Protected areas, poverty and conflicts
A livelihood case study of Mikumi National Park, Tanzania

Paul Vedeld [a,*], Abdallah Jumane [b], Gloria Wapalila [a], Alexander Songorwa [b]

[a] Noragric, Norwegian University of Life Sciences, Box 5003, N-1432 Ås, Norway
[b] Faculty of Forestry, Sokoine, Morogoro, Tanzania

ARTICLE INFO

ABSTRACT

This paper investigates livelihoods of communities around Mikumi, Tanzania's fourth largest national park, and impacts of living close to the park. People are very poor in the area, also beyond the areas close to the park. The average income is around 0.45 USD per person per day. People report food shortages in two out of the last five years. Even "the least poor group" earns no more than an average of 2 USD/cap and day.

Main incomes (80%) are derived from agriculture and non-farm incomes. There is a differential diversification pattern where poor people depend more on selling their labour within agriculture, while the less poor group depends more on non-farm activities. Environmental (forest and natural resources) incomes are low, compared to what is typically found in such rural areas, making up 6.3% of total incomes. Living close to the park incurs costs in the range of 2 to 20% of total household incomes, mainly through wildlife raiding crops and livestock; the scale depending on village location.

The study documents that attempts to reduce tensions between local people and the park through outreach activities yield negligible results compared to the costs people incur, and do little to reduce the conflict-ridden park-people relations.

Although the park may not necessarily be a "poverty trap", it must be seen as yet another and substantial constraint for people securing their livelihoods. Increasing land scarcity, population densities, income inequalities all imply mounting pressures that aggravate resource use conflicts. Furthermore, the present situation with external political interference in selection and implementation of outreach activities is not conducive to progress. Given that 24% of Tanzania consists of wildlife protected areas, much more focused, rights-based and location specific approaches should be developed to reduce losses, and to secure local people's rights to income from the parks and due compensation for accrued costs. People should have formal rights to access park resources that can be subjected to controlled, sustainable harvesting. The present park management culture in terms of attitudes, values and norms needs to change through training in how to work with local people. Such interventions would help reduce conflict levels.

1. Introduction

Global conservation of biodiversity resources through land protection has expanded from less than 1 million km^2 in 1970 to an estimated 12.2 million km^2 in 1997 (Zimmerer et al., 2004). With similar expansion up to 2008, the conserved areas may amount to about 17 million km^2 spread out over more than 100,000 areas.

The expansion process is driven by a complex set of actors and interests. A major contribution to the global policy architecture of protected areas has been engined by powerful lobbying groups such as the Nature Conservancy (NC), the World Wildlife Fund (WWF), Conservation International (CI), the World Conservation Society (WCS) and the African Wildlife Foundation (AWF). There are also global

actors and interests related to tourism. There is a global policy discourse on biodiversity governance where proponents of increased conservation support imposing more and stricter protected area management through a state led, authoritarian "stick and fence" or "Fortress Approach" to conservation (Oates, 1999; Terborgh, 1999; Sanderson et al., 2003; Du Toit et al., 2004; Wilshusen et al., 2002). This also presumes an alienation or separation of man and nature through often quite forceful displacement measures (Agrawal and Redford, 2009). They are confronted by proponents of a more deliberative policy style reflecting variants of participatory development and rights based approaches through park outreach activities, collaborative management and community conservation (Adams and Hutton, 2007; Goldman, 2003; Hutton et al., 2005; Cleaver, 1999). The critique against the Fortress is primarily that it did not deliver well even on biodiversity management, and much less so on livelihood and local benefits and reduced costs of the parks. The lack of deliverance of such public goods generated much conflict with local

* Corresponding author. Fax: +47 64965201.
E-mail address: palve@umb.no (P. Vedeld).

people, accruing substantial political costs in addition to substantial economic and social "law enforcement" costs for the parks themselves. Wilshusen et al. (2002) calls the Fortress position "operationally unrealistic" and "morally questionable". They still argue in favour of conservation but inviting for a discussion over how this can occur in different contexts.

A new wave of conservationists is increasingly arguing that wildlife cannot and should not have to pay its way. One also sees arguments that issues of poverty alleviation should not be linked to protected areas or to see poverty as a critical constraint on conservation (Terborgh, 1999; Brandon et al., 1998). A third approach argues more critically that parks should not in any way increase poverty while a fourth position is more progressively to see sustainable use conservation strategies as a means to reduce poverty (Adams et al., 2004) .

But in practise, strict conservation and protected area policies still expand and the international conservation organizations and donors such as USAID and DFID (Hutton et al., 2005) find support partly within national states' actors who share their environmental concerns, but also with actors holding substantial economic interests in advocating protected areas as a vehicle for expanding tourist activities and incomes (Brockington and Igoe, 2006). Tanzania has at present 1 million international visiting tourists (10 times that of 1990) and the contribution of tourism to GDP was 17.5% in 2006 (Gereta, 2010).

The sector depends on a well-functioning system of protected areas containing wildlife. Tanzania is one of the most wildlife-rich countries in the world. Currently 24% of Tanzania's total land is made up of wildlife protected areas (PAs), of which 17.4% comprises 15 national parks and 34 game reserves (GRs).

The protected area policy comes at a cost as the present strategy is to exclude and deny local people rights and access to the areas. Rural people traditionally depend on environmental incomes for their livelihoods. As much as 15 to 25% of rural household incomes in countries such as Tanzania are typically derived from fuelwood, timber, fodder, grazing and various site specific non-timber forest products (Vedeld et al., 2007).

Protection policies at national and local levels thus emerge as trade-offs between state, public and local rural communities interests, as the policies restrict access to land and other resources vital to rural communities. The resulting challenging trade-offs reflect existing power relations and display particular patterns of benefits and costs accruing to different actors.

In this meeting, however, local people often perceive wildlife conservation as imposing legal constraints rather than offering economic opportunities (Shemweta and Kideghesho, 2000). Local communities typically receive little incomes but substantial costs related to eviction and exclusion, crop and livestock losses and experience a general deprivation of resource access (Brockington and Igoe, 2006). They estimate that 55.7% of Tanzania's present protected areas (PAs) have been through evictions, starting in the 1920s, with a peak period from 1950 to1970 with the evictions from Tarangire, Mikumi and Manyara National Parks. It still goes on today in park expansion processes.

The task of protecting wildlife further compounds as population growth, agricultural export production, biofuel projects, carbon sequestration programmes and forest plantations increase. All contribute to increased land access scarcity and higher values/prices on remaining land, forests and environmental resources. This leads to increased resource pressures on PAs through grazing, increased poaching, agricultural encroachment, land conversion and deforestation/degradation. Options are constrained and protected areas become land under siege (Songorwa, 2004). Various pressures also emanate from animals in national parks, through herbivores that graze and raid crops, and carnivores that prey on livestock outside park boundaries. The result is often loss of life and property of rural people (Gillingham and Lee, 2003). Such losses represent a major challenge to management authorities.

Following the expansion of protected areas, the increasing demands for land for other purposes and increasing consciousness and ability to organize local resistance has led to claims for protected areas to deliver more than biodiversity. Public goals have become increasingly multifunctional; more employment and local benefits, improved political acceptability and local involvement, improved relations with local authorities and social legitimacy among local stakeholders, not least the local communities (Naughton-Treves et al., 2005).

This paper uses Mikumi National Park as a case to discuss issues over sustainable development or ecological modernization (Vedeld, 2002). How do local people construct their livelihoods, what are income scales, distributions and sources, how are environmental and park related incomes integrated in livelihood strategies and how does the park offer benefits -and costs in this context. From this, how can one in the future secure a reasonable trade-off between biodiversity conservation and concerns for rural people's livelihoods so that parks do not become poverty traps? What are the main causes of the economic conflicts and what would be reasonable recommendations?

2. Theory and methods

2.1. The sustainable livelihood approach

We apply the Sustainable Livelihood Approach (SLA) (Chambers and Conway, 1992; Scoones, 1998; Ellis, 2000), a model based on contextualized household economic models. We assess people's livelihood assets and how various social relations, institutions, organizations, policies and shocks modify access to and ability to convert these assets into livelihood outcomes (Fig. 1).

We also utilize insights from the environmental income literature (Sjaastad et al., 2005) in analysing access to protected resources, effects of constrained access, absolute and relative environmental incomes, sources of incomes, and how different groups of households utilize these resources in diversification strategies (Vedeld et al., 2007).

