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SHIRE RIVER BASIN MANAGEMENT PROGRAMME (PHASE I) PROJECT

CLIMATE RESILIENT LIVELIHOODS AND SUSTAINABLE NATURAL RESOURCE MANAGEMENT IN THE ELEPHANT MARSH, MALAWI

Sub-Study 1:
Livelihoods report

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Livelihoods Report

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Acknowledgements

This report forms part of a larger study on the Elephant Marsh, 'Climate resilient livelihoods and sustainable natural resources management in the Elephant Marsh, Malawi'. This project aims to generate a thorough understanding of the functional ecology of the Elephant Marsh incorporating hydromorphology, ecosystem services, biodiversity, and local livelihoods in order to inform a management plan for the marshes and in order to prepare an application for Ramsar status as a wetland of international importance.

The study falls under the Shire River Basin Management Program (SRBMP), the goal of which is to increase sustainable social, economic and environmental benefits by effectively and collaboratively planning, developing and managing the Shire River Basin's natural resources. The SRBMP (Phase 1) is funded through a loan from the World Bank as well as grants by the International Development Association (IDA) of the World Bank with additional financial support from the Global Environmental Facility (GEF) and the Least Developed Countries Fund (LDCF).

The report synthesises the information from the livelihoods surveys that focused on adaptation to change. Additional information can be found in the ecosystem services report. The team is grateful to the technical team for feedback and suggestions for the study and for the wide range of people who provided assistance with the study at the national, district and local levels from governments, NGOs, private sector, traditional authorities and villages in and around the Elephant Marsh.

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Executive Summary

The livelihoods report describes the methodology for assessing the dynamic interactions between people and the environment in the Elephant Marshes and its application within the Elephant Marsh. The methodology focuses on what people's livelihoods consist of, how they relate to and interact with the natural environment and why and framed data collection consultations at national, district and local level in 2015 and 2016.

The report describes the institutional setting and the nature of the livelihoods of people living in the Elephant Marsh. This includes details of what people do, what this contributes to, key challenges and opportunities faced by people living in the Marsh, the impact of livelihoods on the Elephant Marsh and how this has changed over time. The report finishes with suggestions for interventions that can increase livelihood resilience through enhancing productivity and conserving biodiversity. The livelihoods report is part of a larger study on the Elephant Marsh, 'Climate resilient livelihoods and sustainable natural resources management in the Elephant Marsh, Malawi'.

Approach and methodology

The analytical livelihoods assessment provided in this report requires moving beyond a description of what people have and do to focus on identifying the strategies that people pursue, and might pursue under conditions of climate change, including details of *why* people do what they do, the structures (markets, policies, institutions and relationships) that they draw upon in pursuing the strategies that they have chosen and what prevents them from doing so. This sort of analysis includes understanding of the factors that help people (individually and collectively) to adapt to change, diversify and to construct stronger and more resilient livelihoods as well as those that weaken their ability to adapt or cope.

Climate change can affect livelihoods and livelihoods strategies through long-term and short-term effects. It is also the case that the impacts can be both the effect on agricultural harvests and the productivity of natural resources (e.g. fisheries) as well as through associated impacts on local economies and societies. The analysis can contribute to identifying how support mechanisms for community welfare could mitigate the impacts of climate change.

The nature of use of wetland areas changes over the course of the year with the flood cycle and between years and can also differ by village. Stratified semi-structured interviews and focus group discussions with key informants (who included both men and women) provided a detailed picture of the nature of use of the wetlands and the types of environmental services that are accessed by different groups at different times of the year (and in different places), their relative importance and the nature of the contribution (e.g. to food, income, health or spiritual wellbeing) to households and local communities. Because of the dynamic nature of wetlands and wetland livelihoods, the focus of the study was more on the nature of dependency and opportunity and less on the quantification as these change and the important aspect is to consider how management could impact or enhance livelihoods and the resources on which these are based.

Data collection

Two sources of data were used in this study. The first was academic journal articles, reports and grey literature. These were used to provide summary statistics and information about the study area. The second source was primary data and information from the field survey. This used a combination of semi-structured interviews and focus group discussions with line agency staff in Lilongwe, Nsanje and Chikwawa, group village and village headmen, local councillors and household heads – representatives of both male and female headed households were interviewed.

National level results

Malawians living in wetland areas such as the Elephant Marsh are prone to vulnerability, arising due to issues such high and chronic poverty levels, HIV/AIDS and water-borne diseases such as Malaria and Bilharzia. Furthermore, they are also facing challenges due to incidents of drought, floods, interactions with wildlife and other natural phenomena. Furthermore, there are a limited number of strategies available to rural households in Malawi in response to common food security threats.

Malawi's constitution of 1995 provides the foundational principles for a human based (social and economic) environmental management approach. Ministries and Departments have their own specific policies and legislative mandates that guide their activities in the Elephant Marsh. However, it should be noted that these are not always coherent and that there is disjuncture among and within policies and legislation and lack of coordination in planning and implementation in practice. Given the importance of agriculture within the target areas, land tenure frameworks represent critical institutions governing access to, and use of, important resources.

District and settlement results

Data collected at the district level indicated that the population of Chikwawa and Nsanje districts was in the region of 677,000 people with an annual growth rate of around 3% per annum. Average household size was estimated to be 4.5 individuals. The Mang'anja (mainly farmers) are the indigenous people of the Elephant Marsh although many other ethnic groups have also migrated into the area, most notably the Sena (who engage more in fishing).

Livelihoods in the Elephant Marsh are affected by both geography and institutions. The nature of the Marsh as a depression provides areas of higher and lower lying land. The extent to which these are inundated by flooding differs and gives rise both to different forms of cultivation and cropping and potentially provides a degree of flexibility for farmers who are able to crop more upland areas in wetter years and lower lying, and more fertile, areas in drier years. It is also important to note that The Elephant Marsh and surrounding areas have been subject to extensive deforestation.

Chikwawa and Nsanje each have a District Council. The membership of Assembly/Council comprises of politically elected councillors (representing each ward), Traditional Authorities (TAs) Chiefs, Members of Parliament (MPs) and the District Commissioner. Supporting the District Councillors and the DA (through an executive committee that provides technical advice and backstopping) are the government line agencies and NGOs. Key issues that are emerging within the District Councils related to the Elephant Marsh include village loan facilities, seeds (maize, beans and peas) and fertilisers for dry season crops, value addition. There is also a high demand for village clinics to address health care needs as currently villagers often have to rely on private clinics because of a reported lack of alternatives or shortage of drugs in hospitals.

The Lower Shire and Elephant Marshes area are important for both agriculture and fisheries production within Malawi. The two agricultural seasons are summer (rainy season) and winter (dry season). In and around the Elephant Marsh it is the winter production that is most important than summer production. In addition to intensive cash crop production of sugar cane (primarily at the Illovo sugar cane farms on the western side of the Marsh) and cotton there is considerable recession agriculture that is largely based on staple crops such as rice, maize, sorghum, millet, beans, cassava and sweet potatoes. Crop production is supplemented by livestock rearing and households in the area depend on the wetlands to provide food for goats and cattle that represent a source of monetary income and make significant contributions to national meat production. The marshes provide grazing land and watering points that are particularly important during the dry season. In addition to agriculture local people are engaged

in fishing and hunting activities (e.g. for wild birds). The fish fauna of the Elephant Marsh is essentially of Zambezi River Basin origin (Willoughby and Tweddle, 1978). While over 60 species are caught in this fishery, three species, *Mlamba* (*Clarias gariepinus*), *Chikano* (*Clarias ngamensis*) and *Mphende* (*Oreochromis mossambicus*) make up around 90% of the annual total fish catch (Njaya, 2016). There are an estimated 1,500 people involved in fishing activities and the fisheries are estimated to produce around between 2,000 and 12,000 tonnes per annum.

The main edible crops that are grown are: millet, sorghum, maize, sweet potatoes, tomatoes, okra and rice. Most of the food grown is for subsistence though surplus (especially rice) is sold. Rice is mainly grown on the east bank where there are greater areas of marsh that retain residual moisture. Beans are mainly grown during the dry season using irrigation. Additionally cash crops including sugar and cotton may be grown during the summer. Agriculture and fishing are not uniformly distributed within the Marsh area. The upper and western side of the Marsh have areas of both extensive and intensive agricultural activity. Toward the southern end of the Marsh the aquatic habitats become more complex and there is increased fishing activity based around a number of fish landing sites.

Agricultural production is affected by the seasonal cycle of flooding. This cycle was widely perceived to be critical and flooding was generally seen as less problematic than drought. Flooding increases soil moisture (critical for maize) and also provides nutrients through silt deposition. This is important for the winter (dry season) cropping. At the same time the floods were also perceived as increasing fish production.

Casual labour (*ganyu*) for wealthier households or commercial farms represents the main source of income for poorer households (e.g. Dirnowa et al., 2010). Demand for labour (and labour opportunities) are highest during summer land preparation and harvesting, although women will wash clothes or draw water for money. Changes in the price for *ganyu* labour can have significant impacts on poor households.

Fishing occurs all around the Elephant Marsh but is particularly important for households in the southern part of the Elephant Marsh, where fishing represents a full-time occupation and main source of income for many. In the southern area fishing households are often among the wealthier households in mixed farming/fishing villages. Fishers land at landing sites around the Elephant Marsh. Outside the southern/central areas these may be small, for only a few canoes. Total fish production from wild capture fisheries for the Elephant Marsh is estimated to vary between around 2,000 and 10,000 tonnes depending on the nature of the flood cycle. Around 70% of the catches are reported to come from the southern parts of the Elephant Marsh.

People living in the Elephant Marsh are vulnerable to water-borne diseases, in particular Malaria, Bilharzia, Cholera and diarrhoea. These are reported to be correlated with areas of stagnant water that form following inundation. Malaria transmission is perennial, with seasonal increases after rains during November–April. Crocodile (and to some extent hippo) attacks on people are said to be common as the fishers and farmers make use of the marsh for livelihood and basic life (washing, collecting water) activities. Crocodiles are particularly problematic as these can destroy fishing gears as well as attacking people.

School attendance is an issue for households living within the Elephant Marsh, giving rise to high illiteracy rates. This is mostly due to the distances to schools and/or difficult terrain combined with issues such as child labour, inadequate schools and shortage of learning materials and teachers as well as cultural factors and low household income levels.

Poor communication infrastructure including both roads and telecommunications has been identified as a problem. This is as a result of insufficient postal and telecommunication facilities, uneven distribution of telecommunication facilities, vandalism of communication

facilities, irregular maintenance of existing roads and bridges, seasonal roads that can be impassable especially during the rainy season, inadequate public and private transport services.

Village and household level results

The village and household level assessment provided an opportunity to explore differences across the different zones within the Elephant Marsh. Overall land around the Elephant Marsh is considered the most valuable asset as households are able to get two crops and there is no need for fertilisers. However, these lands, and lands in the central area of the Elephant Marsh, are at greater risk from floods. Household food intake is dominated by cereals and pulses, reflecting agricultural production, with fish representing around 2-3% of food consumed.

Income sources for households were similar in all areas around the Elephant Marsh but the relative importance of activities differed by location (e.g. fishing and wild food collection more important in the south) and particularly by wealth group. It was not possible to distinguish differences between the different zones of the Elephant Marsh given the differences within zones. Overall, income and the relative importance of different sources of income, vary in relative importance depending upon the flood cycle.

Northern area

The northern area of the Elephant Marsh is dominated by the main channel of the Shire River and tributaries. The area features extensive agricultural fields and a number of small-scale irrigation schemes on both the east and west sides of the marsh that boost productivity. Outside of irrigated areas agriculture is dependent on the flooding cycle and this can be affected by sediment deposition. Fishing is limited to small backwaters and perennial waterbodies away from the main channel where they tend to use scoop nets and other small scale gears, often fishing from the bank or in shallow water.

Drought tends to be a particular problem in the northern area, limiting production to a single season. During times when households are affected by food shortage they rely principally on markets to buy food. Wild foods (e.g. water lily) are less common in the northern areas (compared to the larger lagoon areas in the south) and therefore people are much more reliant on what they grow and can purchase. As a result, casual labour is an important option in the northern area and work on private lands and the Thyolo tea estates (three days walk) are both options.

Eastern area

The eastern area is bounded by the Thyolo escarpment that rises steeply from the edge of the Elephant Marsh. Rice is mainly grown on the east bank where there is irrigation and there are greater areas of marsh that retain residual moisture. Within the Elephant Marsh crops are grown in fields on the islands. There is very little fishing in this location and it is almost all for household consumption. There is less cattle rearing in this area than in the Western area and most households report owning only chickens and goats and that theft, particularly of goats, is a problem.

The eastern side of the Elephant Marsh, in particular the more southern parts, represent some of the more natural areas of marsh and these areas are characterised by channels, islands and extensive areas of reeds. The eastern as well as southern/central areas have the highest coverage of reeds and grasses and these natural products are harvested by people, especially at times when they need cash for food and are sold in local markets. Products are sold as raw materials or finished products, often to traders coming from Blantyre

Deforestation in the upland areas has meant that the small streams that flow down from the Thyolo escarpment have become prone to flash flooding that causes problems washing away roads and crops. Water quality is reported to have deteriorated and is particularly bad during the rainy season. Channels within the Elephant Marsh are prone to siltation, especially with more silt being washed down the streams. Villagers report that channels used to be dredged periodically but this does not happen any longer. Flooding also causes displacement with people living in the Elephant Marsh moving upland and staying in upland villages. Respondents indicate that some marsh villages have been forced to relocate every year for the last five years.

Western area

In addition to subsistence activities within the Elephant Marsh here are also a number of commercial enterprises located around the western side of the Elephant Marsh. The main commercial enterprise in this area centres on sugarcane growing and processing. Illovo operates several thousand hectares of land extending from the edge of the marsh for growing sugarcane. At Nchalo they also operate a processing factory. Further north Presscane operate an ethanol distillery that distillate molasses from Illovo. Several sugarcane outgrowers are also present, for example at Kasinthula, Sande Ranch, Phata and Kaombe. Commercial farming (especially cotton) is sometimes practiced by households under contract farming. Along the west side of the Marsh there are also livestock operations including fish ponds at Kasinthula, two crocodile farms (Shire Crocodile limited), a game ranch and cattle ranching operations. These commercial operations provide some opportunities for casual labour.

The number of households dependent on the Elephant Marsh is reported by people in this area to have increased as they have lost land elsewhere to the sugar estate and Lengwe. It was also reported that people have been moving into the marsh area to grow crops. Livestock are important in the western part of the Elephant Marsh. The gradient on this side of the marsh increases the area inundated and gives rise to larger areas of grassland. These provide important grazing resources for both the household and commercial cattle and goats that are raised in this area of the Elephant Marsh. While the commercial operations can supplement grazing with maize, molasses and other feeds, households are more dependent on grazing the areas around the Elephant Marsh. Grazing responds the flood cycle with the best grazing being within the wetland areas during the dry season. This takes livestock into the Elephant Marsh and also coincides with the breeding season for crocodiles. This is the period when they are most active and will protect their nests and increases the risk to both livestock and people.

The presence of the sugar plantation restricts the ability of several villages to follow the strategy of having upland and lowland lands and they are more reliant on casual labour as a result. Land availability is reported to be forcing people to move southwards, away from the plantation, to find land to farm but there are issues that in some places the land is too salty to farm. There are generally negative perceptions of the sugar plantations and a feeling that the plantation has encroached on village lands and does not provide them with employment opportunities or compensate them for the loss of their lands.

Health issues include malaria HIV and bilharzia. HIV prevalence remains high in the area. Cholera used to be a problem but a big water and sanitation effort by the government has been successful in reducing this threat. Sanitation is more of a problem within the Marsh (in the central area). Drinking water is often from boreholes but much of the available water is salty so people still need to draw drinking water from the Elephant Marsh. This puts them at risk from water-related disease and crocodile attacks.

Southern/Central area

The area has multiple channels, islands and lagoons that come together to form the main channel around the area where the Ruo river enters the Shire. This is an area that is subject to flooding due to the confluence of the two rivers. The lagoons and channels north of the confluence have extensive aquatic vegetation including reeds, lilies and water hyacinth. While the Central area is less affected by human populations, people have settled in the marginal areas from the surrounding locations, with many coming from the south and a significant number settling in the area after fleeing fighting in Mozambique during the civil war in the 1970s. Perhaps because of this, there is migration into Mozambique in search of fishing opportunities and casual labour when conditions are less favourable in the Elephant Marsh. Along the western side of the southern/central region there are a number of villages that have moved upland from their original location within the Elephant Marsh, although they retain landholdings.

Because of the nature of the area, most agriculture in the southern/central study area takes place in more upland areas and people are most dependent on the winter crop, which is more reliable. While land within the Elephant Marsh is considered to be more productive, the extensive areas of open water, lowland areas that are prone to flooding as well as salty soils limits the agricultural potential. Water lilies are important wild foods for both roots (*nyika*) and seeds (*chembereme*), particularly in years when there are food shortages and water levels are low and households are unable to grow vegetables.

Fishing is an important occupation in the southern area, with over 75% of fishers identifying as full-time, i.e. fishing for over eight months a year and there is more selling of fish from the southern part of the Elephant Marsh than the others. As a result, fishing represents the main (often only) source of income for many people in the Southern area. It is widely believed that there are more fish in this part of the Elephant Marsh, in particular on the eastern side. There are some 15 permanent fish landing sites and a large number of people for whom fishing is the primary occupation. Fishing is poor during June and July, when water levels are typically at their highest, but improve from August as the waters recede. As the floods come they find that there are fish moving up from the Zambezi and this can change the composition of the catches at this time. These fish only move into the south/central parts of the marsh where there is open water and are reportedly not seen in the northern parts of the marsh. As the seasons change, fishers may change the gears that they use with seines used more in the dry season when fish are concentrating.

Food shortages are a problem and food production because they are reliant on fishing and single crop. Respondents report that declines in fish stocks have caused problems for the fishing villages. Where once these were considered better off they have been affected by reduced abundance and smaller size of fish. December to March are the hardest months and the period that people are most reliant on the marshes for lilies, selling fish, reeds and grass for roofing and paddling canoes for transport. Wildlife interactions, particularly crocodiles represent a real problem and concern in the southern areas. There is a perception that no-one is controlling the numbers so that the problem is increasing. Hippos can also be problematic, more because of collisions with canoes than damage to agricultural land.

Livelihoods and adaptive capacity

Income sources for households were similar around the Elephant Marsh although the relative importance of activities differed by location (e.g. fishing and wild food collection more important in the south) and particularly by wealth group. Household income for the majority of households was estimated to be in the region of MK 240,000-360,000 annually. Livestock rearing is widespread with over 90% of households rearing livestock (mainly cattle and goats) and poultry. These represent a source of capital that can be converted to cash or food when

needed (e.g. for school fees, funeral costs or to invest in agricultural or fishing inputs) and for the wealthiest households, the main source of household income.

Households within and around the Elephant Marsh are not homogeneous so the types of strategies and responses available, and the outcomes, are also variable.

Underlying issues that households face are that household agricultural production is typically low and farmers experience low crop yield. For poorer households in particular this leads to increased reliance on *ganyu* and sale of firewood and reeds from the Elephant Marsh to generate income to purchase food. Marketing problems also affect households, including issues such as poor accessibility (particularly on the eastern side of the Elephant Marsh), fluctuating crop prices, and a lack of farmers' associations. All of these challenges are exacerbated by reportedly increasing frequency of drought and floods and long term climate change predictions that highlight shorter wetter rainy seasons and longer dry seasons.

The geography of the area means that there is limited scope for water control. Land near the main channel is more productive but more prone to flooding and the topography of the area also means that there is a greater area available for cultivation on the western side of the Elephant Marsh compared with the east. Female headed households tend to cultivate smaller areas and have less access to appropriate extension advice, inputs and credit.

Availability and access to land with sufficient soil moisture is critical for agriculture. The village headman and TA can play a role in land provision where necessary. Fishers by contrast, particularly in the southern area, are more able to move in response to the flood cycle and local productivity. Fishers will move from one landing site to another and even across the border into Mozambique. In doing so the local institutional structure of the Beach Village Committee (BVC) and the positions of the BVC Chair and village headman play important roles in facilitating access to resources.

Modifying agricultural practices, including location planted, crop varieties and planting dates was a key adaptation strategy for all agricultural households. Households with access to larger land holdings, and with both crop and livestock production, were able and more likely to change crop variety. Fishing households also reported that they would change fishing decisions, in particular the location fished in response to conditions and catch rates.

Purchasing food was identified as important by the majority of respondents, reflecting the developed local market infrastructure and important role that markets play in facilitating household access to food. Other responses include the use of food banks, selling livestock to pay for staples, use of wild foods, such as water lily root, and reliance on government and NGO support programmes.

Poorer households are particularly constrained by factors including dependence on a low number of crops and cropping patterns; low household asset levels (often including farming on poorer soils, lower education levels, fewer livestock etc.); limited options to gain labouring work and low levels of income derived from livelihood activities. This combination can reduce their adaptive capacity and force them into coping and maladaptive strategies that may have detrimental long term consequences.

Assessment of support mechanisms

The analysis identified four categories of support mechanism: markets, government, NGO and village-level institutions. Exploring responses to change amongst households highlighted the important role of markets providing opportunities to generate income and as a source of affordable foods. Households across the study site are dependent to a degree on markets. A key issue in the Elephant Marsh is that annual and interannual variation affects markets and both the price of food and the value of assets. Even relatively small impacts on food supply

can lead to significant increases in food price and decreases in the price of assets (labour and livestock).

Government agencies have a wide range of responsibilities supporting local livelihoods, biodiversity conservation and sustainable use. More specifically, these include health, education, agriculture and fisheries, water and sanitation and problem animals. These responsibilities are addressed through the line agencies and district authorities with coordination at the district level. However, in practice the institutional framework for is fairly weak due to uncoordinated sectoral approaches to wetland planning (including different administrative units). Given the current shortcomings in markets as a mechanism for livelihood and food security, it is important that line agencies and local authorities support households in the Elephant Marsh to provide disaster assistance following shocks and a safety net.

In addition to the external support mechanisms, support is also facilitated and provided at the village level. These village level relationships and relationships at group village level were important in adaptive strategies (e.g. access to land and reciprocal arrangements). Interventions should seek to engage with local leaders and recognise the importance of informal reciprocal arrangements as well as formal organisations in the design of local initiatives While local leaders were identified as particularly important, ensuring the accountability of these leaders a critical element in ensuring that they act responsibly.

Based on the main livelihood activities across the areas of the Elephant Marsh and the types of interactions, adaptation strategies and support mechanisms, a number of key areas for intervention to improve wellbeing and enhance climate resilience were identified. These focus on enhancing the contribution of food and income generating activities and minimising the negative impacts of the Elephant Marsh environment on their individual and collective wellbeing and are summarised below for the whole mars and the five identified sub-areas.

Elephant Marsh Sub-area	Strategies identified as sub-area priorities
Whole Marsh	Agricultural support and technology experimentation including access to improved seeds, introducing some diversity to crops and intercropping long season pigeonpea. Studies should explore drivers of agricultural production (e.g. subsidies that incentivise monocropping). Reducing wildlife interactions, in particular crocodile attacks and hippos destroying crops.
Northern	Drought resistant crops, Improving sanitation and access to water
Western	Managing livestock. Improving access to water. Improving sanitation and access to water
Eastern	Managing water and erosion
Central	Priority for the area is to enhance protection and reduce access. On the basis of the scenario assessment (see DRIFT report) this is likely to have the greatest benefit for the Elephant Marsh biodiversity in the face of identified climate and development change. Explore opportunities with neighbouring villages for tourism-related activities.
Southern	Improving communication links Supporting BVC management of local fisheries. Studies should assess changes in fish species abundance. Assess options for addressing exotic plants

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Acronyms

ADC	Area Development Committees
ADD	Agriculture Development Division
BVC	Beach Village Committee
CBO	Community-Based Organisation
CDF	Constituency Development Funds
CSO	Civil Society Organisation
CTO	Chief Technical Officer
DC	District Council
DEC	District Executive Committee
DEHO	District Environmental Health Officer
DPNW	Department of Parks and National Wildlife
EPA	Extension Planning Area
GEF	Global Environment Fund
GIS	Geographical Information System
GoM	Government of Malawi
GPS	Global Positioning System
GVH	Group Village Head
hh	Household
HIV	Human Immunodeficiency Virus
IDA	International Development Agency
LDF	Local Development Fund
MEGS	Malawi Economic Growth Strategy
MGDS	Malawi Growth and Development Strategy
MK	Malawi Kwatcha
MNSSD	Malawi National Strategy for Sustainable Development
MP	Member of Parliament
MPRS	Malawi Poverty Reduction Strategy
NAPA	National Adaptation Programmes of Action
NEAP	National Environmental Action Plan
NEP	National Environmental Policy
NGO	Non Governmental Organisation
NSBAP	National Biodiversity Strategy and Action Plan
PRA	Participatory Rural Appraisal
SADC	Southern Africa Development Community
SRBMP	Shire River Basin Management Program
TO	Technical Officer
UNDP	United Nations Development Programme
VDC	Village Development Committee

1 Background and purpose

The Government of Malawi received a credit and a grant from the International Development Agency (IDA – World Bank Group) and the Global Environment Fund (GEF) to finance the implementation of the Shire River Basin Management Program (Phase I) Project. The overall Program Development Objective of the Shire River Basin Management Program (SRBMP) is to increase sustainable social, economic and environmental benefits by effectively and collaboratively planning, developing and managing the Shire River Basin's natural resources.

1.1 Background of project

The specific assignment under the SRBMP initiative will contribute to this aim by generating thorough understanding of the functional ecology of the Elephant Marsh incorporating hydromorphology, ecosystem services, biodiversity, and livelihoods; and model past, present, and future possible management strategies. The assignment will also assess the feasibility for designating the marshes as a community-managed protected area and as a wetland of international importance under the Ramsar convention using information from the surveys to assess whether the Elephant Marsh meet the Ramsar Criteria. If it does the intention is to generate the information required to support an application for designation of the Elephant Marsh and develop an integrated management plan for the Marshes that supports community-based management.

1.2 Purpose of the livelihoods report

This report responds to the project ToRs (see Annex 1). The report describes the methodology for assessing the dynamic interactions between people and the environment in the Elephant Marshes and its application within the Elephant Marsh. The methodology focuses on what people's livelihoods consist of, how they relate to and interact with the natural environment and why. The report describes the institutional setting and the nature of the livelihoods of people living in the Elephant Marsh. This includes details of what people do, what this contributes to, key challenges and opportunities faced by people living in the Marsh, the impact of livelihoods on the Elephant Marsh and how this has changed over time. The report finishes with suggestions for interventions that can increase livelihood resilience through enhancing productivity and conserving biodiversity. The information is supported by maps of livelihood usage zones and diagrams such as institutional arrangements and seasonal calendars.

1.3 Report structure

The report provides a summary of the methods that were used and this is followed by a section describing the results of the assessment. Both of these sections are structured around the administrative levels and presents relevant enquiries and the relevant quantitative and qualitative information generated at the National/Regional; District/Settlement and Village/Household levels.

2 Approach and methodology

The specific assignment under this initiative was intended to contribute to the overall Program Development Objective of the SRBMP by generating a more complete understanding of the livelihoods of people living in and around the Elephant Marsh and dependent upon it for environmental goods and services. Based on the results of the hydromorphology and biodiversity sub-studies (see Birkhead et al., 2016 and Turpie et al., 2016) the Elephant Marsh could be divided into five areas. For the purposes of the livelihoods study the south and central areas could be combined. The resulting four areas (See also Figure 1 below) are:

- **Northern** – the area below Chikwawa comprising the main channel of the Shire River flowing into the marsh and associated waterbodies
- **West** - comprising cultivated fields, river channel and marsh vegetation
- **East** - comprising anastomosing and distributary channels through marsh
- **South/Central** - comprising distributary channels and lakes/lagoons within predominantly indigenous marsh but also including some cultivated fields primarily along channel margins

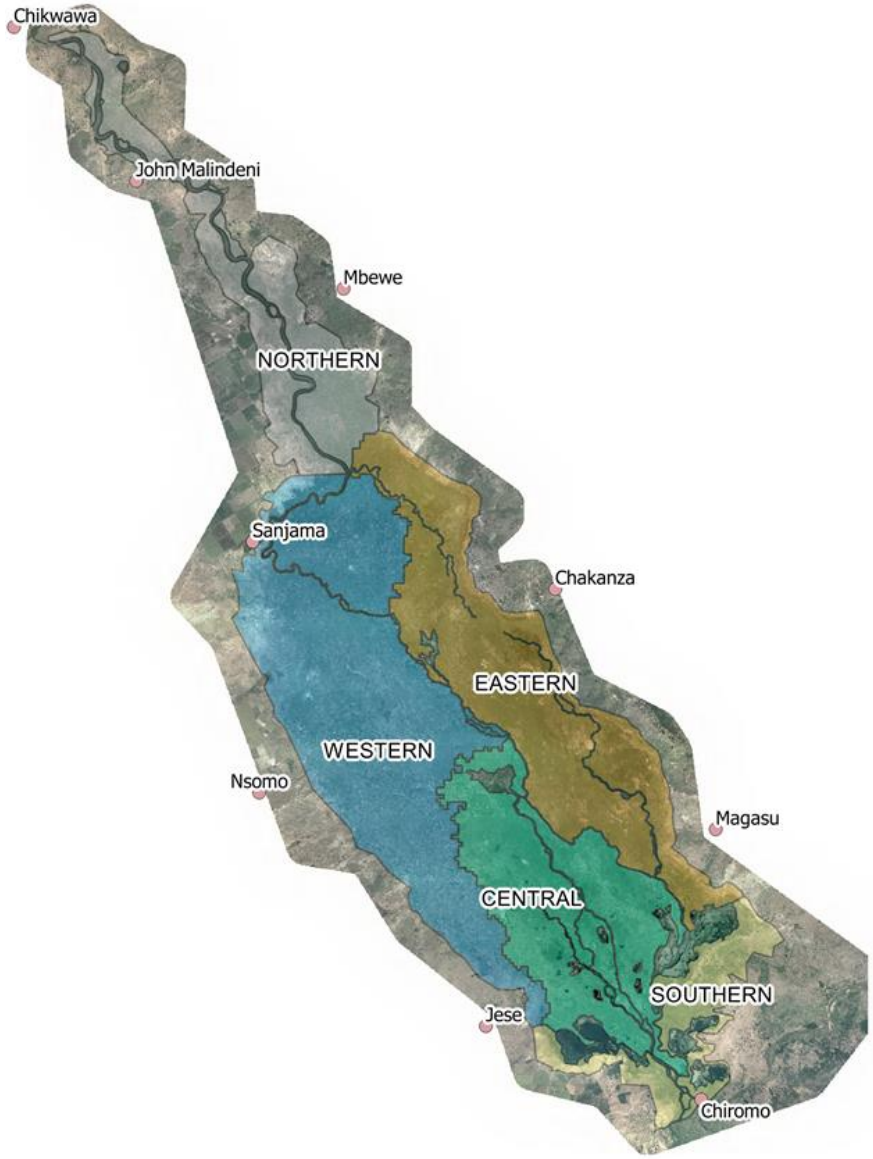

Figure 1: Areas of the Elephant Marsh identified based on vegetation types, hydromorphological influences and stages of transformation for cultivation. Source: Brown et al. 2016

The livelihoods and socio-economic study addresses the following objectives[1]:

- Describe local livelihoods, including spatial and temporal use of resources;
- Assess the past, present and potential future influence of human livelihoods on the Elephant Marshes, and what effect these will have on the functional resilience of the Marshes in the future, and the implication for climate change;
- Identify the socio-economic impacts of livelihoods and how climate change might affect these livelihoods;
- Describe the risks to livelihoods (e.g. flooding or overfishing), and current strategies to increase resilience to these risks that will be exacerbated by climate change; and

[1] Note that descriptions of how climate change might affect livelihoods will be the subject of the modelling exercise and is addressed in the synthesis reporting.

- Provide an assessment of the support mechanisms for community welfare in line with possible flood mitigation measures and disaster management strategies.

Livelihoods are dynamic and it is also important to understand how people's livelihoods are changing and how they respond to environmental, social and economic drivers (see Figure 1). The analytical livelihoods assessment provided in this report requires moving beyond a description of what people have and do to focus on identifying the strategies that people pursue, and might pursue under conditions of climate change, including details of *why* people do what they do, the structures (markets, policies, institutions and relationships) that they draw upon in pursuing the strategies that they have chosen and what prevents them from doing other things.

This sort of analysis includes understanding of the factors that help people (individually and collectively) to adapt to change, diversify and to construct stronger and more resilient livelihoods as well as those that weaken their ability to adapt or cope. This approach requires a focus not only on what people are doing and how they are interacting with the environment (using resources and services, taking action to conserve or enhance resources and being affected by the environment, e.g. through impacts on health – disease, injury and mortality) but also on the institutions, i.e. the rules, structures and customs that determine what they can and cannot do (e.g. Ostrom 1990; Oakerson 1992). The latter are particularly important in relation to developing community based management institutions that build on existing structures rather than introducing new structures that have little legitimacy and that may undermine what exists and functions. The approach itself draws upon sustainable livelihoods (e.g. Carney 1998, Allison and Springate-Baginski, 2009) and institutional analysis (e.g. Oakerson 1992) frameworks as well as work on environmental stresses and capabilities (e.g. Sen 1981; 1985) and environmental entitlements (e.g. Leach et al., 1999).

At the heart of the approach therefore is the idea that adaptation can involve either strategies aimed at maintain existing activities in the face of change or modifying activities, either investing, diversifying or moving (see Figure 2). Individuals can also seek to adopt short-term strategies to reduce consumption in response to shocks, including through reduced spending and food consumption or migration (e.g. Devereaux, 1999). Households may use strategies such as selling assets or using wild foods as ways to cope with short-term shocks and this may part of household risk management. Similarly, households may experiment with new crop varieties or cash crops. What is important therefore is to be able to distinguish when these activities are sustainable and contribute to overall coping and adapting, and when they are less positive and represent maladaptive strategies that leave households less well off or undermine assets leaving households less able to cope with future change.

Climate change can affect livelihoods and livelihoods strategies through long-term and short-term effects. It is also the case that the impacts can be both the effect on agricultural harvests and the productivity of natural resources (e.g. fisheries) as well as through associated impacts on local economies and societies. One aim, through the analysis, is to identify how support mechanisms for community welfare could mitigate the impacts of climate change.

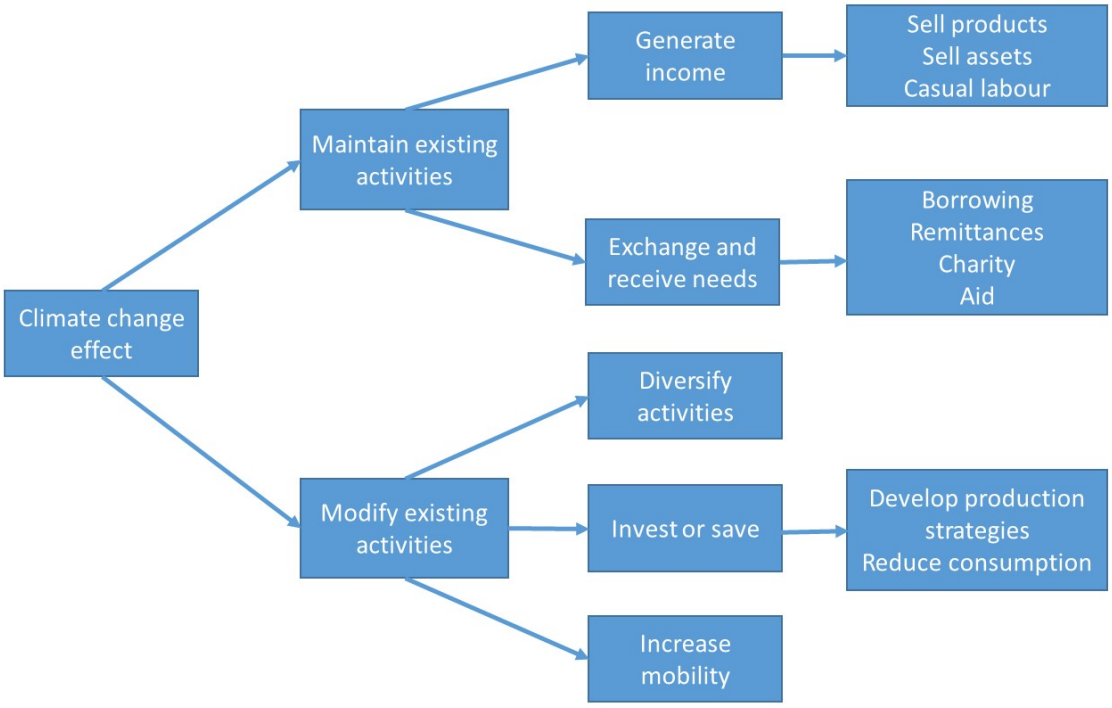

Figure 2: Categorisation of climate change coping and adaptation strategies (adapted from Devereaux, 1999 and 2007)

To support this form of livelihoods assessment and analysis two types of information were collected. Firstly information to enable a description of local livelihoods in different parts of the Elephant Marsh and the resources that they use and the ways they are used. Secondly information to identify the roles of markets, institutions and transfers (both positive and negative). This was used to assess livelihoods using three categories of response to describe the ways in which livelihoods could shift from adaptive to coping and even maladaptive depending upon the assets that households had access to and the mechanisms that they could use to access these and their willingness and ability to change. A better understanding of local people's ongoing adaptation measures can help to inform policies that are aimed at supporting successful adaptation.

The nature of use of wetland areas changes over the course of the year with the flood cycle and between years and can also differ by village. Stratified semi-structured interviews and focus group discussions with key informants (who included both men and women) provided a detailed picture of the nature of use of the wetlands and the types of environmental services that are accessed by different groups at different times of the year (and in different places), their relative importance and the nature of the contribution (e.g. to food, income, health or spiritual wellbeing) to households and local communities. Because of the dynamic nature of wetlands and wetland livelihoods, the focus of the study was more on the nature of dependency and opportunity and less on the quantification as these change and the important aspect is to consider how management could impact or enhance livelihoods and the resources on which these are based. The flood cycle is important as different wild resources can be particularly important at certain times of the year or represent an important resource or safety net under certain conditions, for example when crops fail. Understanding the role of ecosystem services and nature of dependency can help prioritise interventions and investments and highlight key opportunities and constraints that could be addressed to increase livelihood resilience.

2.1 Data collection

Two sources of data were used in this study. The first was academic journal articles, reports and grey literature. These were used to provide summary statistics and information about the study area. The second source was primary data and information from the field survey. This used a combination of semi-structured interviews and focus group discussions with line agency staff in Lilongwe, Nsanje and Chikwawa, group village and village headmen, local councillors and household heads – representatives of both male and female headed households were interviewed. In this context, a participatory approach represented a resource-efficient way to collect local time and place information about local resources, practices and community resource dependency that can build on past assessments. This could then form a sound basis for developing the kinds of local management institutions and strategies envisaged under the program. In many local communities there are often informal systems governing aspects of resource use that are not always easily observed. A participatory survey proved to be an effective way to identify these arrangements, identify key local management needs and priorities and issues of conflicts within and between communities that can have a strong influence on the effectiveness of management.

The livelihoods study undertook assessments at different levels, in order to assess factors across scales and administrative levels that might affect the ecological character of the Elephant Marsh and livelihood opportunities:

- National/Regional;
- District/Settlement, and
- Village/Household.

Collecting information at different levels also provided opportunities to cross-check and triangulate information as a means of validation. The methods used in each of these assessments are elaborated in Annex B.

2.2 Analytical methods

Because of the area of the Elephant Marsh and the risks of bias due to the sampling, descriptive results from the interviews and discussion groups related to adaptation and coping strategies that were chosen by farming and fishing households are presented for each of the four areas of the Elephant Marsh and comparisons between the zones are drawn. Adaptation strategies are analysed as a function of social, human, and physical capital and assets, and of the institutions mediating access and use of these using the framework described above. Qualitative information was compiled and analysed in terms of the differences between people living in the different areas of the Elephant Marsh.

The following sections describe the national and district context before describing livelihoods in the different areas of the Elephant Marsh and providing an assessment of the risks associated with local livelihood strategies, how climate change might affect them (and the resources on which they depend) and some of the implications for support services.

3 Results

Despite the main commercial city of Blantyre being situated here, the southern region of Malawi is considered to be the poorest region of the three in the country (with a poverty rate of 63.3 % compared to 54% for the Northern Region and 44% for the Central region (GOM, 2009)). Nsanje (poverty rate estimated at 81.2%) was the poorest district in Southern Region and therefore the poorest of all the 28 districts in the country. The poverty rate for Chikwawa is estimated at 65.8% (http://knoema.com/atlas/Malawi/Chikwawa/topics/Poverty/datasets), which is higher than both the southern region and national averages.

3.1 National level

While wetland areas can be rich and productive areas that generate a range of ecosystem services that can support livelihoods and contribute to household income, food security and wellbeing they are also dynamic environments that can create shocks and stresses that can negatively impact on livelihoods and wellbeing and increase the vulnerability of people living in these areas. Malawians living in wetland areas such as the Elephant Marsh are prone to vulnerability, arising due to issues such high and chronic poverty levels, HIV/AIDS and water-borne diseases such as Malaria and Bilharzia. Furthermore, they are also facing challenges due to incidents of drought, floods, interactions with wildlife and other natural phenomena (MVAC, 2005). The capability of households to adapt or cope with these stresses and hazards is dependent upon the biophysical setting together with the assets and relationships that the households can draw upon. Analysis by MVAC (2005) suggests that there are a limited number of strategies available to rural households in Malawi in response to common food security threats and that poorer households are constrained by factors including dependence on a low number of crops and cropping patterns; low household asset levels; limited options to gain labouring work and low levels of income derived from livelihood activities (e.g. Alwang 1999).

In terms of the legislative environment and the institutional context at the national level, Malawi's constitution of 1995 provides the foundational principles for a human based (social and economic) environmental management approach. Individual Ministries and Departments have their own specific policies and legislative mandates that guide their development, conversation and management activities in the Elephant Marsh. Because of the conflicting nature of some of these sectoral policies the National Environmental Policy (NEP) (GoM, 1996), revised in 2004 was developed to harmonise legislative and policy formulation and implementation. The Policy promotes the sustainability and the health of the environment in Malawi, and takes cognisance of the numerous challenges that exist between the objectives of economic growth, conservation and environmental management. The Policy prescribes the policy and institutional framework for sustainable utilisation, Environmental Impact Assessments and management plans across all sectors.

In 1998, the Government of Malawi (GoM) approved a national decentralisation policy (Government of Malawi, 1998a), detailed in the subsequent Local Government Act Government of Malawi 1998b – revised in 2009). The Policy and Act mandated decentralisation of administration and development responsibilities from central government to District Councils (DCs). In addition, the Malawi Growth and Development Strategy (MGDS) recommended decentralisation as a means for consolidating democracy and achieving the country's poverty reduction goal. The mandate of the District Council is to formulate development and services policy for the district. Policy formulation is undertaken through specially elected committees among the members of the District Council. The finance committee is responsible for looking for resources for execution of the activities. Thus one of its tasks is formulation of proposals and looking for possible funders of the proposals developed. There is also a National Local government Finance Committee, which is responsible for finding and negotiating for funding for District Councils. The District Council

has also got powers to hold the district public service responsible for the success or failure of execution of activities that it tasks the public service to execute.

It must be noted that district development planning under decentralisation does not take place in isolation from national development planning. Thus it is expected that district level planning has to be linked to national programmes and in fact this has been the main pre-condition for decentralisation. In this context, the district development planning system derives its objectives from the national key development instruments namely: The vision 2020; The Malawi Poverty Reduction Strategy Paper (MPRS); The Malawi Growth and Development Strategy (MGDS); the national Decentralisation Policy and Millennium Development Goals (United Nations, 2000), which were replaced by the Sustainable Development Goals (United Nations, 2015)[2], the National Physical Development Plan.

3.1.1 Legal and policy pluralism

Ministries and Departments have their own specific policies and legislative mandates that guide their activities in the Elephant Marsh. However, it should be noted that these are not always coherent and that there is disjuncture among and within policies and legislation and lack of coordination in planning and implementation in practice. Some of the key Acts and policies are indicated in Box 1.

Box 1. Statutes of Malawi and central government policy documents relevant for the management of resources in the Elephant Marsh:

- The Water Resources Act (No. 2 of 2013) (GOM, 2013)
- The Revised Decentralized Environmental Management Guidelines (GOM, 2012).
- The National Agricultural Policy: Promoting agricultural productivity for national food security and economic growth and development through value chain development of 2010 (GOM, 2010a)
- The Local Government (Amendment) Act 2010 (GOM, 2010b)
- The National Parks and Wildlife Act 2004 (GOM,2004a).
- The Revised National Environmental Policy of 2004 (GOM, 2004b).
- The Tourism and Hotels Amendment Act (No. 1 of 2003) (GOM, 2003)
- The Malawi National Decentralisation Policy (GOM, 1998)
- The Fisheries Conservation and Management Act (Cap 66.05). (GOM, 1997a)
- The Forestry Act (No. 4 of 1997). (GOM, 1997b)
- The Environment Management Act, 1996 (No. 23 of 1996). (GOM, 1996)
- The Town and Country Planning Act (No. 26 of 1988) (GOM, 1988).
- The Agriculture (General Purposes) Act (No. 11 of 1987). (GOM, 1987).
- The Chiefs Act 1967 (Cap 22:03). (GOM, 1967)

[2] The Sustainable Development Goals (SDGs) replaced the Millennium Development Goals (MDGs) of year 2000 aimed to have been achieved by 2015. Officially known as 'Transforming our world: the 2030 Agenda for Sustainable Development', the SDGs is a set of seventeen aspirational "Global Goals" with 169 targets between them aimed to be achieved by 2030. Spearheaded by the United Nations through a deliberative process involving its 193 Member States as well as global civil society, the SDGs represent a broader intergovernmental agreement that (although acting as the Post 2015 Development Agenda, i.e. successor to the MDGs) builds on the Principles agreed upon under UN Resolution A/RES/66/288, popularly known as 'The Future We Want'

The National Environmental Policy (NEP) (GoM, 1996), revised in 2004 was developed to harmonise legislative and policy formulation and implementation. The Policy promotes the sustainability and the health of the environment in Malawi, and takes cognisance of the numerous challenges that exist between the objectives of economic growth, conservation and environmental management. The Policy prescribes the policy and institutional framework for sustainable utilisation, Environmental Impact Assessments and management plans across all sectors (GoM, undated).

3.1.2 Administrative decentralisation

In 1998, the Government of Malawi (GoM) approved a national decentralisation policy (Government of Malawi, 1998a), detailed in the subsequent Local Government Act Government of Malawi 1998b – revised in 2009). The Policy and Act mandated decentralisation of administration and development responsibilities from central government to District Councils (DCs). In addition, the Malawi Growth and Development Strategy (MGDS) recommended decentralisation as a means for consolidating democracy and achieving the country's poverty reduction goal. This has been the means by which institutions and agencies at the district and sub-district levels have gained greater authority and responsibility.

In terms of composition, the DCs are supposed to be fashioned on the District Focus approach in that all civil servants are excluded from membership except for the District Commissioner who continued to convene and chair the DCs. A further change has that the District Commissioner is now only the secretary to the District Council while the chairman is elected among the councillors (see below). The district structure for decentralisation as it is supposed to operate is presented in Figure 3 and described below (Hara, 2008):

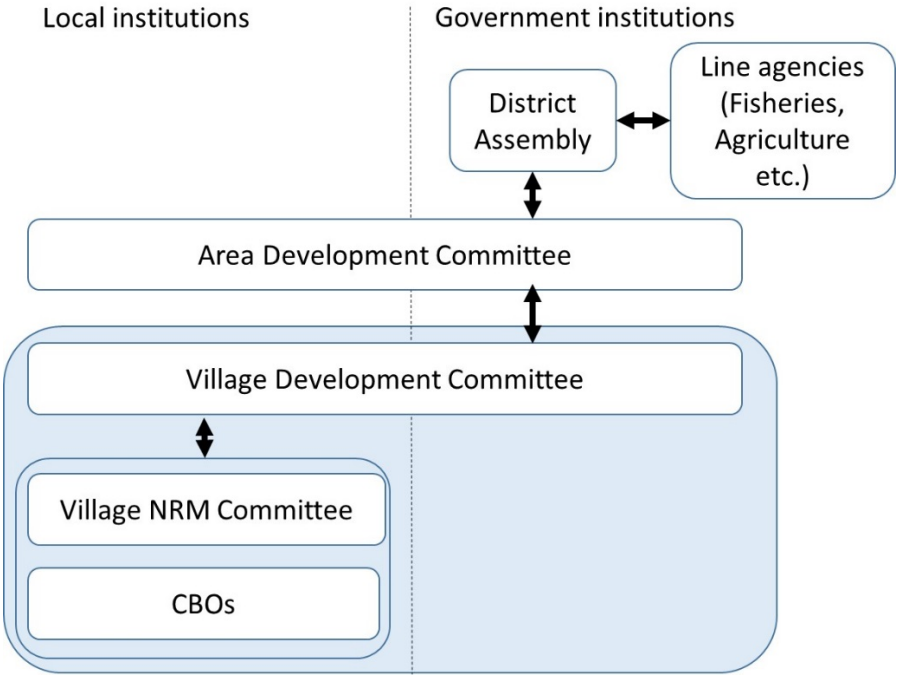

Figure 3: Organisational linkages at the local level (after Hara, 2008 and Dixon and Carrie, 2015)

The District Council is supposed to be a body comprising of elected ward councillors, Members of Parliament (MPs), Traditional Authorities (TAs) and five representatives of interest groups (for Nsanje these are youths, women, faith community, business and livestock owners). Below the District Council are supposed to be Area Development Committees (ADCs) (at Traditional

Authority level, headed by the TA of the area) and under ADCs are supposed to be Village Development Committees (VDCs) (at village level, headed by the village headperson). The ADCs are constituted by and report to the DA. The VDCs are also supposed to be constituted by the DA and are supposed to report to the ADC. The VDC are intended to be democratically elected institutions, overseen by the village headperson that oversee planning, supervision and implementation of developmental activities at the grassroots level (DLG 2001). Within villages there will also be sub-committees, e.g. for natural resource management, irrigation, HIV etc. that also have a role in the process. In addition, villages may have Community Based Organisations (CBOs). All local level sectoral committees such as fisheries BVCs are supposed to report to the VDC within the village where they are situated. District Council is headed by a chairperson (and a vice chairperson). The chairperson and vice chairperson are elected among the ward councillors (The chairperson has the equivalent role of the speaker of parliament). The District Commissioner is the secretary for the District Council and takes minutes of all Council deliberations.

In practice there are a number of contested issues concerning the planning process, decisions regarding development priorities and control of funds among the District Council members, in particular Councillors, Members of Parliament and TAs. For example, MPs get a Development Funds (Costituency fund) from parliament for development activities in their constituency. It was stated that MPs usually retain control of such funds while other members of the District Council felt and argued that these funds ought to be released into the control of the Council. It is also claimed that in most instances, MPs use the funds for personal activities rather than for the intended purpose. MPs argue that the funds are for the constituency work (travel and engaging with the people they represent on the ground). Decisions about which projects, emanating from ADCs, to fund at district level in the DC are bound to be contested as members usually try to draw projects to their own areas. Another issue is that government departments continue to undertake parallel planning and implementation processes outside the decentralisation processes and structures, especially when its concerns sector specific donor-funded projects. Even departmental of ministerial funding that comes through the District Commissioner is ring-fenced for the specific subsidiary departmental/ministerial in the district, which would appear to be defeating the whole purpose of decentralisation. In response to this, and a need to demonstrate progress, there appears to be a willingness of the line agencies to avoid the established planning process through an alternative form of decentralisation based on ‘community-based organisations’ (CBOs). Once established, a CBO becomes a means to identify local sectoral and development priorities and allocate and channel resources to address these.

3.1.3 The Land Legal Framework

Given the importance of agriculture within the target areas, land tenure frameworks represent critical institutions governing access to, and use of, important resources. Malawi’s 1994 Constitution (GOM 1995) provides that all of Malawi’s land is vested in the state and that all citizens have the right to obtain property in land and to engage in economic activity using land. Despite the constitution, Malawi’s land legislation per-dates the constitution and dates back primarily from the post-Independence era and includes:

1. The 1965 Land Act, which sets out the classifications of land and recognises types of land tenure;
2. The 1967 Customary Land (Development) Act, which provides for the conversion of customary land for agricultural development and establishes the means for adjudicating disputes over customary land;
3. The Deeds Registration Act (revised in 2016), which supports a system of deed registration;

4. The 1967 Registered Land Act which provides the legislative foundation for the transfer from a deed registration system of land administration to a title registration system;
5. The 1989 Control of Land (Agricultural Leases) Order (amended in 1996), which introduced a prohibition on conversion of customary land to leaseholds; and

The 2003 Land (Amendment) Act, which prohibits non-citizens from purchasing land in Malawi. 2002 saw the passing of a new National Land Policy for Malawi whose aim and objective was revising the legal framework governing land rights. The goals of this new policy were expressed as being ensuring tenure security and equitable access to land, and facilitating the attainment of social harmony and broad-based social and economic development through optimum and ecologically balanced use of land and land-based resources. The objectives of the policy were expressed as being to:

1. Promote tenure reforms that guarantee security and instil confidence and fairness in all land transactions;
2. Guarantee secure tenure and equitable access to land to all citizens of Malawi without any gender bias or discrimination;
3. Instil order and discipline into land allocation and land market transactions to curb land encroachment, unapproved development, land speculation and racketeering; promote decentralised and transparent land administration;
4. Extend land-use planning strategies to all urban and rural areas;
5. Establish a modern land registration system for delivering land services to all;
6. Enhance conservation and community management of local resources; and
7. Promote research and capacity building in land surveying and land management (GOM 2002).

A draft new land law based on this 2002 Land Policy was formulated by a Special Law Commission in 2003, but the draft land bill was withdrawn from consideration by the National Assembly in 2007 as a result of opposition to among various stakeholders. Although the parliament passed several land related bills (‘Land Bill’, ‘Physical Planning Bill’, ‘Land Survey Bill’; and ‘Customary Land Bill’) in 2016, the president had not assented and signed the bills into law by end of 2016 because of continued opposition to their provisions, in particular among the traditional authorities who felt that the new customary bill eroded their authority in matters of customary land in their areas.

Land Tenure Types

Malawi’s 1965 Land Act and the 2002 Land Policy recognise three categories of land: public land, private land, and customary land.

Public land is land occupied, used, acquired, or held by the government in the public interest. Public land includes national parks, conservation, and historical areas. Government land is owned and used by the government for public purposes, including schools and government offices. Public land is vested in perpetuity in the President, as trustee for the government. Between 15% and 20% of land in Malawi is classified as public land (USAID, 2010).

Private land is owned, held or occupied under freehold title, lease, Certificate of Claim, or land registered as private land under the Registered Land Act of 1967. According to the Land Policy, land registered as private land under the Registered Land Act includes privately owned freehold land and customary land registered by communities or individuals (upon registration, the land loses its character as customary land). Between 10% and 15% of land in Malawi is classified as private land (USAID, 2010).

Customary land is all land held, occupied, or used by community members under customary law. Customary land, though vested in the President in trust for the people of Malawi, is under

the jurisdiction of customary traditional authorities. Customary land may be held communally or individualised in the names of a lineage, family, or individual. Customary law governs land allocation, land use, land transfers, inheritance, and land-dispute resolution in relation to customary land. Between 65% and 75% of land in Malawi is customary land (Chirwa 2008; UNEP/UNDP 2001; GOM 2008; GOM 2002; Niyoka 2003).

Customary tenure

Land held under customary tenure is held by a group as a whole, usually administered by a traditional leader on behalf of his or her community (USAID, 2010; Jul Larsen and Mvula, 2007). Customary land may be individualised in the names of families and individuals. Land that has been individualised carries a presumption of exclusive use in perpetuity by the family or individual, and the family or individual can lease the land or bequeath it. The National Land Policy provides that the community retains a residual interest in the land, suggesting that the land cannot be sold outside the community. Traditional leaders may reclaim and reallocate land if it is abandoned. Jul Larsen and Mvula (2007) argue that traditional leaders are increasingly accepting that in some instances, customary land maybe and is being sold, and secondly also that re-claim of customary land from estates had become common especially after democracy in 1994, which marked the end of Dr. Banda's rule under whom customary land had been transferred to estates under leasehold for commercial crop production. Customary land that is not individualised (e.g., grazing land, burial grounds, etc.) is considered communal land with customary law dictating rights of access and use (GOM 2008; Takane 2007; Matchaya 2009; Chirwa 2008).

Security of rights to Land

The primarily access to land in Malawi is either through inheritance (52%) or marriage (18%) (USAID, 2010). The rights to land through marriage and inheritance are governed by one of the two main customary systems – matrilineal, whereby the husband moves to the wife's village at marriage (*chikamwini* - prevalent in the central and southern region) and patrilineal, whereby the wife moves to her husband's village at the time of marriage (*kutengwa* or *chitengwa*- prevalent in the northern region). Under the former, land is handed down through the female line (*mbumba*) while under the latter land is transferred from father to son. Under the matrilineal system, the husband generally loses rights to the use of the household land in the event of divorce or his wife's death while under the patrilineal system, the wife often loses rights to the use of the household land in the event of divorce or the death of her husband (Matchaya 2009; Jul Larsen and Mvula, 2007; UNEP/UNDP 2001; Chirwa 2008).

Thus tenure insecurity is very evident among a number of social groups in Malawi. Both women of patrilineal and virilocal marriages and men of matrilineal and matrilocal marriages suffer insecurity upon death of their spouse or upon divorce, because they and their children may be forced to leave the land (Jul Larsen and Mvula, 2007). Orphans also have insecure property rights since often, relatives take the deceased parents' land thereby dispossessing the children (Mbaya 2002; Ngwira 2003; Takane 2007; Holden et al. 2006; Matchaya 2009; Chirwa 2008). Other groups that expressed tenure insecurity are non-citizens and some recipients of land programs and in irrigation schemes where the beneficiaries do not receive a land title.

In view of the foregoing, the 2002 National Land Policy expressly recognises the importance of tenure security by recommending the surveying and recording customary land. The Land Policy also notes that local governments should be required to identify existing customary land rights as part of developing land-use plans (Holden et al. 2006; GOM 2002).

3.2 District and settlement level assessment

Information of ecological and agro-ecological context, patterns of livelihoods, local institutional arrangements and local infrastructure (e.g. roads, markets and healthcare provision) was sought at the district level and through the other sub-studies. This information informed the settlement level site selection and subsequent site selection.

The district and settlement assessment involved meetings with district authorities, NGOs and service providers (including agriculture and fisheries departments and healthcare providers). The Elephant Marsh lies within two districts – Chikwawa and Nsanje – that have separate planning processes (Figure 4).

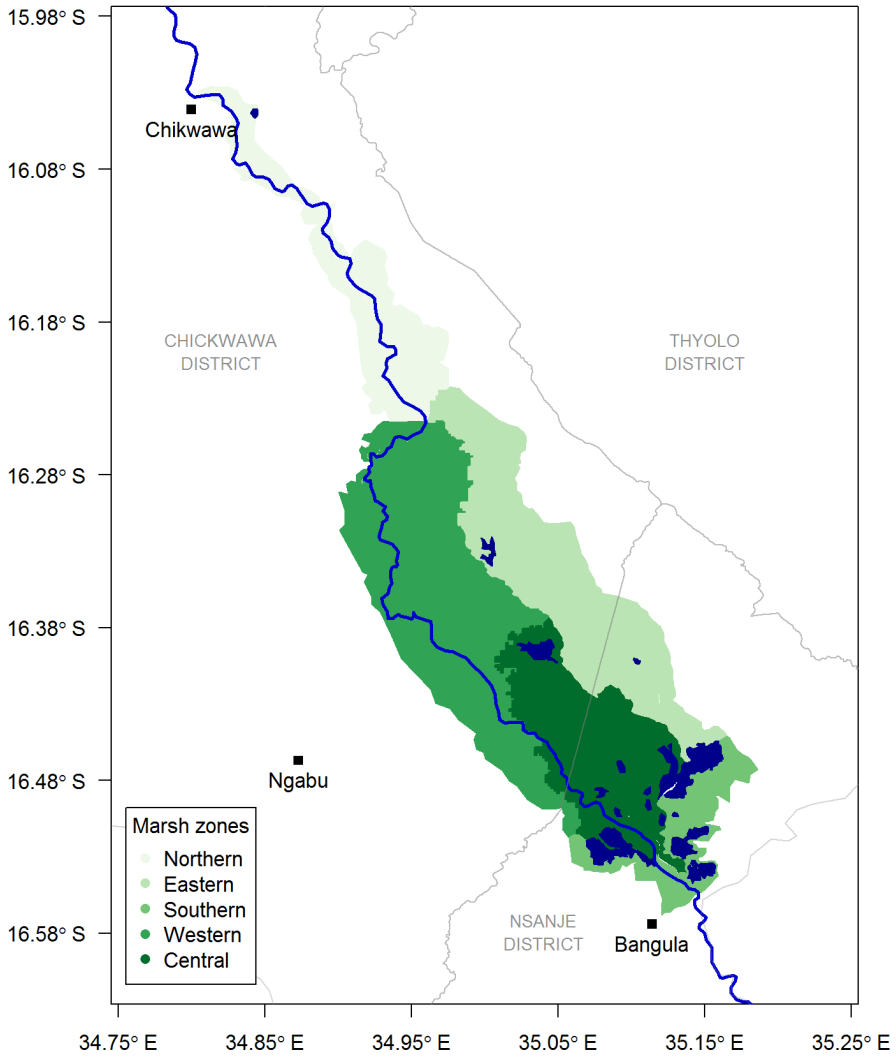

Figure 4: Location of the Elephant Marsh and areas within it in relation to district boundaries

At the settlement level, meetings were held with the Group Village Heads of a number of areas within and around the Marshes to provide an overall picture of the location and livelihoods within it (see Figure 5).

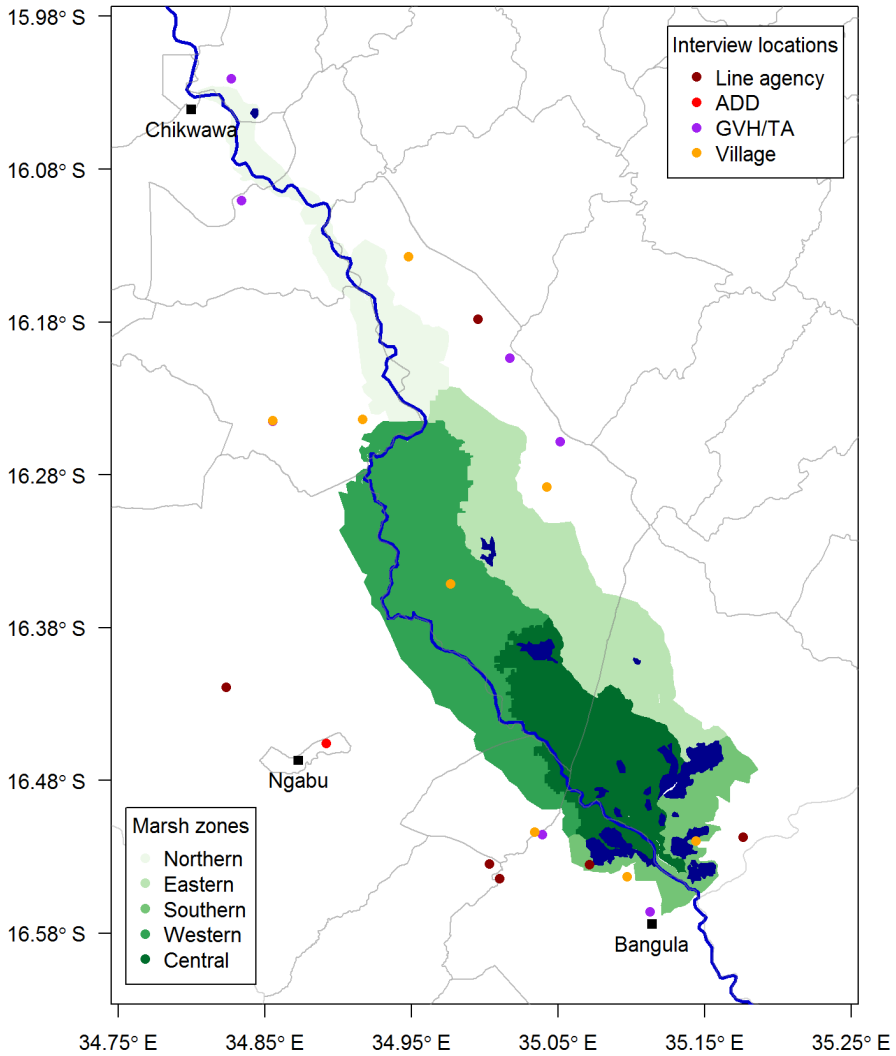

Figure 5: Meetings held with district and settlement level authorities, indicating also the areas of the Elephant Marsh and boundaries of the Traditional Authorities.

Evidence of the ways in which households and communities have been identified as adapting or coping with such vulnerability was the focus of the livelihoods study and were a central part of the interviews and focus group meetings held in November 2015 and May 2016. Data collected at the district level (Table 1) indicated that the population of Chikwawa and Nsanje districts was in the region of 677,000 people. This is based on census data. More recent data for Chikwawa from the Ministry of Health indicate that the population of Chikwawa district in 2015 was 533,714 people (267,444 male).

Table 1: Total population of Chikwawa and Nsanje districts, 2008

	Population			Land area and density	
	Male	**Female**	**Total**	**Total land area (sq. km)**	**Density (persons/sq. km)**
Chikwawa	217,981	220,914	438,895	4755	92
Nsanje	115,371	122,718	238,089	1942	123

Source: NSO (2008)

For each of the two districts, Chikwawa and Nsanje, the intercensual annual population growth rate between 1998 and 2008 was 2.1 but the annual population growth rates based on information obtained from the district health authorities in Chikwawa and Nsanje is around 3%. The population had increased by 23% for Chikwawa and 22% for Nsanje between the same period (1998 and 2008). Population structure information was available only for Chikwawa at the time of writing. The information provided by the Ministry of Health indicates a population with high number of young (Figure 6).

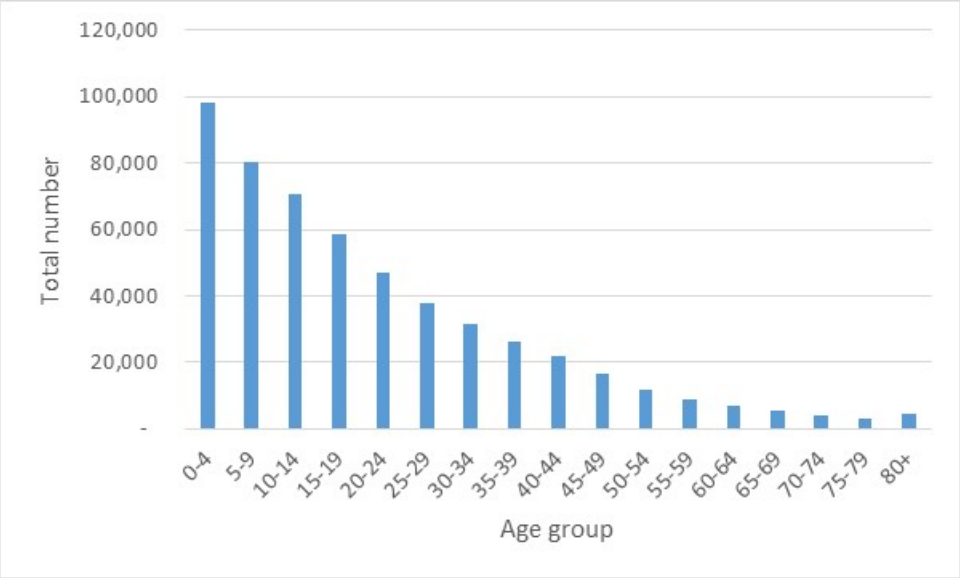

Figure 6: Population structure for Chikwawa district in 2015 based on data from the Ministry of Health.

Further details of the population of the districts within which the Elephant Marsh is situated are given in Tables 2 and 3 and the distribution of the TAs in Table 7.

Table 2: Total households and household size in Chikwawa and Nsanje districts 2008

	Total households	Average household size
Chikwawa	98,035	4.5
Nsanje	52,600	4.5

Source: NSO (2008)

Table 3: Total population for Traditional Authorities that cover Elephant Marsh

District & TA	Population		
	Male	**Female**	**Total**
Chikwawa			
• Katunga	12,176	12,826	25,002
• Kasisi	15,755	14,871	31,033
• Ngabu Urban	3,826	3,649	7,511
Nsanje			
• Mlolo	27,428	29,647	57,075
• S/C Mbenje	21,546	22,222	43,768

Source: NSO (2008)

The Mang'anja are the indigenous people of the Elephant Marsh although many other ethnic groups have also migrated into the area, most notably the Sena (Kosamu et. al., 2012; Schoffeleers, 1968). Other ethnic groups that have settled in marsh area include the Lomwe, Yao, Chewa, Ngoni, Tonga and Tumbuka. According to Kosamu et al. (2012), the Man'ganja mainly specialise in farming while the Sena tend to engage more in fishing and livestock keeping. The people in the Elephant Marsh identify almost exclusively as Christian.

3.2.1 Geography

Livelihoods in the Elephant Marsh are affected by both geography and institutions (see Section 3.1.2). In terms of the geography, the Elephant Marsh represents a low lying floodplain valley fed by the Shire River below the Kapichira Falls in the north. On the west the Marsh is bordered by land that rises gently towards the low lying hills that include the southern-most end of the Kirk Range, the Matandwe hills in the south west and the Namalombo hills extending south wards from the Bangula Road. To the east the Thyolo Escarpment rises steeply with a number of perennial streams flowing into the Elephant Marsh. On both the east and west sides of the Elephant Marsh there are a number of streams and rivers, some seasonal (particularly on the less steep western side), that feed into the marsh. The nature of the Marsh as a depression provides areas of higher and lower lying land. The extent to which these are inundated by flooding differs and gives rise both to different forms of cultivation and cropping and potentially provides a degree of flexibility for farmers who are able to crop more upland areas in wetter years and lower lying, and more fertile, areas in drier years. Based on these biophysical differences, four key regions within the Elephant Marsh were identified (Figure 1). These zones and nature of the Elephant Marsh is further described in Birkhead et al. (2016); Turpie et al. (2016) and Brown et al (2016).

It is also important to note that The Elephant Marsh and surrounding areas have been subject to extensive deforestation. The general deforestation of the Lower Shire is also historical in that the influx of over one million refugees from Mozambique during the civil war in the 1980s and 1990s is reported to have impacted the environment in the area. The refugees, having no land, are reported to have had a greater dependence on natural resources. There is currently little in the way of forest around the Elephant Marsh apart from isolated patches used for fuel

wood (communal woodlots) and grave yards and isolated baobab trees. The national park at Lengwe contains some forested areas and there are also higher densities of large baobab trees to the southwest of the marsh. Deforestation is evident all around the Elephant Marsh but the effects are most pronounced along the eastern side adjacent to the Thyolo Escarpment where the effect has been to increase the water runoff rates and potential for flash floods on the eastern side of the Elephant Marsh.

3.2.2 Government agencies mandated for key livelihoods sectors

For the purposes of development planning and implementation, Chikwawa and Nsanje each have a District Council. The membership of Assembly/Council comprises of politically elected councillors (representing each ward), Traditional Authorities (TAs) Chiefs, Members of Parliament (MPs) and the District Commissioner. Supporting the District Councillors and the DA (through an executive committee that provides technical advice and backstopping) are the government line agencies and NGOs.

The mandate of the District Council is to formulate development and services policy for the district. Policy formulation is undertaken through specially elected committees among the members of the District Council. In the Nsanje District Council, the policy formulation committees are: the Health and District Environmental Sub-Committee, the Works and Agriculture Committee, the Development Committee, the Finance Committee, the Education Committee and the Human Resources Committee. The finance committee is responsible for looking for resources for execution of the development and social activities. Thus one of its tasks is formulation of proposals and looking for possible funders of the proposals developed. There is also a National Local government Finance Committee, which is responsible for finding and negotiating for funding for District Councils. The size of the funding to each District Council is based on the population and economic status of a given district. Once policy has been formulated it is then passed on to the appropriate and relevant public service department or ministry for implementation. The District Council has also got powers to hold the district public service responsible for the success or failure of execution of activities that it tasks the public service to execute.

It must be noted that district development planning under decentralisation does not take place in isolation from national development planning. Thus it is expected that district level planning has to be linked to national programmes and in fact this has been the main pre-condition for decentralisation. In this context, the district development planning system derives its objectives from the national key development instruments namely: The vision 2020; The Malawi Poverty Reduction Strategy Paper (MPRS); The Malawi Growth and Development Strategy (MGDS); the national Decentralisation Policy and Millennium Development Goals, the National Physical Development Plan.

At the sub-district level, villages have representatives on Village Development Committees (VDC) that operate at the Group Village scale and meet monthly. Priorities for each village are put forward to be addressed through this mechanism. The Area Development Committees (ADC) that operate at the TA level provide a forum for discussion of the issues raised at the VDC. The ADC is made up of representatives from the relevant VDCs. All councillors are automatic members of the VDC and ADC in their wards and this is where they can provide input and hear local views. Line agencies are able to provide some inputs at VDC and ADC level (through local level officers working in the areas who form technical committees that provide technical advice and backstopping to ADCs and VDCs) and this can be a mechanism for prioritisation of activities for the line agencies, e.g. seed provision by the Ministry of Agriculture at EPA level.

Issues raised at ADC level are discussed at District Council) meetings that are held quarterly. The District Council meetings are attended by the TA, Councillors and the local MPs as well

as key interest groups, including 'the physically challenged, women, youth, HIV and elders. Key issues that are emerging within the District Councils related to the Elephant Marsh (e.g. Table 4) include village loan facilities, seeds (maize, beans and peas) and fertilizers for dry season crops, value addition. There is also a high demand for village clinics to address health care needs as currently villagers often have to rely on private clinics because of a reported lack of alternatives or shortage of drugs in hospitals.

Table 4: Key issues and objectives in District Development Plans

Issues identified	Immediate objectives
Low food production and food insecurity	Improve crop and livestock productivity Improve crop distribution and marketing Reduce post-harvest losses
Low income levels	Promote on and off farm livelihoods and income generating activities to economically empower communities
Disaster risk	Build capacities of communities and district level stakeholders to coordinate, plan and respond to disasters Strengthen coordination amongst agencies for improved disaster response
Access to clean water	Increase water provision Reduce degradation of surface and ground waters Increase community participation in water point management Improve community hygiene practices
Environmental degradation	Strengthen coordination among environmental stakeholders
Health	Strengthen community level healthcare Strengthen implementation of healthcare activities at the community level Encourage care-seeking Reduce HIV/Aids prevalence Increase number of ambulances
High illiteracy rates	Increase school and school materials provision Increase school sanitary facilities Discourage negative cultural practices
Poor infrastructure	Improve road infrastructure and network Ensure full telecommunications coverage
High crime rate	Improve access to police Improve victim support Improve community policing Improve migration control mechanisms

Source: District Development Plans for Nsanje and Chikwawa

Decentralisation in practice

In practice however, while the DC can identify and prioritise activities and interventions, it does not help passing these on to line agencies and NGOs for implementation if the latter do not have the resources. At the same time, the line agencies have their own programmes and projects (and the resources to implement these) which can make them unwilling to work through, or even align with DC work plans and activities. This is particularly the case where there is a development programme with set objectives and timeframes that do not sit well with the local planning processes and line agencies are under pressure to commit resources and initiate activities. Under these pressures decentralisation tends to be implemented through the

more direct mechanism of channelling funds to the local level through community-based organisations (CBOs). Line agencies can establish or utilise existing CBOs as a means to implement small-scale projects more directly. To ensure that there is some accountability the chair of the CBO however is typically invited to VDC meetings. While these activities can be accounted for in the local planning process, the activities may not be targeting areas or needs that are local priorities. The DC has, in effect, little leverage over the line agencies if the funding does not come through the DC.

Within the District Council the TA, interest groups and MPs were formerly ex-officio members (i.e. not able to vote), however this changed to allow MPs to vote on the issues raised and this has caused some issues within the Assemblies. In particular there is a view that because MPs have access to Constituency Development Funds (CDF) via national Treasury allocations they should not also be able to influence local fund distribution. Currently MPs are able to disburse CDF on priorities agreed with the TAs and are able to do this without oversight at the district level. A certain tension therefore exists between the local and central with calls from Councillors and TAs for greater devolution of control over funding and that staff working at the district level should be employed by the districts rather than centrally.

Some of the challenges with regard to decentralisation were mentioned as being problems of funding for proposed development and service activities and also lack of political will for the implementation of decentralisation. The Director of Planning and Development is supposed to act as liaison officer between the District Council and line ministries/departments. The district heads of departments/ministries and NGOs, the Clerk of Council and religious leaders are supposed to form the District Executive Committee (DEC) that shall provide technical advice to the District Council. Field Officers (for example Agriculture field extension officers, fisheries assistants, etc.) from ministries, departments and NGOs are supposed to form technical committees that are supposed to provide technical advice to ADCs and VDCs in their local geographic areas of responsibility.

A further issue that was identified was the lack of coordination between agencies and their ineffectiveness at the local level. The different agencies (health, agriculture and fisheries for example) have different geographic zoning within the districts, creating challenges for coordination. The zones do not have to be reconfigured but there does need to be recognition of who should be involved in planning and implementation. Ineffectiveness is a more serious issue and one that will need to be addressed in implementing livelihood support programmes. Examples of ineffectiveness include DNPW staff being selective in their response to problem animals (see next Section), fish scouts not addressing issues of illegal fishing (see also Kosamu et al., 2016) and hospital staff charging patients for access to public health care[3].

3.2.3 Land tenure on customary land in the Elephant marsh

Although the three categories of land (public, private and customary) exist in the Lower Shire and Elephant marsh area, over 60% of the land in the basin is under customary tenure (GoM, 2013). Of note is the concern people expressed that Illovo has been acquiring increased amount of land, some of which probably is part of customary land. This follows similar disposition of land from local people in the area when the Sugar Corporation of Malawi (SUCOMA) was established as a parastatal by government in the 1970s. Such acquisitions are likely to impact negatively on amount of land available to the growing local population, which derives its livelihoods mainly from Agriculture. Another source of concern was the acquisitions of customary land by private individuals and/or companies for cattle ranching and game farming.

Ownership and access to customary land in the Elephant Marsh is based on kinship

[3] e.g. http://www.nyasatimes.com/patients-paying-for-public-hospital-services-scam-at-nsanje-dho/

inheritance and/or marriage, depending on the ethnic group and its cultural and traditional tenure practices. Among the two main ethnic groups in the area, the Man'ganja practice the matrilineal system while the Sena system of marriage and land inheritance is patrilineal (Kosamu et al, 2012). Among the other ethnic groups, the practices are variable between these two (matrilineal and patrilineal) depending on the group's ancestral origins. Researchers and commentators point out that these two basic original traditional systems (matrilineal and patrilineal) for access, ownership and inheritance to land have over time been eroded through inter-marriage among the ethnic groups, modernisation, migration and intermingling among the ethnic groups (Schoffeleers, 2008; Mandala, 1990; Schoffeleers, 1974). In line with the National Land Policy of 2002, land under customary tenure in the Elephant Marsh is mainly under communal tenure and cannot be sold outside the community. The communal land is governed by customary law (also as endorsed by the 2002 Land Policy), in which the traditional leaders are the custodians of the land on behalf of their communities (Matchaya, 2009; Takane, 2007).

3.2.4 Agriculture and fisheries

Because of the natural resource-based livelihoods of many people living in and around the Elephant Marsh, key ministries and departments are therefore the Ministry of Agriculture, Ministry of Water and Irrigation, Department of Fisheries, Department of Forestry which falls under the Ministry of Natural Resources, Energy and Environment and Department of National Parks and Wildlife.

The Elephant Marsh fall under the Shire Valley Agricultural Development Division (ADD) in Ngabu. The ADD is further organised into Extension Planning Areas (EPAs) which are further organised into sections. Each EPA is headed by a Chief Technical Officer (CTO) while each section is headed by a Technical Officer (TO). In some instances, TOs are responsible for more than one section, due to shortage of staff (Government has currently put a moratorium on recruitment and training of staff). Table 5 details the organisational structure for Ministry of Agriculture extension activities for the Elephant Marsh. It should be noted that EPAs tend to extend from upland down into the Elephant Marsh and all tend to cover the Central study area as well as the edge area (Figure 1).

Table 5: Organisational structure for Agriculture extension for the Elephant Marsh

Study area	District	EPA	Sections	GVHs
Western	Chikwawa, Shire River west bank	Dolo	Lalanje	Mwana wa Njobvu; Khungubwe
			Masanduko	Masanduko;
Western		Mikalango	Somo	Kumwembe
			Mlambe	Nzangaya; Nkhwazi
			Monjo	Chindoko;
			Nyakamba	Chamboko; Phazi

Study area	District	EPA	Sections	GVHs
Western		Mbewe	Malemia	Malemia; Bester; Tizola 1; Chabuka
			Sekeni	Sekeni 1; Pangiresi; Chipakuza; Kutulo 1
			Nyamphota	Mapale 1
Northern		Mitole	Kanseche	Kanseche
Eastern	Chikwawa, Shire River east bank	Livuzu	Livuzu	Jana
			Thapha	Chikuse; Mazongoza; Champanda; Sabvala;
			Nankhazi	Nantusi
			Namichimba	Kanyimbiri
			Mulunga	Gangu
			Chidimba	Nyangu
			Maperera	Chigambatuka
			Limphangwi	Nyambalo
			Chikumumbwi	Modzi
			Nkuzi	Joseph
			Mwaphanzi	Chinkole; Mpokonyola
Southern	Nsanje, Shire River west bank	Magoti	Lalanje	Mbenje
			Marsh	Kadyamba
			Nkhalango	Nyang'a
			Mlonda	Kaleso
			Nangali B	Nmembe
Southern	Nsanje, Shire River east bank	Makhanga	Dowa	Kalonga
			Mlambe	Kalonga

Study area	District	EPA	Sections	GVHs
			Mlewa	Mchacha James
			Mbwazi	Chitseko
			Monica	Chitseko
			Thangadzi	Chapinga
			Muwona	Chipondeni; Gooke

Source: Shire Valley ADD and Nsanje and Chikwawa EPAs

Physically, the northern part of the Elephant Marsh falls under Chikwawa District fisheries administrative area (under the Chikwawa District Fisheries Officer based at Kasinthula) while the southern end falls under the Nsanje District fisheries administrative area (under the Nsanje District Fisheries Officer based at Nsanje boma). The District Fisheries Officer has overall responsibility for the district administrative area. He or she oversees the planning and execution of all the activities, is responsible for field level operational decisions and the control of the district station's operational budget provision. The district station is charged with extension, data collection and fisheries development in the district administrative area.

The Department of Fisheries organises its data collection and extension activities on the basis on Minor strata. Below (Table 6) are the details for the minor strata on the Elephant Marsh.

Table 6: Department of Fisheries Minor Strata and key beaches around the Elephant Marshes.

District	Minor strata		Study area	Beaches
Chikwawa	11.1	Northwest Elephant Marsh	Western	Mchere
	11.2	Northeast Elephant Marsh	Western and Eastern	Gumbwa; Yolodani; Lisuli
Nsanje	11.3	Southwest Elephant Marsh	Southern and Western	Chambalo; Chisamba; Chivuli; Buluwayo; Phindani
	11.4	Southeast Elephant Marsh	Southern and Eastern	Lokomiya; Chizeti; Nchelenje; Sambo; Kulira; Chulu cha nkango; Nchacha; Twaya; Njale; Nkulimbo

Source: Chikwawa and Nsanje District Fisheries Department Offices

Each minor stratum is supposed to have a fisheries extension officer (responsible for extension activities in his or her area) and a fish scout (responsible for data collection). The extension officer is in-charge of the minor stratum, including supervision of the fish scout in his or her area. Due to shortage of staff, the reality is that in some instances a minor stratum will have only one person rather than two, necessitating that the one person has to do both extension and data collection. Another problem is means of transport. Ideally, extension officers are supposed to have motorcycles while fish scouts are supposed to have bicycles.

Due to budgetary constraints, the department of fisheries has not been in a position to provide motorcycles or bicycles in recent years. Thus during the study, none of the extension officers in Chikwawa or Nsanje had functioning motorcycles or bicycles. The inadequacy of resources has implications in terms of efficiency of field operations and the quality of data that is collected.

In the last two decades, the Department of Fisheries has facilitated the formation of Beach Village Committees (BVCs) in all capture fisheries administrative areas (Hara et al., 2015). In the context of the Elephant Marsh, 'beach' refers to a landing site. The BVCs are supposed to be local level fisheries management committees comprised of elected members from fishers and other stakeholders (for example fish traders) and the Department of Fisheries (usually represented by the local extension office in the area). The BVCs are headed by a BVC chair and village headpersons sit on BVCs as ex-officio members. BVCs (like other sectoral management committees such as Agriculture Farmers Clubs, Forestry Management Committees, etc.) are supposed to function under VDCs, thereby proving the link between local level sectoral natural resource management and administrative decentralisation. There are about twenty BVCs on the Elephant Marsh (Kosamu et al., 2012). It is said the BVC chairs act to control entry to specific fishing areas a BVC has jurisdiction by being positioned at these entry points (ibid.). BVCs are supposed to enhance sustainable fisheries management through strengthening tenure rights to fisheries and also participation in fisheries management decision-making and enforcement of regulations in their areas of jurisdiction. However, currently there is no overall mechanism to coordinate the operations of the individual BVCs (Kosamu 2014). Despite this, many of the BVCs are reported to be operating successfully (e.g. Kosamu et al. (2012).

Land tenure and local planning

Malawi has got a traditional authority (TA) system that pre-dates the colonial era. The lowest tier is the village headperson (presiding over a village), then Group Village Headperson (GVH) (presiding over a group of villages) and then at the highest level is the Traditional Authority (TA) (presiding over a number of village groups). Chieftancy at all these levels is usually hereditary. Key to livelihoods is that chiefs have authority in terms of customary land (and resources that exist on such land) and how this is distributed among the kin groups, families and households under their authority. Customary and traditional practices are also used in the mediation of access rights and informal management of resources. Under the Traditional Authority system, the Elephant Marsh falls under TAs Lundu, Ngowe and Ngabu on the west bank in Chikwawa District; TAs Makhuwira, Maseya and Katunga on the east bank in Chikwawa District; TA Mbenje on the west bank in Nsanje District; and TA Mlolo on the east bank in Nsanje District. Table 7 shows the Groups Villages under each of these.

Table 7: TAs and their GVH which share and rely on the Elephant Marsh for Livelihoods

District	Area	TA	GVHs
Chikwawa, Shire River west bank	Northern	Lundu	Kanseche; Bester; Malemia; Tizola 1; Chabuku; Sekeni1; Pangiresi; Chipakuza; Kutulo; Mapale.
	Southern	Ngowe	Mwana wa Njobvu; Khungubwe; Masanduko.
		Ngabu	Kumwembe; Nzangaya; nkwazi; Chindoko; Phazi.
		Maseya	Joseph; Chinkole
		Katunga	Mpokonyola
Chikwawa, Shire River east bank	Northern	Makhuwira	Mazongoza; Champhanda; Sabvala; Nantusi; Kanyimbiri; Gangu; Nyangu; Chigambatuka; Nyambalo; Modzi; Jana.
Nsanje, Shire River west bank	Southern	Mbenje	Mbenje; Kadyamba; Nyang'a; Kaleso; Nmembe
Nsanje, Shire River east bank	Southern	Mlolo	Kalonga; Mchacha James; Chitseko; Chapinga; Chipondeni; Gooke

Source: Chikwawa and Nsanje EPAs

The District Council connects with the traditional Authority system through the organisation of Area Development Committees (ADCs - at Traditional Authority level) and Village Development Committees (VDCs - at village level). At each of the development organisational levels, the civil servants working at those levels form technical committees for providing technical advice and back-stopping at the appropriate levels they work with traditional authority system and communities, just like at the district level. In terms of prioritising and implementing local development projects, VDCs are intended to identify ideas for development in the villages and prioritise these. These ideas are then passed on to the ADCs of their area which vets and prioritises these at this level. These are then passed on to the assembly with deliberates and decides upon those projects that should be funded and operationalised. Funding for development in a district, whether from government or donors, should be channelled through the District Council via the process outlined above to prioritise projects that should be funded. While some departments (for example the Department of Fisheries) do channel funding for activities in the two districts through the DCs, some (for example the Ministry of Agriculture) do not. In any case, such funding is ring-fenced for a specific department, meaning that the District Commissioner's office is a mere conduit for the funds. Thus the DCs cannot use such money for their own agreed priority activities. In any case, money for salaries and wages for civil servants remains centrally controlled and disbursed.

3.2.5 Local economy

The Lower Shire and Elephant Marshes area are important for both agriculture and fisheries production within Malawi. The two agricultural seasons are summer (rainy season) and winter (dry season). In and around the Elephant Marsh it is the winter production that is most important than summer production. In addition to intensive cash crop production of sugar cane (primarily at the Illovo sugar cane farms on the western side of the Marsh) and cotton there is considerable recession agriculture that is largely based on staple crops such as rice, maize, sorghum, millet, beans, cassava and sweet potatoes. Crop production is supplemented by livestock rearing and households in the area depend on the wetlands to provide food for goats and cattle that represent a source of monetary income and make significant contributions to national meat production. The marshes provide grazing land and watering points that are particularly important during the dry season. In addition to agriculture local people are engaged in fishing and hunting activities (e.g. for wild birds). The fish fauna of the Elephant Marsh is essentially of Zambezi River Basin origin (Willoughby and Tweddle, 1978). While over 60 species are caught in this fishery, three species, *Mlamba* (*Clarias gariepinus*), *Chikano* (*Clarias ngamensis*) and *Mphende* (*Oreochromis mossambicus*) make up around 90% of the annual total fish catch (Njaya, 2016). There are an estimated 1,500 people involved in fishing activities and the fisheries are estimated to produce around between 2,000 and 12,000 tonnes per annum (Njaya, 2016; Kosamu et al. 2016).

Common to all areas is a local economy based on subsistence farming. The main edible crops that are grown are: millet, sorghum, maize, sweet potatoes, tomatoes, okra and rice. Most of the food grown is for subsistence though surplus (especially rice) is sold. Rice is mainly grown on the east bank where there are greater areas of marsh that retain residual moisture. Beans are mainly grown during the dry season using irrigation. Additionally cash crops including sugar and cotton may be grown during the summer. Agriculture and fishing are not uniformly distributed within the Marsh area. The upper and western side of the Marsh have areas of both extensive and intensive agricultural activity (Figure 7). Toward the southern end of the Marsh the aquatic habitats become more complex and there is increased fishing activity based around a number of fish landing sites.

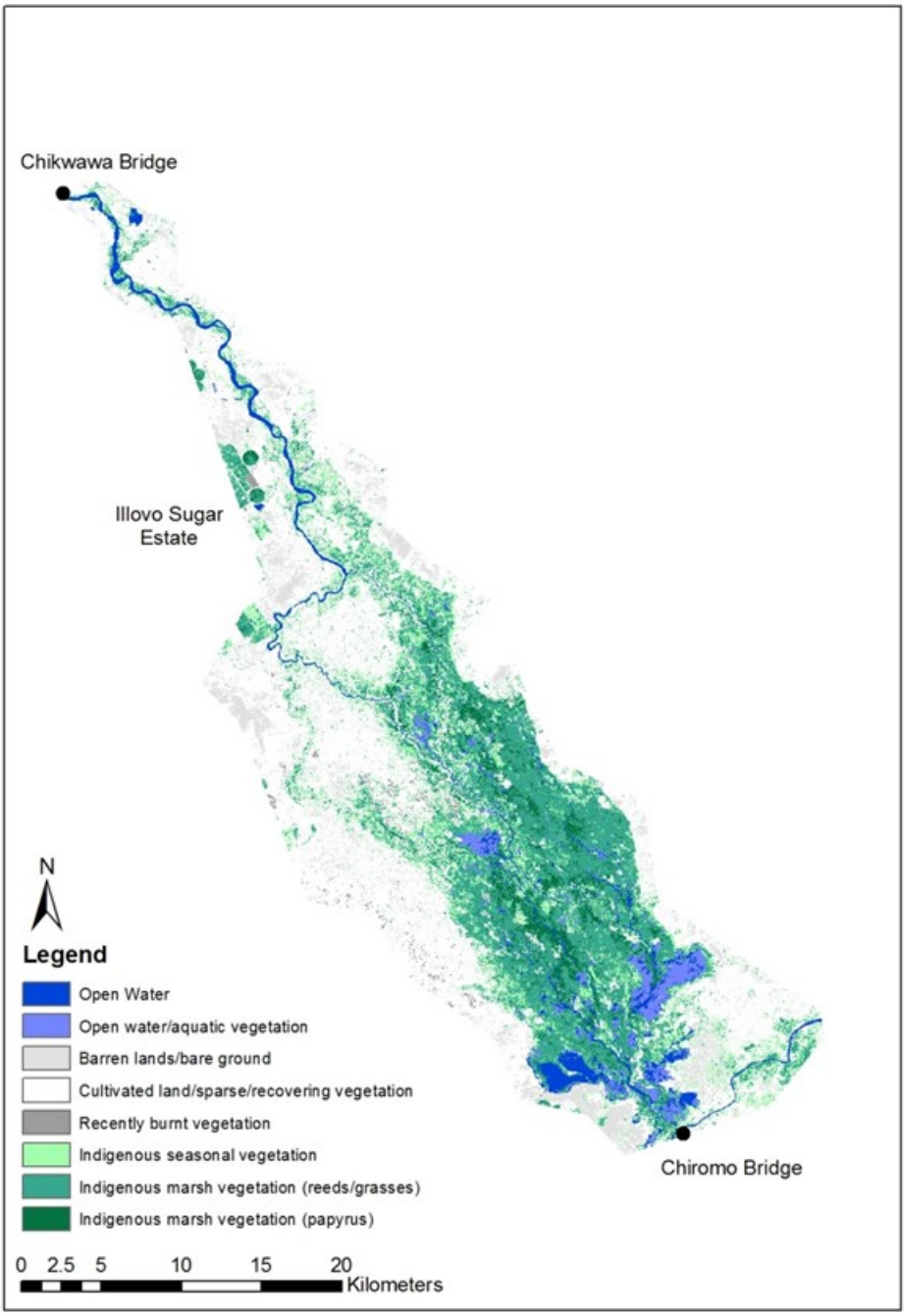

Figure 7: Spatial distribution of vegetation and cultivation across the Elephant Marsh in 2015

Along both sides of the marsh there is evidence of small scale sand extraction in a number of the river beds and a few quarries, only one appeared to be in operation. Brick making is common in many villages. Markets represent a further form of institution that structures processes of exchange and access to products. Along the road around the marsh there are a number of markets that operate on set days and to which traders will come from Blantyre to attend (and buy goods for resale in Blantyre) and trading centres that operate all week, the latter where service providers, including schools and healthcare facilities are available. The location of markets and trading centres are shown in Figure 8 below.

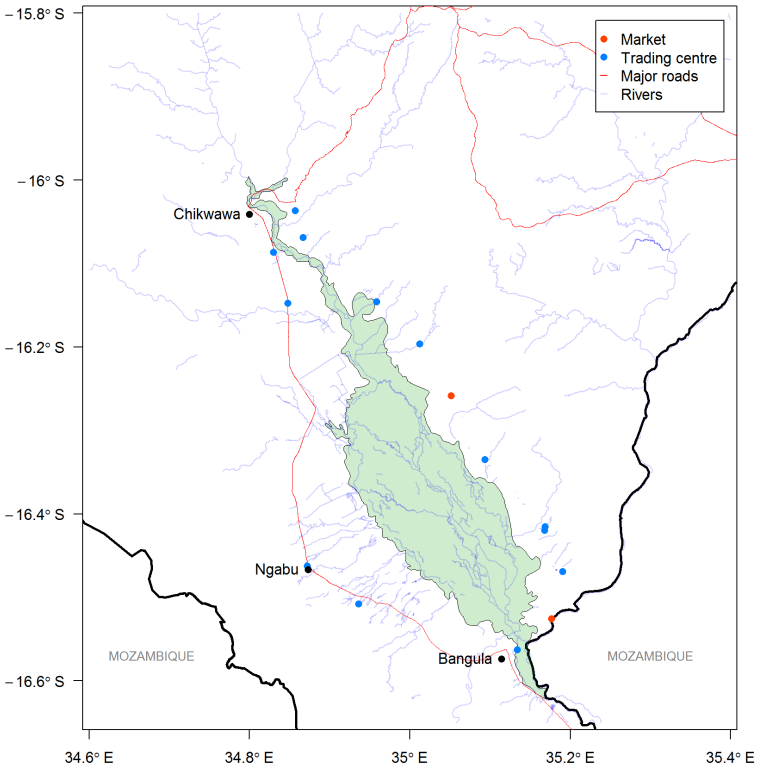

Figure 8: Location of key markets (red) and trading centres (blue).

Markets are held on different days around the Elephant Marsh (Table 8), although some of the larger markets, e.g. Nchalo, will have traders operating every day.

Table 8: Market days for key markets around the Elephant Marsh

Market	Day held
Ngabu	Thursday
Nchalo	Saturday
Bereu	Sunday
Chikwawa	Daily
Sogeni	Monday
Chazunda	Tuesday
Masanjere	Monday/Friday
Mikando	Thursday/Sunday
Livusu	Tuesday/Saturday

All areas of the Marsh, but particularly the more southern parts, have been affected by the civil wars in Mozambique. These have caused large numbers of refugees, hundreds of whom were settled in camps in the Lower Shire. While many of them have returned to Mozambique, a number settled in the area. This is reported to have contributed to increases in deforestation and land degradation as well as an increase in cattle theft.

Livelihood activities

The main livelihood activity for households living in and around the Elephant Marshes is rain-fed agriculture over two seasons as only about 15 to 20% farm families have access to irrigation. Average size of land for irrigation is about 0.2 hectares. This is usually not enough land to grow enough food for the whole year for an average farm family because of a combination of low rainfall and low yielding nature of the staple food crops (maize, millet and sorghum).

The fertility and residual soil moisture in *dimba* land in and around the Elephant Marsh is important for agriculture and the flooding can provide a greater area where it is possible to grow crops as well as reducing the demand for irrigated land. In these lowland (winter cropping) areas the main crops are maize, rice, fruit and vegetables, cowpeas, sweet potato and pigeon peas. Upland areas are also cultivated and the main food crops grown in upland areas are sorghum, maize, and millet. Cash crops, including cotton and sugarcane are also grown in both upland and lowland areas and some rice and maize is also sold. Households with access to *dimba* lands tend to have more income from crop sales compared to those who rely only on upland crop production, due to both the types of crops grown and the higher productivity of the *dimba* lands. Typically households in and around the Elephant Marsh would have access to both upland and lowland (*dimba*) land, cultivating upland areas for the summer crop and lowland for the winter. In cases where there is increased flooding, upland areas may be used for the winter crop as well. Crops and crop production around the Elephant Marshes are provided in Section 3.3 below. It should be noted that flooding can have a significant impact on crop yields, for example, typical local maize yields for 2015 in the Elephant Marsh were around 38% of less flood affected areas and hybrid maize around 70% (Livunzu EPA).

According to respondents, land holding was reported to be similar across households regardless of wealth, although poorer households may not be able to fully utilise their land. Around the marsh there were also a number of female headed households. In some cases these were due to men having more than one wife. This was one way in which total land holding could be increased. Land was also sometimes rented out, often when there was either a very wet year (when there was increased demand for upland agricultural land) or dry year (demand for *dimba* land).

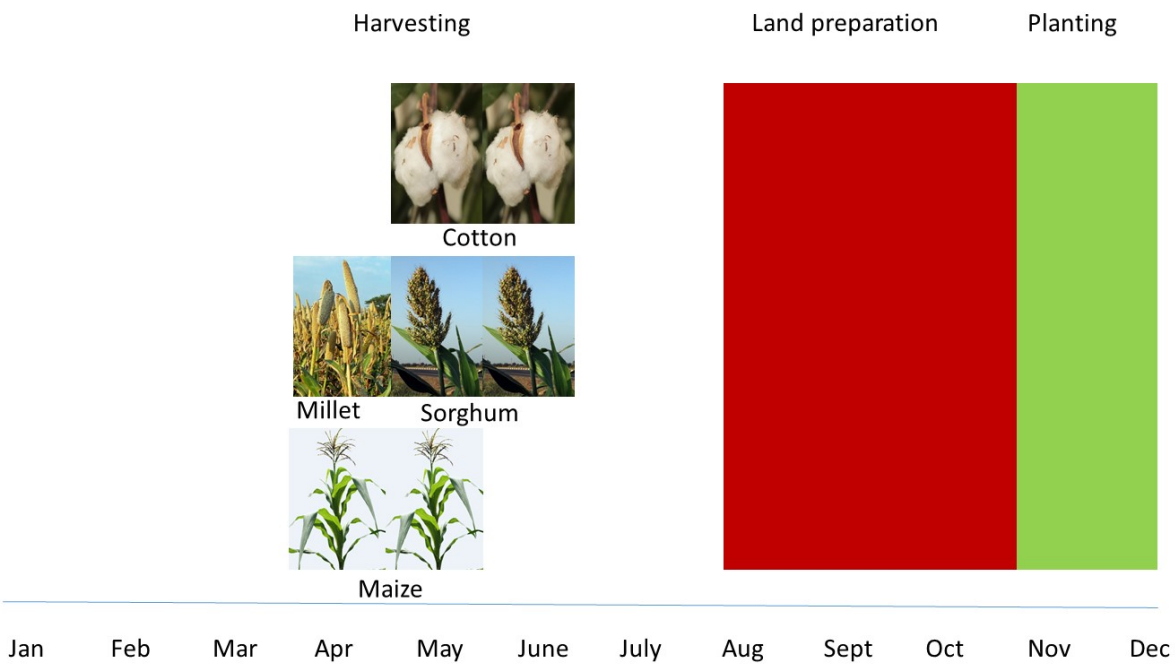

Figure 9: Summer (rainy season) agricultural crop cycle

Source: information from interviews

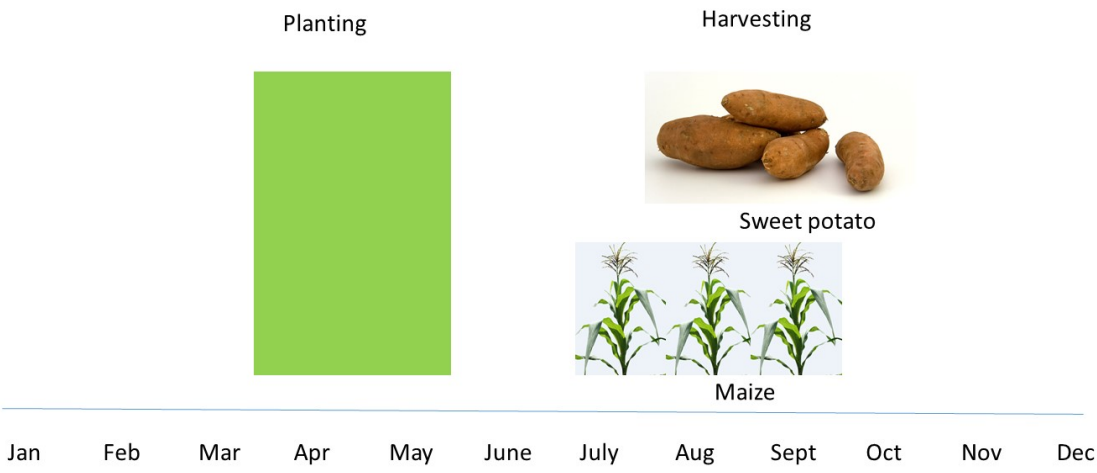

Figure 10: Winter (dry season) agricultural crop cycle

Source: information from interviews

Agricultural production figures were sourced from the ADD and the various EPAs that cover the Elephant Marsh. Based on the production figures provided, the total production of staple crops for the Elephant Marsh was in the region of 255,000 tonnes, of which 132,000 tonnes was produced in the winter season[4]. Details of the relevant levels of production of key crops

[4] Note that the EPA areas do not exactly correspond to the area of the Elephant Marsh. The totals are likely to be an overestimate, particularly for the summer crop. Figures are for 2014/15 with the exception of Southern/Central where figures for 2010/11 were the only ones currently available. Given the flood

by season are provided in Figure 11 and details are provided in the following tables. Areas cropped differed between seasons with the overall areas for maize being roughly the same but with more hybrid maize planted in the winter and significantly less rice planted and produced in the winter. Cotton and sorghum are typically summer crops while Phaseolus beans are a winter crop.

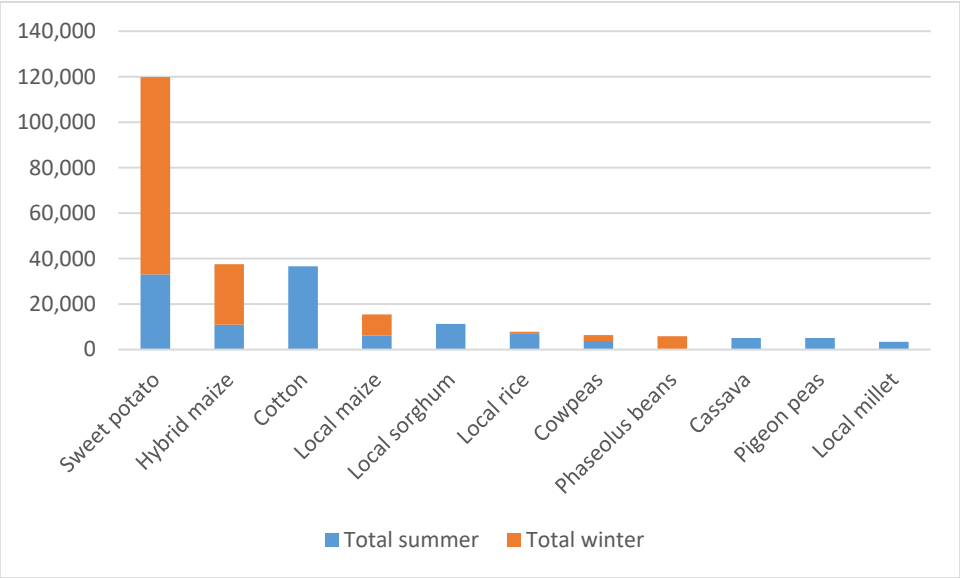

Figure 11: Production of key staple crops by season for the Agricultural Extension Areas covering the Elephant Marsh for recent years. See text for details.

Source: Department of Agriculture figures.

and drought in 2015/16, these figures are again going to be an overestimate of recent production from the Elephant Marsh.

Production summaries are provided in the tables below.

Table 9: Crop production records obtained for the northern study area

Location	Season	Crop	Area cultivated (ha)	Production (tonnes)
Mitole EPA	Summer 2014-15	Local maize	1,336	675
		Hybrid maize	1,304	1,367
		Local rice	373	384
		Local sorghum	3,512	2,564
		Local millet	548	363
		Pigeon peas	1,284	1,045
		Cowpeas	1,525	631
		Sweet potato	482	4,830
		Cassava	62	646
		Cotton	5,935	5,083
		Mangoes		15,070
	Winter 2014-2015	Local maize	870	1,151
		Hybrid maize	1,630	4,167
		Local rice	179	439
		Phaseolus beans	330	212
		Cowpeas	490	273
		Sweet potato	235	4,464

Source: ADD and Mitole EPA

Table 10: Crop production figures obtained for the eastern study area

Location	Season	Crop	Area cultivated (ha)	Production (tonnes)
Livunzu EPA	Summer 2014-15	Local maize	3,334	2,651
		Hybrid maize	1,062	1,289
		Local rice	1,978	5,157
		Local sorghum	134	96
		Local millet	102	63
		Pigeon peas	3,441	3,107
		Cowpeas	897	369
		Sweet potato	1,487	21,904
		Cotton	3,155	2,434
		Mangoes		16,579
	Winter 2014-2015	Local maize	2,950	3,865
		Hybrid maize	1,300	4,078
		Local rice	155	374
		Phaseolus beans	3,455	3,890
		Cowpeas	1,225	701
		Sweet potato	1,750	34,017

Source: ADD and Livuzu EPA

Table 11: Crop production figures obtained for the western study area

Location	Season	Crop	Area cultivated (ha)	Production (tonnes)
Mbewe, Mikalango and Dolo EPAs	Summer 2014-15	Local maize	3,733	2,613
		Hybrid maize	4,551	6,446
		Local rice	770	1,263
		Local sorghum	9,541	7,859
		Local millet	3,665	2,664
		Pigeon peas	638	509
		Cowpeas	3,965	1,893
		Cassava	96	1,102
		Sweet potato	459	5,135
		Cotton	23,889	25,337
		Mangoes		22,150
	Winter 2014-2015	Local maize	2,179	2,437
		Hybrid maize	3,285	7,484
		Local rice	40	89
		Phaseolus beans	1,770	1,697
		Cowpeas	2,140	1,190
		Sweet potato	1,765	29,952

Source: ADD, Mbewe, Mikalango and Dolo EPAs

Table 12: Crop production figures obtained for the southern/central study area

Location	Season	Crop	Area cultivated (ha)	Production (tonnes)
Magoti and Makhanga EPAs	Summer 2010-11	Local maize	383	231
		Hybrid maize	1,524	1,833
		Local rice	66	110
		Local sorghum	1,162	782
		Local millet	536	344
		Pigeon peas	685	398
		Cowpeas	1,862	886
		Cassava	257	3,339
		Sweet potatoes	141	1,157
		Cotton	4,832	3,807
		Mangoes		4,230
	Winter 2010-2011	Local maize	1,385	1,801
		Hybrid maize	3,630	10,890
		Local rice	0	0
		Phaseolus beans	94	81
		Cowpeas	785	391
		Sweet potatoes	1250	18,400

Source: ADD, Makhanga EPA and Magoti EPA

Agricultural production is affected by the seasonal cycle of flooding. This cycle was widely perceived to be critical and flooding was generally seen as less problematic than drought. Flooding increases soil moisture (critical for maize) and also provides nutrients through silt deposition. This is important for the winter (dry season) cropping. At the same time the floods were also perceived as increasing fish production.

Most people in the district also keep livestock (including cows, goats, sheep, chickens and doves) and these make important contributions to household incomes, particularly in times of food shortages (Figure 12). There have been initiatives to increase rabbit keeping but this has not always been successful because of the high temperatures in the dry season that led to in turn to high mortality rates. Doves are kept for consumption with people tending to eat the young birds.

Dovecotes

Cattle grazing at the edge of a channel

Figure 12: Examples of livestock raising in the Elephant Marsh

Cows tend to be owned by wealthier households and there are also more on the western side of the Elephant Marsh where there is more space. Some conflicts can arise between farmers and cattle-owners when cows graze on and destroy other people's crops (hippos can also feed on destroy crops). In the southern part of the western area, farmers also pointed out the birds can also be a nuisance as they feed on millet, sorghum and rice. Poorer households will tend to own goats and chickens. Sales of livestock, including to vendors from Blantyre or commercial livestock farmers who buy cattle from people, fatten them and then sell them on for beef, represent a significant source of income for wealthier households. Total livestock held across the study area EPAs is provided in Table 13 below. Note that the EPAs extend beyond the Elephant Marsh but the Elephant Marsh may be used for grazing for a proportion of these (cattle, goats and sheep).

Table 13: Livestock holdings across the study area EPAs

Livestock	Total number (Northern)	Total number (Eastern)	Total number (Western)	Total number (Southern/Central)	Total (all areas)
Cattle	30,556	7,919	61,322	16,756	**116,553**
Goats	42,841	61,840	98,539	63,584	**266,804**
Sheep	231	61	938	709	**1,939**
Chickens	149,307	77,220	265,644	264,076	**756,247**
Guinea fowl	19,499	5,494	35,074	35,731	**95,798**
Ducks	9,657	5,204	41,056	38,947	**94,864**
Turkeys	50	82	494	171	**797**
Doves	3,298	2,431	11,990	10,416	**28,135**
Rabbits	1,893	4,312	6,279	20,069	**32,553**

Source: SRBMP; Chikwawa and Nsanje EPAs

Casual labour (*ganyu*) for wealthier households or commercial farms represents the main source of income for poorer households (e.g. Dirnowa et al., 2010). Demand for labour (and labour opportunities) are highest during summer land preparation and harvesting, although women will wash clothes or draw water for money. Changes in the price for *ganyu* labour can have significant impacts on poor households. The need to undertake labour for cash income can also affect households on food supply as they may be able to cultivate less of their own land. Commercial farming (especially cotton) sometimes practiced under contract farming (farmers are given inputs and then obliged to sell their produce to the people who provided them with inputs so that the cost of these can be subtracted).

Agricultural production is supplemented with some fishing, Fishing occurs all around the Elephant Marsh but is particularly important for households in the southern part of the Elephant Marsh, where fishing represents a full-time occupation and main source of income for many. In the southern area fishing households are often among the wealthier households in mixed farming/fishing villages. Fishers land at landing sites around the Elephant Marsh. Outside the southern/central areas these may be small, for only a few canoes. In the southern/central area the landing sites are much larger and guards may even be employed. Different gears are used around the Elephant Marsh with smaller scale gears, e.g. traps and scoop nets, used in the northern parts of the lake compared with cast nets and gill nets and even seine nets in the more open water areas in the south.

Fishing is dynamic. Depending on the flooding and local productivity, fishers may move around from one site to another, and even into Mozambique. This is especially true in the more productive south where there are more full-time fishers. In other areas the landing sites may move between seasons as the fishers move further into the Elephant Marsh with receding waters. Overall fish production is also highly variable (Figure 13) and the total fish production from wild capture fisheries for the Elephant Marsh is estimated to vary between around 2,000 and 10,000 tonnes depending on the nature of the flood cycle. Around 70% of the catches are reported to come from Nsanje, i.e. the more southern parts of the Elephant Marsh (Njaya, 2016). However data for flood regime were not available to explore correlations with catches over time.

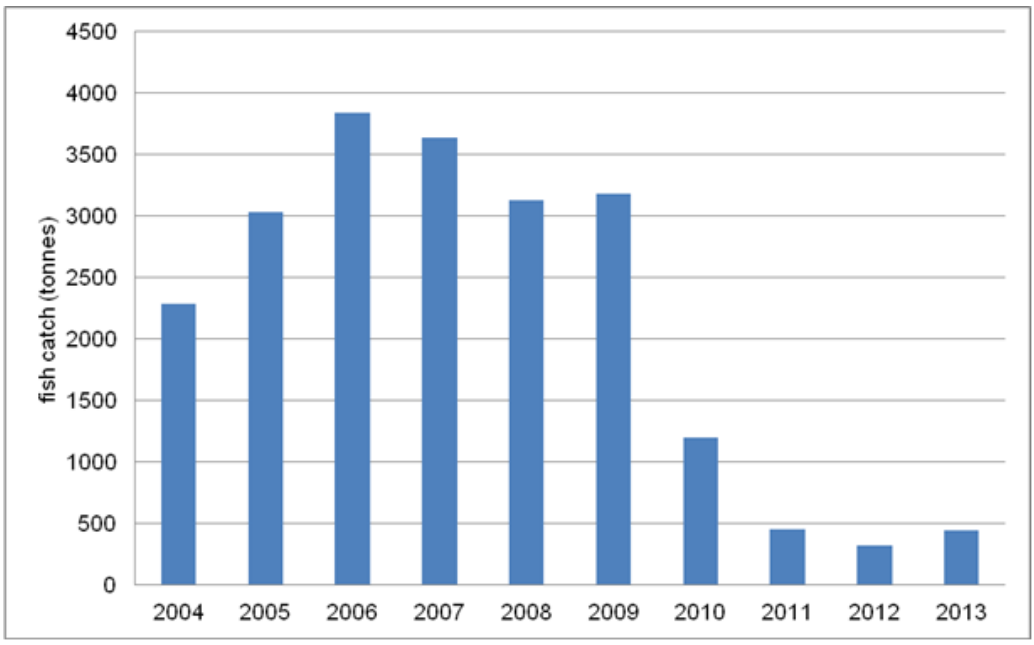

Figure 13: Annual fish production from the Elephant Marsh between 2004 and 2013. Source: Njaya (2016).

The BVCs are the main mechanism for local fisheries planning and control and achieve this through coordination with the local village headman. At the local level fisheries reported that BVC Chairs will communicate and attempt to coordinate with other nearby BVCs on issues such as gear and canoe theft. Kosamu et al. (2016) reports similar findings and that that BVC Chair's attribute their ability to make and enforce local rules effectively to their personal reputation and standing. In addition to managing activities at the landing site, the BVC Chair also has an important role in local conflict resolution. Kosamu et al. (2016) reports that the functioning of the BVC and the relationship with the village headman is facilitated by a regular weekly gift of fish to the headman.

In addition to fishing and farming, collection of wild foods, such as lotus roots, and products such as reeds that can be sold for income and labouring are important activities. Some households are involved in transportation, often using bicycles and sometimes motorcycles, dugout canoes or planked boats (Figure 14). Small-scale sand and clay mining is also evident together with associated small-scale brick production.

Bicycle transport within the Marsh

Transporting people and goods across a channel

Figure 14: Transport activities within the Elephant Marsh

Many villages operate loans/savings clubs. Typically around ten people will establish a club that runs for a set time. Money invested in the club is loaned out with interest. At the end of the agreed period the returns are shared between the members.

In addition to effects on crops and livestock, people living in the Elephant Marsh are also vulnerable to water-borne diseases, in particular Malaria, Bilharzia, Cholera and diarrhoea. These are reported to be correlated with areas of stagnant water that form following inundation. Malaria transmission is perennial, with seasonal increases after rains during November–April (Bennett et al. 2013). Based on information from the Ministry of Health, incidence of Malaria has been increasing in recent years (Figure 15), with 85,069 cases in Nsanje and 182,575 in Chikwawa in 2015. Note that these figures are for the whole of the two districts. It is not possible to disaggregate health data to produce figures for only the Elephant Marsh.

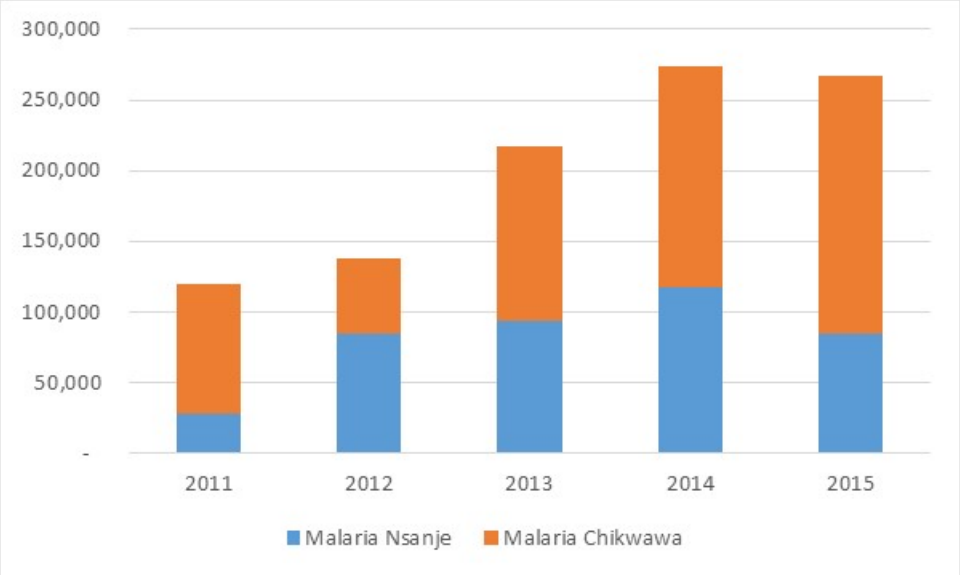

Figure 15: Incidence of Malaria in Chikwawa and Nsanje from 2011 to 2015 based on data from Ministery of Health.

Cholera and diarrhoea are related to poor access to clean water and sanitation that is attributable to limited maintenance of existing water facilities and spatial coverage of permanent latrines combined with flooding and siltation, theft and vandalism of water facility infrastructure and equipment. According to the district health officials, cholera outbreaks can occur in both drought and flood conditions (although mainly in flood). For the first half of 2015 Chikwawa district reported 357 cases and five deaths from Cholera (Figure 16). The majority of these cases were attributed to unsafe water and contaminated food or water (Chikwawa Heath Department), although they believe there is also an association with eating foods obtained from the wild in the Elephant Marsh.

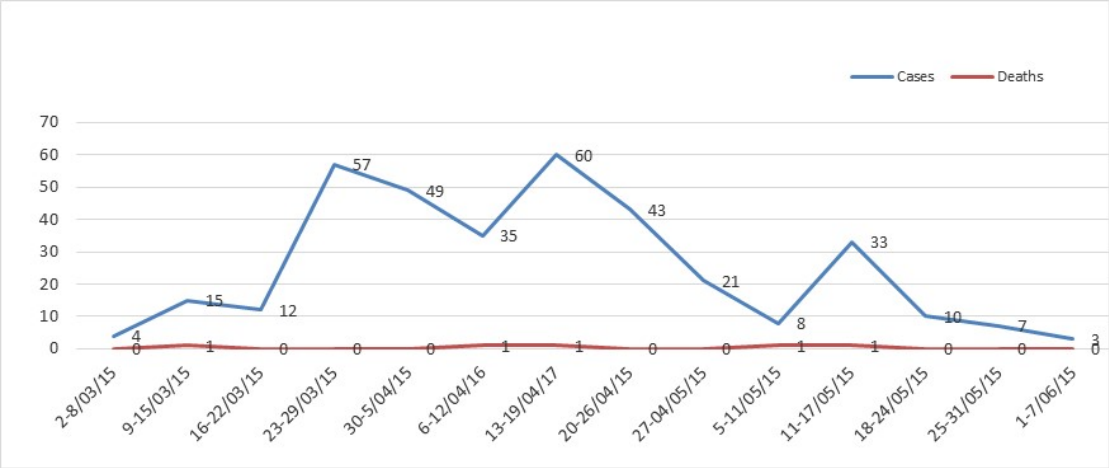

Figure 16: Incidence of cholera in Chikwawa district in the first half of 2015 based on data from the Ministry of Health.

In addition to more acute illness there are high morbidity and mortality rates due to Tuberculosis and malnutrition and a high prevalence of HIV/AIDS and orphanhood. In a number of villages the number of female headed households exceeded the number of male headed households.

Wildlife and human conflict: Crocodile (and to some extent hippo) attacks on people are said to be common as the fishers and farmers make use of the marsh for livelihood and basic life

(washing, collecting water) activities. Crocodiles are particularly problematic as these can destroy fishing gears as well as attacking people. Reports for Chikwawa District hospital alone were of six cases of crocodile bite in 2014 and eight in 2015. Other conflicts relate to poaching and encroachment into protected areas and marginal land cultivation. Hippos are unpopular because they eat crops, are dangerous to farmers and can capsize fishing canoes and ferries. To deter hippos people will erect fences and scarecrows (Forsythe and Turpie, 2016).

Data on problem animals for recent years was provided by the DPNW who have a number of officers on call to deal with problem animals. The data suggests that there have been up to around 120 reports of problem animals a year. In response to this the DPNW officers have killed or injured around 30 animals a year. The DPNW is allowed to sell the meat of the animals killed and use the income to fund activities. It has been suggested in interviews that this tends to affect the response by DPNW in that they are more likely to respond and address calls related to (valuable) problem hippos than crocodiles, which are not valuable but cause considerable levels of injury and death in communities within and around the Marsh.

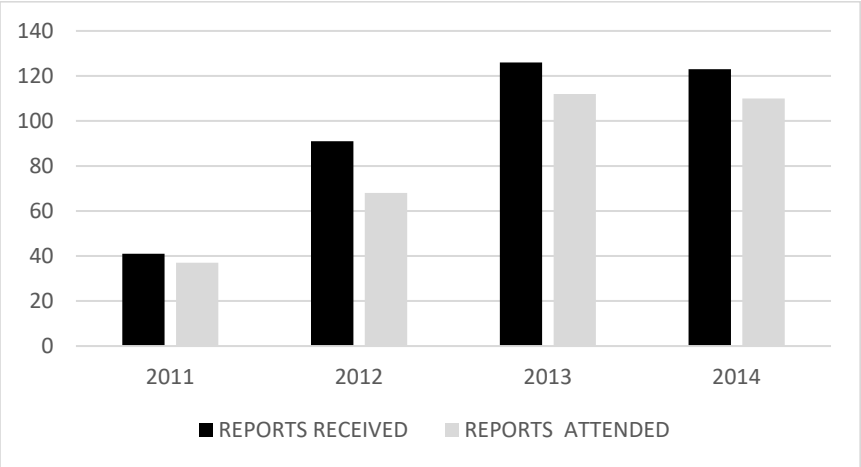

Figure 17: Reports received by DNPW of problem animals and reports attended.

Source: data provided by DNPW

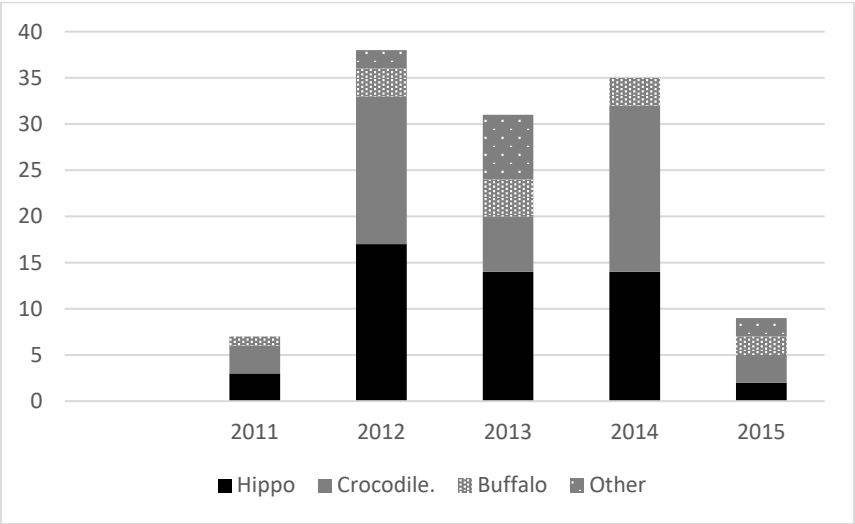

Figure 18: Problem animals killed or injured over time. Other includes elephant, monkey and baboon.

Source: data provided by DNPW

School attendance is an issue for households living within the Elephant Marsh, giving rise to high illiteracy rates. This is mostly due to the distances to schools and/or difficult terrain combined with issues such as child labour, inadequate schools and shortage of learning materials and teachers as well as cultural factors and low household income levels.

Poor communication infrastructure including both roads and telecommunications has been identified as a problem. This is as a result of insufficient postal and telecommunication facilities, uneven distribution of telecommunication facilities, vandalism of communication facilities, irregular maintenance of existing roads and bridges, seasonal roads that can be impassable especially during the rainy season, inadequate public and private transport services.

3.3 Village and household

The village and household level assessment provided an opportunity to explore differences across the different zones within the Elephant Marsh. Interviews with local stakeholders at the village and household level all around the marsh, but particularly in the Western and Southern areas revealed that most farm families do not grow enough food to last the whole year, with poorer households typically only able to produce around 70% of their food requirements. This is less to do with the amount of land holding and reflects the ability to cultivate the land held. The amount of land that households can cultivate has been identified as an important factor in determining wealth (Concern, 2015). Land around the Elephant Marsh is considered the most valuable asset as households are able to get two crops and there is no need for fertilisers. However, these lands and lands in the central area of the Elephant Marsh are at risk from floods. Household food intake is dominated by cereals and pulses, reflecting agricultural production, with fish representing around 2-3% of food consumed. In a study by Coulibaly et al. (2015) 97% of a sample of farmers indicated that they had suffered crop failures and been affected by crop failure more than twice in the past five years. More than half of the households (53%) listed climatic factors as the major causes of crop failure. These households reported an increase in the frequencies of flooding, drought and mid-drought, as well as the late onset of the rainfall followed by a shortening of the rainfall growing season (Coulibaly et al., 2015).

Household income for the majority of households was estimated to be in the region of MK 240,000-360,000 annually. This is consistent with other estimates, e.g. ILRI (2007) and indicates that most households are amongst the poorer in Malawi. As Coulibaly et al. (2015) note, the majority of the 65% of Malawi's population that live below the poverty line live in rural areas.

Income sources for households were similar in all areas around the Elephant Marsh but the relative importance of activities differed by location (e.g. fishing and wild food collection more important in the south) and particularly by wealth group. It was not possible to distinguish differences between the different zones of the Elephant Marsh given the differences within zones. Overall, income and the relative importance of different sources of income, vary in relative importance depending upon the flood cycle. This is critical as it affects the areas that can be cultivated, the crops that are planted, yields (and hence produce available for sale), fishing and labouring opportunities. From estimates based on interviews the richest make up around 15% of the households, wealthier and poorer households make up around 35% and 40% of households and the very poorest 10% respectively. It is the richest group for whom livestock and engagement in forms of trading represent the main sources of income. Selling cattle can be an important income generating activity for wealthier households who maintain larger herds. Selling cattle (and other livestock) is also important as a means to generate income for major investments, such as housing or school fees, or as a means of coping during a crisis, for example funeral or food shortage. Theft of cattle and goats is reported to be common all around the Elephant Marsh.

Trade, in particular fish, reeds and reed products (e.g. making brooms from palm leaves) and agricultural products, is often done at local markets by all households. Local markets (Table 8) are where traders gather from around the Elephant Marsh as well as from Blantyre. Cross-border trade with Mozambique is also important in the area, particularly for commodities such as charcoal, maize and fish. However, it was noted that while fish comes to the area from Mozambique, no fish from the Elephant Marsh goes there and it is instead all sold locally or to traders from Blantyre. Key income generating activities for the poorer and wealthier groups are summarised in Table 14 below.

Table 14: Key income generating activities and their relative importance

Activity	Poorer households (%)	Wealthier households (%)
Agriculture	30-40	20-50
Selling agricultural products	0-5	10-20
Livestock sales	0-3	12-30
Employment (e.g. ganyu)	15-40	0-10
Payment in kind	5-10	0-10
Self-employment (e.g. collecting wild foods/firewood)	10-30	5-15
Fishing	0-2	0-10
Petty trading	0	0-10
Food aid	2-5	0-5

Source: Stakeholder interviews; Concern (2015) and MVAC (2005)

Agricultural commodities make important contributions to both food strategies and incomes for local households. Typically these are sold on local markets and prices can be fairly low (e.g. maize MK 155/kg; rice MK 250/kg and beans MK 500/kg). Wild foods, in particular lotus root, can make important contributions to household income and food supply and represent an important coping strategy, particularly for the poorest households. This includes the water lily and also wild grass grains known as *kapepe/mtegerego* (MVAC, 2005). Small birds are also sometimes caught (using nets or poison) for consumption and sale. Concern (2015) estimate that gathering, eating and selling wild foods contributed over 10% of total income for the poorest households. Firewood sales also represents an important coping activity for these households. Limited income opportunities, for poorer households in particular during floods and droughts are reported to have forced women to engage in unsafe sex practices, exposing them to greater risk of HIV (Actionaid, 2006). Government and NGO 'food for work' programmes operate in the two districts and if people volunteer work they receive food (beans/maize/oil) or, more recently, income. These schemes are particularly important to the poorest households.

Household expenditure differs with wealth groups. For poorer households up to 60% of expenditure may be on food items with health and education as the other key expenses. The main sources of energy for households are firewood (collected or bought), charcoal and reeds. For households near the sugar plantations condemned sugarcane is sometimes available and can be used for fuel. Village banks are operating in some villages. Households make contributions to the grain banks after the harvest and this is sold to those members who need food.

Fishing is often done from dugout canoes and both dugout canoes and planked boats are used to carry people across channels and to markets (Figure 19). A number of carpenters operate in villages close to the Elephant Marsh making boats and planked items. A boat sells for about MK 95,000. Wood for the boats is not sourced locally but is from forested areas above the escarpment. The carpenters will buy a whole tree (MK 2,500) and this is then transported to sawmills where the carpenter then pays MK 200 per plank.

Dugout fishing canoes in the South of the Elephant Marsh

Planked boats and dugout canoes used for transport

Figure 19: Examples of the types of dugout canoe and planked boats used for fishing and transport within the Elephant Marsh

The following sections provide some details of some of the livelihood practices and constraints within the different zones around the Elephant Marsh. This is then used to identify priorities for improving livelihoods within the Elephant Marsh.

3.3.1 Northern area

The northern area of the Elephant Marsh is dominated by the main channel of the Shire River and a number of tributaries. The area features extensive agricultural fields and a number of small-scale irrigation schemes on both the east and west sides of the marsh that boost productivity. Outside of irrigated areas agriculture is dependent on the flooding cycle and this can be affected by sediment deposition. The main road from Blantyre cuts through the northern area ensuring good connections to this important city as well as to both the east and west sides of the Marsh.

There are a total of 140 villages in the eastern area of the Elephant Marsh covered by Mitole EPA. Villages in the EPA are almost exclusively engaged in agriculture. Details are provided in Table 15 below.

Table 15: Number of villages and households in the eastern area of the Elephant Marsh

Location	Total population in EPA	Number of villages in Elephant Marsh	Number of households (in EM)
Mitole EPA	75,722	Not known	Not known

Source: Mitole EPA

The northern area is particularly prone to erosion and siltation. The annual floods bring rich soils but in some cases can also lead to significant deposits of sand along the edges of rivers and channels and occasional risk of flooding at the confluence of the Likabula and Shire Rivers. Where there is sand deposition, households often have to dig to find sufficient moisture, especially for maize, and plants are at risk from the hot sand (Figure 20). While productivity is similar to other areas for the winter crops, summer crop yields (yield per hectare) are generally lower than for the other areas of the Elephant Marsh.

The northern area is affected by flooding whether there is rain or not because of both water flowing down the main channel and water draining off the escarpment and the Mwampazi and Kubuki rivers on the east bank. Even when there is drought affecting the lower Shire this area can be affected by floods, typically the problem is greatest in February when the rains are at their heaviest.

Land adjacent to tributary showing sand deposition

Planting maize in trenches

Figure 20: Example of sand deposition in the northern area and trenches for maize dug to find soil moisture.

In addition to agriculture there is some fishing activity but fishers are limited in number. The area is dominated by the main channel of the Shire but people do not fish there because it is too dangerous. Instead fishing is limited to small backwaters and perennial waterbodies away from the main channel where they tend to use scoop nets and other small scale gears, often fishing from the bank or in shallow water (Figure 21). In some of the backwaters in this area there are efforts to collectively develop the fisheries by building semi-permanent fences within backwaters (see Figure 21). Gates within these fences are left open to allow fish to enter and then closed to entrap the fish and also make the fishing activities less risky. There have been some attempts at aquaculture in the northern area but the ponds were flooded and the venture was not successful.

Example of a backwater area adjacent to the main channel of the Shire. Source: Google Earth

Fishing within a backwater. Note semi-permanent reed fence in background

Figure 21: Example of a backwater and fishing activity within the northern area of the Elephant Marsh.

Drought tends to be a particular problem in the northern area, limiting production to a single season. During times when households are affected by food shortage they rely principally on markets to buy food. Wild foods (e.g. water lily) are less common in the northern areas (compared to the larger lagoon areas in the south) and therefore people are much more reliant on what they grow and can purchase. As a result, casual labour is an important option in the northern area and work on private lands and the Thyolo tea estates (three days walk) are both options. For the former people are often paid in maize and maize husks. Another form of assistance during hardship is through the Local Development Fund (LDF). For two weeks work people are given MK 3,000 that they can use to buy food or to get transport to the tea estates.

Flooding can also bring health issues and the Traditional Authority report that February/March tends to be a time when there is particularly high incidence of malaria and when cholera can also be a problem. The longer the rainy season, the greater the problem. Within this area there is widespread use of boreholes for household water, even though the water quality is perceived to be low. The river tends not to be used as there is a risk of crocodile attack and there is not much that can be done to avoid attack.

3.3.2 Eastern area

The eastern area is bounded by the Thyolo escarpment that rises steeply from the edge of the Elephant Marsh. Coming down from the escarpment are a number of perennial streams that feed into the Elephant Marsh. Running along the bottom of the escarpment is a road that runs north-south. There are a number of towns/trading centres and market places along this road. There are also several small irrigation schemes along the east side of the Elephant Marsh as well as fruit production, for example mango orchards (Crown Plantations Limited) towards the northern end. The irrigation schemes serve to increase productivity of the land in this area year round. Rice is mainly grown on the east bank where there is irrigation and there are greater areas of marsh that retain residual moisture (Figure 22), and this is reflected in the production figures and areas under rice production in the Summer season for this area.

Rural infrastructure scheme in the Eastern area of the Marsh

Irrigated rice crop

Figure 22: Rice cultivation in the Elephant Marsh

Beans are mainly grown during the dry season using irrigation. About 15 to 20% farm families have access to irrigation. The type of irrigation used are treadle pumps (donated) or wells that people dig on their own. The average size of land for irrigation is about 0.2 hectares. This is usually not enough land to grow enough food for the whole year for an average farm family. Most people that have access to suitable land for irrigation therefore also have land in the upland areas. There are a total of 140 villages in the eastern area of the Elephant Marsh covered by Livuzu EPA. Most villages in the EPA will be dependent upon the marsh to some extent. Details are provided in Table 16 below.

Table 16: Number of villages and households in the eastern area of the Elephant Marsh

Location	Total number of villages in EPA	Number of villages in Elephant Marsh	Number of households (in EM)
Livuzu EPA	140	23	2,150

In the wetland areas at the edge of the Elephant Marsh the main crops are maize, beans, rice and sweet potato. There are two crops per year using the same fields and based on residual moisture and respondents indicated that total winter crop for a household would typically be in the region of 20-35 bags. Within the Elephant Marsh crops are grown in fields on the islands. There is very little fishing in this location and it is almost all for household consumption. There is less cattle rearing in this area than in the Western area and most households report owning only chickens and goats and that theft, particularly of goats, is a problem. Small scale theft, whereby an individual steals one or two animals for consumption or quick sale to a butchery are reported to have not been uncommon in the Lower Shire (e.g. Malekano, 2000). Some people are doing small businesses trading rice or bicycle taxis and renting carts as there are no cars or large vehicles in the area.

The eastern side of the Elephant Marsh, in particular the more southern parts, represent some of the more natural areas of marsh and these areas are characterised by channels, islands

and extensive areas of reeds. The eastern as well as southern/central areas have the highest coverage of reeds and grasses (Brown et al. 2016). These natural products are harvested by people, especially at times when they need cash for food and are sold in local markets. Products are sold as raw materials or finished products, often to traders coming from Blantyre (see Figure 23).

Reeds for thatching

Mats

Figure 23: Examples of products sourced from the eastern area of the Elephant Marsh for sale at a local market

People have been moving into the Elephant Marsh (including people settling from Mozambique and Thyolo) and rent land to those from the upland areas (around 40% of people in this area own land in both upland and wetland or marsh areas) at around MK 15,000-20,000 for the winter crop. However, the number of villages and households in the Elephant Marsh has reduced since the flooding in 2015 and people have relocated to higher ground (e.g. Lupiya village) and some households have moved to other villages. The steeper nature of the ground (compared to the western area) means that livelihoods are more distinct between upland, wetland and marsh locations. Inside the Elephant Marsh the main activity is farming – maize, rice and beans and a small amount of sweet potato.

Some small-scale fishing is done using nets and traps in the channels between the islands with fish most abundant between December and March. Most fishing is for household consumption although there may be more fishing for sale on days when there is a market nearby. The better fishing opportunities (compared to the northern and western parts of the marsh) mean that there are more traders coming from Blantyre to buy fresh fish and villagers from upland parts of this area will also come into the Marsh to buy fish. Income from fishing is mainly invested in farming. However fishing is not as important as it is for households and villages the southern area and respondents highlighted the risk from crocodiles. Respondents indicated that in the past people had to ask permission from the headman to fish but now anyone can fish anywhere. Traders also come for reeds and reed products (e.g. mats) that are more abundant in this part of the Elephant Marsh. Reeds and mats (mainly produced between April and December) are viewed as a fast way to generate income as they can be simply cut and sold. Reeds are also sometimes used as fuel, along with maize husks and wood from more upland areas that are all collected by women. The leaves of the reeds are also reported to have medicinal properties and can be used to ease swellings. Other medicinal plants (e.g. neem and mango tree bark) are sourced within the villages not the Elephant Marsh.

As with the western area, some people in villages in the marsh stay in the marsh all year while others (estimated at 20-40%) move between lowland and upland locations over the course of the year. There is a lot of farming within the Elephant Marsh during the winter as people within

the marsh are joined by people from upland areas. People in this area suggested that fish are becoming scarcer such that it is not possible to survive only on one crop and fishing any more.

All around the Elephant Marsh food shortages are identified as a critical constraint and in the Eastern region Jan-March is identified as the 'hunger period'. Key coping strategies are *ganyu* casual labour in return for food or use of wild foods, in particular the water lily root *nyika* collected as the waters recede. Malaria is the major health issue, particularly for those living in the Elephant Marsh. In addition there are cases of bilharzia and cholera and people also report eye problems from being in the wetland and marsh areas. When people become ill they will often move to more upland areas. For people living in the Elephant Marsh, school can be a problem. In this area there is only one school in the Elephant Marsh and accessibility can be a problem. As a result attendance can be variable and children often stay at home and help their parents.

As with other areas, villagers report that there are problems with hippos and crocodiles. They also report that monkeys affect crops within the Elephant Marsh. The hunters are reported to be reluctant to deal with crocodiles. Deforestation in the upland areas has meant that the small streams that flow down from the Thyolo escarpment have become prone to flash flooding that causes problems washing away roads and crops. Water quality is reported to have deteriorated and is particularly bad during the rainy season. Channels within the Elephant Marsh are prone to siltation, especially with more silt being washed down the streams. Villagers report that channels used to be dredged periodically but this does not happen any longer. Flooding also causes displacement with people living in the Elephant Marsh moving upland and staying in upland villages. Respondents indicate that some marsh villages have been forced to relocate every year for the last five years. Schooling is an additional constraint with some children, particularly those in the wetland and marsh areas not starting until they are older and capable of walking the distance to school.

3.3.3 Western area

In addition to subsistence activities within the Elephant Marsh here are also a number of commercial enterprises located around the less steep western side of the Elephant Marsh. The generally low-lying nature of the land in this area (compared to the East) means that the area is susceptible to flooding loss of crops. However, compared to the east, respondents indicated that there is generally a lower likelihood of households being displaced during flooding. Households within the Elephant Marsh in the western area are largely dependent on winter (dry season) crops and face food insecurity when these are affected, particularly by drought.

The main commercial enterprise in this area centres on sugarcane growing and processing. Illovo operates several thousand hectares of land extending from the edge of the marsh for growing sugarcane. At Nchalo they also operate a processing factory. Further north Presscane operate an ethanol distillery that distillate molasses from Illovo. Several sugarcane outgrowers are also present, for example at Kasinthula, Sande Ranch, Phata and Kaombe. Commercial farming (especially cotton) is sometimes practiced by households under contract farming. Along the west side of the Marsh there are also livestock operations including fish ponds at Kasinthula, two crocodile farms (Shire Crocodile limited), a game ranch and cattle ranching operations. There are also some households practicing fish farming, but these are all in the upland areas away from the marsh. These commercial operations provide some opportunities for casual labour.

The western area is also where Lengwe national park is located. A number of households have reported that lands have been lost as a result of the expansion of Lengwe, making them more dependent on lands close to the Elephant Marsh. Both Lengwe and the Illovo sugar plantation are reported to have been expanding over time. Illovo is also reported to be affecting

the Elephant Marsh. When there is excess water in the fields some people report that drainage channels are opened and this can lead to flooding of lowland fields, e.g. in Malemia village.

In the western area there are important markets at Nchalo and Ngabu. Close to these areas there are reported to be a greater number of female-headed households due to the effect of divorce and HIV, e.g. Tomoh 1 (Mbewe EPA). There are a total of 134 villages in the western area of the Elephant Marsh, covered by Dolo, Mikalango and Mbewe EPAs. Details of the villages are provided in Table 17 below.

Table 17: Number of villages and households in the western area of the Elephant Marsh

Location	Total number of villages in EPA	Number of villages in Elephant Marsh	Number of male headed households (in EM)	Number of female headed households (in EM)
Dolo EPA	42	16	385	225
Mikalango EPA	52	5	157	143
Mbewe EPA	40	35	1,852	2,063

The number of households dependent on the Elephant Marsh is reported by people in this area to have increased as they have lost land elsewhere to the sugar estate and Lengwe. It was also reported that people have been moving into the marsh area to grow crops. For many households living in the marsh, or close to it, the flooding restricts opportunities to farm the lowland areas. These are used for a winter crop and people living in more central areas (around three quarters of those living in the Elephant Marsh) will then move to more upland areas to do a summer crop (e.g. Sekeni and Nyampheta villages in Mbewe EPA). In some cases, where there is good access to water, households can manage to get three crops per year. Households will typically own or rent land in both upland and lowland locations (20x50 m plot would cost approximately MK 2,000 for the season).

Livestock are important in the western part of the Elephant Marsh. The gradient on this side of the marsh increases the area inundated and gives rise to larger areas of grassland. These provide important grazing resources for both the household and commercial cattle and goats that are raised in this area of the Elephant Marsh. While the commercial operations can supplement grazing with maize, molasses and other feeds, households are more dependent on grazing the areas around the Elephant Marsh. Grazing responds the flood cycle with the best grazing being within the wetland areas during the dry season. This takes livestock into the Elephant Marsh and also coincides with the breeding season for crocodiles. This is the period when they are most active and will protect their nests and increases the risk to both livestock and people.

A few households will remain in the Elephant Marsh, living on the islands that form during the rainy season (e.g. Nkuma and Dixon villages in Dolo EPA). The number depends upon the extent of flooding. In general the Elephant Marsh becomes more important in drier years. These households may not own land in upland areas and are both more dependent on the Elephant Marsh but also are more vulnerable to flooding. The main crops grown in the lowland areas in and around the Elephant Marsh are maize, rice and beans. Rice can be vulnerable to being washed away by flooding. Those villages and households that are outside the Elephant Marsh and are dependent only on upland areas are generally perceived to suffer more from food stress as the lowland areas are much more productive. The sugar estate does provide employment opportunities for some people from the area and some of the richer

households in nearby villages can also get additional income by renting houses to sugar estate workers.

There are few fish landing sites in the western part of the Elephant Marsh. One of the reasons for this is that the main channel runs along this side and there are fewer fishing opportunities here than in the braids and lagoons of the eastern and southern areas. The sugar cane plantations extend down to the channel along much of the western side. Fishing is mainly undertaken close to the landing sites with handlines (in the main channel) and gillnets, castnets and traps (*myono*) elsewhere for subsistence (Figure 24). Fishing is considered easy because there is plenty of fish but risky because of crocodiles in the channels, this discourages many households. Similarly people tend to rely on boreholes for household water supply because of the risk of crocodile attack. In the past there were more landing sites but issues between fishers and the plantations have led to these being abandoned. There is reported to be a small amount of fish farming being practiced in the Elephant Marsh, where a small number of households have built dams and stocked them with some fish seed obtained from the Fisheries Department in Kasinthula.

Fishing in a channel in the Elephant Marsh

Fishing flooded margins of the Elephant Marsh using dugout canoe

Figure 24: Examples of fishing activities in the Western area of the Elephant Marsh

For households that remain in the Elephant Marsh all year flooding is a risk. If there is a lot of flooding during the summer season this can create problems in the winter season and food shortages for households. Army worm was identified in a number of locations as a threat to cereal crops and birds can affect crops in the more upland areas. The presence of the sugar plantation restricts the ability of several villages to follow the strategy of having upland and lowland lands and they are more reliant on casual labour as a result. Land availability is reported to be forcing people to move southwards, away from the plantation, to find land to farm but there are issues that in some places the land is too salty to farm. There are generally negative perceptions of the sugar plantations and a feeling that the plantation has encroached on village lands and does not provide them with employment opportunities or compensate them for the loss of their lands.

Health issues include malaria HIV and bilharzia. HIV prevalence remains high in the area. Cholera used to be a problem but a big water and sanitation effort by the government has been successful in reducing this threat. Sanitation is more of a problem within the Marsh (in the central area). Drinking water is often from boreholes but much of the available water is salty so people still need to draw drinking water from the Elephant Marsh. This puts them at risk from water-related disease and crocodile attacks.

Balancing the diet can prove problematic. Although cereals, pulses, fruit and vegetables are all grown, trade can restrict what is actually eaten. Wildlife interactions, particularly crocodile and hippo were identified as particular threats. People do not collect as much from the Elephant Marsh because of the risk of crocodile attack. Hippos are also problematic although they are reported to have places that they will tend to stay. The DPNW has been working with communities and recommending that they do not grow crops within the Elephant Marsh to reduce the potential for interactions but villagers indicate that this is difficult in drought years.

In bad years households will do more fishing and eat more leafy vegetables. Fish consumption increases and people will also catch more fish for sale. Those with livestock will sell to buy food and there is increased reliance on food aid from both government and NGOs. Because the western side of the Elephant Marsh has good roads and a number of markets, people from within the Elephant Marsh are able to buy food from the markets in times of crop failure.

3.3.4 Southern/Central area

The area has multiple channels, islands and lagoons that come together to form the main channel around the area where the Ruo river enters the Shire. This is an area that is subject to flooding due to the confluence of the two rivers. The lagoons and channels north of the confluence have extensive aquatic vegetation including reeds, lilies and water hyacinth. While the Central area is less affected by human populations, people have settled in the marginal areas from the surrounding locations, with many coming from the south and a significant number settling in the area after fleeing fighting in Mozambique during the civil war in the 1970s. Perhaps because of this, there is migration into Mozambique in search of fishing opportunities and casual labour when conditions are less favourable in the Elephant Marsh. Along the western side of the southern/central region there are a number of villages that have moved upland from their original location within the Elephant Marsh, although they retain landholdings. There are a total of 111 villages in the southern/central area of the Elephant Marsh, covered primarily by Magoti and Makhanga EPAs. Details of the villages are provided in Table 18 below.

Table 18: Number of villages and households in the western area of the Elephant Marsh

Location	Total number of villages in EPA	Number of villages in Elephant Marsh	Number of male headed households (in EM)	Number of female headed households (in EM)
Magoti EPA	50	28*	1,257	793
Makhanga EPA	61			

*includes eight villages with mix of households inside and outside the Elephant Marsh

Source: Magoti and Makhanga EPAs

Because of the nature of the area, most agriculture in the southern/central study area takes place in more upland areas and people are most dependent on the winter crop, which is more reliable. While land within the Elephant Marsh is considered to be more productive, the extensive areas of open water, lowland areas that are prone to flooding as well as salty soils limits the agricultural potential. Respondents indicate that there is about a 50% chance that the summer crop will be lost due to flooding. As a result, villages in this area close to the Elephant Marsh are able to do only one (summer) crop. In addition to crops, there is a large number of livestock. Cattle and goats in particular are grazed in the lowland areas around the Elephant Marsh during the dry season. There are a number of ranching operations that cattle can be sold to and who also use the Elephant Marsh for grazing.

As well as cultivated crops and fruit trees, water lilies are important wild foods for both roots (*nyika*) and seeds (*chembereme*), particularly in years when there are food shortages and water levels are low and households are unable to grow vegetables (Figure 25). Reeds are also harvested for housing and sale. Water lily roots are also boiled and sold, e.g. at Bangula and Ngabu markets.

Termite mound near a village in the Southern Area

Example of wild lotus root harvested from the Elephant Marsh

Figure 25: Examples of wild foods collected in the southern area of the Elephant Marsh

Fishing is an important occupation in the southern area, with over 75% of fishers identifying as full-time, i.e. fishing for over eight months a year (Njaya, 2016) and there is more selling of fish from the southern part of the Elephant Marsh than the others. As a result, fishing represents the main (often only) source of income for many people in the Southern area. It is widely believed that there are more fish in this part of the Elephant Marsh, in particular on the eastern side. There are some 15 permanent fish landing sites and a large number of people, particularly Sena, for whom fishing is the primary occupation. Respondents in Chisamba village (220 hh) indicated that there were more than 50 full-time fishers in the village. Across the area 30% of all people were estimated to be fishers.

Fishing is largely with gillnets and castnets from canoes and using castnets, scoopnets, hook and line and beach seining gears all year round. A fish trap or hook and line gear can cost as little as MK 200 while a beach seine can, depending on size, cost up to MK 176,000 (Njaya, 2016). Fishing generally takes place fairly close to the landing sites, suggesting that there are areas within the central part of the marsh in particular that are less fished. Canoes at the fish landing sites are often owned by people from more than one village, and some are even owned by people from the larger towns (e.g. Bangula). Typical cost for a canoe is in the region of MK 150,000-180,000. Owners may own between 1 and 20 canoes and fishers who do not have their own canoes are able to rent for MK 200-500 per night or per day. Fishers will also move around the marsh in response to local fish abundance and the ability to rent canoes at the landing sites facilitates this. This process of migration is regulated by the BVCs and fishers have to report to the local BVC Chair. While the BVCs are able to regulate gears and closed areas, they have been less able to regulate access. Njaya (2016) estimates that up to half of the fishers in this area seasonally migrate to the Mozambican side to fish in Morgan and Dunga areas.

Of the total rental price, MK 100 goes to pay the canoe guard at the landing site and the rest to the owner. For those owning boats, these activities are sometimes supplemented by

involvement in transport and ferry services. These services are often organised, for example near Chiromo boat owners register their vessels and operate by rotation. Many farmers will also fish, but for subsistence – mainly with hook and line and traps although as the waters recede it is reported that fish can also be caught by hand in shallower areas.

Fishing is poor during June and July, when water levels are typically at their highest, but improve from August as the waters recede. As the floods come they find that there are fish moving up from the Zambezi and this can change the composition of the catches at this time. These fish only move into the south/central parts of the marsh where there is open water and are reportedly not seen in the northern parts of the marsh. As the seasons change, fishers may change the gears that they use with seines used more in the dry season when fish are concentrating (Njaya, 2016).

Fishers report that December to May is typically the most productive period. Because many of the fishers use passive gears the fish can begin to decompose in the nets and so the fish is processed in the Elephant Marshes, often at the landing site. The most common form of processing is smoking over an open fire (Figure 26). Some respondents have suggested that this activity is contributing to local deforestation in the Elephant Marsh and it is also suggested that processing in this manner leads to an inferior product and low prices (Njaya, 2016). Fishing can be hazardous as crocodiles will attack fishers and also destroy fishing gear. Hippos can capsize canoes and floods and high winds also make fishing dangerous. Fishers in the southern region report that accidents due to weather or wildlife interaction are fairly common (Njaya, 2016). Other hazards reported by fishers include gear theft and theft of fish from gears, lack of access to credit and fluctuating catches and fish prices.

Fishers prepare to check their nets

Processing the catch at the landing site

Figure 26: Activities at a landing site in the south-east Elephant Marsh

Fish are usually sold to traders, usually women, at the landing sites. Many fishers will have a standing arrangement to supply a particular trader. The benefit of this is that the fisher is able to obtain loans or gear on credit and the trader is able to secure supply. Even where the fisher does not have a standing arrangement they will often sell fish on the basis of a pre-agreement with the trader but if there is a better offer the original price may be renegotiated. Some fishers will sell fresh, others will process either at the landing site or at home and then sell. Fish traders operate from the villages but some also come from Blantyre. Traders will process fish and sell at the local markets, targeting the market days, but will also transport dried fish for sale in Blantyre and Lilongwe.

People in the area used to be able to hunt but there is little done now except for birds, and in particular ducks – *tsekwe* and *vuovuo,* often using traps. This is in contrast with other areas where the target is qualia because they are eating crops. Respondents indicated that there was no hunting for animals except by people from Bangula who have guns. People will also

take care of termite mounds near villages (Figure 25) as these can also provide a source of food.

Food shortages are a problem and food production because they are reliant on fishing and single crop. Respondents report that declines in fish stocks have caused problems for the fishing villages. Where once these were considered better off they have been affected by reduced abundance and smaller size of fish. December to March are the hardest months and the period that people are most reliant on the marshes for lilies, selling fish, reeds and grass for roofing and paddling canoes for transport. Additional coping strategies include selling livestock. During flood years the people can move to upland areas to fish and farm. During drought years the fishing is critical. Drought years are considered worse than floods as fishing is poor, crops fail and the opportunities for *ganyu* are less. As with other areas the main heath issue is reported to be malaria. When there is a flood they expect cholera to occur. Malnutrition, especially in the under-fives was also reported to be a concern.

Wildlife interactions, particularly crocodiles represent a real problem and concern in the southern areas. There is a perception that no-one is controlling the numbers so that the problem is increasing. Hippos can also be problematic, more because of collisions with canoes than damage to agricultural land although they tend to have problems with hippos trampling and eating crops between March and April. People did report two benefits from hippos: firstly that they eat the water lilies that are believed to deoxygenate the water and reduce fish abundance and, secondly, the hippos break up the floating vegetation that can block channels.

3.4 Livelihoods and adaptive capacity

In this section we draw on the above sections and summarise the main livelihood impacts, risks to livelihoods and adaptive strategies used by households in and around the Elephant Marsh. This is intended to underpin the identification of interventions that can enhance adaptive capacity and avoid maladaptive practices.

3.4.1 Livelihood impacts

The livelihoods pursued in the Elephant Marsh reflect the local hydrology and bio-geography and needs of local people (see Sections 3.2.4, 3.2.5 and 3.3). Farming, fishing and livestock rearing are the dominant livelihood activities that contribute food and income. Farming mainly focuses on producing staple food crops such as maize, sorghum and millet for household consumption and sale and cash crops (mainly cotton) for sale. Food intake reflects this, being dominated by cereals and pulses with fish representing around 2-3% of food consumed.

Income sources for households were similar around the Elephant Marsh although the relative importance of activities differed by location (e.g. fishing and wild food collection more important in the south) and particularly by wealth group. Household income for the majority of households was estimated to be in the region of MK 240,000-360,000 annually. This is consistent with a recent study by Njaya (2016) indicating that the mean gross income from fishing was MK 401,076.

Livestock rearing is widespread with over 90% of households rearing livestock (mainly cattle and goats) and poultry. These represent a source of capital that can be converted to cash or food when needed (e.g. for school fees, funeral costs or to invest in agricultural or fishing inputs) and for the wealthiest households, the main source of household income.

3.4.2 Risks to livelihoods

People living in wetland areas such as the Elephant Marsh are prone to vulnerability, arising due to issues such high and chronic poverty levels, HIV/AIDS, environmental variability, interactions with wildlife and gender and political power issues. In response to these issues, people are able to adopt strategies that enable them to cope or adapt. These strategies draw upon individual capabilities, household assets and the formal and informal institutions that govern behaviour at the local level. Households within and around the Elephant Marsh are not homogeneous so the types of strategies and responses available, and the outcomes, are also variable. In this section we draw upon the information collected to highlight some of the common constraints faced by households and the types of strategies they typically adopt in response to these. Together with the institutional and decision-making context, these are important when considering what sort of management responses might be appropriate to both enhance adaptive capacity and reduce environmental degradation.

Constraints and stressors can operate across different time and geographical scales. Typical underlying issues that households face are that household agricultural production is typically low and farmers experience low crop yield. For poorer households in particular this leads to increased reliance on *ganyu* and sale of firewood and reeds from the Elephant Marsh to generate income to purchase food. Marketing problems also affect households, including issues such as poor accessibility (particularly on the eastern side of the Elephant Marsh), fluctuating crop prices, and a lack of farmers' associations. All of these challenges are exacerbated by reportedly increasing frequency of drought and floods and long term climate change predictions that highlight shorter wetter rainy seasons and longer dry seasons. These stressors create the following constraints on households:

Food insecurity: mainly as a result of continuous flooding, use of low yielding crop varieties (especially millet and sorghum), expense of farm inputs, low food diversification, low and

unreliable rainfall, inadequate extension services, selling of harvest and livestock for income. Across all the areas of the Elephant Marsh visited, households and community leaders indicated that household food insecurity remained a key issue. Information from the Ministry of Health in Chikwawa indicates that the some 6.4% of all under-fives attending clinics in the district are underweight.

The geography of the area means that there is limited scope for water control and across all the areas of the Elephant Marsh households are farming different locations depending upon the level of flooding. Land near the main channel is more productive but more prone to flooding and the topography of the area also means that there is a greater area available for cultivation on the western side of the Elephant Marsh compared with the east. Female headed households tend to cultivate smaller areas and have less access to appropriate extension advice, inputs and credit. Household production is the primary food source for households and this is supplemented with purchases of key staples (such as maize). Across the Elephant Marsh, respondents indicated that they typically needed to purchase food around 6 months after the main harvest and it is at this point that income generating activities become particularly important.

Low household income levels: This results primarily from the low market price of agricultural produce and livestock and limited marketing opportunities, low wages in formal employment, limited entrepreneurship, high unemployment and low access to credit. These factors are exacerbated during times of drought (such as occurred during 2015/16) as the effect on agricultural production reduces the demand for labour.

Environmental degradation: The main causes relate to deforestation and encroachment into protected areas, increase in human utilisation of natural resources, uncontrolled bush fires, poor waste management, weak enforcement of legislation, flooding and inadequate human capacity for environmental management. There is extensive agriculture within much of the Elephant Marshes together with harvesting of natural products such as reeds. Degradation of upland areas such as the Thyolo escarpment also affect the Marshes through flash flooding of the tributaries and silt deposition that affects land, river channels and irrigation schemes. Deforestation occurs through the clearing of land for agriculture but also arises from high demand for wood for fuel. Almost all energy is from wood-based sources and this is a strong driver of the reduction in forest cover.

Flooding is an annual natural event and people have learned to live with and utilise the flood cycle (see adaptation section below). Floods cause outbreaks of pests (e.g. armyworm) and diseases like cholera and malaria, leading to increased mortality and morbidity and reduced agricultural productivity. Heavy floods in particular (e.g. 2012 and 2015) can result in loss of crops and animals and rapid flooding, as occurred in 2015, can lead to loss of life. .At the same time, floods can have positive impacts in terms of higher residual moisture that can aid dry season cropping. The recent floods have had significant impacts and resulted in a change of course of the Ruo River. Combined with flash flooding of the tributaries running from the Thyolo escarpment this has made access more difficult along the eastern side of the Marsh, especially to Makanga (see Figure 27).

Figure 27: Change of course of the Ruo River following the 2015 flooding has caused problems for transportation and communication on the east side of the Elephant Marsh

As well as flooding, the lack of control over water and rainfall can cause droughts. In this respect 2015 was particularly severe with rain falling over a short period causing floods followed by a period of drought. Drought can again result in loss of crops and animals. While floods can increase soil moisture and also increase fisheries productivity there are no significant benefits in drought years. Flood and drought are natural events and people have been able to establish ways to live with this cycle. What has an impact on them is when the event is more extreme (as with the 2015/16 flood and drought) or when their ability to adapt is constrained, for example through the conversion of land to commercial agriculture that restricts the ability of households to farm upland and lowland areas.

3.4.3 Adaptation within the Elephant Marsh

Adaptation is a key requirement of livelihoods within dynamic systems such as the Elephant Marsh. The capacity to adapt is an indication of the ability to deal with change and disturbance (Walker et al. 2002; Folke et al. 2003). A community perspective was essential because communities are often neglected, but essential parts of ecosystem management. Their roles, including knowledge, experience, institutions, and organizational capabilities, should be acknowledged and embedded in any governance system that aims at strengthening the capacity to manage ecosystems sustainably for human well-being. For both food production and income generation people make use of both upland and lowland (marsh) lands in an integrated manner. Key to the conservation of the marsh and sustainability of local livelihoods is considering how the complementarity of these two elements can be achieved. In order to contribute to this we consider the nature of the strategies that are employed by households around and within the Elephant Marsh in response to opportunities and constraints using the framework presented in Figure 2.

Through the interviews and focus group discussions it was identified that there were a number of possible responsive strategies that were broadly similar for both male and female headed households. These strategies can be considered to be adaptive, coping or maladaptive on the basis of the extent to which they increase the longer-term ability of households and communities to respond to the stressors. In the case of coping and maladaptive strategies, these tend to simply maintain rather than enhance, or undermine the long-term responsive ability. For example, a maladaptive strategy would be one that focused on the short term overexploitation of natural resources and ecosystem services on which their livelihoods are based or risked the health of household members.

The capability of households to adapt or cope, and the extent to which they are able to maintain existing activities or diversify or change is dependent upon the biophysical setting together with the assets and relationships that the households can draw upon. Because of the

topography and amount of water there is little scope to control flooding within the Elephant Marsh. As a result there are a limited number of preventative strategies available to rural households and the majority of strategies involve responding to the current seasonal conditions and making use of formal and informal institutions: predominantly at the village level but also including markets and government and NGO aid.

Maintaining existing activities

Within and around the Elephant Marsh agriculture is the main livelihood option of the majority of people and for agriculture, availability and access to land with sufficient soil moisture is critical. The village headman and TA can play a role in land provision where necessary. Fishers by contrast, particularly in the southern area, are more able to move in response to the flood cycle and local productivity. Fishers will move from one landing site to another and even across the border into Mozambique. In doing so the local institutional structure of the BVC and the positions of the BVC Chair and village headman play important roles in facilitating access to resources. The Elephant Marsh also plays an important role in livestock management. The edges of the marsh produces a lot of grass that is available at important times.

Households have strategies to adapt to seasonal variation and these are based on flexibility and having the ability to cultivate different areas depending upon the level of rainfall and residual soil moisture. Modifying agricultural practices, including location planted, crop varieties and planting dates was a key adaptation strategy for all agricultural households. Households with access to larger land holdings, and with both crop and livestock production, were able and more likely to change crop variety. Fishing households also reported that they would change fishing decisions, in particular the location fished in response to conditions and catch rates. This was facilitated by the ability to rent canoes at different landing sites. Households report that there are indicators of flooding that they observe including the movement of hippos upland, large number of ants and chickens laying eggs on roofs (Njaya, 2016).

Experience with reduced crop yields or crop failure is the primary driver of farmers' coping decisions. It is not surprising that the main coping responses involve the purchase of additional food, reducing consumption or sourcing wild foods. Purchasing food was identified as important by the majority of respondents, reflecting the developed local market infrastructure and important role that markets play in facilitating household access to food. A key strategy to generate income to pay for food, particularly by the rural poor (e.g. Coulibaly et al., 2015; Bryceson 2006) is casual labour (in more extreme cases this may include migrating to the Thyolo escarpment or south into Mozambique). Other responses include the use of food banks, selling livestock to pay for staples, use of wild foods, such as water lily root, and reliance on government and NGO support programmes. These latter strategies can be considered to be coping strategies as they do not enhance household productive potential. These coping strategies are dependent on both opportunities for sale and purchase being available and materials being available from the natural environment. These can be compromised, for example by political instability in Mozambique or climatic conditions within Malawi that reduce food production or demand for labour or lead to price increases for foods. This can have the effect of increasing food insecurity for poorer households in particular. Typically an effect of these coping strategies is also to reduce dietary diversity and to consume less nutritious foods.

Coulibaly et al. (2015) also suggest that while *ganyu* labour may reduce the impact of short term shocks, it can potentially also affect household food production potential. This was confirmed in the interviews where it was reported that farmers often need to earn additional income after a bad crop year, often during periods where they most need to work on their own farms. This can therefore increase the likelihood of crop failure in their own fields due to poor management. For those that are unable to secure labour or other income generating

opportunities, it may mean the sale of assets such as livestock and land. When the stressors are widespread then this can have the additional impact of increasing the number of households forced into these responses and this can negatively affect the price of assets. For example, it was reported that in 2015 the necessary sale of livestock by households in the Western part of the Elephant Marsh in response to the drought conditions had depressed sale prices by over a third. These sales can also reduce the longer-term ability of the households to respond to future stresses.

In addition to what the households can themselves do, a common coping strategy is through external support. Support is provided by the government, by NGOs, CSOs and religious groups in the form of food, agricultural inputs and clothes. Villages and households will also provide support, e.g. shelter during flooding and sharing food. Fishers, in particular those who have links to fish traders, can obtain having access to credit offered by fish traders, some of whom are women (e.g. Njaya 2016).

Modify existing activities

The seasonal variation provides opportunities and also creates the need to develop alternative production strategies. In drier years during the dry season farmers will crop lands further into the Marshes where the soil is more productive and there is residual moisture. This strategy does however bring with it the potential of increased risk of wildlife interaction and waterborne diseases. Some insurance is provided by planting a variety of crops and wealthier households will plant both staple food crops and cash crops, such as cotton. To try and prevent the impact of short-term climate variability some farmers are seeking to take preventative strategies and use irrigation to control seasonal water availability. While there is widespread interest in irrigation, adopters remain a minority and most households respond to the nature of the current season and adopt responsive strategies. As well as moving, fishing households will also seek to increase effort and respondents reported that boys from will take up fishing to support their families rather than go to school.

Depending upon land holdings, a second crop will be produced in the rainy season in more upland areas that are often too dry to crop during the dry season. To enable households to farm in this way they will own or have access to land in both upland and lowland areas. Depending on the level of variability, households can also move and temporarily relocate. There are often understanding and arrangements between villages within a TA to enable this. Underpinning these strategies also are local markets for both products and inputs. There are well established markets for agricultural and other products and these are places where locally produced farm and wild (e.g. reed and charcoal) products are sold. They are also places where agricultural produce, e.g. from the central region and Mozambique and fish from Mozambique are available to buy.

Diversification of livelihood activities carries some risks and it was suggested that poorer households tended to focus on activities that were most likely to generate food and income needs, even where these activities were potentially less productive. Securing a minimum level of livelihood security was seen as the priority. For wealthier households and those with access to credit there was evidence of investment to diversify and to engage in activities that could provide higher returns, such as petty trade. During 2015 for example, households moved well into the Elephant Marsh to plant crops. This created opportunities for petty traders to sell food and drinks to farmers working in these areas and bicycle transport to move crops and crop inputs. Diversification has been promoted by NGOs and government agencies in various forms. Initiatives with livestock (including rabbits) and fish farming have been trialled in the Elephant Marsh with limited success. The area experience high temperatures and droughts that caused high mortalities in rabbits and fish farming requires suitable land and water and access to inputs. The availability of wild fish also affects returns from sales. The development of irrigation schemes is perceived to provide opportunities for aquaculture as there will potentially be a more controlled source of water available.

The availability and wages for agricultural and/or *ganyu* labour are affected when there are drought conditions or below-normal production. Under these conditions wealthier households have less need for labour and households that require but are not able to secure labouring opportunities are reduced to negative strategies. For some, particularly women, limited income opportunities may lead them to engage in unsafe sex practices (including sex for food or prostitution), exposing them to greater risk of HIV (e.g. Njaya, 2016; Actionaid, 2006). Similarly, young people may find that they are absent from school for a time, compromising their education. This can occur for a variety of reasons including need to work or grow food, unable to access schools or the use of school as a shelter for displaced people during flooding. Njaya (2016) reports that during hard times youths will also resort to theft to help support their families.

Investing or saving can provide a form of insurance against shocks and a means to modify activities (see Figure 2). Respondents in interviews and focus groups were interested in possible investments both to increase agricultural productivity and outside agriculture. These included investing in education and human capacity, including schooling and improving adult numeracy and literacy. There was widespread interest in access to training on low-cost income generating activities, including value addition for existing products and marketing. The ability to take advantage of these was also identified as a constraint as access to schools and training is often poor and there is a need for additional labour during times of stress and shock (see above) that can restrict opportunities to participate.

Reducing consumption is a common response to stresses and shocks. In addition to reducing dietary diversity, households report that faced with shortages they may also reduce the number of meals consumed and change the composition of foods – using cheaper foods and relying to a greater extent on wild foods. It was widely reported that this reduces nutrition and can affect health. Where foods are unavailable or households are unable to generate the income required to buy foods aid and charity play important roles.

Poorer households are particularly constrained by factors including dependence on a low number of crops and cropping patterns; low household asset levels (often including farming on poorer soils, lower education levels, fewer livestock etc.); limited options to gain labouring work and low levels of income derived from livelihood activities[5]. This combination can reduce their adaptive capacity and force them into coping and maladaptive strategies that may have detrimental long term consequences.

3.4.4 Assessment of the support mechanisms

The analysis identified four categories of support mechanism: markets, government, NGO and village-level institutions. Exploring responses to change amongst households highlighted the important role of markets providing opportunities to generate income and as a source of affordable foods. Households across the study site are dependent to a degree on markets, for example labour, food staples, firewood and brick making and livestock. A key issue in the Elephant Marsh is that annual and interannual variation affects markets and both the price of food and the value of assets. Even relatively small impacts on food supply can lead to significant increases in food price and decreases in the price of assets (labour and livestock) as people pursue similar strategies to generate income to pay for food (Devereaux 2007; Swift and Hamilton, 2001).

Government agencies have a wide range of responsibilities supporting local livelihoods, biodiversity conservation and sustainable use. More specifically, these include health, education, agriculture and fisheries, water and sanitation and problem animals. These

[5] See also MVAC, 2005 and Alwang (1999)

responsibilities are addressed through the line agencies and district authorities with coordination at the district level. However, in practice the institutional framework for is fairly weak due to uncoordinated sectoral approaches to wetland planning (including different administrative units). Examples of ineffectiveness that were reported in the interviews include DNPW staff being selective in their response to problem animals, fish scouts not addressing issues of illegal fishing and hospital staff charging patients for access to public health care. Furthermore, while health extension workers appeared to be an effective source of information at the village level, the activities of some agencies (e.g. fisheries) were focused more on data collection than resource management and increasing the contribution to livelihoods of fishing.

In the eastern part of the Elephant Marsh some villages were aware of activities to address flooding and climate change and in the western area of initiatives to support irrigation and smallholder agriculture. However the majority of respondents were unable to identify initiatives to increase resilience to climate change impacts. Respondents across the Elephant Marsh were able to identify that government agencies (along with NGOs) did play an important role assisting villages during and after disasters like the floods of 2015. Types of assistance that were reported included evacuating affected households, provision of shelter, food and water and medication. Given the current shortcomings in markets as a mechanism for livelihood and food security, it is important that line agencies and local authorities support households in the Elephant Marsh to provide disaster assistance following shocks and a safety net. The safety net should ensure access to wild foods, food subsidies and work for food that supports households in meeting their food consumption and nutritional requirements. This includes increasing coordination and enhancing activities that can increase household productivity and conserve biodiversity (see Section 3.4.5).

NGOs and donors were identified as also playing an important role in disaster relief. Amongst those identified were World Vision, Action Aid and CARE. Some of these organisations, e.g. World Vision, were also active in supporting conservation agriculture and there were also NGOs providing assistance with water and sanitation in the northern part of the Elephant Marsh. NGOs were also identified as an important source of information about HIV/AIDs prevention and care.

In addition to the external support mechanisms, support is also facilitated and provided at the village level. These village level relationships and relationships at group village level were important in adaptive strategies (e.g. access to land and reciprocal arrangements). Inter-village relationships also supported relocation, shelter and food and water during disasters, although in some cases the local leaders would make use of facilities designed for disaster relief. Local leaders were identified as particularly important and ensuring the accountability of these leaders a critical element in ensuring that they act responsibly. In addition, there was evidence that informal and customary relationships were as important as formal with respondents suggesting that less than half of households were involved in community based organisations but reliant on other households for exchanges, support and information. This suggests that interventions should seek to engage with local leaders and recognise the importance of informal reciprocal arrangements as well as formal organisations in the design of local initiatives.

3.4.5 Future interventions

Based on the main livelihood activities across the areas of the Elephant Marsh and the types of interactions, adaptation strategies and support mechanisms, a number of key areas for intervention to improve wellbeing and enhance climate resilience were identified. These focus on enhancing the contribution of food and income generating activities and minimising the negative impacts of the Elephant Marsh environment on their individual and collective wellbeing.

A critical challenge will be to identify how and where agriculture fits within the wetland management plan. This is made more complex because many farmers are in a situation where they are unable to reliably feed their families each year and their priority is a secure food supply. Farming in and around the Elephant Marsh is focused on staple crops, of which maize is a central component, and one requiring a minimum threshold of soil moisture for successful cropping. Individual areas for cultivation are typically small and households often face food shortages over the course of the year. Changing cropping patterns, managing water and soil moisture and fertility through conservation agriculture

Conservation agriculture, aimed at improving the management of agro-ecosystems to achieve higher productivity and increased food security while enhancing the environment is widely promoted and has the potential to increase yields and contribute to managing environmental impacts at low cost to farmers. It can also help to overcome some of the shrotcomings of the markets as reliance on selling assets and buying food may be reduced. Measures that reduce erosion and increase soil moisture and fertility, crop rotation (e.g. maize and groundnut) and intercropping (e.g. maize with pigeonpea) can all contribute to improved yields and reduced risk. Increasing the productivity of existing lands, particularly with regard to recession farming, will be important in reducing the incentive to extend farmlands into the Elephant Marsh. It also has the potential to increase local food availability and the value of *ganyu* labour. The frequency of fires during dry periods in the marsh and surrounding areas is believed to have increased with population increase and encroachment into the marsh in dry years. Fire is used to facilitate the establishment of new cultivated fields at these times. However, burning can dry papyrus marsh and has caused extensive habitat loss and modification. In turn this threatens mammal, reptile and amphibian populations, especially those that are not able to vacate quickly enough to escape the fire.

Over harvesting of wild resources was also identified as a potential threat. This includes plant harvesting, fuel wood collection, overgrazing, overfishing and excess hunting pressure. While introducing legislation to prohibit or limit the harvest may seem the most appropriate response, the drivers of overharvesting are often complex and care has to be taken to ensure that this will not simply change the nature of the problem, displace it or even exacerbate it (e.g. Claridge and O'Callaghan, 1997). Within the Elephant Marsh, historical patterns of exploitation, including the dependence on wild resources by refugees and the combination of commercial and subsistence exploitation (e.g. livestock and hunting) can complicate control. Local people may not have many options regarding resource use, particularly in times of drought or flood and inappropriate regulation can make things worse. That said, it is important that overall (subsistence and commercial) harvesting should be limited to at rates below the capacity to renew. Harvesting of vegetation should also be limited at the time when birds and insects are breeding. There are examples within the Elephant Marsh of successfully managed community woodlots. These could provide a model for other communities within and around the Elephant Marsh.

People living in the Elephant Marsh are vulnerable to water-borne diseases, in particular malaria, bilharzia, cholera and diarrhoea. These are reported to be correlated with areas of stagnant water that form following inundation. Malaria transmission is perennial, with seasonal increases after rains during November–April (Bennett et al. 2013). Cholera and diarrhoea are related to poor access to clean water and sanitation that is attributable to limited maintenance of existing water facilities and spatial coverage of permanent latrines combined with flooding and siltation, theft and vandalism of water facility infrastructure and equipment. In addition to more acute illness there are high morbidity and mortality rates due to Tuberculosis and malnutrition and a high prevalence of HIV/AIDS and orphanhood.

Additional health threats reported included crocodile (and to some extent hippopotamus) attacks on people are said to be common as the fishers and farmers make use of the marsh for livelihood and basic life (washing, collecting water) activities. Crocodiles are particularly problematic as these can destroy fishing gears and attack people. Local people have tried

various means to address the issue of wildlife interactions (e.g. scarecrows and guards for hippos and fences for crocodiles) with varying degrees of success.

While wildlife is often viewed as a resource or problem, given the proximity of Lengwe and Majete and the alternative forms of wildlife available in the Elephant Marsh it may be possible to develop the potential of the Elephant Marsh as a tourist site and as a source of benefits to local communities. Birdlife is plentiful and offers potential for some bird-watching based tourism. In order to maximise the value of this ecosystem service, tourism access to the marsh would need to be improved. These opportunities should be explored and pilot activities trialled.

Water hyacinth (*Eichhornia crassipies*) water lettuce (*Pistia stratiotes*) and water fern (*Azolla filliculoides*) are all abundant across the Elephant Marsh, sometimes forming large mats that almost completely cover smaller lake. These plants impact human use of the wetland, for example making travel by boat more difficult and affecting fishing opportunities. They may also impact on the functioning and economic potential of the Elephant Marsh. This is more of a problem in the southern part of the marsh where there are larger areas of open water.

The interventions described above are summarised in (Table 19) below for the whole marsh and individual sub-areas.

Table 19: Intervention strategies identified as enhancing livelihoods resilience across the whole Elephant Marsh and within the sub-areas.

Elephant Marsh Sub-area	Strategies identified as sub-area priorities
Whole Marsh	Agricultural support and technology experimentation including access to improved seeds, introducing some diversity to crops and intercropping long season pigeonpea. Studies should explore drivers of agricultural production (e.g. subsidies that incentivise monocropping). Reducing wildlife interactions, in particular crocodile attacks and hippos destroying crops.
Northern	Drought resistant crops, Improving sanitation and access to water
Western	Managing livestock. Improving access to water. Improving sanitation and access to water
Eastern	Managing water and erosion
Central	Priority for the area is to enhance protection and reduce access. On the basis of the scenario assessment (see DRIFT report) this is likely to have the greatest benefit for the Elephant Marsh biodiversity in the face of identified climate and development change. Explore opportunities with neighbouring villages for tourism-related activities.
Southern	Improving communication links Supporting BVC management of local fisheries. Studies should assess changes in fish species abundance. Assess options for addressing exotic plants

4 Conclusions

The study of livelihoods in the Elephant Marsh provides detail of the ways in which people living in the different areas around the Elephant Marsh are dependent on the Elephant Marsh to support their livelihoods strategies. It is clear that the Elephant Marsh supports a range of livelihood activities including rainfed agriculture; livestock rearing; fishing; gathering of wild products including roofing materials and foods. While a range of livelihood activities were identified, the most significant in many ways is cultivation within the Elephant Marsh. Most people identify themselves as farmers and identify cultivation as the activity that makes the greatest contribution to household income and food security. However, the nature of cultivation appears both spatially and temporally variable, determined to a large extent by the flood cycle and local topography. The Elephant Marsh area plays a particularly important role during the dry (winter) season, especially when there is a dry year when people move further into the wetland to cultivate crops and there is a greater reliance on the soil moisture and fertile lands within the Elephant Marsh. The study also examined the institutional and decision-making arrangements and the ways that these enabled and constrained household and community choices. Indeed the flexible use of the Elephant Marsh is managed primarily through the local village level decision-making, highlighting the critical role of local institutions and arrangements governing land use and access to natural resources.

An overall contribution of the Elephant Marsh is that it provides the possibility of pursing a variety of livelihood strategies and combinations of these. The importance of a particular livelihood activity in practice varies according to location around the Marsh (the local agro-ecology), a household's social and economic position, season and the nature of the climatic conditions. An important contribution of the study is to highlight that people are capable of adapting and of managing in this dynamic environment. However, because of the dynamic nature of the Elephant Marsh, and the different ways that people respond to changing conditions, it is difficult to predict the exact nature and scale of services and livelihood functions the Marsh will provide at any given point.

The study has identified that there is significant human pressure on the wetlands of the Elephant Marsh. People in and around the Elephant Marsh are dependent upon a combination of farming/fishing as well as labour and market-based exchange and this is likely to continue. Pressure on the Elephant Marsh is, and has been, exacerbated by upstream and upland livelihood activities and development as well as the legacy of additional pressures that were placed on the wetlands during the conflict in Mozambique. Climate change, especially if it leads to longer and drier dry seasons, may result in increased permanent migration and seasonal movement into the wetland. It is therefore likely that the pressure on the Elephant Marsh, and potentially on the more central area that has been less affected by human activity, will increase with population increases, continuing upstream and upland development and improved access to markets.

A critical challenge for the management of the Elephant Marsh is maintaining and enhancing system resilience and ensure that the wetland is utilised in a manner that does not undermine or compromise the resource base that underpins the livelihoods benefits and ecosystem services. Furthermore, this needs also to account for the inter- and intra-annual variation that characterises the area. Given that decisions taken at the local level have an important impact on aggregate outcomes, this will require investment to identify a combination of low-cost individual and collective strategies for agriculture and natural resources that represent adaptive and coping strategies and to enhance local capabilities to innovate and adapt to future shocks and stresses. These aspects are considered in more detail in the scenario analysis (Brown et al., 2016) and management plan report (Arthur 2016).

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Annex 1 Terms of reference for the livelihoods study.

The study will:

- Assess the past, present, and potential future influence of human livelihoods on the Elephant Marshes, and what effect these will have on the functional resilience of the Marshes in the future, and the implications for climate change. This study should focus on socio-economic impacts of various livelihoods (such as fish stock declines), and how climate change (such as flooding) would affect these livelihoods. Investigate livelihood strategies that contribute to resilience.

- Assess support mechanisms for community welfare in line with possible flood mitigation measures and disaster management strategies.

- Deliverables for this study should include a report of livelihood activities, a report on all assessment above including that of resilience, support for livelihoods , and maps of potential livelihood usage zones.

Annex 2 Data collected at the national, district, settlement, village and household level.

5.1 National and regional level assessment

Assessment at this level provided an understanding of the policy and governance context of the Elephant Marsh area and its use, as well as identifying new or changing activities/uses, major development projects, etc., which have had/are having/may have a detrimental effect on the natural ecological character of the wetland. The policy, institutions and governance review undertook a review of key policy documents as well as supplementary interviews with key informants. Key documents used in the assessment included:

- Malawi Poverty Reduction Strategy (MPRS);
- Malawi Economic Growth Strategy (MEGS);
- Malawi's National Adaptation Programmes of Action (NAPA);
- National Biodiversity Strategy and Action Plan (NBSAP);
- National Environmental Action Plan (NEAP);
- National Disaster Risk Management Policy;
- Draft Interim Operational Guidelines for Disaster Risk Management;
- Malawi National Strategy for Sustainable Development (MNSSD);
- SADC Biodiversity Strategy (2005);
- