UNESCO World Heritage Centre – IUCN

MISSION REPORT

Reactive Monitoring Mission to Lake Malawi National Park (Malawi)

30th March to 4th April 2014

Otopharynx lithobates, one of Lake Malawi's estimated 800 endemic species of cichlid fish occurs only at Zimbabwe Rock, a tiny (3ha) island in Lake Malawi National Park
(Photo courtesy of: H. Blair Howell)

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May 2014

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ACKNOWLEDGEMENTS AND DEDICATION

The mission team is most grateful to the Hon. Minister of Tourism, Wildlife and Culture for his warm welcome and for availing the resources of his ministry and staff. We are especially grateful to Dr Elizabeth Gomani (Director of Culture) for arranging and co-ordinating the mission's schedule throughout and to Mary Chilimampunga (Dept of National Parks), Alfred Topeka (Dept of Culture) and Christopher Magomero (National Commission for UNESCO) who accompanied us and facilitated our numerous meetings and discussions. We are especially grateful to Bryson Banda (Chief Park Warden, Lake Malawi National Park) for his advance preparations and tireless efforts to ensure that the mission was invited in the first place, and for his warm hospitality and willingness to share his considerable knowledge and experience of the park.

We are especially grateful for the cooperation we were given by the senior representatives of Surestream (Keith Robinson) and RAKGAS (Chimwemwe Chikusa), who ensured that we had the latest information concerning the proposed oil exploration activities in Lake Malawi. In the field, village representatives, lodge managers and research scientists willingly shared their knowledge and met with us, often at short notice.

Finally, this report is dedicated to the memory of Chief Park Warden Bryson Banda who passed away unexpectedly in his sleep during the night of Sunday 6th April 2014, two days after completion of the mission. His long service and depth of knowledge were indispensable to the mission and it is our hope that his legacy will live on through the solid foundation he has laid for Lake Malawi National Park.

LIST OF ACRONYMS

CBD	Convention on Biological Diversity
EIA	Environmental Impact Assessment
EMA	Environment Management Act
ESIA	Environmental and Social Impact Assessment
GEF	Global Environment Facility
IUCN	International Union for Conservation of Nature
NBSAP	National Biodiversity Strategy and Action Plan
NEP	National Environmental Policy
NRC	Natural Resource Committee
OUV	Outstanding Universal Value
RAKGAS	Ras al Khaimah Gas Commission
SADC	Southern African Development Community
UAE	United Arab Emirates
UNESCO	United Nations Educational, Scientific and Cultural Organization
VT	Village Trust
WHC	World Heritage Centre
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY AND RECOMMENDATIONS

In response to a request by the World Heritage Committee at its 37th session, the State Party of Malawi invited a monitoring mission to review the state of conservation of the Lake Malawi National Park World Heritage property, in particular the potential impacts of oil exploration on its Outstanding Universal Value (OUV). The joint UNESCO/IUCN mission took place from 31st March to 4th April 2014, examining the following issues related to the Committee's decision:

- Progress with the preparation of an Environmental and Social Impact Assessment (ESIA) for an oil exploration concession awarded to Surestream covering the northern part of the lake (outside the property);
- Award of an additional oil exploration concession to a UAE-based company, RAKGAS covering the southern portion of the lake, including the whole of the world heritage property;
- The state of existing knowledge of biodiversity in the lake, including an important (2004) publication arising from a GEF/SADC Lake Malawi/Niassa/Nyasa Biodiversity Conservation Project, as well as publications in the aquarium literature;
- Considerations and scope for extension of the property to ensure more complete representation of the lake's unique biodiversity and OUV;

Some other issues which had been reported by the State Party were also examined by the mission, including the following:

- Expansion of human populations within the enclave villages and associated pressures on terrestrial and aquatic resources in neighbouring parts of the property;
- Land degradation in the lake's catchment, leading to increased rates of siltation, nutrient loading and ecological change;
- Over-fishing in the in-shore fisheries, including illegal fishing within the property;
- Impacts of tourism infrastructure development and activities;
- Pollution of lake waters with domestic waste and excessive nutrient loads originating from commercial fish-farming operations;
- Inadequate enforcement of protection measures due to resource constraints affecting the management authority, particularly in respect of the aquatic zone of the property;
- The ever-present risk of an intentional introduction of non-native fish species, which could permanently alter the lake ecosystem.

The mission concluded that a significant oil discovery in Lake Malawi could clearly transform national economic development so the award of two major exploration licenses covering the whole of the Malawian portion of the lake is understandable from a development perspective. The mission was assured that no exploration will commence until appropriate Environmental and Social Impact Assessments have been completed and it will be several years before initial surveys are completed, with possible test drilling and exploitation to follow. Nevertheless there is clearly widespread concern over oil exploitation anywhere within the lake, with its associated risks of pollution and the potentially devastating impact this could have on the ecology of this unique evolutionary system.

Recognising past decisions regarding oil and mineral exploration in World Heritage properties, the mission considers that it is crucial to ensure that RAKGAS refrains from exercising any exploration rights over the property and that the two companies that have been awarded concessions in Lake Malawi subscribe to the commitment already made by industry leaders Shell and Total not to explore and/or exploit oil or gas in World Heritage properties.

With regard to the small size of the property (which currently covers just 0.02% of the lake's surface area) and its vulnerability to external pressures and threats, the mission considers that (1) there is a need to establish a wide buffer zone around the property to protect it from major threats such as oil exploitation and (2) there is clearly scope for extension of the property to include a more fully representative sample of the lake's unique species, biodiversity and evolutionary processes. This might involve the States Parties of Malawi, Mozambique and Tanzania (which share the lake's shoreline) and build on existing scientific knowledge of species distributions and ecology. A considerable body of work has already been carried out to identify important localities for fish biodiversity throughout the lake, and this should be used to underpin decisions on the design of an extended trans-boundary serial property. International conservation non-governmental organisations and scientific experts could play an important role in facilitating necessary further research and dialogue towards this objective.

Management of the property needs to be strengthened and additional resources allocated to ensure that threats are contained. Some of the pressing management issues that require attention to safeguard the property's OUV include the need for measures to curb illegal fishing within the property, strengthen work with local communities, better regulate tourism and develop an efficient monitoring programme which includes the fish, water quality and other aspects of the aquatic ecology. The management plan for 2007-2011 needs to be revised and approved for implementation.

Recommendations

In respect of oil exploration the mission's recommendations are to:

- Complete the ESIA process for the initial exploration phase of the two oil concessions, including a specific assessment of impacts on the OUV of the property in conformity with IUCN's World Heritage Advice Note on Environmental Assessment
- Adjust the oil exploration permit awarded to RAKGAS, to ensure that the property is fully excluded from the permit, in line with the World Heritage Committee's established position that oil and gas exploration and exploitation are incompatible with World Heritage status;
- Enhance stakeholder involvement and transparency in all aspects of the oil development programme, and improve inter-ministerial and inter-departmental consultation and communication;
- Surestream and RAKGAS, as holders of oil exploration concessions in parts of Lake Malawi are encouraged to publicly subscribe to the commitment already made by industry leaders Shell and Total not to undertake any exploration and/or exploitation of oil and gas inside World Heritage properties;

With regard to strengthening the level of protection and management of the property the mission recommends that the management authority should:

- Demarcate the boundaries of the property, especially the outer limits of the aquatic zone (with floating buoys), and the terrestrial boundaries of the five village enclaves;
- Define a wide buffer zone (e.g. 20-50km) around the property within which oil exploitation would not be permitted;
- Increase the deployment of patrol boats, other equipment and personnel to ensure enforcement of fishing restrictions and other measures aimed at protecting the OUV of the property;
- Design and implement an effective monitoring protocol to provide a basis for assessing changes in fish diversity and populations, other fauna, water quality and management parameters that could be used in adapting management interventions for better protection of the property's OUV;

- Work closely with communities in the village enclaves and around the periphery of the property to develop suitable programmes for the sustainable use of resources such as firewood, thatching grass etc from designated zones within the terrestrial parts of the property;
- Noting that the scope and scale of the Cape Maclear Resort proposed tourism development is clearly inappropriate within a World Heritage property, the mission recommends the State Party to promote low-impact eco-tourism ventures that comply with appropriate environmental and social impact standards, and continue to monitor and regulate their operation;
- Ensure that all lodge developments and other tourism infrastructure within the property are subject to rigorous ESIA processes and that draft ESIA reports are submitted to the World Heritage Centre and IUCN for review prior to approval, in accordance with Paragraph 172 of the *Operational Guidelines*;
- Revise the 2007-2011 draft management plan and ensure that it is formally approved for implementation.
- Ensure that management is financed and supported at a level commensurate with the area's global significance, mobilising support from the international community as necessary.

In respect of threats originating outside the property the mission recognises the need for major improvements in resource management throughout the lake and its catchment areas. Although the necessary actions are largely beyond the scope of the mission, the mission recommends that the State Party should:

- Maintain the utmost vigilance in ensuring that non-native species of fish (especially top-level predators such as the Nile Perch and Tiger Fish) are not introduced into the lake or its catchment areas;
- Improve agricultural practices in the headwaters of the catchment rivers so as to minimise soil erosion and sedimentation;
- Prevent pollution of the lake and its inflowing rivers through effective regulation and control of mining effluents, other industrial and domestic pollution and agrochemicals;
- Monitor, regulate and restore the lake fisheries for maximum sustainable yield, enforcing such restrictions as may be necessary to achieve this objective;
- Develop a lake-wide system for the routine monitoring of selected indicators of the 'ecological health' of the waters and biota inhabiting the lake. Many elements of such a monitoring programme were piloted during the GEF/SADC Lake Malawi/Nyasa/Niassa Conservation Project (1995-2000).

The mission further recommends that the States Parties of Malawi, Mozambique and Tanzania should investigate the feasibility of increasing protection for additional areas of the shoreline and islands that have been identified as important localities for the protection of endemic fish and evolutionary processes throughout the lake. Where possible, these areas might be designated as reserves or community-run 'special use zones' and might ultimately be incorporated into an extended trans-national serial property. The mission considers that the initial stages of such a collaborative programme might be facilitated by an international conservation non-governmental organisation or through an internationally-recognised mechanism (as per the SADC/GEF project of 1995-2000).

1. BACKGROUND TO THE MISSION

Lake Malawi National Park was inscribed on the World Heritage List in 1984 under criterion (vii) for its exceptional natural beauty; (ix) due to its outstanding example of biological evolution, where adaptive radiation and speciation are particularly noteworthy in the small brightly coloured rocky-shore tilapiine cichlids; and (x) due to the outstanding diversity of the fresh water fishes it hosts. Lake Malawi National Park covers 9,400 ha comprised of a large terrestrial zone, a few small islands, and a relatively small aquatic component extending 100 metres from the park's shoreline (see Annex 5 for map and list of component areas).

