



ISTF NEWS

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THE CHANGING ROLE OF FORESTRY IN CONSERVATION AND DEVELOPMENT

WHY TREES ARE GOOD FOR MALAWI*/

Jeffery Burley

Introduction

Malawi, Nyika and Vwaza

The Republic of Malawi is a small, beautiful, landlocked country in south east Africa. It is bordered by Mozambique, Tanzania and Zambia with an area of some 118,000 square kilometers. Lake Malawi, the most southerly of the Great African Rift Lakes, occupies 29, 600 square kilometers (km²). The surface of the lake is 457 meters above sea level (masl) while the surrounding mountainous plateaux range from 900 to 2200 masl. The climate on the plateaux is temperate equatorial with a single rainy season.

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Photograph of Nyika Plateau reproduced with acknowledgement to Dr. Thomas Wagner under the Commons: GNU Free Documentation License.

MALAWI



The Nyika National Park and the Vwaza Marsh Game Reserve, located in the northern region of Malawi with a small portion in Zambia, have a combined total area of nearly 4,000 km². They lie adjacent to each other and are administered by the Department of National Parks and Wildlife. Because of their social and ecological importance it is now proposed to include the two areas into a Trans Frontier Conservation Area, in a project to be funded by the World Bank, the Norwegian Government, Peace Parks Foundation, and the Malawi and Zambian Governments, as well as with contributions from the Nyika-Vwaza Trust, and overseen by the Nyika Foundation. The proposal will meet the criteria of long-term conservation of natural resources, improved living conditions for the surrounding communities and self-sustainable park management.

Both areas are of great ecological value; the Nyika National Park displays a unique highland ecosystem of grasslands and montane rainforests, above the malarial belt, with a particular importance as a huge ground water reservoir for Northern Malawi and Eastern Zambia (Nyika means locally “where the water comes from”); the Vwaza Marsh, in turn, consists of lower-lying wet and wooded lands supporting a considerable population density of large game animals. The area has low rainfall so groundwater reserves are important and excessive extraction could become a problem. Parts of the area have highly erodible “duplex” soils.

The Nyika National Park was sparsely settled and used by Phoka people, who engaged in gathering, bee-keeping and occasional herding and hunting for domestic use. In the 1970s, a large park extension was approved which entailed resettling the population at much lower elevation and exposed them to malaria with huge mortality. The process is now, more than 20 years later, being reversed but in the interests of ‘conservation’ (actually misguided ‘preservation’). Cases of encroachment are common and requests for land from these areas are numerous. The rate of illegal off-take of various wildlife and forest resources is also increasing.

Malawi, Africa and Commonwealth

In the last hundred years various forms of forestry use, management and, occasionally mismanagement, have been significant activities in Africa generally and in Central and East Africa particularly. The six countries of the two earlier political federations (Malawi, Zambia with Zimbabwe and Kenya, Tanzania with Uganda) were among the tropical world’s leaders in the survey, assessment, research and development of their forest resources. Throughout the colonial era and independence to the present time they were noted for the good organization of national Forest Departments, for the management of forests, and for investment in research in both natural forests and plantations, particularly with a view to their economic products.

In the last decade of the last century and in the present century more attention has been given to the social and environmental aspects of forestry in these countries and to the need for close integration with agriculture and other land uses. The purpose of my talk today is therefore to review the current global importance of forests, to highlight current issues and concerns, and to emphasize the value of forests and trees for Malawi in the future.

My qualifications for the task are several years of heading a federal research unit based in Zambia and working for all three countries; several more years as an adviser to many tropical countries including particularly the six countries plus India, Pakistan, Malaysia and some Caribbean countries; and 20 years heading the Commonwealth Forestry Institute in Oxford which provided research, teaching, advice and information for all Commonwealth countries plus many others too. For several years I was also chairman of the Commonwealth Forestry Association, a professional association of individuals, departments and companies, that provides opportunities for them to share experience and to make political inputs to international processes and developments. A particular qualification would be my many visits to Dedza, the Viphya Plateau and Zomba Mountain to assist in forest research but a particular disqualification might be my failure ever to set foot on the Nyika.