2.2. Poverty, traps and environment

The livelihoods approach to poverty allows for a broader focus — understanding poverty in its *structural context*, rather than viewing poverty as individual failures to access and/or use assets. Poverty emanates from social structures and institutions, from unequal power relations and from contextual factors and trends beyond individual household control. Nevertheless, poverty has a direct impact on the people's ability to secure a stable and predictable means of survival. There are many factors beyond individual household control that impact heavily on households' survival and livelihood strategies and the extent to which they remain in poverty, escape from it, or descend deeper into poverty. Such factors include exposures to world markets and prices, structural adjustment programmes and contraction of the public sector, bad governance and corruption, war and unrest, droughts, land contraction through protection of areas, increased export production, climate change and land protection, amongst others.

One strength of the SLA is that it recognizes human agency and examines how household livelihood strategies are built around protecting, substituting, increasing and using assets to produce security and achieve other goals. The SLA enables analysis of the complex connections between diversification and poverty. It is often found that non-poor households tend to diversify when the options outside their main agricultural activities are more profitable, whereas poorer households diversify most often due to lack of alternatives, or in order to utilize their household assets (i.e. labour) more fully. In areas where there are profitable off-farm or non-farm options or where the level of remittances (in particular international remittances) is particularly high, inequality often becomes more
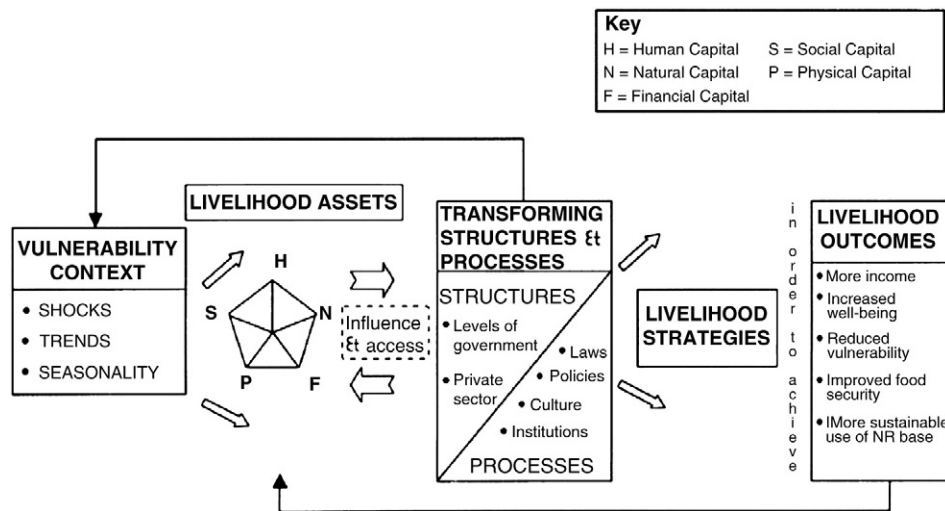
Fig. 1. The sustainable livelihood approach (from Ellis, 2000).

entrenched. In other cases, diversification may lead to less income disparity, because poor people, not being able to utilize all the resources on their farm, can supplement their income through off-farm activities, thus reducing risks and avoiding problems such as seasonality, among others (Ellis, 2000).

A *poverty trap* is a situation where poor people find themselves with little capital, trapped in poverty and with the ratio of capital per person actually falling over time even from generation to generation (Sachs, 2006). In more recent times, a broader poverty trap concept has been developed in relation to an SLA approach where capital, social relations and power, institutions and organizations, policy trends and shocks, and the variety of outcome options are seen to interact, forming prosperity options or poverty traps. Missing and imperfect markets but also other institutions and service providers — "dysfunctional institutions" — critical thresholds and social relations are often flagged as important causes of poverty traps (Bowles et al., 2006).

In this cross-section study we do not have time-series data, and analysis of poverty traps is carried out through comparisons of household groups in different socio-economic positions. They face different economic possibility sets; where especially lack of assets becomes important reasons for poverty or for avoiding entering poverty adaptation paths.

Adams and Hutton (2007) outline possible causal relations between conservation and poverty; they can be seen as independent policy realms; or seen as interlinked policy fields where conservation increases/reduces poverty or where poverty reduction either enhances or threatens conservation.

2.3. Conflict theory

The main material conflicts that occur in protected areas are evictions, removals and resettlements, exclusion from resource access and use, costs accrued from damage by wildlife on crops and livestock, threats to human life, health and property, insufficient share of park generated incomes, distribution of what is allocated and the disparity between costs and benefits accrued to different groups. In this paper we concentrate on material aspects of conflicts while reflecting on links to normative and ideological conflicts (see also Adams and Hutton, 2007).

2.4. Study area description and sampling

Mikumi National Park was established as a Game Controlled Area in 1954, following the highway construction from 1951 to 1954 (Fig. 2). This opened the area to professional hunting. It was

proclaimed a National Park in 1964 (1070 km^2) and extended by 2130 km^2 in 1975. Mikumi is the fourth largest park in Tanzania, covering an area of 3230 km^2. It had around 28,000 visitors in 2005/06. The park is located in eastern Tanzania, in the Morogoro region, 283 km west of Dar es Salaam and shares boundary in the south with Selous Game Reserve (TANAPA, 2007).

Mikumi and Selous constitute one ecosystem where animals migrate. Mikumi National Park (MINAPA) supports a variety of mammals (60), more than 300 bird species and more than 1200 registered plant species (Hawkins and Norton, 1998). The park contains diverse ecozones: miombo woodland in the south, arid bush land in the north, a coastal zone in the east and a mountain climate in the east and west (Hawkins and Norton, 1998). The annual rainfall is about 750–850 mm. Mikumi may be seasonally flooded in the Mkata floodplains in the centre of the park. These ecological differences are also reflected in different production systems, in different park resources and in different problems with local people around the park and is reflected in our location-specific analyses.

The population growth rate in the districts is 2.6% per year and the population density is around 25–35 people/km^2 (TDC, 2002).

The main livelihood activity for most villagers is small-scale extensive farming and cultivation is found up to 500 m from the park (Gunn, 2009). The farming system is mainly monoculture with some mixed farming (maize and beans). The majority of the farmers are subsistence oriented, selling their excess crops. Major cash crops are tomatoes, sugarcane, coconut, sesame and tobacco. Maize, beans and rice are main staple food crops. Livestock is not important due to diseases. Poultry was commonly observed, although repeated outbreaks of disease also affect this activity. Non-farm activities like making mats and bricks, tailoring, shop-keeping, running coffee shops (*mgahawa*) and brewing local beer, were also observed.

This study was conducted in five out of the eighteen villages bordering the park, located in the three rural districts surrounding Mikumi: Mvomero, Kilosa and Morogoro. The five selected villages are located in two different climatic areas. Differences in climate influence ecological conditions and economic activities, especially in agriculture.

2.5. Methods

Quantitative and qualitative data were collected at household and village level from October to December 2007 (Wapalila, 2008) and additional information regarding conflicts was collected in 2009–2010. Primary data were collected using a household questionnaire with both closed and open-ended questions, administered to household heads. Twenty five households were randomly picked in
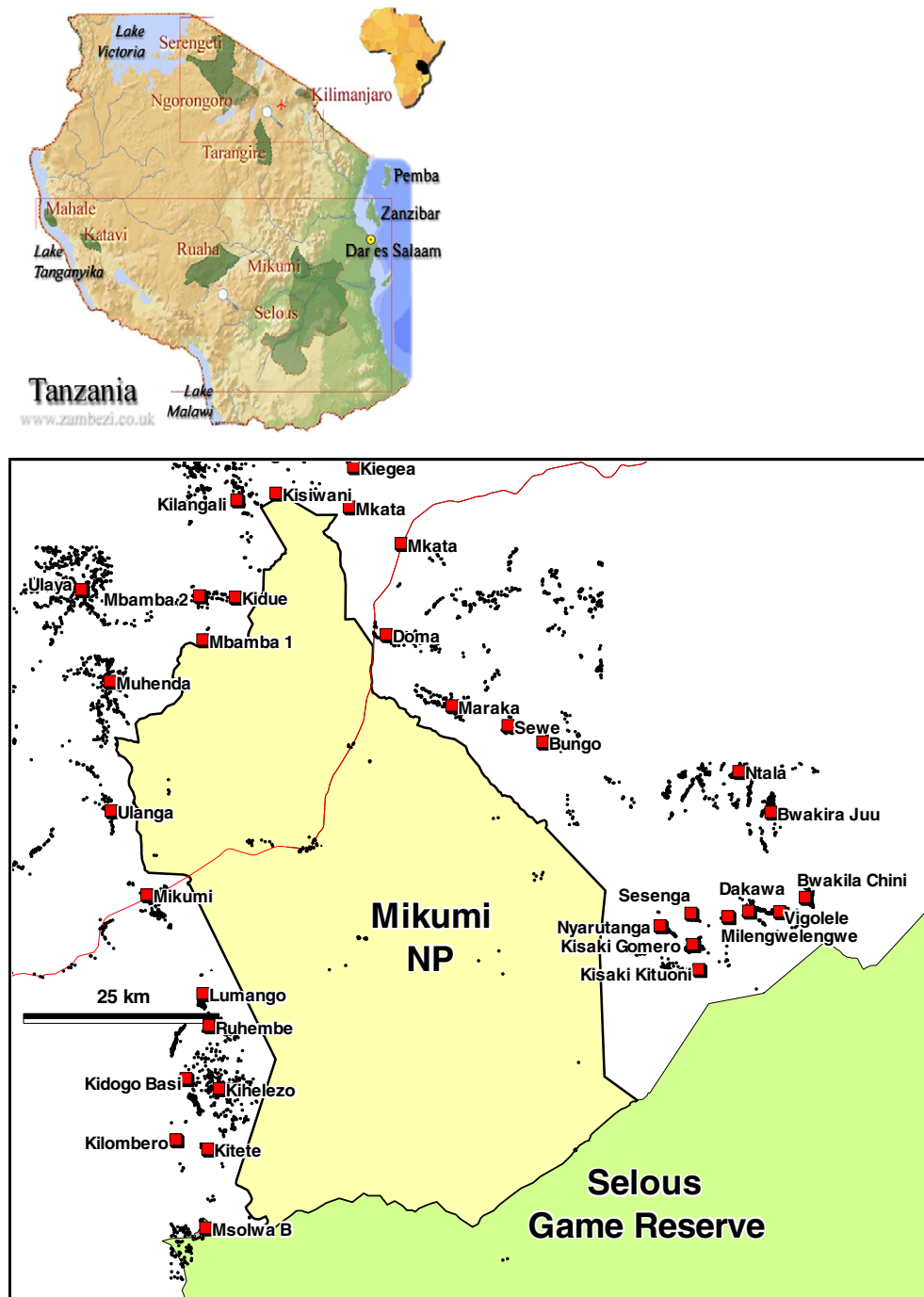
Fig. 2. Map of Tanzania and study area villages.
(Source: Zambezi website, 2008 and TANAPA, 2007).

each of five selected villages in areas around the park. The villages were selected based on different ecological zones and different distance to park headquarters and the main highway, factors thought to impact livelihood adaptation.

We also used focus group discussions with key informants and physical observations by several research staff members. A separate investigation was carried out on benefit sharing programmes in Mikumi and Kilimanjaro parks (Nyeme and Nilsen, 2010).

Total incomes are defined as the sum of cash and subsistence incomes, using reported and local market prices. Measurement of crop and livestock losses is based on results from the household survey, using local market prices to assess the economic value. There is

clearly a risk of households' exaggerating losses, but attempts were made to qualify answers and also to stress that this was research and not any compensation assessment. We also compared results with similar research from Mikumi (Gunn, 2009; Gunn et al., 2005; Gillingham and Lee, 2003). The environmental income is basically based on reports from people. However, we only reported sales of fuelwood in the survey. In addition we therefore estimated an annual fuelwood subsistence consumption and added this to the fuelwood income using local market prices. It proved difficult to get people to report where (park or not park) they took resources from.

The data was analysed through descriptive statistics and by using analytical models, through the software packages SAS JMP and SPSS.

3. Results and discussion

3.1. Household livelihood assets and outcomes

Arable land is quite scarce in the area and people are generally resource-poor (Table 1). The average household controls around 4.2 ha of land, while 19.3% of households do not own any land. The average household consist of 5.4 members with low education levels (average 5.2 years of schooling for head of household). Most households are male-headed and around 75% of heads of households are married. Splitting the sample by income levels, three wealth groups display significantly different properties concerning marital status, sex of head of household, size of household as adult equivalent units and as total members of households, house asset value and total income (Table 1).

In order to investigate the relationship between *total household income* and asset access, we ran a multiple regression with total household income against socio-economic variables of the household. This yielded a statistically significant overall model, but only the asset value and size of own land were statistically significant. Using an aeu adjusted income per capita gave similar results.

Using an ordinary least square model for *total environmental income* against socio-economic characteristics of the households, we found that households with more members, less land (own), and with lower household asset values have statistically significant higher total environmental incomes (Table 2). There is also a tendency that older household heads with more education have lower environmental incomes.

3.2. Diversification by income sources, wealth and type of environmental resource

3.2.1. Diversification by income sources

Agricultural (41.6%) and non-farm (38.4%) incomes contribute most to total household incomes (Table 3).

Households acquire their food primarily by means of their own production. Over 71% of the crops were grown for subsistence use. Table 3 shows that agricultural production was the most important income source for both the poor and less poor income groups. The reported non-farm incomes relate to businesses, small shops, food vending (*mgahawa*), local beer brewing, crop businesses, handicrafts, tailoring, carpentry and also formal employment as teachers, nurses and pensions. Off-farm incomes (9.2%) relate to working on other people's farms using own labour in agricultural related activities.

Reported environmental activities contribute 6.3% to total household income, from both inside and outside the park.

The differences in income sources between the three wealth groups are statistically significant. Poor households have lower total

Table 2
Total environmental income by socio-economic characteristics, Mikumi National Park, Tanzania, 2007.

Variable	Coef. Estimate	Std Error	t ratio	Prob>|t|
(Constant)	74,264.732	74,508.366	.997	.321
Sex head of household	4248.092	24,243.630	.175	.861
Age head of household	−1544.787	852.342	−1.812	.073
Marital status	−4584.829	10,267.517	−.447	.656
Education household head	−7628.733	4387.361	−1.739	.085
Size household	10,384.854	4729.038	2.196	.030
Consumer producer ratio	−18,172.777	52,535.729	−.346	.730
Own land size	6148.826	2501.187	2.458	.015
Size of hired land	−5392.617	11,141.009	−.484	.629
House asset value	.015	.006	2.311	.023

n = 124; R squared = 0.201; R squared adj = 0.138; DF = 123; F = 3.190; P<0.002.

income from any source (except remittances) compared to the less poor group, and lower income shares from non-farm activities. They depend more on agriculture in particular and have less access to non-farm activities.

Remittances (4.4%) are received mainly by parents of urban migrants — older people living at home with their grand-children. Remittances are relatively speaking slightly higher among poor households. Livestock is scarce and economically speaking not very important. Most households do not keep large ruminants. Chickens, goats and pigs dominate livestock income.

3.2.2. Diversification by environmental resource and wealth group

We found little variations in the composition of environmental income sources between different wealth groups. Fuelwood is the dominant environmental income source (Table 4). About 90% of rural people rely on biomass energy for traditional cooking and have little or no access to electricity and gas (LPG).

Few high-return forest activities like logging, timber or formal employment were recorded. Households with grass thatched houses and non-cemented floors periodically collect forest soil and thatching grass for maintenance of their houses, but it does not amount to much incomes. Most environmental resources are collected outside the park. Of the 20 respondents who were willing to answer our questions on where they collected fuelwood, 8 reported to use the park. For other products, few mentioned the park.

3.2.3. Diversification, cash needs, safety nets and accumulation strategies

Diversification involves more than households choosing types, numbers and scales of various income generating activities. Their cash and subsistence needs also require particular strategies, as does facing particular unexpected events. These patterns also reflect differences between income groups and when investigating the

Table 1
Socio-economic assets of different wealth groups, Mikumi National Park, Tanzania, 2007.