Between 1986 and 2005, six international assistance requests were granted for a total of $126,400. These requests supported the purchase of boats and motors, capacity building with local communities and park staff, and for biological inventories. Since its inscription in 1984, the property had never been the subject of State of Conservation reporting until 2013 (30 years), nor has it hosted any previous reactive monitoring missions.

At its 37th session, the World Heritage Committee requested the State Party of Malawi to invite a joint World Heritage Centre / IUCN reactive monitoring mission to Lake Malawi National Park World Heritage Site (Decision **37 COM 7B.5**). The objective of the monitoring mission was to review the state of conservation of the property, in particular the potential impacts of oil exploration on the Outstanding Universal Value (OUV) of Lake Malawi, as well as other potential threats and concerns related to the integrity of the property.

2 NATIONAL POLICY FOR THE PRESERVATION AND MANAGEMENT OF THE WORLD HERITAGE PROPERTY

2.1 Protected area legislation / legislation related to the property[1]

Malawi has no comprehensive structural and legal framework for the conservation of biodiversity but rather follows a sectoral approach. Most of the sectoral policies and legislation are consistent with its National Environmental Policy (NEP). The main features of the NEP and sectoral policies and acts pertinent to this report are described below.

The National Environmental Policy

The NEP was adopted in 1996 in order to promote sustainable social and economic development through sound management of the environment. It provides an overall framework against which relevant sectoral environmental policies can be developed and revised to ensure that these are consistent with the principle of sustainable development. However, as a result of policy gaps, conflicts and duplication, which have adversely affected implementation of the policy, the 1996 NEP has been revised. The revision was necessary to ensure that the NEP remains current and responsive to new challenges and incorporates lessons learned. The revised NEP contains a section on the conservation of biological

[1] Much of the text in this section is obtained and/or adapted from the *Malawi to the Clearing-House Mechanism* (CHM) under the Convention on Biological Diversity (CBD). The objective of the CHM is to deliver information on the Convention on Biological Diversity and its implementation in accordance with Article 18 (3) of the CBD.

diversity, which is general in nature. It seeks to manage, conserve and utilize biological diversity (ecosystems, genetic resources and species) for the preservation of national heritage. It also contains sections, which deal specifically with fisheries, and parks and wildlife among other things and these contain strategies on conservation of specific species.

The NEP is backed by the Environment Management Act (EMA), which was enacted in 1996 in order to remove the lack of an overarching statute providing general environmental protection. Sectoral policies (e.g. Policies on land, water, fisheries, waste, and forestry) are required to be consistent with the National Environmental Policy. The EMA makes provisions for preparation of National Environmental Action Plans, conducting of Environmental Impact Assessments (EIAs), control of pollution and discharge of waste, and also has provision for the establishment of environmental protection areas and conservation of biological diversity, among other things. The revised version of the Act has a comprehensive part on biological diversity.

National Parks and Wildlife Act (1992) – amended in 2004

The principal legislation dealing with management of wildlife resources is the National Parks and Wildlife Act [No. 11 of 1992]. The Act provides for wildlife management, including identification of species which should be designated for protection. It also has provisions in section 28 to declare any area of land or water within Malawi as a national park or wildlife reserve. The law also governs the taking and management of wild game species both inside and outside of protected areas. The law makes it an offense for anyone to harass wildlife while inside protected areas.

The National Wildlife Policy (2000)

The policy was adopted in 2000 (amended in 2002) with a goal to ensure proper conservation and management of wildlife resources in order to provide for sustainable utilization and equitable access to the resources and fair sharing of the benefits from the resources for both present and future generations of Malawi. To achieve this goal the policy seeks to:

- Adequately protect representative ecosystems and their biological diversity through adopting sustainable land management practices;
- Raise public awareness and appreciation of the importance of wildlife conservation and management;
- Provide enabling legal framework to control poaching;
- Encourage wildlife-based enterprises; and
- Develop a cost-effective legal, administrative and institutional framework for managing wildlife resources.

In its Periodic Report to the World Heritage Committee (2001), the State Party noted The Wildlife Policy has resulted in the formation of three Village Trusts (VTs) and several natural resource committees (NRCs). This was corroborated during the mission.

The National Biodiversity Strategic Action Plan (2006)

The NBSAP recognizes Lake Malawi as an important aquatic biodiversity area, with approximately 15% of global freshwater fish species found in its waters. The NBSAP recommends actions such as carrying out inventories of aquatic ecosystems, dealing with threats thereto, and also increasing the number of aquatic protected areas thereby increasing the protection of a greater diversity of aquatic systems and species, beyond just Malawi National Park.

The Forestry Act (1997)

The principal legislation that governs forestry matters is the Forestry Act [No. 11 of 1997], which provides for participatory forestry, forest management, forestry research, forestry education, forestry industries, protection and rehabilitation of environmentally fragile areas and international cooperation in forestry. The Act has provisions relating to co-management of forest areas such that local communities can assist in the implementation of a mutually acceptable management plan.

One major weakness of the Act is that it was developed without extensive consultation and without specific reference to EMA. There is also a recognized need to harmonize the Forestry Act with other acts, including the National Parks and Wildlife Act [No. 11 of 1992] since their provisions affect, directly or otherwise, biodiversity conservation issues.

The National Fisheries and Aquaculture Policy (2001)

The fisheries and aquaculture policy was adopted in 2001 in order to improve the efficiency of all aspects of the national fisheries industry, the production and supply of existing fisheries products, as well as development of new products to satisfy local demands and potential export markets. The policy thus aims at controlling and monitoring fishing activities to enhance quality of life for fishing communities. There is a clear link to the health of the cichlid species both within and outside the World Heritage site.

Fisheries Conservation and Management Act (1997)

The principal statute governing fisheries is the Fisheries Conservation and Management Act, 1997, which seeks to strengthen institutional capacity by involving various stakeholders in the management of fisheries, including the private sector, local communities and non-governmental organizations. The Act promotes community participation in the protection of fish and provides for the establishment and operation of aquaculture. The establishment of aquaculture is an important step in order to reduce pressure on natural fisheries.

It is important to note that Malawi is not a signatory to the International Maritime Organization's Convention on Oil Pollution Preparedness Response and Co-operation, whose parties are required to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries. Nor is Malawi a signatory to the Convention on the protection and use of trans-boundary watercourses and international lakes. This convention is intended to strengthen national measures for the protection and ecologically sound management of trans-boundary surface waters.

2.2 Institutional framework

Responsibility for the management of all national parks in Malawi sits under the Ministry of Tourism, Wildlife and Culture, and specifically with the Department of National Parks and Wildlife. The Chief Park Warden of Lake Malawi National Park reports to the director of the department of National Parks and Wildlife. This department was established in 2002 and as such the overall institutional framework for management of the property has not significantly changed since inscription.

2.3. Management structure

The chief park warden is assisted by a senior staff of approximately five people, in charge of various departments such as: administration and management; wildlife management; research and monitoring, education and extension. Management is loosely carried out in accordance with a 2007-2011 management plan (partially financed by UNESCO) which was

never formally approved. There are approximately 30 park rangers, technical and administrative staff supporting the senior staff. Ranger stations are located at Cape Maclear, Monkey Bay and on the mainland near Salima (for the Maleri Island group). The park is divided into four management zones: Special zone, Wilderness zone, Natural zone and General zone.

3. IDENTIFICATION AND ASSESSMENT OF ISSUES AND THREATS

3.1 Issues and threats

Most of the threats to the property's natural values originate beyond its boundaries so protection of its OUV depends on appropriate conservation and management of resources throughout the lake and its catchment. The main issues are highlighted below, although measures to address them may be, in some cases, beyond the scope of the mission.

3.1.1 Oil Exploration.

The Malawi portion of the lake has been divided into three exploration blocks and the entire area (including the world heritage site) awarded to foreign companies to explore for oil and gas. The northern portion (north of Nkhotakota) was awarded to UK-based Surestream Ltd in 2011, while the southern part (including the whole of the world heritage site) was awarded to UAE-based RAKGAS in late 2013. The mission held direct discussions with high-level representatives of both companies and was presented with copies of a draft Environmental and Social Impact Assessment (ESIA) report covering 2D seismic exploration activities in Surestream's concession area. The mission also met with Malawi government's Director of Mines, representing the agency responsible for the tender and award of mineral and mining concessions in Malawi.

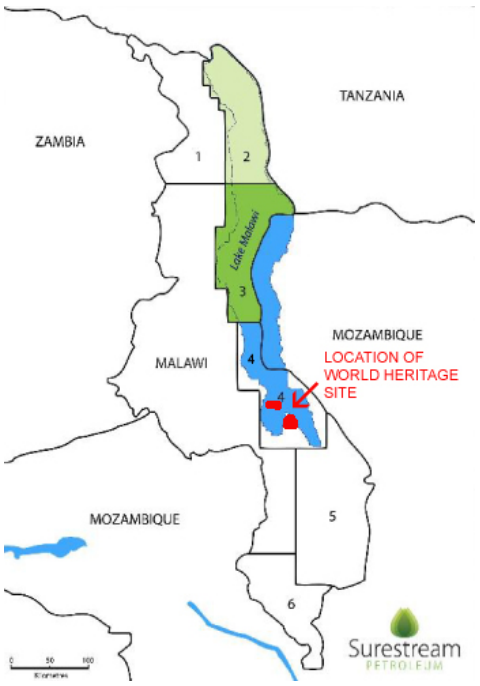


Fig 1. Location of oil and gas exploration concessions covering Lake Malawi and its surroundings (Source: Surestream Petroleum). Blocks 2 and 3 are held by Surestream Petroleum, while Block 4 is held by RAKGAS

Surestream's activities during the initial two years of their seven-year concession term have concentrated on the conduct of a detailed ESIA for the initial aerial and water-based seismic surveys. No active exploration has yet been conducted pending completion of the ESIA. Depending on the outcome of the ESIA process it is anticipated that aerial surveys could take place in 2015 and water-based seismic surveys during 2016. If the results of this initial stage of exploration are promising a new ESIA would be carried out in respect of any possible exploratory drilling in identified target areas. No such exploratory drilling would take place until 2018 at the earliest and commercial exploitation of oil in Lake Malawi – if any is found – is clearly many years off.

