

**BALANCING THE OPPORTUNITY COSTS
OF WILDLIFE CONSERVATION FOR
COMMUNITIES AROUND LAKE MBURO
NATIONAL PARK, UGANDA**

Lucy Emerton

September 1999

ACKNOWLEDGEMENTS

These materials were collected jointly with Tony Potterton and Patrick Rubagyema of Penroche Development Services Kenya and are largely based on fieldwork carried out during February and March 1998. Fieldwork benefited greatly from the comments and practical support of Mark Infield of the Community Conservation for Uganda Wildlife Authority Project and from data provided by the Uganda Wildlife Authority, LMNP authorities and village residents and administrators of the LMNP-adjacent area.

This report was produced as a collaborative effort between the Evaluating Eden project (IIED) and the Community Conservation Research Project (Universities of Manchester, Zimbabwe and Cambridge, and the African Wildlife Foundation). The latter's work was funded by the Economic and Social Research Council in the UK (Global Environmental Change Grant No.L320253211).

The opinions expressed in these paper are those of the author and not of any of the above organisations.

CONTENTS

	Page No
1. INTRODUCTION	1
2. HISTORY OF LAND USE AND RESERVATION IN THE LAKE MBURO AREA	1
2.1 1950s: establishment of a Controlled Hunting Area	1
2.2 1960s and 1970s: establishment of a Game Reserve	2
2.3 1980s: establishment of a National Park	2
2.4 1990s: community wildlife conservation in Lake Mbuoro National Park	2
3. POPULATION AND LIVELIHOODS AROUND LAKE MBURO NATIONAL PARK	4
3.1 The human population.....	4
3.2 Land use and agricultural livelihoods	7
3.3 Off-farm activities	8
4. THE ON-SITE ECONOMIC BENEFITS OF LAKE MBURO NATIONAL PARK	10
4.1 Park authorities' income.....	11
4.2 Household resource utilisation.....	12
4.3 Local participation in commercial hunting and fishing activities	13
4.4 Community development activities.....	14
5. THE ON-SITE ECONOMIC COSTS OF LAKE MBURO NATIONAL PARK	16
5.1 Expenditures on park management	17
5.2 Wild animal damage to agriculture	18
5.3 Loss of productive agricultural and grazing land.....	18
5.4 Restrictions on plant and animal resource utilisation.....	20
6. ANALYSIS OF THE COSTS AND BENEFITS OF CONSERVING LAKE MBURO NATIONAL PARK	21
6.1 Economic sustainability issues for local communities.....	21
6.2 Financial sustainability issues in park management	22
6.3 Identifying the financing gaps in conservation	23
6.4 Ways forward for closing financing gap and balancing the costs and benefits of conservation	24
7. CONCLUSIONS: BALANCING THE COSTS AND BENEFITS OF CONSERVING LAKE MBURO NATIONAL PARK	26
8. REFERENCES	27

1. INTRODUCTION

This paper addresses the financial and economic impacts of a community-based approach to wildlife conservation in Lake Mburo National Park (LMNP), Uganda. It seeks to investigate how a National Park such as Lake Mburo which generates few revenues and is subject to extensive pressures from surrounding human populations can be seen as a financially and economically sustainable land use. The main focus of the paper is the economic competition between protected areas and agricultural land uses, the opportunity costs of wildlife conservation to rural communities and the attempts made as part of the community conservation programme by Park managing authorities to offset local wildlife costs. In conclusion, the paper questions whether conserving wildlife in LMNP can be sustainable in the future – in economic terms for surrounding communities, and in financial terms for the Government of Uganda.

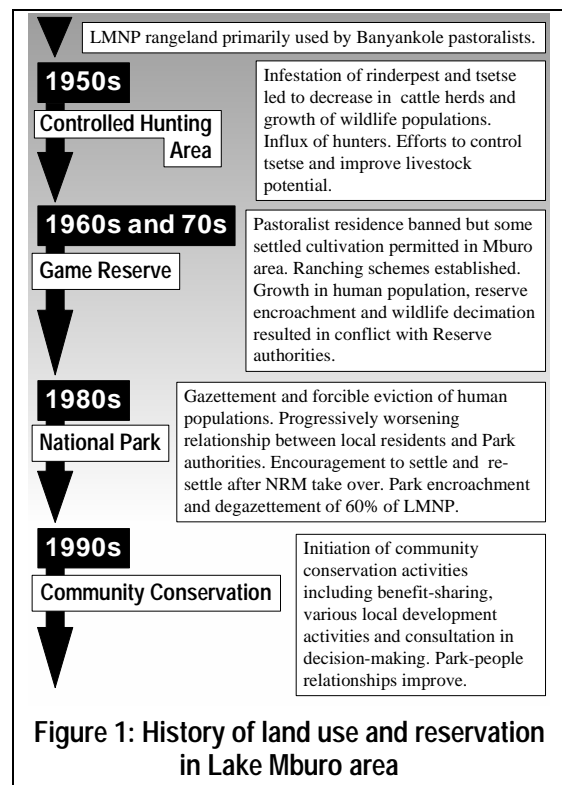
2. HISTORY OF LAND USE AND RESERVATION IN THE LAKE MBURO AREA

The complex historical and ecological context to Lake Mburo National Park are covered in detail elsewhere and will not be repeated here (see for example Kamugisha *et al* 1997; Marquardt *et al* 1994; Hulme 1997). This paper is primarily concerned with local economy and land use in LMNP and its surrounding area, and will therefore only present a brief overview of these aspects of the background to LMNP.

2.1 1950s: establishment of a Controlled Hunting Area

Historically the area which is now LMNP formed part of a corridor of rangeland which was used by Banyankole *Bahima*, who depended on transhumant pastoralism for their livelihoods. Pastoralist livestock herds were decimated by rinderpest epidemics at the turn of the century. Decreased grazing pressure and subsequent bush regeneration resulted in the spread of the tsetse fly, which limited pastoral activity and simultaneously provided the conditions for wildlife populations to grow. Over this period wildlife attracted *Bakooki* hunters from Buganda, as a result of which several game posts were established in the area.

In order to stem the spread of tsetse and improve the area's potential for livestock



production chemical spraying and mechanical clearance of wide strips of bush was undertaken in the 1950s. Much of this reclaimed land was earmarked for livestock production under large-scale ranches. In agreement with the Ankole Royal Establishment an area around Lake Mburo was designated a Controlled Hunting Area in the 1930s, and underwent legal gazettment in 1958.

2.2 1960s and 1970s: establishment of a Game Reserve

In 1964 the establishment of a Game Reserve around Lake Mburo area provided for the continued settlement, on existing farms, of 120 cultivating families on the northern side of the reserve. No pastoralists were permitted permanent residence within the Game Reserve but were allowed inside the reserve for transit purposes and to water their livestock during dry seasons. By the 1970s much of the tsetse in the area had been eradicated, 647 km² of the Game Reserve had been excised and established as the Ankole Ranching Scheme, and the government Nshaara dairy ranch was created from Reserve land.

From Independence, and especially under the Amin regime, Lake Mburo Reserve was encroached at the same time as the number of licensed residents increased. During the latter part of the 1970s conflict between Reserve authorities and local populations escalated, and concern grew for the conservation of wildlife in the area. Widescale drought, civil unrest and resulting displacement of human populations in the late 1970s and early 1980s exacerbated pressure on the natural resources of Lake Mburo.

2.3 1980s: establishment of a National Park

In 1982 Lake Mburo National Park was created, resulting in 1983 in the forcible eviction without compensation of up to 4,500 families. The human population around Lake Mburo area grew rapidly during the 1980s, and demand for crop and grazing land increased accordingly. A number of illegal encroachments were made by both pastoralists and cultivators into the Game Reserve, prompting unpleasant and violent evictions. Relations between the Park authorities and local communities worsened.