Forest benefits

The concept of sustainable development was coined by the Brundlandt Commission in 1987 and it emerged into the public consciousness largely after the United Nations Conference on Environment and Development in Rio, Brazil, in 1992. Foresters have recognized the multiple benefits of forests for centuries but the recent expansion of the sustainability concept to forest management is well described in a statement from the Inter-Ministerial Conference on the Protection of Forests in Europe in 1993: *Sustainable management means the stewardship and use of forest lands in such a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil now, and in the future, relevant ecological, economic and social functions at local, national and global levels; and that does not cause damage to other ecosystems.* Despite its debatable English usage, this definition aptly describes the benefits that mankind seeks from forests.

Forest products. These include:- solid wood products such as poles, sawnwood and veneer, fuelwood and charcoal. In Malawi annual production figures for 2008 were woodfuel 5.293 million m³, industrial roundwood 520,000 m³ and sawnwood 45,000 m³. (FAO, 2011)

Comminuted wood includes chipboard, waferboard, blockboard, fibreboard, paper and cardboard. Malawi produced 18,000 m³ of wood-based panels and exported 16,000 m³ in 2008. The country produced no pulp and paper but imported 19,000 tonnes in 2008. It was largely to avoid such imports that the vision of industrial pine plantations developed in the early 1960s although pines had been planted, including on the Nyika Plateau, in the late 1940s and 1950s for sawnwood. An FAO report by R Green in 1962 summarized the many earlier arguments for and against a pulp mill on Lake Malawi with wood from the Viphya Plateau in particular. Subsequent studies have all reached the same conclusion, namely that the landlocked nature of the country and the vast distances to transport wood, chemicals and pulp for export with at least three transshipments, plus the risk of pollution to the lake, precluded a pulp industry. However, the demands for other products within the country could well be satisfied internally and a report by the Finnish consultant firm Jakko Poyry recommended an integrated complex for sawnwood and panel products.

Non-wood products. These include human food and animal fodder (both of which are highly significant in Malawi); the energy derivatives of pyrolysis, gasification and esterification; industrial feedstocks; biopolymers; extractives and other derivatives for pharmaceuticals, nutraceuticals and cosmeceuticals. Opportunities exist for local, smallscale developments of many of these products including on the margins of the Nyika. Worldwide there is rapidly increasing interest in exploring, developing and marketing phytonutrients that improve human and animal welfare but little attention has yet been given to Malawi flora other than for traditional local uses of herbal medicine.

Changes of focus. In the last 60 years production forestry has changed focus and stakeholders several times; Malawi followed these trends rather closely:-
1950s Industrial wood volume from natural forests and plantations, largely controlled by government.

1960s	Industrial wood quality from plantations – start of commercial control
1970s	Industrial pulp/paper quality from plantations – partners in research
1950-90s	Non-wood products – by rural communities in developing countries
1980-90s	Trees support agriculture and human welfare; people’s participation and development agencies
1990 - present	Environmental impacts and multiple benefits; role and opportunities for multi-business (UNCED, UNSCD, IFPF, UNFF, IPCC, Kyoto to Copenhagen; NGOs; commercial sector)

Environmental services. Globally there have been protracted debates on the extent of proof that forests provide environmental benefits but it is generally accepted that the benefits are real in many cases. They include soil conservation and improvement; enhanced water quantity and quality and flood control; climate amelioration; site rehabilitation; and maintained or increased biological diversity use and conservation.

The Nyika Plateau is a major upland water catchment providing domestic water downstream. A common complaint about plantations is their consumption of water that deprives downstream users; however, the excess of rainfall over evaporation and transpiration is sufficient to support large areas of plantation should they be required. On the eastern, more fertile soils, some natural landslips and some man-made erosion occur.