Whilst the closest part of the Surestream concession lies about 100km to the north of the World Heritage site, the recently-awarded RAKGAS concession covers the whole of the property and is therefore of more direct concern. RAKGAS is currently developing its company work-plans and has not yet started the ESIA process which would precede its exploration activities.
The mission was made aware of widespread concern amongst the Malawi public over the possible environmental impact of oil exploitation in the event of a significant discovery. The team was assured of Surestream's commitment to corporate environmental best practice and its belief that oil exploitation could be carried out without jeopardising the fisheries or other environmental values of the lake.

From a government perspective the team was assured (by the Director of Mines) that efforts are being made to ensure that National Parks are excluded from areas awarded for mineral exploration. This principle has not however been followed in the award of oil and gas exploration licenses. In these cases it is expected that 'no go' areas (such as National Parks) will be identified during the ESIA process and necessary restrictions will be incorporated into any subsequent agreement to proceed with exploration. Under National Parks legislation, mineral exploration can be carried out with the Director of Park's approval, but no exploitation is allowed within National Parks.

3.1.2 Inadequate size and vulnerability of the World Heritage property.

The aquatic zone of the property (which provides the basis of its Outstanding Universal Value) extends for just 100 metres from the lake shore and covers just 0.02% of the lake's total area. This makes it highly vulnerable to threats originating beyond its boundaries, including over-fishing, pollution and changes in water quality and turbidity. It also means that it is of limited value in representing the evolutionary processes for which the property is recognised. These are most conspicuously represented in the diversity of cichlid fish species, but only about half of these are found within the property. Many species (and colour varieties) are known from very limited geographical areas elsewhere in the lake where they have evolved through ecological isolation from related types. Ideally the property would encompass a more fully representative sample of the lake's cichlid fish and other endemic biota, covering a wider geographical area of the lake.

Extensive scientific research carried out over several decades (together with collecting for the aquarium trade) provides a sound basis for understanding the distribution, ecology and evolutionary biology of Lake Malawi's cichlid fishes and should now be used to guide the development of appropriate conservation measures. These should include the designation of aquatic reserves covering known 'biodiversity hotspots' throughout the lake. These might ultimately be incorporated into an extended trans-national serial World Heritage site with components covering key island and shoreline habitats across the lake. The mission was unable to explore the scope for trans-boundary co-operation in extending the property but notes that Mozambique has recently declared a reserve in its part of the lake which is known to support a distinctive and complementary biota and could potentially be incorporated into

an extended World Heritage property. Appendix X includes a number of figures and diagrams from the scientific and aquarium literature to illustrate the extent of existing knowledge of cichlid evolutionary processes, demonstrating that:

- The rock-dwelling 'mbuna' cichlids which live around the islands and shores of the lake have evolved and adapted to habitat conditions in a highly localised way, with each species (or variety) restricted to a relatively small area. An outstanding example of this is provided by *Otopharynx lithobates* (see cover photo), a species whose world-wide distribution is limited to Zimbabwe Rock, a tiny pinnacle protruding from the lake north of Domwe Island (within the property).
- Surveys of mbuna species diversity in different parts of the lake indicate a number of 'biodiversity hotspots' (such as the Likoma Island group) which might be incorporated into a more comprehensive reserve network with relative ease.

3.1.3 Over-fishing

It is widely recognised that the lake has been heavily over-fished and there has been a steep decline in fish catches over the past several decades. This affects the inshore fisheries in particular and the operations of small-scale fishermen (working from dug-out canoes within a kilometre or so of the shore). The mission was informed that fishermen operating in the waters around the enclave villages within the property had witnessed the commercial extinction of certain species (e.g. 'Ntchila' and 'Mpasa') and dramatic population declines in other species (e.g. 'Nsumgwa' and 'Mbaba' – bower-building cichlids which use seasonal breeding sites close to the enclave village beaches). Local fishermen do not (yet) recognise new regulations which prohibit fishing during the November-to-March breeding season, and it seems unlikely that such a ban could be widely implemented (due to the very large number of people dependent on fishing who have no alternative livelihoods).

The rock-dwelling 'mbuna' cichlids – which constitute a large part of the unique biodiversity for which the property is recognised – are generally too small and unpalatable to be targeted by fishermen. This gives them a degree of 'inherent protection' and contributes to their conservation. However it is important to recognise that as catches of the more favourable species decline fishing preferences are shifting towards smaller, less desirable species. Although local people in the Cape Maclear area (i.e. around the property) do not currently fish for mbuna, it was reported that they are targeted by fishermen around Mbenji Island (north of Salima, which surveys demonstrate to be a mbuna diversity hotspot, see Appendix X).

The mission was unable to determine whether there has been any significant change in mbuna cichlid diversity or population density in the 30 years since the property was inscribed, due to lack of data. There seems to be a widely-held view that mbuna populations are stable despite the decline of species targeted by fishermen. The mission was told of an early scientific monograph (Ribbink et al., date unknown probably 1980s) which records species abundance at different depths and might provide useful baseline data if survey methods can be replicated.

3.1.4 Sedimentation and pollution

Satellite imagery of the lake catchment areas reveals dramatic declines of vegetation cover and increased incidence of bare (eroded) soil since 1984, implying increased rates of surface run-off and soil erosion (Fig. 2). This is leading to increased rates of siltation, decreased water clarity and alterations in water nutrient balance.

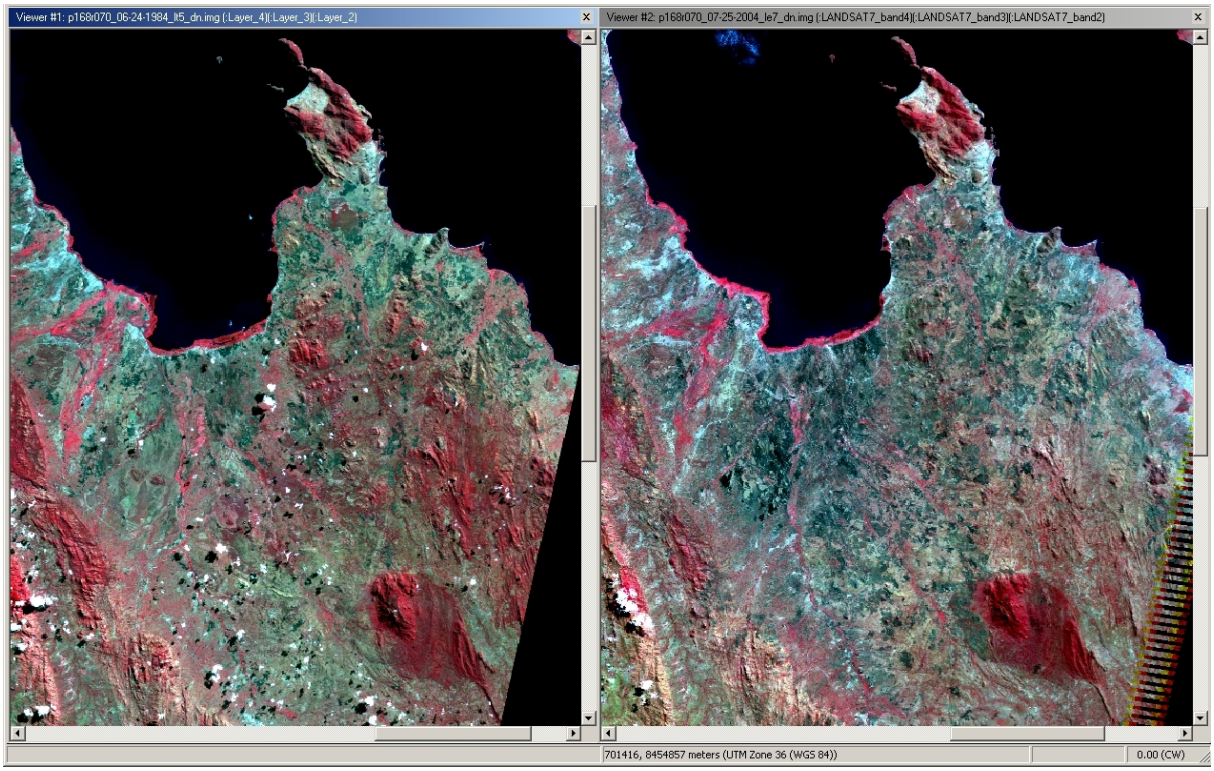


Fig. 2. Landsat imagery of the southern part of Lake Malawi and its catchment, including the World Heritage site, showing the reduction in tree cover (dark red) between 1984 (left) and 2004 (right).

The long-term ecological consequences of such changes are not fully understood, but may, for example, have an adverse effect on the rock-dwelling mbuna cichlids many of which graze algae from submerged rocks. Sedimentary deposits on these rocks and decreased penetration of light are likely to interfere with these fish feeding grounds. Significantly, the fish biodiversity surveys carried out under the GEF/SADC Lake Malawi/Nyasa/Niassa Conservation Project (1995-2000) revealed that mbuna diversity is consistently high to depths of around 20m, but habitat use at the deeper end of this spectrum could be threatened by reduced light penetration.

The mission was informed of a number of major fish-kill events (the most recent in 1999 and 2013). The 2013 fish-kill lasted about a month, affecting most species throughout the lake. It was observed to start in parts of the lake close to the inflow of major rivers and is thought to be associated with elevated hydrogen sulphide levels generated when unusually large amounts of clay are deposited by inflowing rivers (K. Kamtambe, pers.comm.). These cyclical events are not fully understood but are the subject of ongoing research in collaboration with the University of Minnesota Duluth. Several alternative explanations for these major fish-kill events have been proposed[2].

Apart from sedimentation arising from poor agricultural practices in the catchment areas the lake is potentially vulnerable to pollution from mining and industrial effluents, agrochemical run-off, domestic sewerage and waste, and eutrophication from fish-farming operations. None of these is thought to be a serious problem at present and the great depth of the lake may mean that many pollutants sink 'out of harms way' or become diluted and decomposed quickly enough to avoid damaging impacts. Within the property some domestic sewerage

[2] see, for example, http://praise.manoa.hawaii.edu/news/eh60.html and http://www.nyasatimes.com/2013/07/07/dead-fish-scare-lakeshore-residents-push-malawi-govt-for-speedy-investigations/

and waste from the enclave villages finds its way into the lake but is not thought to be a serious problem.

3.1.5 Potential introduction of alien fish species

The introduction of non-native fish, notably top predators such as the Nile Perch (*Lates niloticus*) and Tiger Fish (*Hydrocynus vittatus*), would have a major ecological impact in Lake Malawi and could potentially result in the extinction of numerous species. This is clear from experience at Lake Victoria where the introduction of Nile Perch has caused the loss of many of the lake's smaller endemic cichlids. Prior to the mission IUCN had received unconfirmed reports that Tiger fish may have been introduced in the north of the lake by foreign sport fishermen. Fortunately this seems not to be the case. One member of the mission travelled the length of the lake by road and interviewed fish market traders in the northern lakeshore town of Karonga without finding any evidence of such an introduction.