Household	Poor	Medium	Less poor	Sample mean	Max(min)
Socio-economic factors	(n = 42)	(n = 41)	(n = 41)	(n = 124)	Values
Age household head	47.6	43.2	43.0	44.6	84(18)
Married (%)*	88.1[a]	68.3[b]	68.3[b]	75	–
Female hh. head (%)*	2.4a	17.1b	9.8c	9.7	–
Education hh. head (yr)	4.8	5.2	5.7	5.2	11(0)
Size household*** (aeu)	5.7[a]	4.8[b]	3.4[b]	4.6	11.3(0.72)
Total hh. members*	6.5[a]	5.7[a]	3.9[b]	5.4	15 (1)
Consumer worker ratio	1.7	1.9	1.7	1.7	3.96(1)
Own land size (ha)	1.6	1.8	1.7	1.7	12.1 (0)
Size of hired land (ha)	0.2	0.3	0.3	0.3	1.6 (0)
No own land (%)	16.7	22.0	12.2	16.9	–
House asset value (TSh)***	118,876[a]	117,601[a]	398,534[b]	210,922	3,200,000(0)
Total income ***	89,547[a]	180,807[b]	533,749[c]	266,595	1,517,134

USD1 = TSh 1200 * = significant difference between some of the three categories (F-test). *P<0.05; ***P<0.01.
a,b,c, Bonferroni test; groups with different letters are significantly different from each other (p<0.05).

Table 3
Sources and relative importance of mean annual incomes across wealth groups, Mikumi National Park, Tanzania, 2007.

Income source	Poor (n = 42)		Medium (n = 41)		Less poor (n = 41)		Total (n = 124)	
	Income (TSH)	%	Income (TSH)	%	Income (TSH)	%	Income (TSH)	%
Non-farm***[+]	28,803[a]	32.2[a]	78,346[a]	43.3[b]	202,095[b]	37.9	102,482	38.4
Agriculture***	39,061[a]	43.6	63,174[a]	34.9	232,610[b]	43.6	111,030	41.6
Environmental	6571	7.3	6691	3.7	37,153	7.0	16,722	6.3
Remittances	7277	8.1	9673	5.4	18,707	3.5	11,849	4.4
Off-farm***	7834[a]	8.7	22,923	12.7	43,184[b]	8.1	24,511	9.2
Total inc.***	89,547[a]	100	180,807[b]	100	533,749[c]	100	266,595	100

USD1 = TSh 1200. (Aeu TSh/cap).
*= significant difference between some of the three categories (F-test). *P<0.05; ***P<0.01.
[+] = significant difference between some of the three relative income categories [+]P<0.05; [+++]P<0.01.
a,b,c, Bonferroni test; groups with different letters are significantly different from each other (p<0.05).

Table 4
Environmental income sources and wealth groups, Mikumi National Park, Tanzania, 2007.

	Poor (n = 42)		Medium (n = 41)		Less poor (n = 41)		Total (n = 124)	
Environmental resources	Income (TSh/cap)	% of total	Income (TSh/cap)	% of total	Income (TSh/cap)	% of total	Income (TSh/cap)	% of total
Fuelwood	6488	98.7	6291	94.0	36,811	99.1	16,449	98,4
Fodder	51	0.8	0	0.0	32	0.1	28	0,2
Fishing	19	0.3	28	0.4	42	0.1	30	0,2
Thatch grass	0	0.0	71	1.1	74	0.2	48	0,3
Poles	12	0.2	114	1.7	0	0.0	42	0,2
Medicine plants	0	0.0	0	0.0	32	0.1	11	0,1
Timber	0	0.0	188	2.8	0	0.0	62	0,4
Wild meat/birds	0	0.0	0	0.0	161	0.4	53	0,3

USD1 = TSh 1200.

sample further, a picture of social differentiation in the villages emerges, emanating from the patterns of diversification. We find a Gini-coefficient of 0.5 indicating skewed distribution of incomes.

Some few households may seem to be more able to establish some kind of "pathway out of poverty" resembling strategies. There is a group of 10% of the households holding some 38% of total incomes. They control more land, have higher education levels, and more access to labour and their asset values are 10 times higher than the average household. Their strategies involve much higher incomes from both agriculture and non-farm activities, and also higher total incomes from the other activities (Table 3). We have not studied the group's changes in adaptation and incomes over time, and this group, though much higher on income, still only nets around 2USD/cap (aeu) and day, so if the unequal adaption and distribution actually reflects a "pathway out of poverty" can clearly be discussed.

At the other extreme, a group of the 13 poorest (10.5%) hold less than 1.9% of total incomes (average of TSh. 48 966). This group consist of older, more female headed households, lower education levels, larger household sizes, less own and hired land. All sources of income are low. Relatively speaking, they depend more on agricultural incomes, environmental incomes and remittances.

Environmental incomes contribute around 6.3% of total household income (Table 3). Thus, environmental incomes cannot be said to constitute any substantial livelihood strategies for cash or total income for any group of households. A group of 14 (11.2%) of the households with the highest environmental incomes, have much less own land, more are landless and they report to hire more land. The group still has higher total incomes than the average (32% more) and especially more from remittances, off-farm activities— and environmental sources. Land ownership may thus not be decisive in defining individual households' income levels.

In line with this, we find that the 16.9% who do not own land do not have *extremely* low incomes (Tsh. 201 270). This is around 75.5% of the total sample average income. They have a higher share of income from non-farm activities (54.1%), but they also hire land (2.3 ha) and make some 25% of their total income from agriculture.

3.3. Environmental income dependence

3.3.1. Relative environmental income

We ran a multiple regression model of *relative environmental income* against socio-economic properties of the household, and found that lower education levels of the head of household, older household heads and households with hired land, all depend significantly more on environmental income (Table 5). Lower education levels are often found to correlate with higher dependence as less income options are available and older household heads control less labour resources to go to the forests and therefore often have lower dependence as is more generally documented (Vedeld et al., 2007). People with hired land tend to depend more on environmental incomes often because they have less resources. We also found that people in areas with more forest access utilize these possibilities and resources.

3.3.2. Location, access and dependence

"Location" as a nominal variable represents environmental, climatic, agro-ecological, ethnic, socio-cultural and political conditions, involving different social institutions, values and norms that often

Table 5
Relative environmental income by socio-economic characteristics, Mikumi National Park, Tanzania, 2007.

Variable	Coef. est.	Std Error	T ratio	Prob>|t|
(Constant)	.173	.053	3.246	.002
Sex of head of household	.003	.015	.195	.846
Age of head of household	−.001	.001	−2.787	.006
Marital status	−.021	.017	−1.246	.215
Education head of household	−.007	.003	−2.669	.009
Size household	.003	.003	.927	.356
Consumer producer ratio	.007	.033	.212	.833
Own land size	.000	.002	.245	.807
Size of hired land	−.013	.007	−1.814	.072
House asset value	.000	.000	−.888	.376

n = 124; R squared = 0.136; R squared adj = 0.068; DF = 113, F = 1.98; P<0.047.

Table 6
Assets distribution in villages around Mikumi National Park, Tanzania, 2007.

Household socio-economic factors	Doma	Mikumi	Ruhembe	Kihelozi	Gomero	Sample mean
Female head of hh. (%)	8.0	8.7	4.0	7.7	20.0	9.7
Age, head of hh. (yr)*	43.2[a]	55.0[b]	45.0	41.5[a]	39.5[a]	44.6
Married (%)	76.0	82.6	88.0	61.5	68.0	75
Education,head of (yr)*	6.4[a]	5.0	5.1	5.6	3.9[b]	5.2
Size household (aeu)*	4.0[a]	5.9b	5.2	3.9[a]	4.3[a]	4.6
Total hh members*	4.5[a]	6.5[b]	6.4	4.6	5.2	5.4
Consumer worker	1.6	1.6	1.9	1.7	2.0	1.7
Own land size (ha)	1.9	2.1	1.8	1.6	1.3	1.7
Size of hired land (ha)	0.3	0.1	0.2	0.4	0.4	0.3
Landless share (%)	8.0	13.0	12.0	26.9	24.0	16.9
House asset value (TSh.)*	284,635	430,605[a]	810,819[b]	119,462[b]	160,059	210,922

USD1 = TSh 1200; n = 124; * indicates significant differences between the assets categories (P<0.05).
* = significant difference between some of the three categories (F-test). *P<0.05; ***P<0.01.
a,b,c, Bonferroni test; groups with different letters are significantly different from each other (p<0.05).

impacts resource use patterns. Location reflects factors that have impacts on both production and consumption decisions of households and will often correlate with outcomes from households across location.

We also find differences between villages around the national park relating to assets such as household size, age, sex and education levels of household heads, as well as the value of their houses (Table 6).

The total household incomes are not significantly different between the villages. Households in all villages rely on agriculture and non-farm activities to sustain a (meagre) standard of living (Table 7).

We further see that the diversification patterns vary by location and that the sum of environmental, remittances and off-farm incomes are higher in Gomero and Mikumi. Ruhembe and Kihelozi have higher agricultural incomes as they produce sugarcane, where organised producers have access to credit and to controlled market outlets through agreements with sugar companies. Off-farm labour for others (*vibarua*) is clearly not popular, but conducted on a needs basis. It is more common in Ruhembe and Kihelozi where agriculture is more important. In Gomero, people access the Selous game reserve for resources and report somewhat higher environmental incomes.

"Location" is thus a composite variable requiring careful analysis. There are factors other than the "access" dimension of the location variable that impact adaptation and diversification patterns. Even short geographical differences are sufficient to generate substantial and complex adaptation differences in general and among different socio-economic and cultural/ethnic groups. This has further implications for park management sensitive to locality and context.

3.4. Institutional constraints to improved livelihoods

Apart from the park as an institution, organisation and substantial land and resource owner, there are also other local institutional and organisational conditions beyond the direct control of individual households that impact on people's ability to secure their livelihoods. We cannot go in details on this here, but some important issues could be mentioned;

- Land access and tenure policies are major challenges. 16.9% do not own land at all, and depend on hiring land.
- The quality of public transport, infrastructure, market access and degree of market imperfection is a widespread constraint for production and marketing
- Local people "meet the state" in terms of general public service performance failures, not only in agriculture, but also in bad health and education offers, low access to clean water and expensive electricity
- People also meet corruption and inefficient public management and resource use in local governance (see Ellis and Mdoe, 2003).

Institutional failures that constrain income enhancement strategies are not only found in the public sector. The private sector is featured by imperfect markets and asymmetric power relations; where prices on inputs and outputs and conditions for transactions and market access do not favour weak and disorganised local people and communities.

We now move to Mikumi National Park itself and how it forms both enabling and constraining frameworks for local people.

3.5. Benefits of living close to the park

3.5.1. Direct benefits

Accessing resources directly from the park is carried out in clandestine ways, making it difficult to assess- and to measure. Poaching is substantial, given park staff reports (more than 60% claim it is a problem) and their activities (64% work in the Protection Department), but the economic scale of poaching proved difficult to assess. It would be worth an in-depth study beyond the scope of this work (but see Kvalvik and Bitariho, 2011).

Table 7
Location by annual household income sources, Mikumi National Park, Tanzania, 2007 (TSh).

Income source	Doma		Mikumi		Ruhembe		Kihelezo		Gomero		Total	
	Income (TSH)	%	Income (TSH)	%	Income (TSH)	%	Income (TSH)	%	Income (TSH)	%	Income (TSH)	%
Non-farm	124,271	46.0	103,272	43.2	75,989	29,8	89,477	29.6	119,985	45.5	102,482	38.4
Agricultural[+]	120,881	44.8 [a]	74,787	31.3	130,415	51,1	162,499	53.8	61,611	23.4 [b]	111,030	41.6
Environment	4480	1.7	17,611	7.4	9944	3,9	13,147	4.4	38,643	14.7	16,722	6.3
Remittances[+]	3072	1.1[a]	17,005	7.1 [b]	2584	1,0 [a]	0	0 [a]	37,469	14.2	11,849	4.4
Off-farm[+]	17,178	6.4[a]	26,248	11.0	36,204	14,2[c]	36,765	12.2	5818	2.2[a]	24,511	9.2
Total	269,882	100	238,923	100	255,136	100	301,888	100	263,519	100	266,595	100

USD1 = TSh 1200; n = 124; * indicates significant differences between the assets categories (P<0.05).
+ = significant difference between some of the three categories (F-test). *P<0.05; ***P<0.01.
a,b,c, Bonferroni test; groups with different letters are significantly different from each other (p<0.05).

The reported direct resource benefits from the park areas constitute a small share of the reported environmental incomes (5.6% of total incomes). Most areas have sufficient fuelwood outside the park and grazing is also carried out outside the park.

Very few local people work directly for the park as also observed by Haslerig, 2000.

3.5.2. Indirect benefits

There are some, but reported few sales of handicrafts to tourists, as well as some hosting of visitors and researchers. These opportunities may benefit Mikumi village more than the other villages as Mikumi is situated along the highway and close to the park.

Another indirect benefit could be local people visiting the park, but this is not reported by the households in the sample. Haslerig, 2000 found for three parks in Tanzania, including Mikumi, that 93% of local people has never visited the local park. However, with the highway running through the park, more Tanzanian probably get to view wildlife here than in any other park in Tanzania.

We find indirect benefits to be low. It could be that some of the non-farm incomes found in Mikumi and Doma may relate to the park, but as stated earlier, we find that most non-farm incomes are *not* park related. They are more related to Mikumi being a transport junction. (We are investigating this further in a separate job multiplier study).

3.5.3. Benefit sharing programmes

Since the present policy and legal frameworks do not allow for compensating farmers, various benefit sharing programmes have been launched as alternatives. Such programs involve a "consolation" principle, as opposed to more formally rights-based compensation. The Support to Community Initiated Projects mechanism (SCIP) was established in 1992. It includes a range of benefit sharing community programs initiated by the park and developed together with local communities, jointly financed and implemented.

According to the General Management Plan for Mikumi 2007–2017, SCIP allocations have amounted to more than USD 330 000 since its inception in 1994, or some 25,000 USD/year on average (TANAPA, 2007). The local communities contribute 30% in principle: 20% in manpower and local materials and 10% in monetary contributions. Support have been given to 32 projects; each project receiving an average of USD 8000. The projects involve building schools, classrooms and dispensaries, providing drinking water, a ward level bank building and even a police station! The initiative encountered several challenges:

– A project costing USD 8000 or around TSh.10 million to a village with 1000 people constitutes Tsh.25 per person per day, which in essence is negligible
– Decisions about project content do not always reflect local priorities, such as the new police station in Doma or the primary school for park staff inside the park
– Target communities are often not receiving the funds. Five of 18 target communities have never received support, and 50% of all funds and 30% of all projects have been allocated non-target communities. Only 5 out of the last 10 projects were awarded to communities. Projects can be found up to 150 km away from the park. There is high level of external political interferences in project selection.
– Around 44% of the local people in the total sample do not know about these projects. If the intention is to bring "consolation", improved information and participation is crucial.

A major additional challenge apart from the factual allocation of funds is that MINAPA makes all decisions, control who that can apply, what will be funded and also how the funding is allocated. There are no clear, written criteria on these issues (see Nyeme and Nilsen, 2010). This also links back to the lack of awareness among local people as reflected above. It further points to that a policy ambition of SCIP improving legitimacy has major challenges. Finding ways to improve, rights-base and institutionalize participation is crucial in this context.

3.6. Conflicts and costs

3.6.1. Evictions and exclusion

Prior to the construction of the Morogoro–Iringa road, Mikumi was thinly populated. The existing roads were old slave and ivory trade routes. Mikumi town was established in 1914. A few Wasagala and Wavidunda tribes had settled in the valleys of Doma, Kikoboga and Mgoda, living off fishing, hunting and agricultural activities. When the road was opened in 1954, professional hunters increased the use of the natural resources (Balozi, 1989). A Game Control area was established in 1954. In 1960, the railway line linked Mikumi with other parts of Tanzania, further improving access to the area.

Mikumi National Park was established in 1963 and some 70 indigenous peasant families were compensated and then resettled in nearby villages of Maharaka, Mkata, Ruhembe, Mbamba and Mikumi (Balozi, 1989). There is little local recollection of the establishment of the park in 1963 and its effects on local people. Few people lived inside the area, but the park contained important dry season grazing lands for pastoralists, especially the Mkata plains.

With the expansion of the park in 1975, some 2139 km^2 was added to the park. These areas included Masai rangelands in the north and the Makuluwili Swamp as well as substantial land in the southern areas towards Selous Game reserve. Not much is known about evictions and exclusion from resource access following this expansion. An area of 2000 km^2 can potentially hold a substantial number of livestock, maybe in the range of 50–120 000 TLU, depending on dry season/wet season pasture relations, rangeland resource dynamics, livestock diseases, wildlife interactions etc. (URT, 2007). There has further been strong in-migration of people from the mountain areas surrounding Mikumi. Land is getting scarcer and 16.4% are now reported landless in our study area. People report low environmental incomes compared to other research where around 22% of total rural incomes are environmental incomes (Vedeld et al., 2007). This could imply severely constrained access, but also low livestock levels (less fodder need) and low prices of fuelwood due to ample supply outside the park could contribute to keeping environmental incomes comparatively low.

Little formal, written evidence and reports exist on the eviction scales and on applied compensation measures. We still learned from our fieldwork that little compensations were paid, and there is little evidence of a well planned and formal process of resettlement. Local people in focus groups around the park, key informants within the park, retired officials and also researchers would repeatedly report this. In focus group interviews we found that the expansion did bring substantial costs to local people. About 10% of the local people also complained about park staff harassment in the process and that they were involved in boundary disputes etc. And regardless of formal rights and reasons, it is still so that people felt strongly about being deprived of park resource access, despite it taking place 35 years ago. We interpret the fact that this process is not forgotten by people as a rather strong reason for the continued resentment and conflicts between people and the park authorities as the state representatives long after the "new park" boundaries should have been settled and accepted.

3.6.2. Wildlife induced damage

With these historical processes as a backcloth, major problems caused by park wildlife to people's crops, domestic animals and human life tend to be reinforced. Some 93% of households reported that they have been affected by crop raiding losses, resulting in an average loss last year of 7.4% of total farm incomes and 4.1% of total

Table 8
Reported wildlife induced costs of being close to Mikumi National Park in 2006/2007, Tanzania, 2007.

Village	Farm income lost	Crop losses (TShs)	Poultry losses (TShs)	Costs incurred (TShs)	Farm income lost (%)	Total income lost (%)
Doma	96,400	96,000	0	400	22.6%	10%
Mikumi	80,000	78,750	0	1250	17.5%	6.2%
Ruhembe	10,760	10,640	120	0	2%	1%
Kihelezo	25,080	24,480	0	600	4.6%	2.6%
Gomero	6120	6120	0	0	2.7%	0.7%
Sampleav.	43,666	43,198	24	444	7.4%	4.1%

n = 124 (Source: Own field data 2007).

household incomes (Table 8). The variation in losses is substantial, where villages close to the park, like Doma and Mikumi, incur much higher costs than other sample villages. Distance to the park is statistically significant in relation to losses incurred. Newmark et al., 1994; Gunn et al., 2005 and Mbaruka, 1996 all report substantial variations in costs between surveyed villages.

The major costs are caused by elephants during peak harvest seasons, but monkeys and bushpigs are also problematic. Mbaruka, 1996 reports that 48% of households claimed that more than 75% of crop yields were severely damaged by animals.

Running an ordinal logistic regression of wealth groups against reported costs we find significantly higher costs among the poorest households. The difference is even more substantial when considering losses as a proportion of total income. The poorest households reported a 20% loss, the medium group 2.9%, and the less poor group only 1.2% of their total incomes. Possible reasons could be that the poorest have a much higher share of incomes from agriculture, prone to wildlife. It may also be that they have their land closer to the park, or even that they are poor because of the costs accrued. The last of the three possibilities is not likely, given the size of total costs in relation to total incomes. It could also be that marginal costs have a higher effect on the poor households and that they therefore exaggerate their costs more than the others.

There are some reports over time from Mikumi on human lives being lost. Mbaruka, 1996 reports that five people were killed in 1984 in Ruhembe, while two persons were killed by lions in Maharaka in 1986/89. One person was killed by buffaloes in 1994. Gunn, 2010 reports that 36 people were killed by lions in Mikumi in 1986.

3.6.3. Comparing costs and benefits

This paper does not offer a full-fledged cost–benefit analysis of the park for local people in order to assess total national economic effects of the park. People in the selected villages around the park have reported to lose on average some 4.1% of their total incomes (43,666 TSh/year). If there are 13,234 hhs in total around Mikumi in all 18 villages (reports from Tanzania District Councils, 2002), the total loss of income would be around 577.9 millionTSH or some USD 481,600 per year. These figures are highly uncertain for several reasons (validity, reliability, reporting biases, accuracy of census etc.). We still believe that they indicate something about the scale. By comparison, the support to outreach activities in Mikumi is USD 12,000 per year.

One could also compare these figures for direct costs for local people with Mikumi National Parks revenues and costs. The revenues for 2009/2010 were USD 489 000 whereas the TANAPA approved budget for 2009–2010-was around USD 1.3 million (MINAPA, 2010). Parks in Tanzania have a financial management structure where the annual cost budget is given from TANAPA centrally. All MINAPA incomes are transferred directly to TANAPA leaving little incentive for parks to increase their incomes or close the gap. TANAPA decides the final annual budgets for the parks, including the allocations to outreach activities (Kvalvik and Bitariho, 2011). Most parks in Tanzania at present are not profit makers! In a total economic analysis for the sector or for Tanzania as a country, the picture would be different as

tourism has substantial national and local multiplier effects and other incomes—themes beyond the scope of this paper.

The figures above are difficult to fully verify or fully trust, but we still believe they indicate something about the scale of at least three important issues;

1. The compensation offered through SCIP is insignificant relative to direct costs accrued by the park (some 2.5%).
2. The direct park costs accrued by local people constitute a substantial amount compared to what the government invests in the park in terms of their annual budget (some 44%). In these figures are not assessed additional indirect costs for households such as losses of resource access from the park (grazing, NTFP, water, land etc.). With some precautionary remarks about the quality of data then, we may argue that local people living adjacent to the park seem to pay as much as 50% of what the government does and they thus cover a substantial share of total park costs.
3. A park like Mikumi cannot pay its way on its own; especially if a policy ambition is to compensate local people properly. Such policy ambition would require a national thrust, where overall incomes from the net income earning parks and the tourism sector at large would be involved both in subsidising the less "profitable" parks and in compensating local people around all parks.

Apart from the economic impacts, costs also relate to how people feel treated by the park and its representatives. When people neither receives direct compensation, nor are allowed to take effective precautions or even retaliate against the wild animals, this alienates people from the park. From a human rights perspective, many people express feelings of helplessness and despair, and that they have lost legitimate rights to resources. They are further critical to the compensation they see offered as alimonies ("consolation").

3.7. The poverty trap debate and alternatives

People in the study area are very poor. Households in all three income groups report having experienced food shortages in two of the last five years. Sixty-two percent of households in the sample do not have secure food supply from year to year. There is a slightly higher and significant incidence of this lack of food security in Ruhemba and Kihelezi villages. People report a number of coping strategies such as selling crops, livestock, household assets, own labour and even borrowing money for consume.

To what extent can we say that the existence of the park constitutes a poverty trap for people surrounding the park?

We have seen that the park has substantial impacts on rural livelihoods: indirect costs in the form of loss of access to resources and loss of potential incomes from these resources, and direct costs from crop and livestock raiding which can result in income losses in the range of 10–20% of total incomes. However, rural people in Tanzania are generally poor and as such, the park does not constitute a *particular* poverty trap — you cannot become what you already are. Comparing the results from our survey in 2009 with our student (Mbaruka, 1996) work in the same areas, we observe changes in the following indicators: land size was 3 ha/hh (now 2 ha/hh), 13% landless people (now 16.9%), population density of around 20 people/km^2 in 1988

(now around 28), incomes outside agriculture of 47.5% (now 58.4%) and a Gini coefficient increase from 0.42 to 0.5 indicating that a segment of local people have become relatively speaking poorer. Our findings also indicates that relatively speaking, poorer people suffer more (costs) than the "less poor". These changes cannot only be attributed to the park. General policies on land and agricultural pricing of inputs and outputs leads to lower profitability in agriculture, a substantial in-migration and high natural population growth creates pressure on land access and livelihood generation possibilities. This is then reinforced by a park induced restricted resource access and the direct costs of crop raiding already mentioned.

Poverty is reflected in more than income and wealth levels. Using DAC-criteria (DAC, 2001), we find that the local people have very low education levels, high child mortality levels and there is a high HIV/AIDS prevalence. Politically, we find that people to some degree are allowed to voice opinions, but that they have little political power to realize their own interests in meeting with the state, district and local levels of governance and in encounters with park staff. The benefit sharing programme is one such example where local priorities are over-ruled by the park authorities and by outside politicians interfering in the priority processes. Concerning security, risks and vulnerability ("protective capital") there can be little doubt that the park existence in general increases these hazards. Socio-cultural capital (status and dignity) may also be negatively influenced by the park's rather dominant and militant proximity.

4. Conclusions and recommendations

Parks and other protected areas are established to solve challenges of biodiversity conservation, secure other environmental services and contribute to local livelihood improvements. As political measures and instruments, parks are notoriously imprecise in reaching these targets. Parks tend to live their own lives; they reshape and change the land use patterns and people surrounding the park. As a social institution and political construct, it both attracts and evicts people, changes relative prices, constrains resource access and alienates people from nature and alters rights and power relations. Modernization processes and tourism development has increasingly entangled parks and people in a modern market economy with capitalistic relations, where profit making and biodiversity conservation has priority especially relative to the interest of marginal displaced local people (Brockington and Holmes, 2010).

This paper has probed deeper into how the park actually affects the economic life of people surrounding the park, how people adapt and to what extent it constrains and/or adds to poverty among different groups of people.

4.1. Conclusions

People near Mikumi National Park have adopted various livelihood diversification strategies involving agricultural production (41.6%) and non-farm income (38.4%) generating activities. Remaining incomes are in the form of remittances (4.4%), non-farm employment (9.2%) and environmental income (6.3%). Income levels are very low, around USD 0.6 per person (aeu) per day. Even for the "least poor group" the average income is only USD 1.2 per person per day.

Poor households report lower total environmental income than the other groups, but higher dependence on such incomes (6.3%). Forest resources include fuelwood, fodder, thatching grass and soil for re-surfacing floors. A few households engage in fishing, acquire bush meat or involve in live bird sales. There is most likely an under-reporting on (clandestine) environmental incomes from the park.

We observe a pattern of differential diversification, where the poorest households depend more on agriculture, environmental income, remittances and off-farm activities, mostly in the form of

selling their labour to other farmers. The less-poor group earns higher incomes for all economic activities they undertake, with agriculture and non-farm as the dominant activities (81.5%).

The 10% highest household income group control 38% of all incomes and own more than 34% of all land in the sample.

The proportion of landless households is 16.9%. Their incomes are around 24.5% lower than the average, yet they are not the most destitute households. They hire land and have higher dependence on non-farm incomes (54.1%). All households in the sample are poor: the average income (per adult equivalent unit) for the "least poor group" is 2 USD/day. As such, any pathway out of poverty is relative and it is more a question of how far into poverty one can avoid sinking.

The main role of environmental income lies in filling current consumption needs of the households. The forest mainly provides supplementary income generating activities for households whose other opportunities are constrained. The extreme restriction of resource access experienced by households living near the park is a major constraint for improved livelihoods. Compared to similar studies, one would expect environmental incomes to be in the range of 20 to 30% of total household incomes in areas like this, and not 6.3% as found in this study (see Vedeld et al., 2007; Mamo et al., 2007).

Location influences the ability and willingness of households to engage in forest activities. Even short geographical differences (less than 50 km) generate substantial differences in adaptation both between and within communities. These adaptations are linked not least to forest resource access and park vicinity, but also to local climatic and agronomic conditions and local relative prices. This is essential knowledge in designing context sensitive, practical policies for outreach and participatory park management.

The present benefits of the park are not linked to direct resource access, but to indirect non-farm options available due to the park's existence. The present SCIP programme also involves community goods and services like dispensaries, police posts, primary and secondary schools and drinking water projects.

Wildlife crop raiding constitutes the key source of conflict, affecting 44% of the surveyed households last year. On average 7.4% of farm household incomes and 4.1% of total household incomes were reported lost. For many households, crop damages result in food insecurity. Considering costs by location, villages close to the park such as Doma and Mikumi reported 22.6% and 17.5% losses of their farm incomes respectively. The losses are socially differentiated i.e. the poorest group reported a loss of 20% of total incomes, while the medium group reported 2.9% and the least poor group only 1.2% of total incomes.

Putting these issues on scale we find that the compensation offered through SCIP is insignificant in relation to direct costs accrued by the park (some 2.5%). We further find that the total direct park costs for local people are large even compared to what the government invests in the park in terms of its annual budget

The park is not the main cause of poverty. While the park contributes to local poverty it will and cannot be responsible for total poverty alleviation. It could still contribute (more) to reduce costs and increase benefits for local people. The present situation reflects what Adams and Hutton (2007) refer to as "development that has failed the truly poor".

4.2. Policy implications and recommendations

The park and its staff are not popular with local people. The park needs to deliver more tangible benefits to local people and to treat them in a way that promotes long term partnerships. There must be a congruence between benefits and costs that accrue people. The majority of local people are interestingly not opposed to the park as such and 75% and 80% do not want it abolished (Newmark et al., 1993; Mbaruka, 1996). People offer economic reasons (national), ethical

reasons and even argue that the park facilitates presence of extension services to support their view. A basis thus exists for collaboration and conflict resolution.

4.2.1. Increase benefits

The Community Conservation Services needs to be scaled up substantially to be of interest to people. The projects should further be selected by representative groups of local people. Activities need to be secured in terms of maintenance funding.

An individual compensation mechanism should be established as most costs presently accrue private individuals. The government and TANAPA could pilot schemes to compensate people properly for crop losses and other damages caused by marauding animals. There is a need for a debate over compensation as a right versus compensation as consolation. If a park as a principle would have to internalize all external costs, including compensation, it would have a substantial impact on park policies and priorities.

Further, the philosophy of present park management that tourism and scientific research reflect acceptable uses of park resources, while local peoples' uses do not, constrain major policy opportunities to reduce conflicts. Introducing substantial resource use agreements in park buffer zones is one promising way to reduce conflicts through increased direct benefits–dispersed benefits less prone to elite capture.

4.2.2. Reduce local direct costs

Strategies for reducing crop and livestock raiding costs should be developed together with local people. Measures could include: reduce the number of problem animals; investigate their movements and seek to change problematic patterns through fencing, ditches and other physical measures; revitalize the presence of rangers in the villages and increase their capacity to remove problem animals swiftly; re-introduce systems of "lure crop planting" to distract animals from entering local villages; and introduce non-edible cash crops (chilli, sesame). Increase night vigils during harvest periods; develop improved systems for generating noise, fires, barriers, deterrents and repellents, guards (animals or human) change in human or husbandry behaviour and manipulation of wildlife and torches to scare off animals; investigating green crop harvesting; and changing cropping patterns (Gunn et al., 2005). All of these can be employed, even if they also come at quite high costs that need to be paid.

4.2.3. Improving legitimacy and social relations

One should develop more effective and legitimate mechanisms for joint management. The present local institutions are weak and disorganised. The role of the local communities and their village councils is at best unclear. The outreach programmes do not anchor decisions over use of funds with the local village councils. Establishing a joint committee for all villages around the park to voice their (common) interests through their village councils would be a start.

More competent people are needed in the Community Conservation Services section of the park; at present there is only one person (1% of total staff) while 68% of total staff are in law enforcement alone.

A substantial change in the park organisation and management culture is also necessary, in terms of changing attitudes, values and norms. As Goldman, 2003 states; "these agencies need to continue to grapple with the question of how to reshape their own institutions and agendas to really fit communities—with their diverse needs, knowledge, and complex social and ecological structures—into conservation." Mbaruka (1996) suggests that park staff should live in local villages. Authorities should also agree on clear rights or concessions to local people, such as resource use agreements and usufruct rights for important resources in buffer zones. Clarification of village boundaries and village level titles is another suggestion.

4.2.4. A remarkably resilient creature

As a policy instrument for protecting biodiversity, parks have proved to be remarkably resilient—like a cat with nine lives. Not much have actually changed over the last 100 years, despite shifts in rhetoric, in policy debates and donor trends. One has managed to maintain a *global blueprint approach* across ecological, cultural, political, economic and social landscapes.

There are many ecologists wanting to reinforce the "Fortress". Looking at the MINAPA General Management plan (TANAPA, 2007) for instance, the main park challenges mentioned relate to subsistence (maybe underreported) and commercial (not addressed by us here) poaching, to human encroachments and illegal forest resource harvesting inside the park, on blocking of migratory routes, on "wild" fires started by local people. A majority of park financial and human resources are therefore allocated to control and reduce biodiversity degradation that threatens park viability. A stricter policy regime can clearly be seen as one solution.

Countering this are advocates in the name of local people and right-based approaches that want to dismantle or develop new types of institutional arrangement for a majority of protected areas (Hutton et al., 2005).

It thus seems fair to talk about a consensus over "park failure", but from quite different sets of expectations. Many feel that parks do not deliver sufficiently on biodiversity conservation and other environmental services, they have given less economic values than the potential, they have not secured local people's livelihoods, they send a major part of total park costs back to local people while central government and related partners keep a lion's share of the benefits. And furthermore, as Adams and Hutton, 2007 state; "parks tend to reproduce existing economic inequalities within local communities and wider societies".

These failures are not only caused by greed, by corruption or by asymmetric power relations; they also relate to faulty governance architectures; to a lack of competent, resourceful and proficient delivery systems for a multifunctional ambition of delivering public goods like biodiversity conservation, environmental services and poverty alleviation as is clearly stated in Tanzanian government policies and documents. Most protected areas are furthermore financially unable on their own to lift people out of poverty and as such national levels cross-sector policies must address poverty in more comprehensive policy programs.

So, we call for a park revolution. It is time to change. Less parks, more competent parks, more locally owned parks, more rights-based approaches to compensation and to local use, access and control.

References

Adams, W.M., Hutton, J., 2007. People, parks and poverty: political ecology and biodiversity conservation. Conservation and Society 5 (2), 147–183.

Adams, William, Aveling, M., Brockington, D., Dickson, B., Elliott, J., Hutton, J., Roe, D., Vira, B., Wolmer, W., 2004. Biodiversity conservation and the eradication of poverty. Science 306 (5699), 1146–1149 12 November 2004.

Agrawal, A., Redford, K., 2009. Place, conservation, and displacement. Ecology and Society 7 (1), 56–58.

Balozi, J. 1989. Effect of Poaching on Mikumi Elephant Population Dynamics Masters thesis, Noragric, University of Life Sciences. Norway.

Bowles, S., Durlauf, S.N., Hoff, K., 2006. Poverty Traps. Princeton University Press, Princeton. NJ. USA.

Brandon, K., Redford, K., Sanderson, S. (Eds.), 1998. Parks in peril. People, Politics and Protected Areas. Island Press, Washington DC US.

Brockington, D., Igoe, J., 2006. Eviction for conservation. A global overview. Conservation and Society 4 (3), 424–470.

Brockington, D., Holmes, G., 2010. Presentation in Chronic poverty seminar Manchester 8. 10 September 2010.

Chambers, R., Conway, G.R., 1992. Sustainable Rural Livelihoods: Practical Concepts for the 21st Century, *Discussion Paper* 296. Institute of Development Studies, Brighton, UK.

Cleaver, F., 1999. Paradoxes of participation: questioning participatory approaches to development. Journal of International Development 11, 597–612.

DAC, 2001. The DAC Guidelines Poverty Reduction. OECD Publications Service, Paris France.

du Toit, J., Walker, B., Campbell, B., 2004. Conserving tropical nature: current challenges for ecologists. Trends in Ecology & Evolution 19, 12–17.

Ellis, F., 2000. Rural Livelihoods and Diversity in Developing Countries. Oxford University Press, Oxford.

Ellis, F., Mdoe, N., 2003. Rural livelihoods and poverty reduction in Tanzania. World Development 31 (8), 1367–1384.

Gereta, E., 2010. The role of biodiversity conservation in the development of the tourism industry in Tanzania. In: Gereta, E., Røskaft, E. (Eds.), Conservation of Natural Resources. Tapir, Trondheim.

Gillingham, S.G., Lee, P.C., 2003. People and protected areas: a study of local perceptions of wildlife crop-damage conflict in an area bordering the Selous Game Reserve, Tanzania. Oryx 37, 316–325.

Goldman, M., 2003. Partitioned nature, privileged knowledge: community-based conservation in Tanzania. Development and Change 34 (5), 833–862.

Gunn, J. 2009. *Human–elephant conflict around Mikumi National Park, Tanzania: a quantitative evaluation*. PHD thesis. Anglia Ruskin University. Cambridge.UK.

Gunn, J., Hawkins, D., Mofulu, F., Critton, C., Augistine, J., Norton, G., 2005. Human Wildlife Conflict around Mikumi National Park, Tanzania. Proceedings from 5th Tawiri Scientific Conference, 1–3 December, Arusha, Tanzania.

Haslerig, J. M. 2000. People and wildlife conservation in Tanzania.. Ph.D. dissertation. University of Florida.

Hawkins, D., Norton, G., 1998. Mikumi National Park: The Unknown and Neglected National Park. Animal Behaviour Research Unit (ABRU), Mikumi, Tanzania.

Hutton, J., Adams, W.M., Murombedzi, J.C., 2005. Back to the barriers? Changing narratives in biodiversity conservation. Forum for Development Studies 2, 342–370.

Kvalvik, K. and K.R. Bitariho 2011. *Can National Parks deliver in a modern world? Cases from Mikumi National Park in Tanzania and Bwindi Impenetrable National Park in Uganda*. 275 p. Master thesis. Noragric. UMB. Norway

Mamo, G., Sjaastad, E., Vedeld, P., 2007. Economic dependence on forest resources: a case from Dendi District, Ethiopia. Forest Policy and Economics 9, 916–927.

Mbaruka, J.Y. 1996. Park-people border interactions: the case of Mikumi National Park and the surrounding communities, Tanzania. Master thesis, Noragric, University of Life Sciences. Norway.

MINAPA Finance and Procurement Department, 2010. Budget overview. Internal work document, Mikumi.

Naughton-Treves, L., Buck, M., Brandon, K., 2005. The role of protected areas in conserving biodiversity and sustaining local livelihoods. Annual Review of Environment and Resources 30, 219–252.

Newmark, W.D., Nancy, L.L., Sariko, H.I., Gamassa, D.M., 1993. Conservation attitudes of local people living adjacent to five protected areas in Tanzania. Biological Conservation 63 (2), 177–183.

Newmark, W., Manyanza, D., Gamassa, D., Sariko, H., 1994. The conflict between wildlife and local people living adjacent to protected areas in Tanzania: human density as a predictor. Conservation Biology 8, 249–255.

Nyeme, L., Nilsen, H., 2010. Revenue sharing Schemes in Protected Areas in Tanzania et al 2009. Project report. PAPIA, NORAGRIC. UMB 2010.

Oates, J.F., 1999. Myth and Reality in the Rainforest: How Conservation Strategies are Failing in West Africa. University of California Press, Berkeley.

Sachs, J., 2006. The End of Poverty. Penguin Books, New York.

Sanderson, K., da Alger, G.A.B., Fonseca, C., Galindo-Leal, V.H. Inchausty, Morrison, K., 2003. Biodiversity conservation corridors: planning, implementing and monitoring sustainable landscapes. Conservation International, Washington, DC.

Scoones, I., 1998. Sustainable Rural Livelihoods: A Framework for Analysis. *Working Paper* 72. Institute for Development Studies, Brighton, UK.

Shemweta, D.T.K., Kideghesho, J.R., 2000. Human wildlife conflicts in Tanzania: what research and extension could offer to conflicts resolution. 1st University Wide Conference, Proceedings. Morogoro.

Sjaastad, E.P., Vedeld, P., Angelsen, A., Bojø, J., 2005. What is environmental income? Ecological Economics 55 (1), 37–46.

Songorwa, A.N., 2004. Human population increase and wildlife conservation in Tanzania: are the wildlife managers addressing the problem or treating symptoms? African Journal of Environmental Assessment and Management 9, 49–77.

TANAPA, 2007. General Management plan. Mikumi National Park, Tanapa, Arusha, Tanzania.

Tanzania District Councils, 2002. Population census reports from Kilombero, Kilosa, Mvomero,Morogoro Rural District Councils. Gov.of Tanzania.

Terborgh, John, 1999. Requiem for Nature. Island Press, Washington, DC. 234 pp.

URT, 2007. National adaptation programme of action (NAPA). Vice President's Office, Dar-Es-Salaam, Tanzania.

Vedeld, P., 2002. The Process Of Institution Building To Facilitate Local Biodiversity Management. Working paper. 26. Agricultural University of Norway, Ås, Noragric.

Vedeld, P., Angelsen, A., Bojø, J., Sjaastad, E., Kobugabe, G.K., 2007. Forest environmental incomes and the rural poor. Forest Policy and Economics 9 (7), 869–879.

Wapalila, G.J. 2008. *Protected areas, local people livelihoods and conflicts :a case study of Mikumi National Park in Tanzania*. Master thesis, Noragric, UMB. Norway.

Wilshusen, P.R., Brechin, S., Fortwangler, C., West, P., 2002. Reinventing a square wheel: critique of a resurgent 'protection paradigm' in international biodiversity conservation. Society and Natural Resources 15 (1), 17–40.

Zambezi website, 2008. http://www.zambezi.co.uk/safari/tanzania/maptzs.html2008.

Zimmerer, K.S., Galt, R.E., Buck, M.V., 2004. Globalization and multi-spatial trends in the coverage of protected-area conservation (1980–2000). Ambio 33, 520–529.