Social benefits. A major pillar of sustainable development is a set of social benefits and modern forest policies and management plans seek these including:- contributions to national economic development; the provision of standing capital for farmers and communities; employment and income generation and diversity; risk reduction and counter seasonality; gender equality; diet diversity and human and animal health; reduction of artificial inputs such as fertilizers and pesticides; culture, amenity, tourism; all landscape features and benefits.

Current global issues and international activities relevant to Malawi

Forest types, areas and losses. There is no single type of forest. Ecologists recognize up to a hundred defined types, but six major sets are widespread and widely recognized:- boreal, temperate mixed, temperate evergreen, tropical rain, tropical deciduous, and tropical dry forests. They differ in geographic location, environmental conditions, species composition, pressure from human populations, and appropriate silvicultural management.

The world's forest area is one third of the land area, some 4 billion hectares, of which 36% are still primary forests and 7% plantations (FAO, 2010). Many land use systems incorporate trees ranging from pure virgin forest through open woodland and managed or restored forest, to agroforestry mixtures with agricultural crops and animals. The annual decline in forest area during the decade 1990–1999 was 16 million hectares but this has reduced to 13 million hectares in the present century.

In Malawi the forest area approximates 32,370 km² which is declining at a rate of 1% per year; it holds a carbon stock of 144 million tonnes declining at 2 million tonnes annually (FAO, 2011). Historically over 90% of the miombo woodland has been under shifting cultivation in the last 250 years. A palynological study by a team from the University of Newcastle in the late 1970s indicated that natural climate changes had caused cyclic variation in vegetation from woodland to grassland over the past thousand years. Tree biodiversity near the Nyika is interesting with *Ocotea usambarensis* on the east and *Entrandrophragma* and *Mitragyna* on the west side. *Juniper procera* forest could be expanded.

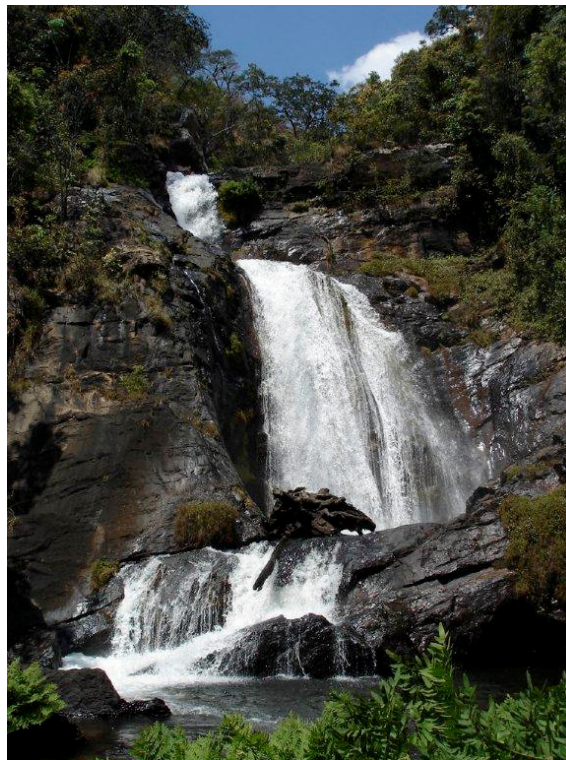
Population, poverty and welfare. The current year is recognized as the International Year of Forests 2011. In preparing for its launch an Inter-Ministerial Meeting in 2009 declared that forests are an integral part of human well-being that address poverty, food, water, climate, desert, biological diversity and natural disasters, playing a crucial role in the livelihoods of local people.

The global population has doubled in the last 50 years and the 7 billionth person was born this year. The population is expected to reach 9 billion by the middle of the present century. Although there is a rapidly increasing trend to urbanization with more than half the world's population now living in towns, the demand for the products and services that forests provide will continue to rise. As populations rise, poverty increases, welfare decreases and the Millennium Development Goals become harder to attain. In this context poverty includes financial, food and energy poverty and forests have great roles to play in decreasing all three. When my wife and I first arrived in Malawi (early 1965) there were approximately 4 million people. Now the figure is nearer 15 million who demand the same or higher levels of welfare.

Biological diversity and conservation. Some 70% of terrestrial plant and animal species are found in forests. There is now widespread recognition of the values of biological diversity at the levels of ecosystem, species, population and individual genetic variation. In many parts of the world it is impossible to turn on a television or read a newspaper without seeing some documentary or news item extolling the many values to humans of



Montane Rain Forest, Nyika. Photo courtesy of Vera Müller-Plantenburg and Jorg Mellenstein.



Chisanga Falls on the North Rukuru River, Nyika Plateau. Photo by courtesy of Vera Müller-Plantenburg and Jorg Mellenstein.

other species and their ecosystems. Several major international institutions are concerned with the conservation and management of forest biodiversity; these include the United Nations Convention on Biological Diversity (CBD) with its Cartagena Protocol (which seeks to avoid risks associated with genetically modified organisms), the International Union for the Conservation of Nature and Natural Resources (IUCN), the World Wildlife Foundation (WWF) and the United Nations Environment Programme-World Conservation Monitoring Centre (WCMC).

The countries of East and Central Africa have long recognized the need to conserve these resources both *in situ* and *ex situ*. The establishment of forest reserves by State Forest Departments from the 19th Century onwards was among the first attempts to conserve natural ecosystems and their constituent species; the Nyika Juniper Forest Reserve created in the 1930s was a good example. Although their value is still recognized, population pressures are causing social and political incursions and losses. The issue of illegal logging and trade is a major topic for the CBD and Malawi suffers illegal logging for export to China, often with species not considered commercial such as *Colophospermum (Copaifera) mopane* and *Combretum* species. In many countries ecotourism based on landscape and biodiversity is being developed but cannot be considered the only alternative income source.

Climate change, carbon sequestration and carbon trading. Deforestation accounts for 10 – 20 per cent of global greenhouse gas emissions. In Malawi, as in much of Africa, deforestation is for access to land and wood is burned to provide short-lived soil fertility. The role of forests as carbon stores and in ameliorating the effects of climate change have been a major focus of international and national governments, agencies and institutions for nearly two decades. International agreements and concerted actions include the United Nations Framework Convention on Climate Change (UNFCCC) with its scientific Intergovernmental Panel on Climate Change (IPCC) and the Kyoto Protocol with its Clean Development Mechanism (CDM).

Discussions in the UNFCCC generated the concept of Reduced Emissions from Deforestation and Forest Degradation (REDD) in developing countries. This provides for rich countries to compensate poor countries for not cutting their forests. Two major initiatives focus on this to assist developing countries in preparing for a successor to the Kyoto Protocol. – the World Bank's Forest Carbon Partnership and the UN –REDD Programme.

In addition to inter-governmental financial transactions the practice of carbon trading has emerged whereby polluters emitting carbon dioxide pay for activities that sequester carbon – with both formal CDM-compliant trading (8.2 billion metric tonnes of carbon dioxide equivalent valued at US \$13.5 billion in 2009 of which little was related to forestry) and various voluntary markets (the VCS Project Database indicates that 21 forest-based projects were registered in 2011 alone).

Payment for other ecological services. Many attempts have been made to put values on biological diversity, particularly of intact ecosystems. While this is feasible for typical, marketed products, current attention is focussing on payment for a range of ecological services in addition to carbon credits. An expansion to REDD+ (payment for Reduced



Buli Hill. En route from Lilongwe to the Viphya Plateau, 1965. (Photo J. Burley)



Eucalyptus grandis on Zomba Slopes, 40 years old, 50 m total height, 30 m to first branch, 1965. (Photo J. Burley)

Deforestation and Forest Degradation with added services) is seeking to include conservation of forests, afforestation and increased carbon storage in forests while REDD++ might include agricultural land uses. The Malawi Environmental Endowment Trust (MEET), working with USAID and the Plan Vivo (Edinburgh) have one of the first REDD forestry programmes with 1.5 million tonnes of carbon dioxide equivalent for trade over ten years.

There is now considerable debate and demand for research on the often-quoted impacts of trees and forests on local and global environments:- soil conservation and improvement; water quality and quantity; flood control; climate and weather amelioration; shade and wind protection; site rehabilitation and restoration; and biodiversity conservation for ecosystem function and stability (see Calder, 2002). Malawi, supported by the World Agroforestry Centre (ICRAF, the International Centre for Research in Agroforestry, Nairobi), has been among the leading countries in Africa to show the benefits of forest trees in supporting agriculture – the so-called fertilizer trees that have reduced the use of artificial fertilizers. For conservation to succeed it is vital to ensure the sustainable flow of all such benefits and values to local communities.

Bioenergy. One of the major human causes of global climate change is recognized to be the release of carbon dioxide into the atmosphere through the use of fossil fuels for vehicle propulsion, domestic heat and light, and industrial processing. In the present century a vast array of new and old technologies have been investigated for the replacement of fossil fuels by renewable technologies including nuclear, wind, wave, tidal and river energies.

One further set of renewable resources, and one that most closely involves forests, is that of biomass. This is biological material derived from living or recently living organisms, most frequently plants. Whereas fossil fuels such as coal, oil and gas sequestered carbon from the atmosphere millions of years ago and release it back to the atmosphere when burned, biomass actively sequesters carbon at the present time and can be replaced and grown at rates to compensate for carbon releases during conversion to energy. The principal resources include virgin wood from natural forests, plantations, agroforestry and wood processing; high yielding energy crops; agricultural residues and food waste; and industrial waste from manufacturing processes.

These resources may be converted by thermal processes of combustion, gasification and pyrolysis; by chemical conversion into ethanol or diesel fuel; and by biochemical and microbiological processes including anaerobic digestion, fermentation and composting. It is noteworthy that, at present, nearly one half of the world's population (3 billion people) rely on unsustainable biomass-based energy sources.

In Malawi over 90% of all energy used is derived from biomass including the large demands from tobacco curing. Tobacco farmers traditionally used fuel from the forest to flue-cure tobacco and poles for rack-drying Burley tobacco. As the industry developed, many switched to plantation trees for fuel and poles; originally 3 hectares of eucalypt plantation were required for each hectare of tobacco (plus 1 – 3 ha for food); on larger estates, with improved eucalypts, the plantation requirement has reduced to 1 ha further reducing the pressure on natural woodlands.



Brachystegia Woodland at Vwaza Marsh – showing elephant damage in the foreground.
Photo by courtesy of Mike Budgen.



Remnants of Montane Rain Forest (with Roan Antelope in foreground), Nyika Plateau.
Photo by courtesy of Jerry Kent.

Other rural domestic fuelwood is collected from plantations and natural forests as small wood while urban supplies are typically met from poles and logs to facilitate handling and transport. Although new plantations could be established or natural regeneration of existing plantations encouraged to increase yields, the remoteness and terrain of the Nyika would require prohibitively expensive upgrading of the road to Rumphu and other towns. In Malawi fuelwood is preferred to charcoal although the charcoal trade currently approaches 1.6 billion kwacha annually. Charcoal is used when wood is not freely available but it has different burning properties that do not suit local cooking and that do not provide light or smoke to control insects.

The special case of plantations

One of the most contentious issues in forestry for the past 50 years or more has been the role of plantations, especially when they are derived from exotic (non-native) species. In the agriculture and food industries few people complain about exotic species yet the major crops in Malawi are not indigenous - maize, tea, tobacco. Throughout the tropical and sub-tropical regions forest plantations have been successfully established with eucalypts, pines, teak and many other hardwood species. The many comparisons between natural forest and exotics are summarized in Table 1.

Table 1. Summary comparison of natural forest (N) and plantation (P).

Biological			Technical		
	N	P		N	P
Diversity	High	Low	Management	Extensive	Intensive
Genetic knowledge	Low	High	Knowledge	Limited	Good
Pest risk	Low	High	Harvesting	Poor	Efficient
			Growth	Slow	Fast
			Trees/ha	1-10	100-1000
			Processing	Inefficient	Efficient
			Research needed	Much	Little
Ecological			Economic		
Soil conservation	Yes	Less	Value per unit volume	High	Low
Soil improvement	Yes	Vary (some N ² fixation)	Cost of access/extract	High	Low
Soil decline	No	Vary (some acidity)	Export quality potential	High	Moderate
Microclimatic effects	Beneficial	Beneficial	Non-market values	Many	Moderate
Macroclimatic effects	Global	Regional and local			
Carbon fixing	Balanced	Rapid in youth			
Water use	Balanced	Vary with species and site			
	Social/political				
Political will needed	High	Moderate			
Motivated staff needed	High	High			
Employ direct	Low	High			
Employ indirect	High	Low			

Globally, 70% of forests products are sourced from 7% of the world's forests, of which the latter are predominantly planted or have a planted component (Evans, 2009). In the words of W R J Sutton (New Zealand forest economist) "What is the alternative?"

Plantation research and development in Malawi was excellent until the turn of the 1990s with well established and managed plantations in Dedza-Chongoni, Viphya and Zomba. In the 1970s Patrick Hardcastle conducted significant research to classify silvicultural zones in Malawi and identify suitable species for each. Then population pressures and the influx of refugees from Mozambique intensified the illegal removal of wood from research plots and industrial plantations. Furthermore, the numbers, standard and motivation of many Forestry Department staff declined and their leaders were unable to maintain the standards. The plantation area on the Nyika is currently being clear felled; however it is worth noting that past experience indicates it would not have been sensible to expand the limited plantation area on the Nyika itself. The moist conditions make timber drying difficult (the Oxford Forestry Institute solar kiln was installed but did not prove effective because of the relatively low solar incidence and the high relative humidity in much of the year) and transport conditions are unfavourable.

The removal of the plantation area will pose new challenges. In the short term these include issues relating to harvesting (increased run off and siltation of water ways and dams), transport (damage to earth roads constructed for access rather than heavy extraction vehicles moving on and off the plateau), fire risk (greatly increases due to the fuel load on the ground) and the social impact of an increased itinerant population (requiring housing and other services). Longer term issues include provision of sustainable sources of fuelwood for the Chilinda population, and the unknown impact of removal of a long established plantation area on mammal, bird and other plant and animal communities in the Chilinda area. There will also be the challenge of managing the area so that it does not revert back to self-seeded pine. This should be possible to control by early burning the areas followed by removal of young stems before flowering (usually 7 years). Some areas will need to be replanted to indigenous forest, which will have been suppressed by the impact of plantations for close to 60 years.

Gaining acceptance of the visual impact of removing pine plantations, a problem not unique to the Nyika, will require a communication programme for visitors. Some form of amenity planting may need to be considered.

Conclusion

The Brundtland and UNCED concepts of sustainable forest management are hardly new. George Hartig, a Prussian silviculturist, in 1785 wrote:

"All wise forest management must...have woodlands valued...and endeavour to utilize them as much as possible but in such a way that later generations will be able to derive at least as much benefit from them as the present generation claims for itself."

Personally I think the failure of foresters and policy-makers to insist on recognizing the true value of natural forests and feeding back profits into maintenance was another major failure to support the conservation of natural resources.

Forestry has always been a wide-ranging topic; traditional professional education of foresters ranged from soil science to climate, from botany, biochemistry, physiology and genetics to forest policy, economics and management; from harvesting to processing and marketing a wide range of products. It is this very mixture of disciplines and their practical applications that has led many universities, particularly in developed countries, to abandon holistic subjects like forestry and agriculture as academic disciplines in favour of the reductionist so-called “pure” sciences, especially molecular biology.