The Malawi Fisheries Department has a clear policy of ensuring that no alien fish species are introduced into the lake or any of its catchment areas. They are currently investigating reports that Nile Tilapia (*Oreochromis niloticus*) and grass carp *(Ctenopharyngodon idella)* are being farmed within the lake's catchment area in Tanzania.

3.1.6 Tourism Development

Tourism is growing steadily but remains a relatively low-key activity centred on a number of small private hotels in the Cape Maclear enclave settlement and four small 'eco-lodge' concessions within the property. A prime lodge site within the property ('Golden Sands', at the western end of the long beach at Cape Maclear) was initially developed by the Department of National Parks but now lies derelict. It has been unsuccessfully tendered for redevelopment and is at the centre of a controversial major new development proposal which would include a large 5-star hotel and residential property complex with casino, amphitheatre and entertainment facilities, golf course, etc. (details of which can be viewed at www.capemaclearresort.com). A tourism development on such a scale within the property would clearly not be appropriate.

Tourism developments to date appear to be well located and appropriate in scale and ecological impact. It is clearly important to ensure that any further developments adhere to similar standards and are subject to full ESIA procedures prior to development, including a specific assessment of impacts on the property's OUV, in conformity with IUCN's World Heritage Advice Note on Environmental Assessment. For any developments within the property the State Party should inform the World Heritage Centre prior to making any decisions that are difficult to reverse, in accordance with Paragraph 172 of the *Operational Guidelines for the Implementation of the World Heritage Convention*.

3.1.7 Aquarium trade in live fish

Although most of the world-wide demand for Lake Malawi cichlids in the aquarium trade is satisfied by captive breeding elsewhere in the world, there remains a small 'niche' market for wild-caught specimens. A handful of established dealers satisfies this demand, collecting throughout the lake and consolidating shipments from centralised fish holding facilities. The international trade in wild-caught fish seems to have declined in recent years but a significant legacy of past activity has been the translocation and release of fish into areas where they do not occur naturally. The most significant such release was carried out around Thumbi Island West, part of the World Heritage site, several decades ago. Fortunately it appears that the introduced fish have not moved far away from their point of release. Elsewhere unconfirmed reports indicate that some fish from Likoma Island and other locations that were being held in floating cages at Nkhata Bay inadvertently escaped and have since hybridised with local varieties. Thus the aquarium trade has been responsible for disrupting natural evolutionary processes in a number of localities.

3.1.8 Resource use by enclave village communities

The population of the five villages that lie within the property as 'legal enclaves' has increased from around 6,000 at the time of inscription to an estimated 25,000 today. These are essentially fishing communities but they depend on adjacent areas (within the terrestrial part of the property) for firewood, thatching grass and a range of other natural materials. As a result these resources are under increasing, unsustainable pressure. The mission made an aerial reconnaissance of all five villages and observed first hand the impact of this unsustainable resource use on the tree cover of hillsides adjacent to each village. Community leaders informed the mission that crop damage by monkeys and other human-wildlife conflict was a cause of concern and the population of elephants which used to roam the Cape Maclear peninsula a short time ago is now reduced to a single individual. Most of the larger mammals which once inhabited the terrestrial part of the property have been eliminated altogether or reduced to remnant populations.

3.2 Management capacity and effectiveness

The park has a staff of 47 deployed at its Monkey Bay headquarters and two outstations at Cape Maclear and Salima (for the Maleri Islands). Park management is organised around four departments responsible for (a) conservation management (b) research and monitoring (c) education and extension and (d) administration. There is a good park management plan developed in 2007 with UNESCO/WHC support which has never been formally approved and remains in 'draft' form. It was preceded by a series of earlier plans developed in 1980, 1993 and 2001 with support from various external partners.

Whilst the planning framework and staffing levels are good, management is severely constrained by inadequate recurrent budgets and insufficient vehicles, boats and other equipment to enable efficient deployment of staff. The park has only one serviceable vehicle, three wooden boats (all of which are in a poor state of repair) and one inflatable craft (with outboard). As a result, patrol efforts, outreach and monitoring activities are concentrated in the terrestrial parts of the park (which can be reached on foot if necessary), while the aquatic zone receives little management input. Furthermore most park staff have a 'terrestrial' background and their training and experience do not prepare them adequately for the tasks of managing an aquatic environment. The aquatic zone consequently receives much less management attention than it deserves.

A particular requirement is the ability to establish baseline data and a monitoring framework through which to evaluate change in the diversity and population density of mbuna and other elements of the aquatic biota, which is currently lacking. This would provide a basis against which to evaluate management effectiveness as well as wider environmental changes originating beyond the park boundaries.

At a national institutional level the mission observed that inter-agency co-operation and communication was not as good as it should be, and this is clearly hindering effective decision-making at national level. For example, many of the agencies present at the mission's initial government stakeholders meeting (including representatives of the World Heritage management authority) were not aware that oil exploration rights covering the World Heritage property had been awarded several months previously. There is clearly a need to improve inter-agency co-ordination and the Department of National Parks and Wildlife should pro-actively engage with the other agencies concerned with the ESIA and other aspects of the oil exploration initiative.

The mission was impressed by the resourcefulness of the present management team. With a modest level of additional finance priority actions to be taken would include boundary demarcation (including floating buoys for the aquatic zone), increased patrol effort in the aquatic zone, development of an ecological monitoring protocol with emphasis on aquatic

habitats, enhanced efforts to reduce the environmental impact of neighbouring/enclave communities on the park, and further development of low-impact tourism facilities. The Park's 2007-11 draft management plan should be reviewed, revised as necessary and formally approved for implementation.

It was with deep regret that the mission learned of the untimely death of the park's long-term chief park warden, Bryson Banda, two days after completion of the mission. Bryson's sound leadership, commitment, knowledge and understanding of issues were much in evidence during the course of the mission and will be difficult to match.

3.3 Developments in conservation since the property's inscription

As the present mission is the first of its kind to visit the property since its inscription on the World Heritage list it is worth noting a few of the key developments in its conservation over this 30-year period:

- WWF provided sustained low-level support during the early years of the park's development, contributing to the development of a residential environmental education centre at Cape Maclear, preparation of the 1993 management plan and (more recently, through WWF-Finland) community-based conservation activities in the enclave villages.
- A joint GEF-Canadian financed project (Lake Malawi/Nyasa/Niassa Conservation Project, approximately US$ 10 million under SADC) covering the entire lake was carried out from 1995-2000. Amongst other things it helped conduct faunal surveys and identify biodiversity hotspots, as well as establishing capacity for limnology and water quality monitoring. Some of the project's key outputs are reported in Appendix X.
- WWF developed a Lake Malawi/Niassa/Nyasa Ecoregion Conservation Programme document (2005), identifying priority areas for conservation throughout the lake's catchment area.
- Policy over tourism development has changed in favour of private sector involvement, and four small eco-friendly private lodge facilities have been developed under concession arrangements in strategic locations around the park (Maleri, Mumbo and Domwe Islands as well as the southwest corner of the Cape Maclear peninsula). The presence of these facilities has undoubtedly contributed to park protection.
- Training has been provided to park staff through various IUCN/UNESCO/WHC programmes including the Enhancing Our Heritage project and the Shell-sponsored Business Planning initiative.

4. ASSESSMENT OF THE STATE OF CONSERVATION OF THE PROPERTY

4.1 Maintenance of conservation values

In the absence of an established monitoring programme it has not been possible for the mission to assess objectively the extent to which the property's conservation values have been maintained since inscription 30 years ago. However, based on (somewhat anecdotal) evidence gathered by the mission there seems to be a general consensus that:

- (Criterion ix): The rock-dwelling mbuna fish communities and the evolutionary processes they exemplify appear to be well maintained within the property, largely unaffected by fishing or other threats;

- (Criterion vii): The exceptional natural beauty of the site, with its crystal clear waters, tree-covered islands and magnificent boulder-strewn shorelines and beaches remains largely intact;
- (Criterion x): There has undoubtedly been some degradation of biodiversity values in the aquatic zone through over-fishing of selected (non-mbuna) species;
- (Criterion x): The terrestrial parts of the property on the Cape Maclear peninsula (which contribute relatively little to the site's OUV) have been significantly degraded with the loss of most large mammals and reduction in tree cover on the hillsides adjacent to the 5 enclave villages;
- (Integrity / Protection and Management): A four-fold increase in the number of people living in the enclave villages has resulted in ever-increasing pressure on natural resources in adjacent parts of the park as well as increased waste and sewerage management problems;
- (Integrity): Water clarity may be decreasing, at least locally, due to increased siltation resulting from poor agricultural practise in the catchment areas. Lake-wide fish-kills have been reported. The Maleri Island group (the most north-western part of the property) has been particularly affected by increased turbidity on account of a recent change in the course of the lower reaches of the Lingadze/Lilongwe River, which now discharges directly opposite the islands.

4.2 Response to previous decisions of the World Heritage Committee

The World Heritage committee's first decisions concerning the property were taken at its 37th session in 2013 and details of the State Party's response to these are fully reported above.

5. CONCLUSIONS AND RECOMMENDATIONS

A significant oil discovery in Lake Malawi could clearly transform national economic development so the award of two major exploration licenses covering the whole of the Malawian portion of the lake is understandable from a development perspective. The mission was assured that no exploration will commence until appropriate Environmental and Social Impact Assessments have been carried out and it will be several years before initial surveys are completed, with possible test drilling and exploitation to follow. Nevertheless there is clearly widespread concern over oil exploitation anywhere within the lake, with its associated risks of pollution and the potentially devastating impact this could have on the ecology of this unique evolutionary system.

Recognising past decisions regarding oil and mineral exploration in World Heritage properties, the mission considers that it is crucial to ensure that RAKGAS refrains from exercising any exploration rights over the property and that the two companies that have been awarded concessions in Lake Malawi subscribe to the commitment already made by industry leaders Shell and Total not to explore and/or exploit oil or gas in World Heritage properties.