In 1986, under the new National Resistance Movement government in Uganda, people were encouraged to re-occupy land that they had migrated or been evicted from. Former residents of the LMNP area returned to settle, also accompanied by newcomers. Park infrastructure and wildlife were largely destroyed. In 1987 the Kanyaryeru Resettlement Scheme was established, covering approximately 8,000 ha and providing land to 700 families. Under this progressive influx of human population LMNP was subjected to a number of encroachments and degazettments. Following recommendations made by the Lake Mburo taskforce, 60% of the Park's area was excised and allocated to human settlement for former landowners and occupants and, inevitably, a number of newcomers.

2.4 1990s: community wildlife conservation in Lake Mburo National Park

Today LMNP covers 260 km² and includes savanna, woodland, lake and wetland habitats. Poor and worsening relationships between Park authorities and adjacent communities, coupled with widespread encroachment and illegal resource use, led to the initiation of a new approach to the management of LMNP in the early 1990s. This approach aimed to improve the level to which surrounding communities participated in, and benefited from, the conservation of LMNP wildlife resources. Over this period the relationship between Park authorities and local communities has improved substantially, and the last of the occupants were moved out of LMNP with compensation in 1997.

The Lake Mburo Community Conservation Project (LMCCP), now the Community Conservation for Uganda Wildlife Authority Project (CCUWA), funded initially by SIDA and then by USAID, and implemented by the African Wildlife Foundation and Uganda National Parks (now Uganda Wildlife Authority (UWA)), commenced in 1991. LMNP became the first protected area in Uganda to employ staff specifically designated as community conservation officers and a range of activities were carried out to improve local awareness of conservation issues, increase local participation in sustainable income-generating activities and initiate and support community-initiated development projects. In 1994 Parish Resource Management Committees (PRMCs) were set in place in parishes bordering the park and a Park Management Advisory Committee (PMAC) comprising PRMC chairmen was established to facilitate dialogue and develop joint activities between park authorities and adjacent communities.

CCUWA today operates in LMNP under the provisions of new national legislation on wildlife conservation and benefit-sharing which also covers other National Parks in Uganda. Policy has, since 1995, guaranteed a system of revenue distribution with the communities who live around National Parks. Initially this involved the allocation to community development activities of 12% of all revenues collected by Park authorities, subsequently changed by legislation to 20% of gate fees less VAT. These revenues are supplemented by donor funds and by contributions made by communities themselves at LMNP, and distributed through a Support of Community-Initiated Projects (SCIP) fund earmarked for local development projects.

Community conservation activities and systems of benefit-sharing have undergone some change in LMNP over recent years. There has been a general shift from financing individual enterprises such as beekeeping, bakeries, handicrafts and tree nurseries to community development projects – mainly the rehabilitation and construction of primary schools and dispensaries, and arrangements for resource utilisation in LMNP – including agreements made concerning fisheries, traditional medicines collection and access of cattle to water in drought. Development projects are currently sequenced over the Parishes bordering LMNP so that each part of the park-adjacent area shares in funds raised. The resolution of wildlife-human conflicts – particularly the issue of crop damage by wild animals – has also become an increasingly important activity undertaken by community conservation staff in LMNP.

3. POPULATION AND LIVELIHOODS AROUND LAKE MBURO NATIONAL PARK

3.1 The human population

CCUWA activities in LMNP operate on the basis of a territorial definition of community, working with residents of the parishes which directly border the National Park (Hulme 1997) – for this reason the Park-adjacent population, the residents of these parishes, also form the major focus of this paper. The 13 Parishes of Nyabushozi County surrounding LMNP illustrated in Map 1 contain a population of approximately 51,000 people¹.

Although the LMNP area is sparsely settled overall, especially in the rangelands lying on the eastern side of the Park, population density and intensity of cultivation increase around the southern boundary. The LMNP-adjacent area supports a diverse human population. As illustrated in Figure 2 the Banyankole still form the dominant ethnic group of the LMNP area, with *Bairu* cultivators and *Bahima* herders together accounting for over two thirds of the total park-adjacent population. The remainder is made up of other groups, including Bakooki and Baganda agriculturalists and Bakiga and Banyarwanda immigrants from south-western Uganda and Rwanda (Kamugisha *et al* 1997, Namara *et al* 1998).

Figure 2: Composition of the LMNP-adjacent human population

Group	% population	Approximate population	Approximate households
Bahima herders	30	15,285	1,698
Bairu cultivators	41	20,635	3,439
Other mixed farming groups (Baganda, Bakiga, Bakooki, Banyarwanda, etc.)	27	13,961	2,327
Landless	2	1,070	178
TOTAL	100	50,951	7,643

(Source: Extrapolated from data in Hulme 1997, Namara *et al* 1998)

Although these ethnic groups are distinct in economic, social and cultural terms their livelihood patterns are becoming progressively homogenised. Groups can be broadly differentiated – and importantly define themselves – as traditional cattle keepers or cultivators, but most of the communities around LMNP now practice mixed farming combining both livestock management and crop cultivation to varying degrees, as well as engaging in a range of occasional off-farm income earning opportunities (Kamugisha *et al* 1997, Marquardt *et al* 1994, Namara *et al* 1998).

¹ This data, and the population and land data in the following section, are based on previous administrative boundaries which have now changed. At least 2 park-adjacent parishes have been sub-divided. The population of the ‘original’ LMNP-adjacent parishes was recorded as just over 40,000 in 1991, population growth rates in Mbarara District are thought to be in excess of 3%.

Map 1: LMNP-adjacent parishes

Map 2: Land use and settlement zones in the LMNP-adjacent area

3.2 Land use and agricultural livelihoods

Although there is significant socio-economic and cultural variation within communities, it is possible to classify the area around LMNP into the five broad settlement and land-use zones illustrated in Map 2, and one cross-cutting landless category. As illustrated in Figure 3 the total LMNP and park-adjacent area occupies some 2,000 km², with a population of approximately 51,000 people or 7,500 households dominated by cultivators and mixed farmers.

Figure 3: Land use and settlement patterns in and around LMNP

	Estimated area (km ²)	Estimated Population	Estimated households	Approximate % population	Approximate % land area
National Park	260	150	-	0	13
Eastern rangelands	650	6,500	725	13	33
Kanyaryeru Settlement Scheme	80	7,000	1,100	14	4
Southern farmlands	700	30,000	5,000	59	35
Sanga Road axis	300	6,000	800	12	15
Landless	-	1,070	178	2	-
TOTAL	± 2,000	± 51,000	± 7,500	100	100

(Source: extrapolated from data in Kamugisha et al 1997, Marquardt et al 1994. Area and population from maps in Kamugisha et al 1997, household size from Marquardt et al 1994)

- Lake Mbuoro National Park:** Following the eviction of the last park residents in late 1997 there is now no permanent human settlement in the 260 km² Lake Mbuoro National Park aside from approximately 50 UWA staff stationed at Park Headquarters and 100 or so workers and fisherfolk who temporarily reside at Rubale Fish Landing².
- Eastern rangelands:** The predominant land use in the rangelands lying to the east of LMNP is livestock rearing on private and government ranches by registered ranchers and ‘squatters’ (mainly people evicted from gazetted areas, displaced as a result of war and original residents of the scheme and surrounding area (Kamugisha et al 1997)). These rangelands are dominated by the Ankole Ranching Scheme, containing some 6,500 people or 725 households. Most residents traditionally depended almost exclusively on cattle and milk products for subsistence and income. Cattle, as well as forming an important source of wealth and security, still provide a means of generating income to meet sudden or unexpected cash needs. Crop production, although increasing, is somewhat constrained by the threat of wildlife damage as well as by unfavourable agroecological conditions and insecure land tenure.
- Kanyaryeru Resettlement Scheme:** Kanyaryeru Resettlement Scheme was established in 1987 and covers approximately 80 km² of land. It contains a population of 1,000 families or about 7,000 people. Although the scheme was originally formed to promote arable agriculture, the main land use is livestock rearing and – to a lesser but increasing extent – mixed crop farming.