In seeking to maximize understanding of systems and production of the many benefits required, we need to find ways to develop closer collaboration between disciplines and comprehension of each other’s languages rather than competition between them. Even subjects as closely related as agriculture and forestry are traditionally taught and researched in different university or college institutions; they are administered and managed by different government departments; and they are frequently governed by the policies of different governmental ministries; these conspire to generate unproductive competition for resources and reputations by individuals and institutions. The issue is magnified because of the gaps in understanding between practitioners of biophysical subjects and socio-economic subjects.

In addition to collaboration between these recognized academic disciplines, we need to consider inter-sectoral cooperation and understanding. In the light of the current issues outlined earlier many sectors must work together to seek compatible policies. We must therefore continue to lobby and educate policy-makers, resource managers, business managers, scientists and educators to recognize the true value of natural resources and to insist on closer, co-ordinated actions between disciplines, sectors and institutions if we are to meet the valid demands of future human populations. Above all, perhaps, we need to train practising land managers; too many academic institutions produce theoreticians and fail to recognize the need for practical, hands-on experience.

One issue that was obviously not foreseen by Hartig is the role of forests in the global carbon cycle and approaches to mitigating climate change through carbon sequestration and storage; this potential will expand throughout the century and forests offer a major contribution to the reduction of carbon in the atmosphere. At the start of the third millennium this has to be seen in the light of other emerging issues for forestry including:- the conservation of biological diversity (at ecosystem, species and individual genetic levels); the use of indigenous species rather than exotics; environmental quality and changes; renewable energy sources; deforestation, desertification, restoration and rehabilitation; commoditization, trade, incentives, corruption, and conflict; food security, poverty alleviation, and human health; water resources; policy reform, professional status and, education; public and political support; and the globalization of forests and forestry.

Conservation may be seen as the wise management of human use of natural resources. Since the 1992 United Nations Conference on Economic Development (the Rio “Earth Summit”), increasing pressure on the world’s forests has prompted international efforts to manage them sustainably for the full range of goods and services they can provide and to certify good management when it occurs. The difficulty of making policy with numerous stakeholders has been alleviated by the development of participatory processes for forest

planning, management, and benefits. Research has increasingly involved co-operation between governments, between research institutions within countries, and between companies. In forest-related education also, co-operation is intensifying. Interdisciplinary co-operation in policy making, forest management, research, and education will be increasingly necessary, given the coming increases in human populations and livestock, changes in climate and other environmental factors, growth in demand for energy and water, and changes in forest managerial methods and processing techniques for forest-based products.

The Nyika Plateau and the Vwaza Marsh, with their great biological diversity, and their socially and environmentally important local roles, require the application of such integrated policies and management, although globally their ecosystem type is represented well elsewhere in Zambia and East Africa.. There are opportunities for great contributions to the wealth and welfare of local populations, the tourists who visit the area, and the State as a whole. The current national policy and legislative framework provides for co-management of forest reserves and national parks by Forest Department and the Department of National Parks and Wildlife but this has yet to be fully implemented, especially the sharing of incomes.

Agreements with local communities on access, use and profit-sharing are still to be developed fully but are essential for the conservation and wise management of Malawi's resources. One example already in place is the USAID-supported COMPASS II project that has a Resource Use Agreement with local people and that has designated two thirds of the Nyika Park as an apiary for the production of honey and wax.

Once established the Nyika Foundation (an endowment fund) and the Nyika Transfrontier Conservation Area (TFCA) will straddle the Malawi-Zambia border. The conservation area will total 19,281 km² (approx 7,500 square miles) comprising the Nyika and Vwaza in Malawi, and in Zambia the Nyika National Park, Lundazi, Mitengi and Mikuti Forest Reserves and Musalangu Game Management Area, together with the local communities surrounding these areas in both countries. It is planned that this will be a sustainable model for future development. Too often the costs of conservation are borne by local people while the benefits are taken by illegal loggers and poachers. Any policy for sustainable development must seek diversity of income and participatory management.

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