat.

Agriculture (F) includes cultivation of food crops, horticulture, fruits, spices, fish, seeds, specialty tea, coffee, medicinal species, and nurseries. COMPASS' emphasis will be fairly limited but may involve improving on-farm land management practices related to crop selection and soil and water conservation, and promoting agricultural intensification *where appropriate*. At this time, we do not believe that further subdivision of this unit is warranted. Nevertheless, if COMPASS II identifies opportunities to promote agroforestry in areas where current agricultural extensification is compromising valuable natural resources, classification into high potential (F1) and lower potential (F2) zones may be useful.

Agro-industries (B) comprise value-added processing of any of the above products, including but not limited to drying, juicing, fermenting, packaging, and machining. The COMPASS II team will emphasize identifying economically viable enterprises and brokering equitable partnerships throughout the value chains of selected commodities to raise rural incomes and promote alternatives to agricultural extensification and overexploitation of resources in natural habitats. COMPASS II will focus on promoting such initiatives in existing population centers located at some distance from important conservation and natural resource management areas so as to avoid increasing pressures on the resources. This notwithstanding, we also recognize the need to maximize the benefits accruing to the people and communities that are managing the resources, so we will strive to promote on-farm or forest gate activities that add value to the products without requiring a significant increase in local labor requirements. We also acknowledge that different natural products have different transport needs: fresh goods need to be shipped and processed expeditiously; heavy materials may require truck access in order to transport them to processing centers and markets. The variable condition of dirt roads and tracks depending on the season, also plays a role in determining whether market accessibility is adequate for certain products, especially when they are available only during the rainy season (mushrooms, for example).

Table 4: Area of different development pathway units mapped in each COMPASS II target district (reported in square kilometres)

District	C1	C2	N1	N2	F	B
Chikwawa	727	290	16	1,682	2,175	-
Chitipa	748	82	328	1,232	1,830	-
Dedza	-	259	250	1,196	2,038	5
Lilongwe	-	687	94	673	4,581	166
Machinga	404	629	500	621	1,777	-
Mangochi	97	1,019	442	1,919	3,264	7
Mulanje	434	14	-	-	1,555	-
Mzimba	405	802	239	2,184	6,920	25
Nkhata Bay	-	546	198	1,644	1,807	-
Nkhotakota	1,731	515	73	514	1,492	3
Nsanje	139	567	30	489	736	-
Ntcheu	-		224	605	2,389	-
Phalombe	-	169	93	69	1,092	-
Rumphi	2,430	452	122	687	958	-
Zomba	-	185	720	77	2,123	10
Total Area	**7,115**	**6,216**	**3,330**	**13,592**	**34,737**	**216**
Unit as % of Total	**11**	**10**	**5**	**21**	**53**	**0**

Mapping of Development Pathways using the Land-Use Background Information

Since several supplementary criteria have been used to map development pathways using the land-cover base maps, there are few cases of specific units being readily converted from one classification system to the other. In general, however, evergreen forest (F) and montane grassland units will fall within pathway C (probably C1) and most W1 units fall within C1 or C2. Important wetlands (M) such as Lake Chilwa and the Elephant Marsh are not formally protected and as such warrant classification as either C2 or possibly N1, though their important as fish breeding areas still needs to be carefully assessed before specific development activities are proposed. Some existing fish breeding sanctuaries such as those at Bana Lagoon in Nkhotakota district are classified as C1. W2 and A2 areas are generally represented as N1 or N2 pathways depending on environmental fragility assessments and proximity to markets and critical conservation areas. As a matter of course, COMPASS has designated all areas within 5 Km. of C1 (highest conservation status) units as C2 rather than N1 or N2. This distance may be revised at a later date.

C1 units comprise all F, W1, G, D and M units that fall within the following areas:

1. Evergreen forests of the Misuku Hills (Chitipa district)
2. Evergreen forests, grasslands and woodlands of Nyika National Park (Chitipa and Rumphi Districts)
3. Woodlands, marshes and dambos of Vwaza Marsh Wildlife Reserve (Rumphi and Mzimba Districts)
4. Evergreen forests of the north Viphya Mountains (Uzumara Forest Reserve and Chimaliro forest in Rumphi and Nkhata Bay Districts)
5. Woodlands of the Nkhotakota Wildlife Reserve (Nkhotakota District)
6. Woodlands, grasslands and evergreen forest of the Mangochi Hills Forest Reserve (Mangochi District)
7. Lakeshore and islands of Lake Malawi National Park (Mangochi District)
8. Woodlands and wetlands of Liwonde National Park (Machinga District)
9. Grasslands, evergreen forests and woodlands of Mount Mulanje (Phalombe and Mulanje Districts)
10. Woodland of the Majete Wildlife Reserve (Chikwawa District)
11. Woodlands and thicket of Lengwe National Park (Chikwawa District)
12. Woodlands and thicket of Mwabvi Wildlife Reserve (Nsanje District)

C2 units comprise all W2 units in the aforementioned areas

PLUS all F, W1, G, D and M units that fall within the following areas:

1. Evergreen forests of the lakeshore area of Nkhata Bay District
2. Evergreen forests, woodlands and grasslands of the Viphya Plateau and adjacent areas (the South Viphya, Mtangatanga, Perekezi and Dwambadzi Forest Reserves of Mzimba and Nkhata Bay Districts)
3. Wetlands of Bana Lagoon and Unika Swamp (Nkhotakota District)
4. Woodlands of the Dzalanyama Forest Reserve (Lilongwe District)
5. Woodlands of the Tuma Forest Reserve (Lilongwe District)
6. Woodlands of the Namizimu Forest reserve (Mangohi District)
7. Woodlands and evergreen forests of the Liwonde Forest Reserve (Machinga District)
8. Wetlands of Lake Chilwa (Machinga, Zomba and Phalombe Districts)
9. Wetlands of the Elephant and Ndindi Marsh (Chikwawa and Nsanje Districts)

PLUS all F, W1, G, D and M units that fall within 5 km of the C1 units.

N1 units comprise all F, W1, G, D and M units that are outside of C1 and C2 **AND** within 5 km of an all-weather road (data to be assessed)

PLUS all lakes.

N2 units are all F, W1, W2, G, D and M units that are not included in C1, C2 and N1 units.

F units are all A1, A2, A3, and P areas that fall outside C1 and C2 areas.

B units are all U areas.

Dambo (D) areas that are not under agriculture are generally classified as C2, N1 or N2 units though development opportunities are as yet uncertain.

Agricultural areas (A1, A2, A3 and P) for the most part fall within the F pathway though wooded areas within some A2 and A3 units warrant classification as N1 pathways if the tree species present are of value and in sufficient numbers for tree-seed oil extraction. Similarly, some P units such as eucalyptus, coffee and macadamia plantations might be valuable areas for honey production.

Finally, **urban areas (U)** are generally designated as B pathways though many smaller towns and some larger villages may also warrant similar classification when access to smaller, less distant processing centers and markets is appropriate.

6 NEXT STEPS

The resolution of the LANDSAT 7 ETM+ imagery is 28.5 metres (each pixel measures 28.5 metres by 28.5 metres on the ground). This resolution is probably to low to measure any changes in the areal extent of critical habits over the timeframe of COMPASS II (2004 to 2008). Moreover, annual variations in rainfall conditions also result in marked changes in the spectral signature of all the land use and land cover units. Hence, it is extremely difficult to gauge changes in the quality of vegetation cover using this type of imagery. Nevertheless, we believe that satellite imagery can provide a cost effective option for mapping certainly changes in the extent of different habitats or ecosystems as a result of human pressures or other factors. However, the spatial resolution of the imagery must be considerably higher than available from the LANDSAT program. COMPASS II will explore the potential for using either SPOT or IKONOS imagery for selected areas of the country to track changes in vegetation cover. We will also explore the potential for using these types of imagery for gauging changes in the quality of the land cover.

At this time, we believe that monitoring the quality of key habitats and ecosystems will undoubtedly require supplementary ground-truthing, which will involve simple ecological inventories. We are exploring the possibility of using simplified assessments of the presence or numbers of key species as indicators of ecosystem health. For example, if an area of forest or woodland is being degraded through the harvesting of valuable timber species of specific medicinal plants, it might be easier to gauge the impact of this by monitoring the insects that are dependent on these plants (butterflies, for example, which require the plants as host for their caterpillars) rather than attempting to quantify the numbers of plants that have been lost from year to year (see for example, Claire Kremen's work in Madagascar[3]). Such an approach will require careful analysis of the biology of the species involved but there is already a considerable body of literature on several species that might be useful4.

The selection of key sites for this approach to monitoring the impact of COMPASS II activities will have to await final decisions on the precise locations of the field level interventions. At this time, we believe that possible sites could be the evergreen forests of the Misuku Hills, where the impact of in-forest coffee and honey production needs to be assessed. The impact of tree-seed collection for oil production in the Lower Shire perhaps merits a similar approach to monitor the health of woodlands and resident animal populations in Mwabvi Wildlife Reserve, for example. If COMPASS II, embarks on the commercialization of wild mushroom harvesting, the potential changes in the miombo woodlands of the Perekezi and Mtangatanga Forest Reserves in Mzimba District should be carefully monitored.

It must be stressed that the anticipated impact of these COMPASS II activities is not necessarily negative. In fact, we believe that there is a strong likelihood that the human pressures on many natural habitats will be reduced when local communities gain financial benefits from sound management of the natural resources. COMPASS II will explore the possibility of obtaining satellite imagery from the past 25 years for the selected monitoring sites in order to determine encroachment and degradation rates over the past two or three decades. This information will provide a valuable measure against which to gauge the impact COMPASS has over the next few years. Much of the older LANDSAT imagery is now archived and is being made available free of charge through programs such as USAID's CARPE initiative, which is involved in monitoring changes in forest cover and quality throughout central Africa.

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[3] Kremen, C. 1992. Assessing indicator species assemblages for natural areas monitoring: Guidelines from a study of rainforest butterflies in Madagascar. *Ecological Applications*, **2**: 203-217.
Kremen, C. 1994. Biological inventory using target taxa: A case study of the butterflies of Madagascar. *Ecological Applications*, **4**: 407-422.

[4] Henning, S.F. date. *The Charaxinae Butterflies of Africa.* Check ref.

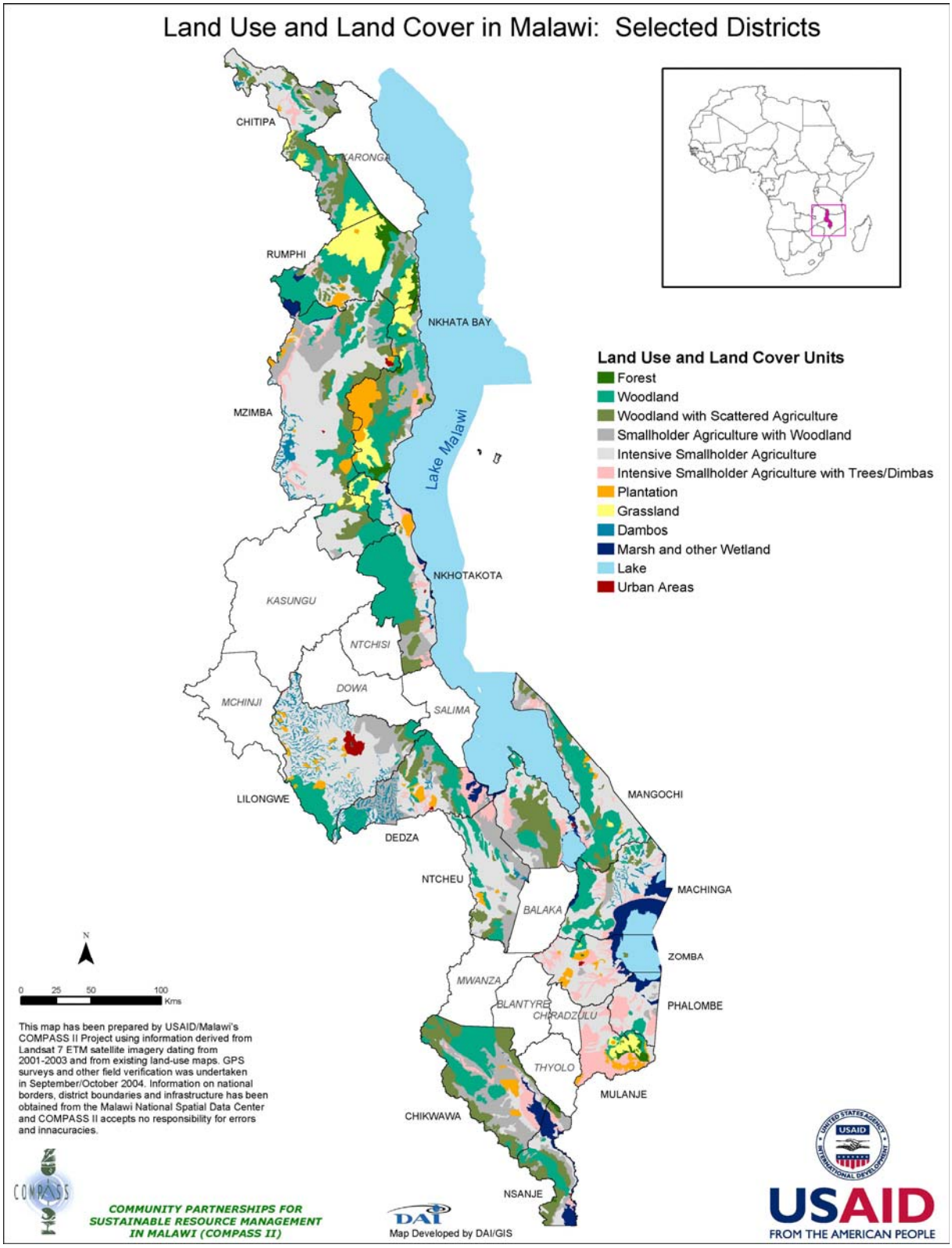
We recognize several opportunities to collaborate with key partners on sharing the cost of such monitoring efforts. The Mulanje Mountain Conservation Trust is currently implementing an ecological monitoring program in collaboration with the Wildlife Conservation Society (US) and Kew Botanical Gardens (UK). We hope to be able to join this collaborative effort if COMPASS II becomes involved in CBNRM activities in this part of the country.

7 SUMMARY

Development pathway mapping will assist COMPASS II target its activities and customize its interventions in order to maximize results and impact. This approach to spatial planning can be readily adopted by local jurisdictions and can help them move toward an "asset-based" approach to development that treats natural resources as economic opportunities rather than "problems" that need to be mitigated. Most importantly, the pathway maps are an important baseline for community mapping, which enables rural communities work with local authorities to identify natural resources to which they have access and develop appropriate management plans that enables wealth creation from the sustainable utilization of the resources.

This approach to spatial planning within the context of natural resource management and agriculture development will help channel scarce resources to activities and locations where they are most likely to succeed and achieve sustainable impact. The approach can be used as a springboard for applying "appreciative" techniques when working with local jurisdictions and rural communities. Community mapping then follows as a natural next step for identifying local assets in a fully inclusive and participatory manner. These approaches help build consensus for tailoring interventions that will improve natural resource management in an environmentally, economically and socially sustainable manner.

Annex 1: Selected Districts Land Use and Cover in Malawi



Annex 2: Compass II Development Pathways