² Formerly Rwonyo Fish Landing, recently relocated within LMNP after negotiation with Park-adjacent communities and renamed Rubale Fish Landing.

- **Southern farmlands:** The density of population and incidence of settled agriculture rises in the parishes bordering the southern boundaries of LMNP, estimated to cover approximately 700 km² and support a population of some 30,000 people or nearly 5,000 households. These settled agriculturalists cultivate mainly beans, maize, bananas, millet, groundnuts, sweet potatoes, soya beans, cassava and vegetables as well as keeping cattle, smallstock and poultry. Fishing, although primarily a part-time dry-season activity, is also an important component of livelihood systems among some 10% of cultivators living in the Park-adjacent area (Marquardt *et al* 1994). Fishing is carried out in Lake Kachera to the east of LMNP and in the smaller lakes and swamps concentrated on the southern boundary of the Park, as well as at Rubale Fish Landing inside LMNP.
- **Sanga Road Axis:** The Sanga Road Axis comprises the area of Nombe and Rwabarata Parishes which border and are partially surrounded by the central-northern part of the park. They cover a land area of some 300 km² outside LMNP and are occupied by approximately 6,000 pastoralists and mixed farmers
- **Landless households:** The landless population varies among different Park-adjacent communities. Estimates range from 6-10% of the total LMNP-adjacent population (Kamugisha *et al* 1997), as high as nearly two thirds of cattle keepers (Namara *et al* 1998) and approximately 2% of overall population³ (1991 census).

Although the settled areas around LMNP can be broadly characterised as rangelands and farmlands as above, this is an over-simplification. Cattle rearing still forms an important land use in the region, but is becoming increasingly uncommon as a sole livelihood activity (Marquardt *et al* 1994, Namara *et al* 1998). Conversely, livestock remain an important activity for people who primarily depend on crops. It has been estimated that cultivation is now the principal economic activity for over a third of the Park-adjacent population, cattle keeping for 30% of the population and mixed farming for 30% of the population (Namara *et al* 1998). Traditional boundaries in livelihood and land-use between cultivators and cattle keepers are becoming less well-defined, although ethnic boundaries remain strong. In general, rural livelihoods in the LMNP area are becoming increasingly diversified, moving towards mixed cultivation and cattle rearing in combination with a range of small-scale and occasional off-farm activities pursued as a strategy to spread the risk of agricultural enterprises and increase household cash income and food security (Namara *et al* 1998).

3.3 Off-farm activities

Infrastructure, transport and communications are poorly developed and local income-earning and employment opportunities are limited around LMNP. Aside from fishing, off-farm activities form a relatively minor and insecure component of rural livelihoods in

³ This proportion of households has been assumed landless.

the Park-adjacent area. It is also reported that remittances from migrant workers make an insignificant contribution to household economies (Infield 1993). Crop or livestock agriculture provides for the bulk of subsistence and income needs for the majority of the population. Local opportunities for income-generation and employment – including petty trade, casual labour, beer brewing and charcoal burning – tend to be occasional and small-scale, providing the primary income source for less than a third of all households (Namara *et al* 1998).

4. THE ON-SITE ECONOMIC BENEFITS OF LAKE MBURO NATIONAL PARK

Lake Mbuoro National Park generates two main sources of on-site economic benefits, which both accrue directly to the Uganda Wildlife Authority – the managers of LMNP – and are shared directly and indirectly with surrounding communities:

- **Benefits accruing from resource utilisation:** Resource utilisation provides two main sources of income for the Uganda Wildlife Authority – revenues from tourism and from fisheries activities. Both of these are extremely limited. Although local participation in tourism and employment in LMNP is negligible, resource utilisation activities generate a significant level of direct benefits for Park-adjacent populations. These benefits include income and subsistence products provided for community members who legally engage in fishing and livestock watering and illegally carry out hunting, wood and medicines collection, grazing and other activities in LMNP. Local communities additionally benefit indirectly through the allocation of a proportion of the revenues collected by Park authorities to community development activities.
- **Budgetary contributions from external sources:** External donors contribute to the budget of running LMNP. This income directly accrues to the Park authorities. It also indirectly benefits surrounding communities through budget allocations made to local development projects, resolution of wildlife conflicts and implementation of other community conservation activities.

As illustrated in Figures 4 and 5 the quantified annual value of LMNP benefits is US\$ 685 million. This figure represents tangible on-site benefits only, it excludes other – potentially large – values associated with wildlife conservation in LMNP including the maintenance of ecosystem services, option and existence values.

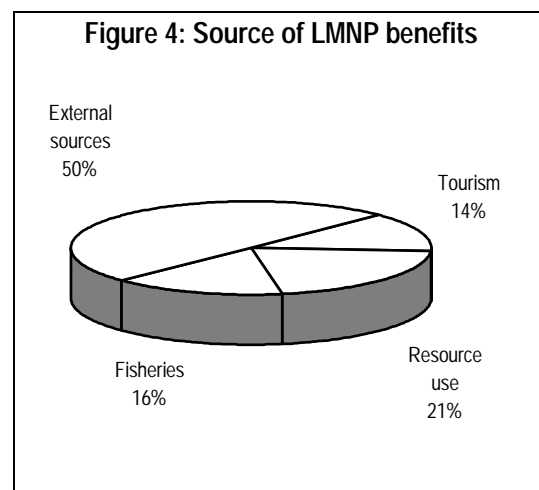


Figure 5: Summary table of quantified LMNP on-site economic benefits 1997

	Total value (USh mill)	Park authorities (USh mill)	Community benefits (USh mill)
Park tourism	93.7	93.7	0
Rubale Fish Landing	108.1 ⁴	7.6	43.6
Local resource utilisation	143.4	0	143.4
Donor funds	339.9	312.0	27.9
TOTAL	685.1	413.3	214.9
% resource utilisation	50	24	87
% external sources	50	76	13

(See following sections for calculation of component values)

4.1 Park authorities' income

As illustrated in Figure 6 LMNP revenues have increased substantially in both nominal and real terms over the 1990s, and totalled USH 101.3 million in 1997.

Figure 6: Lake Mburo National Park direct revenues

Year	Revenues (USh mill)
1992	15.6
1993	31.8
1994	52.3
1996	103.0
1997	101.3

(Source: Howard 1995, Hulme 1997; excludes donor contributions, government subventions and other internal sources)

Sources of income for LMNP are extremely limited. In addition to external budgetary contributions described below, LMNP authorities only have two sources of direct park income – from fisheries and tourism activities. As illustrated in Figure 7 the vast majority of this direct income was in 1997 generated by tourism.

Figure 7: Composition of LMNP direct income 1997

LMNP revenues	USh mill	% total
Visitor revenues	93.7	92.5
Canoe fees	5.8	5.8
Fishing house maintenance fees	1.34	1.3
Firewood fees	0.4	0.4
TOTAL	101.3	100.0

(Source: Potterton and Rubagyema 1998)

Although license fees and development levies⁵ accrue to the Fisheries Department, activities at Rubale Fish Landing also generate revenues for the LMNP authorities. Each of the 32 fishing canoes currently operating from Rubale Fish Landing pays a house maintenance fee of USH 3,500 a month and boat fees of USH 3,500 a week to LMNP. All of the 4 fish processors working in the park also pay a fuelwood fee of USH 8,000 a

⁴ Also includes income accruing to UWA staff and to Department of fisheries.

⁵ These are separate from the levy paid to PMAC activities for community-initiated projects described below, and comprise fisheries development activities such as stocking and restocking dams.

month to the Park authorities. In total, fisheries-related revenues to LMNP were worth US\$ 7.5 million in 1997.