With regard to the small size of the property (which currently covers just 0.02% of the lake's surface area) and its vulnerability to external pressures and threats, the mission considers that (1) there is a need to establish a wide buffer zone around the property to protect it from major threats such as oil exploitation and (2) there is clearly scope for extension of the property to include a more fully representative sample of the lake's unique species, biodiversity and evolutionary processes. This might involve the States Parties of Malawi, Mozambique and Tanzania (which share the lake's shoreline) and build on existing scientific

knowledge of species distributions and ecology. A considerable body of work has already been carried out to identify important localities for fish biodiversity throughout the lake, and this should be used to underpin decisions on the design of an extended trans-boundary serial property. International conservation non-governmental organisations and scientific experts could play an important role in facilitating necessary further research and dialogue towards this objective.

Management of the property needs to be strengthened and additional resources allocated to ensure that threats are contained. Some of the pressing management issues that require attention to safeguard the property's OUV, include the need for measures to curb illegal fishing within the property, strengthen work with local communities, better regulate tourism and develop an efficient monitoring programme which includes the fish, water quality and other aspects of the aquatic ecology. The management plan for 2007-2011 needs to be revised and approved for implementation.

Recommendations

In respect of oil exploration the mission's recommendations are to:

- Complete the ESIA process for the initial exploration phase of the two oil concessions, including a specific assessment of impacts on the OUV of the property in conformity with IUCN's World Heritage Advice Note on Environmental Assessment
- Adjust the oil exploration permit awarded to RAKGAS, to ensure that the property is fully excluded from the permit, in line with the World Heritage Committee's established position that oil and gas exploration and exploitation are incompatible with World Heritage status;
- Enhance stakeholder involvement and transparency in all aspects of the oil development programme, and improve inter-ministerial and inter-departmental consultation and communication;
- Surestream and RAKGAS, as holders of oil exploration concessions in parts of Lake Malawi are encouraged to publicly subscribe to the commitment already made by industry leaders Shell and Total not to undertake any exploration and/or exploitation of oil and gas inside World Heritage properties;

With regard to strengthening the level of protection and management of the property the mission recommends that the management authority should:

- Demarcate the boundaries of the property, especially the outer limits of the aquatic zone (with floating buoys), and the terrestrial boundaries of the five village enclaves;
- Define a wide buffer zone (e.g. 50km) around the property within which oil exploitation would not be permitted;
- Increase the deployment of patrol boats, other equipment and personnel to ensure enforcement of fishing restrictions and other measures aimed at protecting the OUV of the property;
- Design and implement an effective monitoring protocol to provide a basis for assessing changes in fish diversity and populations, other fauna, water quality and management parameters that could be used in adapting management interventions for better protection of the property's OUV;
- Work closely with communities in the village enclaves and around the periphery of the property to develop suitable programmes for the sustainable use of resources such as firewood, thatching grass, etc., from designated zones within the terrestrial parts of the property;
- Noting that the scope and scale of the Cape Maclear Resort proposed tourism development is clearly inappropriate within a World Heritage property, the mission

recommends the State Party to promote low-impact eco-tourism ventures that comply with appropriate environmental and social impact standards, and continue to monitor and regulate their operation;
- Ensure that all lodge developments and other tourism infrastructure within the property are subject to rigorous ESIA processes and that draft ESIA reports are submitted to the World Heritage Centre and IUCN for review prior to approval, in accordance with Paragraph 172 of the *Operational Guidelines*;
- Revise the 2007-2011 draft management plan and ensure that it is formally approved for implementation.
- Ensure that management is financed and supported at a level commensurate with the area's global significance, mobilising support from the international community as necessary.

In respect of threats originating outside the property the mission recognises the need for major improvements in resource management throughout the lake and its catchment areas. This will require a high level of trans-boundary co-operation and co-ordination. Although the necessary actions are largely beyond the scope of the mission, the mission recommends that the State Party should:

- Maintain the utmost vigilance in ensuring that non-native species of fish (especially top-level predators such as the Nile Perch and Tiger Fish) are not introduced into the lake or its catchment areas;
- Improve agricultural practices in the headwaters of the catchment rivers so as to minimise soil erosion and sedimentation;
- Prevent pollution of the lake and its inflowing rivers through effective regulation and control of mining effluents, other industrial and domestic pollution and agrochemicals;
- Monitor, regulate and restore the lake fisheries for maximum sustainable yield, enforcing such restrictions as may be necessary to achieve this objective;
- Develop a lake-wide system for the routine monitoring of selected indicators of the 'ecological health' of the waters and biota inhabiting the lake. Many elements of such a monitoring programme were piloted during the GEF/SADC Lake Malawi/Nyasa/Niassa Conservation Project (1995-2000).

The mission further recommends that the States Parties of Malawi, Mozambique and Tanzania should investigate the feasibility of increasing protection for additional areas of the shoreline and islands that have been identified as important localities for the protection of endemic fish and evolutionary processes throughout the lake. Where possible, these areas might be designated as reserves or community-run 'special use zones' and might ultimately be incorporated into an extended trans-national serial property. The mission considers that the initial stages of such a collaborative programme might be facilitated by an international conservation non-governmental organisation or through an internationally-recognised mechanism (as per the SADC/GEF project of 1995-2000).

6. ANNEXES

Annex 1. Terms of reference for the mission

Joint World Heritage Centre / IUCN Reactive Monitoring Mission

Lake Malawi National Park, Malawi

31.3. - 4.4. 2014

At its 37th session, the World Heritage Committee requested the State Party of Malawi to invite a joint World Heritage Centre / IUCN reactive monitoring mission to Lake Malawi National Park World Heritage Site (Decision **37 COM 7B.5**). The objective of the monitoring mission is to review the state of conservation of the property, in particular the potential impacts of oil exploration on the Outstanding Universal Value (OUV) of Lake Malawi, other potential threats and concerns related to the integrity of the property. The mission team will be composed of Marc Patry of the UNESCO World Heritage Centre and Peter Howard, representing IUCN.

In particular, the mission should address the following key issues:

1. Review the potential impacts of oil exploration on the OUV of the property, based on the available documentation;

2. Review issues of the property's integrity, particularly concerns raised about the inadequate size of the property and its individual components and the small proportion of aquatic habitats it covers, and provide advice to the State Party to address these issues;

3. In line with paragraph 173 of the *Operational Guidelines*, assess any other relevant conservation issues that may negatively impact on the Outstanding Universal Value of the property, including the conditions of integrity and protection and management.

The State Party should facilitate necessary field visits to key locations. In order to enable preparation for the mission, it would be appreciated if the following items could be provided to the World Heritage Centre (copied to IUCN) as soon as possible and preferably no later than 1 month prior to the mission:

a) Full details of the proposed oil exploration activities, including a map of the concession area and details of the activities, operations and environmental safeguards envisaged;

b) Copies of the Environmental and Social Impact Assessment of the proposed oil exploration activities;

c) Any available data about the most significant localities for endemic fish species, other biodiversity and evolutionary processes throughout Lake Malawi;

The mission should also hold consultations with the Malawian authorities at national, regional and district levels, including representatives of the Lake Malawi National Park management authorities, the Ministry of Tourism, Wildlife and Culture (the Department of National Parks and Wildlife), the Ministry of Energy and Mines, the Environmental Affairs Department /Department of Environmental Affairs (in charge of Environmental Impact assessments), the Regional Government of the Southern Region, and the District Governments of Mangochi and Salima districts. In addition, the mission should hold consultation with a range of relevant stakeholders, including i) researchers; ii) NGOs; iii) representatives of local communities; iv) representatives of the oil company(ies) involved in (proposed) exploration activities on the lake; and v) representatives of the embassies of Mozambique and Tanzania in Lilongwe, to facilitate a discussion on the Committee's recommendation to consider a possible transboundary extension of the property.

Based on the results of the above-mentioned assessments and discussions with the State Party representatives and stakeholders, the mission will develop recommendations to the Government of Malawi and the World Heritage Committee to conserve the Outstanding Universal Value of the property and improve its conservation and management. It should be noted that recommendations will be provided within the mission report (see below), and not during the mission implementation.

The mission will prepare a concise report on the findings and recommendations within 6 weeks following the site visit, following World Heritage Centre reactive monitoring mission report format.

Annex 2. Mission itinerary and programme

Sunday 30th March	**Arrival of Mission**
1800-1845	Meeting with Dr Elizabeth Gomani (Director of Culture)
Monday 31st March	**Meetings in Lilongwe**
0945-1200	Government Stake-holder meeting at Dept National Parks HQ
1430-1530	Meeting with NGO and Private Sector (Oil Industry) Stake-holders
1600-1700	Meeting with Director of Mines
Tuesday 1st April	**Aerial Reconnaissance and Meetings in Monkey Bay**
1130-1300	Aerial reconnaissance of LMNP
1530-1800	Meeting with senior park staff at LMNP HQ (Monkey Bay)
Wednesday 2nd April	**Tour of Site and meetings with local stakeholders**
0800-0830	Meeting with Lodge Owner, Cape Mac Lodge
1030-1100	Meeting with Fishing Community representatives
1130-1200	Meeting with Chembe village leadership
1300-1500	Lunch and Meeting with Manager, Pumulani Lodge
1600-1800	Visit Golden Sands Resort, Otter Point (swim and snorkel), Education Centre
Thursday 3rd April	**Monkey Bay and return to Lilongwe by road**
1030-1140	Meeting at Fisheries Research Institute (Monkey Bay)
1200-1530	Travel by road to Lilongwe
1615-1700	Meeting with Hon Minister and Principal Secretary, Ministry of Tourism, Wildlife and Culture
Friday 4th April	**Meetings in Lilongwe**
0830-0915	Meeting with Director of Parks
0930-1000	Meeting with Country Director, RAKGAS
1000-1200	Wrap-up meeting with stakeholders

Annex 3. Composition of the mission team

Mr Marc Patry, Programme Specialist, UNESCO Regional Office for Eastern Africa, P.O. Box 30592 00100, NAIROBI, Kenya
Email: ma.patry@unesco.org

Dr Peter Howard, IUCN consultant, P.O. Box 24994, Karen 00502, NAIROBI, Kenya
Email: phoward@AfricanNaturalHeritage.org

Annex 4. List and contact details of people met

Table 4.1 Consultations with government officials in Lilongwe, 31/03/2014 and 03/04/2014 and 04/04/2014

Name	Organization	Post	Telephone	Email Address
Hon Moses Kunkuyu Kalongashawa	Ministry of Tourism, W & C	Hon Minister		
Ms Elsie Tembo	Ministry of Tourism, W & C	Principal Secretary		
Brighton Kumchedwa	Department of National Parks and Wildlife	Director		
Alfred Topeka	Department of Culture	Archeologist	888350319	topekazakeyo@yahoo.com
Christopher Magomelo	UNESCO Commission	Assistant Executive Secretary	995675713	cjmagomelo.mnacomunesco@mtlonline.mw
Chrissy Chiumia	Culture	Deputy Director	888344238	cchiumia@gmail.com
A.E.Bulirani	Fisheries Department	Director	991572682	bulirani@gmail.com
William Mgoola	Department of National Parks & Wildlife	Assistant Director	888353993	wmgoola@yahoo.co.uk
Jester Nyirenda	Department of National Parks & Wildlife	Assistant Director	884997605	jkaunganyirenda@gmail.com
Humphrey Mdyetseni	Ministry of tourism & Culture	Deputy Director	999483485	hajmdyetseni@yahoo.com
E. Gomani Chendebvu	Ministry of tourism & Culture	Director of Culture	888899209	egomanichindebvu@yahoo.com
Juwo Sibale	Environmental Affairs Department	Principal Environmental officer	999272192	juwosibale@yahoo.co.uk
Joseph Kalowekamo	Department of Energy	Deputy Director	999483260	jkalowek@gmail.com
K.A. C. Mbwana	Ministry of tourism & Culture	Director	999551100	kensonmbwana@yahoo.com
P. Chadza	Ministry of tourism & Culture	Chief Accountant	881081937	chadzapete@yahoo.com

Table 4.2 NGO & Oil Companies (Lilongwe) 31/03/2014

Name	Organization	Post	Telephone	Email Address
Keith Robinson	Surestream	Managing Director	994250364	krobinson@surestream-petroleum.com
Elesani C. Zakochera	Wildlife & Environmental Society of Malawi	Senior Environmental officer	99464668	zakochera@gmail.com
Chimwemwe Chikusa	RAK GAS	Manager	888844448	cchikusa@gmail.com

Table 4.3 Consultations with Park Staff at LM Park HQ (Monkey Bay) 01/04/2014

Name	Organization	Post	Telephone	Email Address
Bryson Banda	Lake Malawi National Park	Senior Parks & Wildlife Officer		
Aggrey Dzimbiri	Lake Malawi National Park	Senior Parks & Wildlife Officer Education & Extension)	999260157	
Patrick Chinguwo	Lake Malawi National Park	Senior Assistant Parks & Wildlife Officer (Research & Monitoring)	999457186	pchinguwo@gmail.com

Mc Phillip Mwithokona	Lake Malawi National Park	Parks & Wildlife Officer (Education & Extension)	881055430	phillipmwitho@gmail.com
Dyce Kamwana	Lake Malawi National Park	Parks & wildlife Officer (Conservation Services)	995455560	kamwanadyce@gmail.com
Alfred Topeka	Department of Culture	Archeologist		topekazakeyo@yahoo.com
Christopher Magomelo	UNESCO Commission	Assistant Executive Secretary	995675713	cjmagomelo.mnacomunesco@mtlonline.mw

Table 4.4 Fishing Community (Chembe Village, Cape Maclear) 02/04/2014

Name	Organization	Post	Telephone	Email Address
Hesten Jali	Chembe Beach Village Committee	Chairman	995428901	
Tokyo Jali	Chembe Beach Village Committee	Member		
Esau Msisha	Chembe Beach Village committee	Member		
Hastings Kawerenga	Lake Malawi National Park	Assistant Parks & wildlife Officer	881425975	kawerenga@gmail.com

Table 4.5 Traditional Community Leaders (Chembe Village, Cape Maclear) 02/04/2014

Name	Organization	Post	Telephone	Email Address
Group Village Head Chembe	Chembe Village (one of the 5 enclaved villages)			

Table 4.6 Lodge owners (Cape Maclear) 02/04/2014

Name	Organization	Post	Telephone	Email Address
Natalie Leclercq	Cape Mac Lodge	Owner-Manager	999621279	rogerl@africa-online.net
Rob Walsh	Pumulani Lodge (Robin Pope Safaris)	Manager		

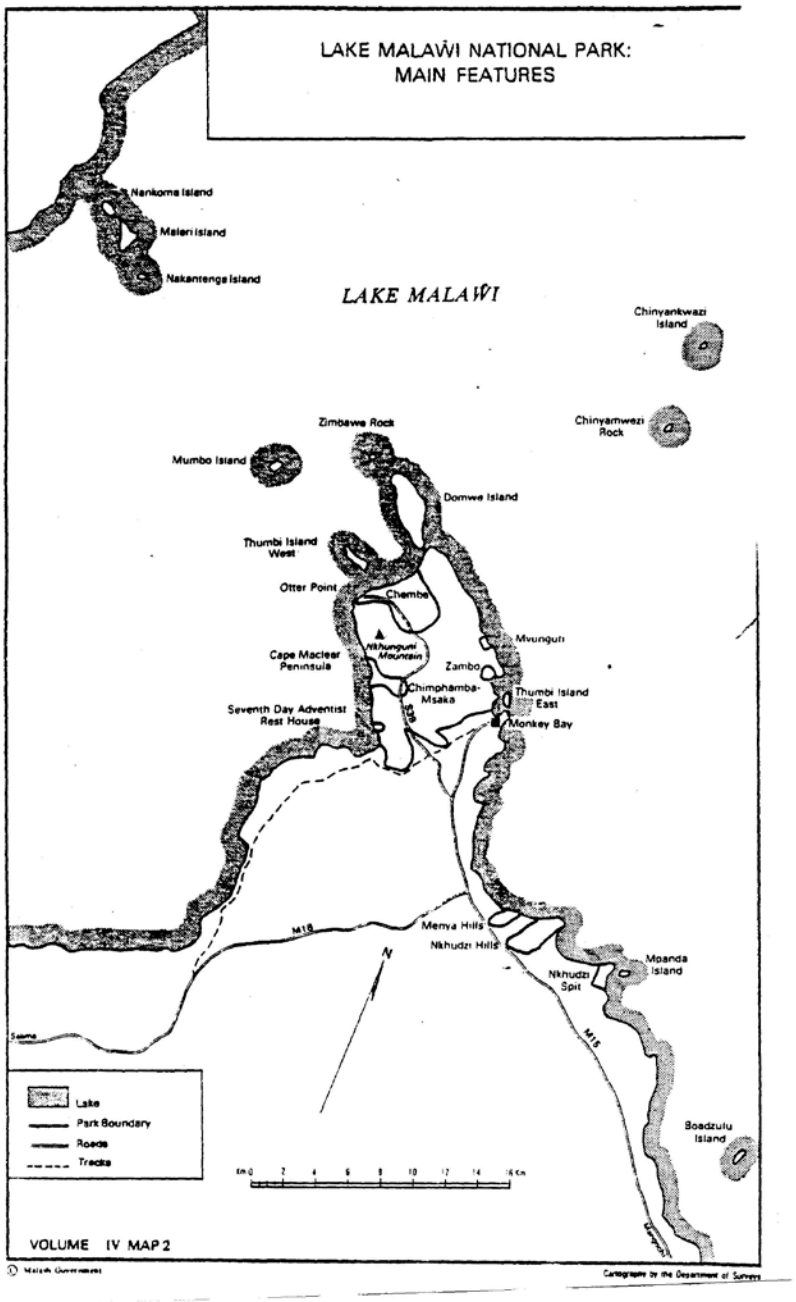
Table 4.7 Fisheries Research Unit (Monkey Bay)

Name	Organization	Post	Telephone	Email Address
Kingsley Kamtambe	Fisheries Research Unit (Monkey Bay)	Research officer	999415835	kingskamtambe@gmail.com
Christopher Magomero	Malawi National Commission Unesco	Assistant Executive Secretary	995675713	cjmagomelo.mnatcomunesco@mtlonline.com
Alfred Topeka	Culture	Archeologist	888350319	topekazakeyo@yahoo.com
Mary Chilimampunga	Department of National Parks & Wildlife	Senior Parks & Wildlife officer	999246996	mchilimampunga40@gmail.com
Bryson Banda	Department of National parks & Wildlife (Lake Malawi National Park)	Senior Parks & Wildlife Officer		

Table 4.8 Wrap up Meeting (Debriefing, Lilongwe) 04/04/2014

Name	Organization	Post	Telephone	Email Address
Alice Magombo	Tourism	Assistant Director	992966638	alice.magombo@gmail.com
Christopher Magomero	Malawi National Commission Unesco	Assistant Executive Secretary	995675713	cjmagomelo.mnatcomunesco@mtlonline.com
Aaron Khombe	Culture	Historian	888566022	akhombe@gmail.com
Alfred Topeka	Culture	Archeologist	888350319	topekazakeyo@yahoo.com
Dr. F. J. Njaya	Fisheries	Assistant Director	888516208	fnjaya@gmail.com
Mphatso Chikoti	Mines Department	Mining Engineer	999629581	mphatsosamul@gmail.com
David Liabunya	Mines Department	Principal Mining Engineer	999957601	tutubunya@yahoo.com
Dr. Aloysius Kamperewera	Environmental Affairs Department	Director	888869446	kamphatso1@gmail.com
Elesani C. Zakochera	Wildlife & Environmental Society of Malawi	Senior Environmental Education Officer	99464668	zakochera@gmail.com
William Mgoola	Department of National Parks & Wildlife	Assistant Director	888353993	wmgoola@yahoo.co.uk
Mary Chilimampunga	Department of National Parks & Wildlife	Senior Parks & Wildlife officer	999246996	mchilimampunga40@gmail.com

Annex 5. Map and list of components of the property



The boundary description is contained in Government Notice No. 205 of 1980. In most cases, the various components of the National Park correspond to pre-existing Forest Reserves, which had been gazetted as such from about 1935 to about 1960. The exceptions to this are the following areas of customary land which were included in the National park:

- Nkhudzi Spit;

- Mpanda Island;
- Boadzulu Island;
- Zimbawe Rock;
- Chinyamwezi and Chinyankhwazi reefs.

Components of Lake Malawi National Park

COMPONENT	AREA (Ha)	DISTRICT	TRADITIONAL AUTHORITY	VILLAGE HEADMAN
Cape Maclear Peninsula	6,868	Mangochi	Nankumba	Chembe, Chimphamba, Kasankha, Nsumbi,
Mwenya Hill	101	Mangochi	Nankumba	Namakoma
Nkhudzi Hill	484	Mangochi	Nankumba	Mwanyama
Nkhudzi Spit	104	Mangochi	Nankumba	Unknown
Otter Island	7	Mangochi	Nankumba	Chembe
Domwe Island	580	Mangochi	Nankumba	Chembe
Thumbi Island, West	133	Mangochi	Nankumba	Chembe
Mumbo Island	75	Mangochi	Nankumba	Chembe
Zimbawe Island	3	Mangochi	Nankumba	Chembe
Thumbi Island, East	30	Mangochi	Nankumba	Nsumbi
Mpanda Island	10	Mangochi	Nankumba	Unknown
Boadzulu Island	48	Mangochi	Mponda	Makawa
Chinyankhwazi Rock	15	Mangochi	Makanjila	Unknown
Chinyamwezi Rock	1	Mangochi	Makanjila	Unknown
Nankoma Island	65	Salima	Maganga	Unknown
Maleri Island	168	Salima	Maganga	Unknown
Nakantenga Island	18	Salima	Maganga	Unknown
Total Land Area	**8,710**			
Total Aquatic Zone	**700**			
TOTAL AREA	**9,410**			

Annex 6. Samples of published work illustrating the extent of existing knowledge of cichlid fish diversity and distribution.

Note that such information can be used to develop a more representative network of aquatic reserves throughout the lake.

Fig. 6.1. *Evolutionary processes in action: distribution of 12 distinct colour varieties of the cichlid fish, Aulonocara stuartgranti around the shores of the lake. Note that only one of these varieties ('Mundola Point') occurs in the world heritage site.*
(From: Konings, A, (2001). Malawi cichlids in their natural habitats. El Paso: Cichlid Press

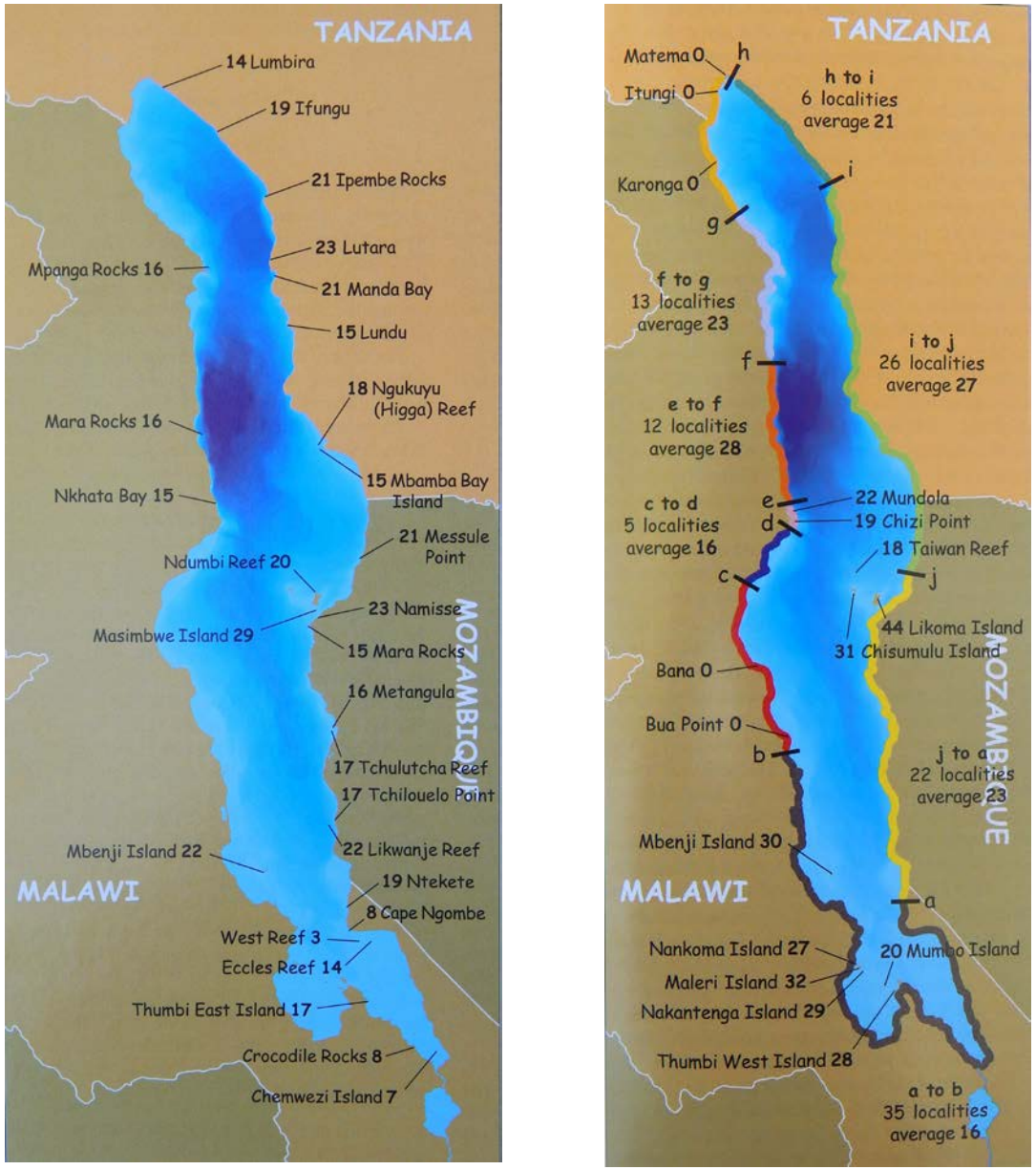


Fig 6.2. Relative diversity of 'mbuna' cichlid fishes at locations around the lake as determined by surveys carried out and data compiled under the SADC/GEF Lake Malawi/Nyasa/Niassa Conservation Project (1995-2000).

(left): The number of mbuna species collected at different localities around the lake through systematic sampling carried out under the GEF/SADC project. (see p. 326 in: Snoeks et al, 2004)

(right): Average species numbers for different areas around the lake shore and islands (data compiled from Konings, 1996) (see p. 327 in: Snoeks et al. 2004)

From: Snoeks, J. (ed) (2004). The cichlid diversity of Lake Malawi/Nyasa/Niassa: identification, distribution and taxonomy. El Paso: Cichlid Press (www.cichlidpress.com)

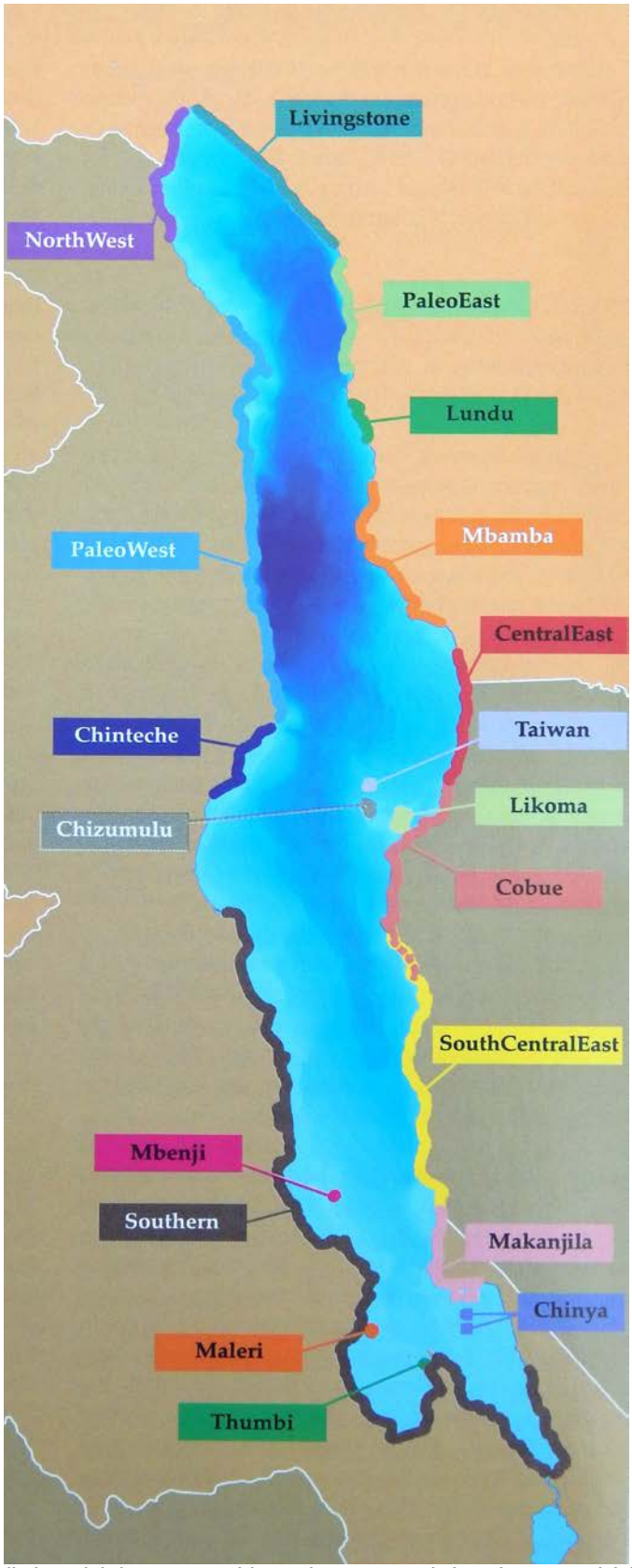


Fig 6.3. *Definition of distinct 'ichthyogeographic regions' around the shores and islands of the lake, based on distribution and diversity of mbuna cichlid fish (see pp. 332-353 in Snoeks, 2004 for detailed discussion).*
From: *Snoeks, J. (ed) (2004). The cichlid diversity of Lake Malawi/Nyasa/Niassa: identification, distribution and taxonomy. El Paso: Cichlid Press (www.cichlidpress.com)*

Annex 7. Photographic record of an overflight of the property undertaken during the mission and other photos of the property.

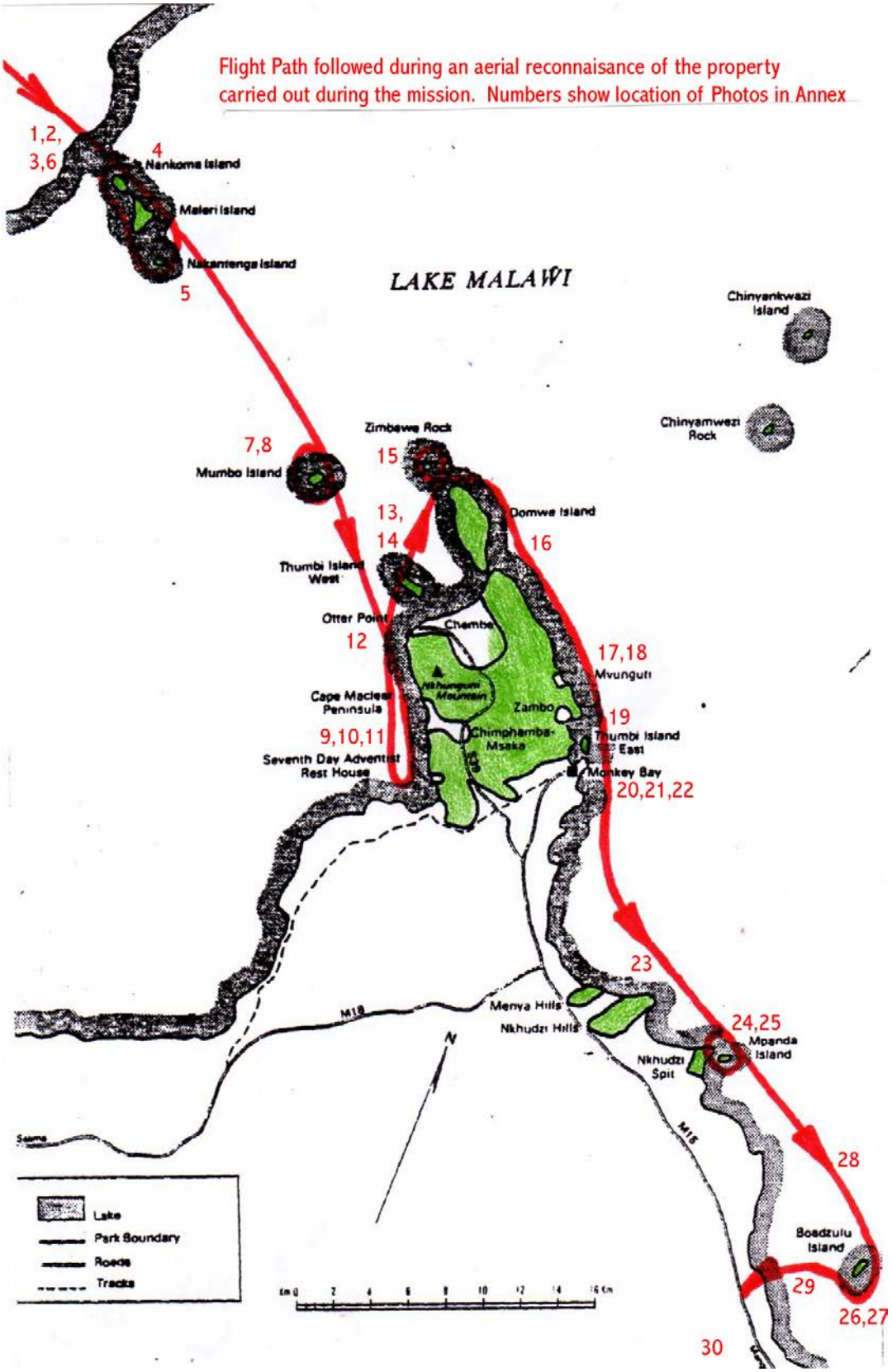


Photo 1 and 2. Distant view of the property, showing the point of discharge for the heavily-silted Lingadze/Lilongwe River (opposite the Maleri Isalnds)

Photo 3. The Maleri island group (from the northwest).

Photo 4. Nankoma Island, showing the tourist lodge and extent of deforestation

Photo 5. Nakantenga Island with fishing boats offshore (beyond the boundary)

Photo 6. Discharge of silt into the lake from the Lingadze/Lilongwe River (opposite the Maleri Islands)

Photo 7. Mumbo Island lodge location.

Photo 8. Mumbo Island showing the intact tree cover.

Photo 9. Village enclave 1 (Adventist Rest House)

Photo 10. Village enclave 2 (Chimphamba-Msaka) showing deforestation of adjacent hillsides within the property

Photo 11. Western side of the Cape Maclear Peninsula (mostly deforested).

Photo 12. Northern shore of the Cape Maclear Peninsula, showing Otter Point and Island (foreground), and the long beach of enclave 3 (Chembe village)

Photo 13. Thumbi Island West (well-forested).

Photo 14. Thumbi Island West and the Chembe village enclave (behind)

Photo 15. Zimbabwe Rock (off Domwe Island), a tiny outcrop and the only known locality for the endemic cichlid fish *Otopharyx lithobates* (cover photo)

Photo 16. Densely-wooded southern end of Domwe Island (right) contrasting with heavily deforested slopes of the Cape Maclear Peninsula (left)

Photo 17. Village enclave 4 (Mvunguti)

Photo 18. Village enclave 4 (Mvunguti) showing deforestation of hillsides

Photo 19. Village enclave 5 (Zambo) with deforested hills.

Photo 20. South-eastern side of the Cape Maclear Peninsula, showing the extent of deforestation within the mainland part of the property

Photo 21. Thumbi Island East with Monkey Bay (location of the park HQ) and the southern boundary of the mainland portion of the park (behind).

Photo 22. Southern end of the Cape Maclear Peninsula showing the (partially) forested hills of the property (right) and mostly deforested land outside (left).

Photo 23. Nkhudzi Hills is a separate mainland component of the property.

Photo 24. Nkudzi Spit is another separate mainland component of the property.

Photo 25. Mpanda Island

Photo 26. Boadzulu ('Bird') Island from the north-east

Photo 27. Boadzulu Island showing two illegal fishing boats close to shore (right)

Photo 28. A fishing trawler in deep water in the southern part of the lake

Photo 29. Beach seine nets in use at a village opposite Boadzulu Island. Such fishing practices have led to dramatic declines of 'bower-building' cichlid species that depend on shallow sandy beaches for breeding.

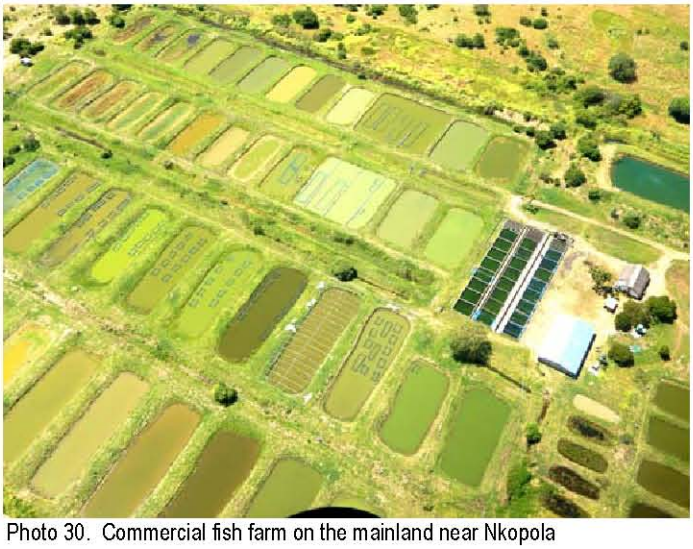


Photo 30. Commercial fish farm on the mainland near Nkopola

Photo 31. The derelict lodge at Golden Sands Resort, Cape Maclear

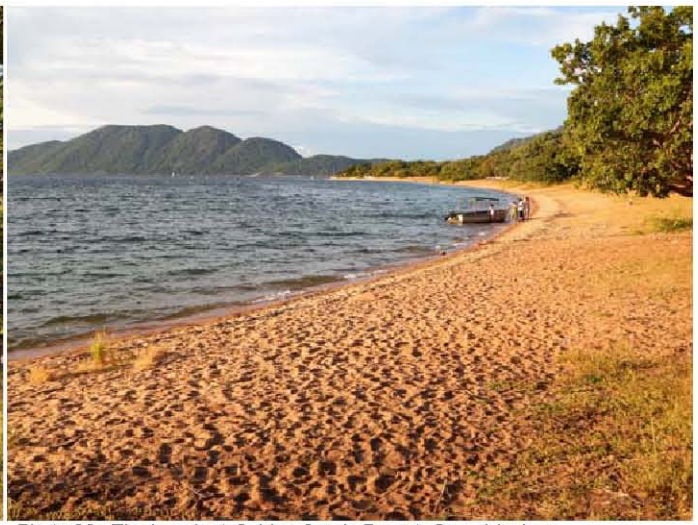


Photo 32. The beach at Golden Sands Resort, Cape Maclear

Photo 33. View across the bay to Thumbi and Domwe Islands

Photo 34. Otter Point, Lake Malawi National Park

Photo 35. Otter Point, Lake Malawi National Park

Photo 36. Swimming pool at Pumulani Lodge, one of several small eco-lodge facilities operating within the property

Photo 37. Sign-board at Otter Point

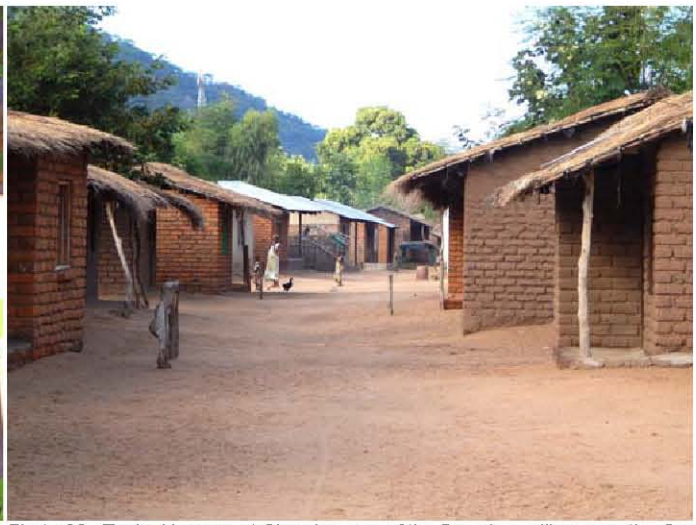


Photo 38. Typical houses at Chembe, one of the 5 enclave villages on the Cape Maclear Peninsula within the property

Photo 39. Heavily silted river near its point of discharge into Lake Malawi.

Photo 40. Turtle shells collected illegally from Lake Malawi and confiscated from an illegal Chinese trader

Photos 41 and 42. Fish smoking (left) and brick making (right) at Chembe enclave village. Such activities are responsible for much of the deforestation of hillsides within the property.

Photo 43. Thatching grass is harvested from the property by villagers nearby

Photo 44. Dugout canoes loaded with nets and lines for a fishing expedition.

Photos 45 and 46. Traditional fishing gear, Lake Malawi

Photo 47. Pressure lamps mounted on dugout canoes are used for night-time fishing of 'Usipa', a small sardine representing 30% of Lake Malawi's fisheries

Photo 48. Crowded beach at Chembe, the largest of the 5 enclave villages on the Cape Maclear Peninsula

Photo 49. Fish drying racks at Chembe village

Photo 50. Small 'chambo' (a favourite food fish) being sun-dried