Tourism generates a range of revenues for the LMNP authorities, in 1997 earning a total of US\$ 93.7 million. In addition to entry fees, charges are levied on Park visitors for camping, guided walks, accommodation facilities and boat hire (Snelson and Wilson 1994). Although tourist numbers have increased in recent years at LMNP they are still relatively low, with just under 8,500 visits made in 1996. As illustrated in Figure 8, the majority of these visitors were 'low cost' Uganda citizens and students. Between 5-10% of park entry fees are also contributed by the 10 fishmongers operating from LMNP, who pay daily entry fees of US\$ 2,000

Figure 8: Visitor numbers and income 1996

Category of visitor	Number of visitors	Entry fee (US\$/day)
Foreign visitors		
- Resident overseas	1,079	10,000
- Resident in Uganda	1,804	10,000
Uganda visitors		
- Local residents	645	1,000
- Students	2,029	0
- Other citizens	2,745	2,000
VIPs	63	0
Other Park services	-	-
TOTAL	8,365	-

(Source: Potterton and Rubagyema 1998)

Income also accrues to LMNP from external sources, as illustrated in Figure 9. Park authorities receive budgetary support from the donor-financed CCUWA project, a total of nearly US\$ 340 million in 1997.

Figure 9: External budgetary support to LMNP 1997⁶

	Average support (US\$ mill/year)
Staff and professional services	74.9
Investment in buildings, equipment and vehicles	81.9
Vehicle and office running costs	54.3
Travel and meetings	65.9
Education and training	35.0
Support to community development	27.9
TOTAL	339.9

(Source: AWF 1998)

4.2 Household resource utilisation

Until 1990 all forms of extractive resource utilisation were banned in Uganda's National Parks. Some level of negotiated local resource utilisation is now permitted in LMNP. As well as encouraging local eco-tourism employment and income opportunities, this has included initiatives in fisheries and agreements concerning park access for the watering of livestock in dry-seasons and droughts. In addition to this negotiated use, a range of activities are carried out illegally by the communities living around LMNP. These include

⁶ From CCUWA budget (AWF 1998), figures extrapolated from April-December 1997 data.

polewood, fuelwood, honey thatch and medicines collection, hunting and utilisation of livestock pasture and water resources over and above agreed use. Some of these activities may not be sustainable, they nonetheless comprise a local benefit associated with LMNP.

As illustrated in Figure 10 just under 10% of the LMNP-adjacent population obtain natural resources from LMNP to a value of approximately US\$ 143 million a year. Although these figures may underestimate actual levels of LMNP resource use – many of these activities are illegal, and people are reluctant to admit to carrying them out – they provide an indicator of the value of local utilisation of LMNP resources.

Figure 10: Household-level use of LMNP resources

Resource	% Park-adjacent households*	Approximate number of households	Estimated utilisation (units/hhold/year)	Unit value ⁷ (US\$/unit) ⁺	Household value (US\$/hhold/yr)	Total value (US\$ mill/yr)
Livestock	9	688 ⁸	20TLU	6,364 ⁹	127,273	87.5
Medicines	6	459	<i>nd</i>	<i>nd</i>	<i>nd</i>	<i>nd</i>
Firewood	3	229	250 headloads	500	125,000	28.7
Hunting	3	229	100 kg	1,000	100,000	22.9
Polewood	2	153	25 poles	200	5,000	0.8
Thatch	< 1	38	50 bundles	200	10,000	0.4
Weaving	< 1	38	100 bundles	350	35,000	1.3
Honey	< 1	38	25 litres	500	12,500	0.5
Papyrus	< 1	38	100 bundles	350	35,000	1.3
TOTAL						143.4

(Source: *Marquardt et al 1994, +Potterton and Rubagyema 1998; excludes fish, covered below)

4.3 Local participation in commercial hunting and fishing activities

In addition to domestic utilisation, LMNP resources support commercial activities in hunting and fisheries. Although a number of estimates have been made of hunting offtakes in the Lake Mburo area – for example figures for impala are variously cited as 600 (Hulme 1997) and 1,200 (Kamugisha *et al* 1997) – the vast majority of hunting takes place outside the park boundaries so has not been considered in this analysis.

Lake Mburo supports a commercial fishery which is controlled and regulated by the park authorities. There are currently 32 canoes operating from Rubale Fish Landing, generating a catch of some 300 tonnes¹⁰. As illustrated in Figure 11 the gross income accruing from fisheries activities in LMNP in 1997 was US\$ 108 million or an average of nearly US\$ 3.5 million per canoe. Of this total, net income of approximately US\$ 44 million accrued to local residents – 18 of the canoes are operated by UWA staff, and various fees and levies are paid by fishers – divided 60:40 between license holders or boat owners and fishers. In addition to fees payable to LMNP and to the Fisheries

⁷ Valued at local market prices.

⁸ Including negotiated access to water.

⁹ Assuming that LMNP water and pasture account for 50% of livestock productivity.

¹⁰ Only partial data are available for 1997, covering the first two quarters of the year. The weight of catch over this period is similar to 1996 records, so 1996 weights have been taken.

Department a levy has since March 1998 been imposed on fisheries of 10% of total catch value, which will in the future be paid to PMAC for community development activities.

Figure 11: Fisheries catch and value, Rwonyo Fish Landing 1997

	Catch (kg)	Value (US\$ '000)	% value Tilapia	% value Catfish	% value Lungfish	% value Haplochromines
Jan	20,360	7,938	60	13	7	20
Feb	24,275	9,334	66	12	9	14
Mar	24,189	9,318	60	13	10	17
Apr	23,336	9,307	54	25	8	13
May	13,254	5,126	50	19	14	16
Jun	16,386	6,352	55	16	11	17
Jul	20,940	8,081	60	12	9	19
Aug	29,760	11,335	67	9	10	13
Sep	32,265	12,123	50	12	19	19
Oct	16,767	6,032	43	8	32	17
Nov	43,975	15,064	25	13	54	7
Dec	21,978	8,084	49	11	26	14
Total	287,485	108,095	52	13	19	15
Gross average amount/canoe		3,378				
LMNP fees		7,168				
Department of Fisheries fees		1,280				
Net income to local residents		43,595				

(Source: Potterton and Rubagyema 1998)

4.4 Community development activities

Since the initiation of the LMCCP in 1991, revenue sharing arrangements have operated between Park authorities and local communities. Projects are submitted by communities and selected for implementation by PMAC. In theory one third of the external funding for these projects is provided by Park authorities, raised from gate fees, and two thirds by CCUWA, in addition to which levies raised from fisheries will be channelled through PMAC for community development activities¹¹. Communities themselves also provide one third of the total cost of project implementation, in cash and kind contributions.

During the first phase of LMCCP, running from 1991-1994, community development activities were focused in Kamuli¹², Kyarubambura, Nombe, Nyakahita, Nyamitsindo¹³, Rwabarata and Rwenjeru Parishes, which primarily contain cultivators. In the second phase of the project activities have mainly been carried out in Akaku, Rushasha, Rwamuranda and Rurambira Parishes, where livestock production is the main land use and livelihood (Hulme 1997). Community development projects implemented under CCUWA are now sequenced across adjacent parishes so that each LMNP-adjacent parish shares in revenues generated, regardless of their area or population. By 1998 all park-adjacent parishes will have received assistance (Hulme 1997).

¹¹ Park authorities have not, in fact, set aside any funds for community development activities since new wildlife legislation was passed in 1996. No levies raised from fisheries have yet been allocated to community development projects.

¹² Kamuli Parish has now been split into two, of which Kyaragaju is adjacent to LMNP.

¹³ Nyamitsindo Parish has now been split into two, of which Rwetango is adjacent to LMNP.

As illustrated in Figure 12 a total of US\$ 91 million has been spent on community development projects in 10 parishes spread over the LMNP-adjacent area between 1994 and 1996. In 1997 an estimated US\$ 27.9 million was allocated to community development activities from CCUWA¹⁴, in addition to communities' own contributions.

Figure 12: Funds allocated to community development projects 1994-96

Year	Parish	Activity	Total cost (US\$ mill)
1994	Kyarubambura	Dispensary	14.9
1994	Nombe	School	13.6
1994	Nyakahita	School	4.4
1994	Nyamitsindo	School	5.7
1996	Akaku	School	5.2
1996	Rurambira	School	12.0
1996	Rushasha	School	9.2
1996	Rwamuranda	School	5.7
1994	Rwabarata	School	12.4
1994	Rwenjeru	School	7.9
	TOTAL		91.0

(Source: Potterton and Rubagyema 1998)

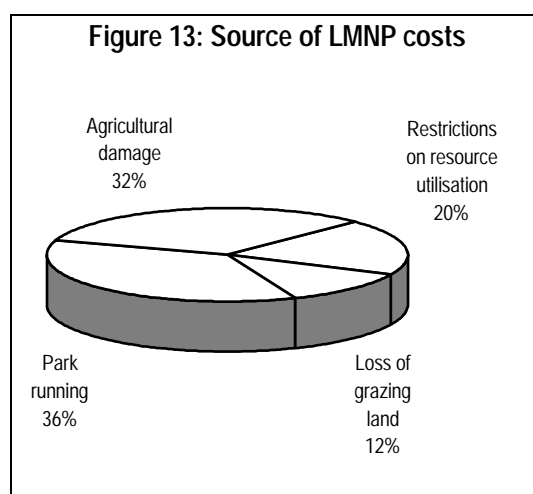
¹⁴ Annual average estimated from CCUWA project budget.

5. THE ON-SITE ECONOMIC COSTS OF LAKE MBURO NATIONAL PARK

Four main categories of costs associated with the conservation of LMNP can be identified. These accrue both to Park authorities and to local communities, as well as being partially financed by external agencies:

- **Expenditures on park management.** A range of management expenditures are necessary to conserve the wildlife in LMNP. These include the costs of salaries, housing, vehicles, maintenance of roads and other infrastructure and expenditures on community conservation activities and community development projects.
- **Crop and livestock damage caused by wild animals.** Farmers living near to the boundaries of LMNP suffer higher than usual levels of damage to their crops and livestock caused by wild animals, incurring costs in terms of lost agricultural income.
- **Loss of productive agricultural and grazing land.** The reservation of LMNP for the purposes of wildlife conservation precludes agricultural land uses within the park boundaries, including both crop and livestock production opportunities. This incurs costs on local communities as potential land users of the LMNP area in terms of agricultural income foregone.
- **Restrictions on plant and animal resource utilisation.** Because LMNP is a protected area, limitations are placed on the nature and level of natural resource utilisation permitted within its boundaries. This incurs costs on local communities as potential resource users in terms of natural resource utilisation activities foregone.

The total quantified annual costs associated with conserving LMNP, outlined in Figure 14, are in excess of USh 742 million. As illustrated in Figure 13, direct management expenditures, borne mainly by Park authorities and external donors, comprise only just over a third of the total costs associated with LMNP. Of far greater value are the costs that the presence of LMNP imposes on nearby livelihoods and agricultural systems, including damage to crop and livestock enterprises, and resource and land uses foregone, valued at some USh 739 million a year. These costs wholly accrue to local communities. For cultivating households, the main costs associated with LMNP relate to its plant and animal wildlife resources, and include animal damage to crops, resource utilisation opportunities foregone and – to a lesser extent at the current time – the



preclusion of arable agricultural expansion into LMNP. For livestock-keeping households the main costs associated with LMNP concern the loss of access to park land for livestock grazing and watering.

Figure 14: Summary table of quantified LMNP on-site economic costs

	Total value (USh mill)	Park authority costs (USh mill)	Community costs (USh mill)
Management costs	418.6	414.4 ¹⁵	4.2 ¹⁶
Crop and livestock damage	375.0	0 ¹⁷	375.0
Loss of grazing land	137.3	0	137.3
Restrictions on resource utilisation	226.4	0 ¹⁸	226.4
TOTAL	1,157.3	414.4	742.9
% management	36	100	<1
% livelihoods	64	0	>99

(See following sections for calculation of component values)

5.1 Expenditures on park management

The Uganda Wildlife Authority are ultimately responsible for the bulk of the direct management costs of LMNP including staffing, equipment, vehicles, maintenance and community conservation activities. In 1997 these totalled USh 740 million. As illustrated in Figure 15 under a quarter of these costs were met by income accruing from LMNP, a substantial amount are covered by external budgetary support to LMNP. Currently no funding or subventions are made to LMNP from central government budgets.

Figure 15: LMNP management costs 1997

	Annual costs (USh mill)
Staff salaries	378.0
Vehicle running	8.4
Support to community development ¹⁹	27.9
TOTAL	414.4
% LMNP income	24
% donor funding	76²⁰

(Source: AWF 1998, Potterton and Rubagyema 1998)

Local communities also cover park management costs in so far as they make contributions to the community conservation programme in the form of sharing the costs

¹⁵ Includes donor contributions and park income.

¹⁶ Including contributions to community conservation activities.

¹⁷ Although a certain proportion of the LMNP annual budget is allocated to activities to minimise wild animal damage to farms, this figure has been impossible to determine, and is therefore covered in management costs, above.

¹⁸ Although a certain proportion of the LMNP annual budget is allocated to protection activities, this figure has been impossible to determine, and is therefore covered in management costs, above.

¹⁹ Average annual amount calculated from AWF total project budget.

²⁰ Calculated figure slightly larger than this (82%) as CCUWA 1997 budget estimated from partial figures.

of development activities in cash or kind. No data are available for 1997, but CCUWA contributed approximately 87% of the cost of projects carried out during 1996, meaning that community contributions were approximately US\$ 4.2 million.

5.2 Wild animal damage to agriculture

The damage that wild animals cause to agricultural enterprises – in terms of crop destruction, livestock kills and transmission of disease to domestic herds – is perceived as a major problem by over 90% of the residents of the LMNP area (Namara *et al* 1998). Nearly half of households suffer crop damage and a fifth experience livestock loss and disease as a result of wildlife (Marquardt *et al* 1994). These problems are particularly severe in areas near to the Park boundary, although decline substantially to the south of LMNP where swamps form a natural barrier preventing animals crossing into farmland. Households living near to the Park also tend to be poorer overall (Hulme 1997, Marquardt *et al* 1994) because they are the most recent in-migrants and because infrastructure and services are few, and thus less able to bear these costs.

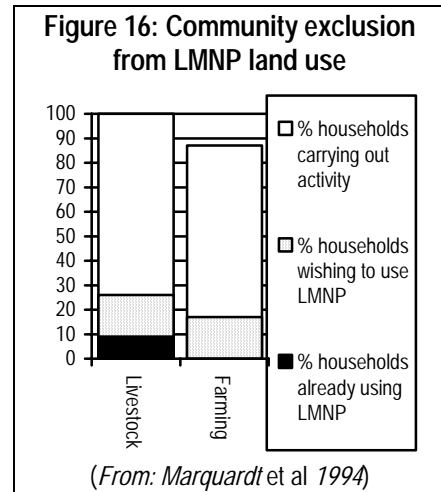
The economic costs of wildlife damage to agriculture accrue to householders living around LMNP as the value of production lost due to wildlife as well as through the additional time and inputs they must use guarding crops and livestock against loss. Taking into account variations in land use the annual costs of wild animal crop and livestock damage in Mbarara District have been calculated as US\$ 5 million/km of National Park boundary (Howard 1995), meaning that the total value of agricultural output lost to wildlife from LMNP may be in the region of US\$ 375 million²¹.

5.3 Loss of productive agricultural and grazing land

In common with other National Parks in Uganda, there is an agricultural opportunity cost to LMNP (Howard 1995, Mason 1995). No crop cultivation or livestock rearing is permitted within the boundaries of LMNP. The reservation of the Lake Mburo area thus represents the loss of potentially productive agricultural and grazing land – the major land use systems in the region surrounding the park. These opportunities foregone constitute costs to Uganda's national economy in terms of lost food, income and employment. They immediately accrue to the communities living around LMNP, who used the area prior to its reservation and would use it if they were not prevented from doing so by the existence of the National Park.

²¹ Excluding swamp and lake areas, which effectively prevent wildlife from entering farms, the boundary of LMNP is approximately 75 km long.

Under current conditions the main opportunity cost of LMNP is land taken out of local livestock production systems, taken as the opportunity cost of the National Park in this analysis. As illustrated in Figure 16 over a quarter of the total park-adjacent population or nearly two thirds of pastoralist households desire access to LMNP for grazing and watering livestock (Marquardt *et al* 1994). The issue of dry-season and drought livestock refuge is a particularly important one in LMNP, as the Lake Mburu/Ruizi River wetland system is the most important permanent water source in what is otherwise a semi-arid region (Turyaho and Infield 1993).



The arable opportunity cost of LMNP is not yet significant. Only 17% of the park-adjacent population express the wish to utilise LMNP for arable agriculture – an indication that agriculture land is still considered relatively abundant outside the park (Marquardt *et al* 1994). On-going changes in land use and demography around the Park however suggest that both the livestock and crop opportunity costs of LMNP are likely to change in the future as local livelihoods become progressively more crop-based, population increases, available arable land grows more scarce and competition escalates between crop and livestock-based land uses (Namara *et al* 1998). Arable agriculture is steadily expanding into the more fertile parts of Mbarara District which also form dry-season grazing areas, and there are already signs of severe grazing pressure as evidenced by the replacement of palatable and nutritious grasses by unpalatable pioneer grasses (Kamugisha and Ståhl 1993). All these changes increase the agricultural pressure on LMNP and will in the future raise the opportunity cost of alternative land uses foregone.

The agricultural opportunity costs of LMNP range from a lower estimate of foregone livestock production – the likely present opportunity cost, to a higher estimate of the potential value of National Park land under mixed cultivation – a possible future opportunity cost. As illustrated in Figure 17 LMNP has the potential to support at least 10,800 TLUs²² or 13,000 ha of mixed agriculture²³ – equivalent to a minimum loss of some US\$ 137 million a year pastoralist income or US\$ 6.6 billion a year mixed farming income, or support to 180 pastoralist or 830 mixed farming households.

Figure 17: Crop and livestock opportunity costs of LMNP

Alternative land use	Production potential	Returns to land (US\$/ha/yr)	Foregone income (US\$ mill/yr)	Approximate no. households supported
Livestock production	10,800 TLU	10,500	137.3	180
Mixed agriculture	13,000 ha	506,500	6,586.5	830

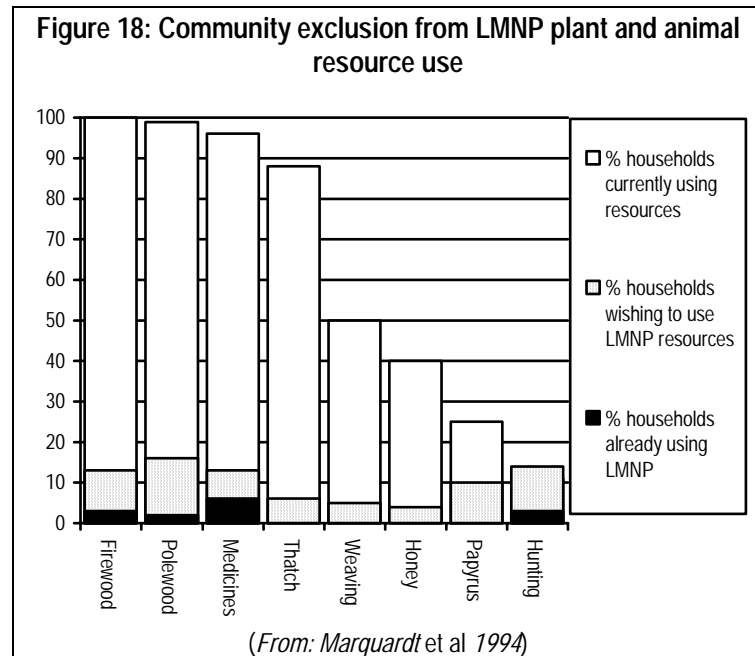
(Source: extrapolated from Potterton and Rubagyema 1998)

²² One Tropical Livestock Unit (TLU) = 1 cow or 8 smallstock. Assumed that 50% or 13,000 ha of LMNP area is suitable for pasture (i.e. not steep slopes, closed forest, swamps, rivers or lakes). For LMNP the recommended stocking rate is taken of 0.83 TLU/ha (Kamugisha *et al* 1997).

²³ Assuming that 50% or 13,000 ha of LMNP is suitable for mixed crop and livestock agriculture.

5.4 Restrictions on plant and animal resource utilisation

Historically the people living around the LMNP area obtained key natural resources such as water, fish, grass, building materials, fuel, medicines, fibres and foods by collecting them from the wild. The creation of LMNP resulted in a loss of the right to legally exploit most of these utilisation opportunities and has led to long-standing conflict between local communities and park authorities (Namara *et al* 1998). As illustrated in Figure 18 although less than 10% of the adjacent population currently obtain natural resources from LMNP, many more would do so if legally permitted. This exclusion from LMNP has an economic cost in terms of natural resource



income and subsistence products foregone. These costs accrue particularly to people living close to the Park boundary and to cultivator households – the primary groups expressing a desire to increase their utilisation of plant and animal resources above levels currently permitted.

Figure 19 illustrates the value of resource utilisation foregone under current Park restrictions. The major proportion of this cost – estimated to have a total value of US\$ 226 million a year – is accounted for by the foregone value of hunting and the extraction of wood products.

Figure 19: Value of LMNP resource uses foregone for local communities

Resource	% of population excluded from LMNP resource use *	Approximate no. households excluded	Value of foregone resource utilisation (US\$ mill/yr)
Polewood	14	1,070	5.3
Hunting	11	841	84.1
Firewood	10	764	95.5
Papyrus	9	688	24.1
Medicines	7	535	nd
Thatch	5	382	3.8
Weaving	4	306	10.7
Honey	3	229	2.9
TOTAL			226.4

(Source: *Households currently not using Park resources but expressing a desire to do so, from Marquardt et al 1994.

Note: values are additional to existing agreed and illegal resource use; per household consumption values as in existing use; farming, pasture and water excluded because they are dealt with above as an agricultural opportunity cost of conservation)

6. ANALYSIS OF THE COSTS AND BENEFITS OF CONSERVING LAKE MBURO NATIONAL PARK

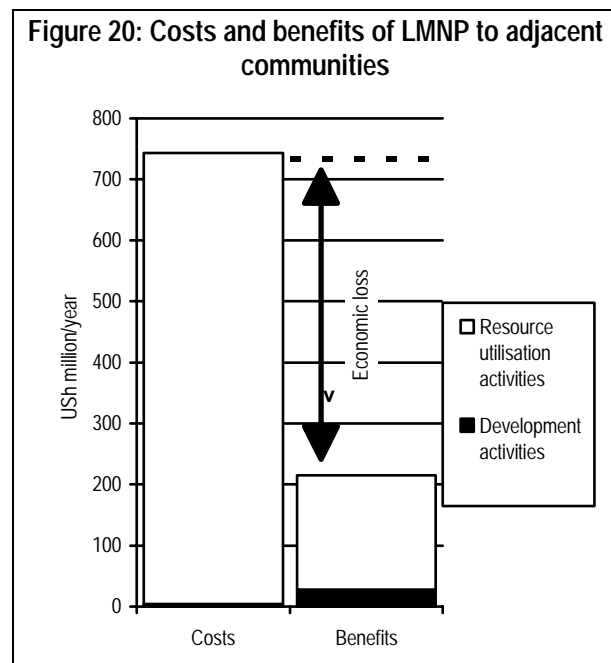
This case study has demonstrated that while LMNP currently generates few tangible on-site benefits for either local communities or park authorities, its continued conservation gives rise to substantial and wide-ranging costs. Under these conditions the Uganda national economy is incurring a net economic loss by conserving LMNP – a situation which has also been noted for other National Parks and protected areas in the country (Howard 1995, Mason 1995). On the ground, the conservation of LMNP is effectively being subsidised by the local residents of the Lake Mburo area and by external donors. The foregoing economic analysis raises the important question of whether this situation is tenable or equitable over the long-term, in financial terms for UWA or in economic terms for the communities who live around LMNP.

6.1 Economic sustainability issues for local communities

The land and other natural resources contained in LMNP are of primary economic importance to surrounding communities. As illustrated in Figure 20 both the values associated with community development activities in LMNP are negligible compared to the potential benefits of the park as a source of land, plant and animal-based resources, and the costs associated with conserving these resources through not using them. Despite a small gain in terms of development activities carried out under the CCUWA project, local communities currently face a net economic loss of some US\$ 528 million a year resulting from the continued conservation of LMNP, mainly comprised of land and resource utilisation opportunities foregone.

The Lake Mburo area has long been the object of competing demands and claims on land and natural resources. The issue of access to land and its tenure has played a major role in the history of LMNP, and continues to do so today (Marquardt *et al* 1994). A series of protected areas have been established around Lake Mburo which have progressively placed greater controls on land use and settlement – initially as a Controlled Hunting Area, then Game Reserve and now a National Park – and land and resource-based conflicts have escalated. As population and land pressure grow around LMNP these demands are intensifying still further.

Under ongoing changes in settlement and land use patterns, the economic cost of LMNP to local residents in terms of land and resource uses foregone is rising rapidly. If current

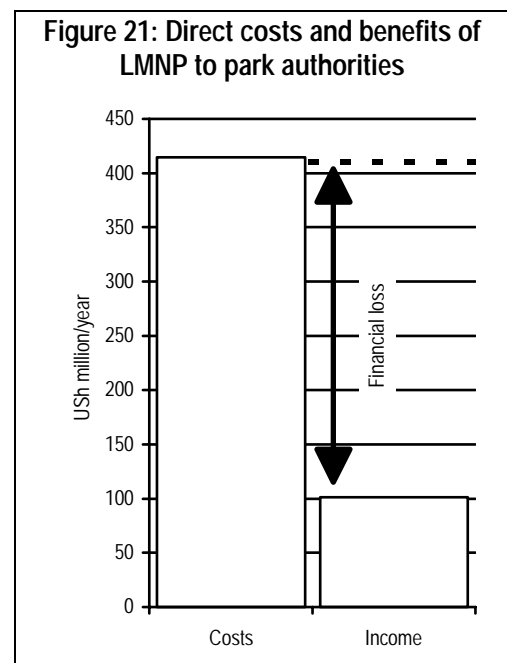


levels of – mainly illegal – local resource use are in fact unsustainable, this opportunity cost increases still further (from a net economic cost of approximately US\$ 528 million to one of nearly US\$ 1 billion). As the arable opportunity cost of the park rises, local costs of exclusion may rise to more than 13 times their current level. Local communities are subsidising wildlife conservation by foregoing productive resource utilisation activities in LMNP. Given the widespread poverty and growing land pressure in the LMNP-adjacent area it is not clear whether this is a cost that they can afford – or be willing – to bear over the long term.

6.2 Financial sustainability issues in park management

LMNP currently generates low levels of cash income for UWA – at some US\$ 101 million a year, park revenues are sufficient to cover only 24% of the annual costs of managing and running the National Park. LMNP is not financially self-sustaining, and relies on a large external subsidy for its direct maintenance. The park is currently running at a financial loss of some US\$ 313 million a year, as illustrated in Figure 22. This financing gap – some three-quarters of the park budget – is met by contributions from donors.

The direct revenue base of LMNP is at present wholly dependent on income earned from tourism and fisheries, and from external donor contributions. All these sources of finance have an extremely limited potential to increase. Lake Mburo is already being fished at close to maximum sustainable levels, and attracting the 30,000 additional overseas visitors a year required to raise gate revenues to a sufficient level to cover costs requires a major reorganisation of tourism operations. The government of Uganda, including UWA, is under severe budgetary constraints and has many other pressing needs for funding, and the donor-financed CCUWA project is nearing the end of its current phase. Under existing conditions and management needs it is difficult to see how LMNP would be able to become financially self-sufficient on the basis of existing income sources.



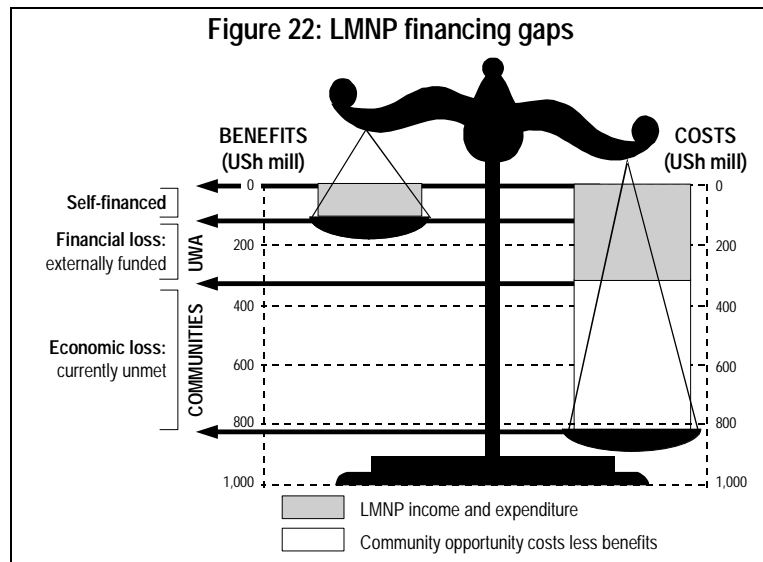
6.3 Identifying the financing gaps in conservation

Economic analysis initially presents a somewhat pessimistic picture for the future conservation of LMNP. Direct income sources are nowhere near enough to finance the running of LMNP. Expenditures on community conservation activities do not come close to compensating for local land and resource opportunities foregone by the reservation of the Lake Mbuoro area. These costs, and the current inability of LMNP to cover them without outside assistance, seem likely to become even more pronounced in the future if local pressure on land and resources intensify and external funding sources become more difficult to access.

As illustrated in Figure 23, LMNP faces two significant financing gaps – the financial loss incurred to park authorities comprising the gap between park revenues and

expenditures, and the economic loss to local communities comprising opportunity costs over and above the local benefits accruing from LMNP. The combined value of these financing gaps is substantial at some US\$ 841 million a year (and would be nearly one and a quarter times higher if current community resource utilisation is unsustainable and had to be curtailed). For LMNP to be conserved in the future these financing gaps must be filled, so as to offset the expenditures associated with park management and to compensate local communities for the opportunity costs of conservation. The total costs and total benefits associated with LMNP must be balanced in a way which is both financially and economically sustainable.

The authorities of LMNP recognise this situation, and have had some success in their attempts to resolve it. The major problem is not however that recent community conservation efforts are misplaced, but rather that they cannot generate benefits to an adequate level to balance the high and recurrent costs of conserving LMNP. Park authorities have made significant advances in offsetting the local costs of conservation by engaging in development projects and community conservation activities. There is evidence that both community conservation awareness and relations between Park authorities and local residents have improved substantially since the initiation of community conservation activities. Given the conservation imperative and limited funds generated by LMNP, it is difficult to see how these activities could be increased or improved under current conditions. Likewise, there have been significant efforts made by park authorities to generate revenues for conservation through fishing and tourism activities. Again, under the *status quo*, it would be difficult to increase substantially the income earned from these activities.



6.4 Ways forward for closing financing gap and balancing the costs and benefits of conservation

A considerably more optimistic picture of future conservation possibilities for LMNP arises from an investigation of methods for closing the gap in financing needs. The main issue facing LMNP is to find new ways of generating benefits which will enhance the degree to which park conservation is financially and economically sustainable. This requires a series of additional and innovative approaches to balancing the costs of conservation.

Balancing the community opportunity costs of conservation requires a rethinking of the nature of park benefits. Development projects have clearly been an effective way of bettering park-people relations and improving community conservation awareness. Illegal park resource utilisation however shows less signs of having decreased as a result of community development activities (Marquardt *et al* 1994). Even if the overall level of funding to community development projects could be increased to a level which is commensurate with opportunity costs – which is unlikely, given the large value of the costs involved – this might not be an effective means of compensation. Local communities utilise park resources not because they lack basic infrastructure, but as a result of the need for natural resources and because some perceive that they have been unfairly excluded from lands and resources over which they have a right. While it is impossible to avoid local opportunity costs to conservation completely – the continued preservation of LMNP depends on controlling the exploitation of park resources and land – there is a clear need to generate benefits through increasing local rights and opportunities to sustainably utilise park land and resources and extending existing negotiated park access agreements.

Closing the financing gap in park management – by making more money available for community activities and for compensating opportunity costs – may require a more innovative approach to generating funds. The possibilities for increasing existing revenue sources are extremely limited. There are however a range of additional sources of funds and financing mechanisms which have great potential for contributing to LMNP conservation costs. If the conservation of LMNP gives rise to global benefits – as we must assume it does by virtue of existing donor support to the park, this justifies funding contributions from international sources. There may however be a need to move beyond conventional bilateral, multilateral and non-governmental donor programmes and projects. A range of new mechanisms have been developed for facilitating financial flows to conservation from international sources, some of which have been piloted in other National Parks in Uganda²⁴ – for example the Bwindi-Mgahinga Trust Fund and arrangements made between a Netherlands power utility and the Uganda Forest Department to channel funding for global carbon offsets. A range of other global mechanisms also exist for financing conservation, involving investment from international industry as well as from foreign governments – for example arrangements made concerning biodiversity prospecting, debt-for-conservation swaps and various forms of international compacts, credits and offsets (Emerton 1998). The potential for

²⁴ It is worth underlining that these financing mechanisms have given rise to some controversy in Uganda.

generating these types of funds, and their suitability to the situation of LMNP, bears further analysis.

If the conservation of LMNP gives rise to national benefits – as we must assume it does because it is a protected area which has been targeted by the Uganda government for conservation, this justifies funding contributions and cross-financing from other domestic sources. LMNP currently receives no central funding from UWA or from other private or public sector agencies. In addition to conventional budgetary support from central government, there are a number of private sector arrangements which can generate finance for the conservation of LMNP. Although such mechanisms have been applied with success in other parts of sub-Saharan Africa (see Emerton 1997, 1998) there has yet to be any significant entry of the private sector into wildlife management and financing in Uganda. Opportunities for private sector financing of wildlife conservation encompass both direct income-earning arrangements – for example participation in wildlife-based enterprises such as cropping, hunting or tourism, which can additionally be run in partnership with park-adjacent communities or with UWA – as well as measures which attract financial flows in the form of investment and charitable contributions. A range of incentives can be provided to encourage the private sector to invest, directly or indirectly, in LMNP. In addition to providing support to the development of opportunities for wildlife enterprise, such inducements as sponsorship and advertising deals, the provision of tax relief on contributions and the establishment of endowments, foundations and trusts to channel funding would undoubtedly make LMNP a more attractive investment option to the private sector.

7. CONCLUSIONS: BALANCING THE COSTS AND BENEFITS OF CONSERVING LAKE MBURO NATIONAL PARK

LMNP illustrates well the case of a wildlife protected area where conservation is primarily justified in terms of external, intangible benefits and yet gives rise to significant on-site costs. A common issue faced by protected area managers, exemplified by the case of LMNP, is that of how to generate sufficient on-site gains to balance the costs of wildlife conservation for park authorities and local communities. Rather than the low direct income-earning potential and high on-site costs of protected areas such as LMNP being seen as insurmountable obstacles to conservation, they should instead be viewed as a positive opportunity to set in place more innovative mechanisms to finance the gap between wildlife-related income and expenditure and to balance the costs and benefits of conservation.

8. REFERENCES

- AWF, 1998, *CCUWA Project Budget*, African Wildlife Foundation, Kampala
- Emerton, L., 1997, *The Economics of Tourism, and Wildlife Conservation in Africa*, Applied Conservation Economics Discussion Paper No. 4, African Wildlife Foundation, Nairobi
- Emerton, L., 1998, 'Innovations for financing wildlife conservation in Kenya', paper presented at 10th *Global Biodiversity Forum Financial Innovations Workshop*, Bratislava
- Howard, P., 1995, *The Economics of Protected Areas in Uganda: Costs, Benefits and Policy Issues*, MSc dissertation, University of Edinburgh
- Hulme, D., 1997, 'Community conservation in practice: a case study of Lake Mburo National Park, Uganda', *Community Conservation in Practice Working Paper No. 3*, Institute for Development Policy and Management, University of Manchester
- Infield, M., 1993, 'Local socio-economy and resource use', in Kamugisha, J., and Ståhl, M. (eds), *Parks and People: Pastoralists and Wildlife*, Regional Soil Conservation Unit/SIDA, Nairobi
- Kamugisha, J., and Ståhl, M. (eds), 1993, *Parks and People: Pastoralists and Wildlife*, Regional Soil Conservation Unit/SIDA, Nairobi
- Kamugisha, J., Ogotu, Z. and Ståhl, M., 1997, *Parks and People: Conservation and Livelihoods at the Crossroads*, Regional Soil Conservation Unit/SIDA, Nairobi
- Marquardt, M., Infield, M., and Namara, A., 1994, *Socio-Economic Survey of Communities in the Buffer Zone of Lake Mburo National Park*, Lake Mburo Community Conservation Project, Kampala
- Mason, P., 1995, *Wildlife Conservation in the Long Term: Uganda as a Case Study*, MPhil dissertation, Oxford University
- Monday, G., and Infield, M., 1993, 'The status of Lake Mburo National Park', in Kamugisha, J., and Ståhl, M. (eds), *Parks and People: Pastoralists and Wildlife*, Regional Soil Conservation Unit/SIDA, Nairobi
- Namara, A., Infield, M., and Sumba, D., 1998, *The Influence of a Community Conservation Programme on Farmers and Pastoralist Communities, Lake Mburo National Park Uganda: Report of a Socio-Economic Survey Carried Out under the Community Conservation for Uganda Wildlife Authority Project*, Uganda Wildlife Authority, Makerere University Institute of Social Research and African Wildlife Foundation, Kampala
- Potterton, A. and Rubagyema, P., 1998, *Field Notes from an Economic and Socio-Economic Survey of the Communities Living around Lake Mburo National Park, Uganda*, Penroche Development Services and Policy Research Group, Nairobi
- Snelson, D., and Wilson, A., 1994, *Lake Mburo National Park Guidebook*, African Wildlife Foundation, Nairobi
- Turyaho, M., and Infield, M., 1993, 'Attitudes of pastoralists towards Lake Mburo National Park', in Kamugisha, J., and Ståhl, M. (eds), *Parks and People: Pastoralists and Wildlife*, Regional Soil Conservation Unit/SIDA, Nairobi
- Turyaho, M., and Infield, M., 1996, *Pastoralists, Fishermen and Farmers In and Around Lake Mburo National Park: Changing Conflict into Awareness and Responsibility*, Community Conservation Discussion Paper No. 6, African Wildlife Foundation, Nairobi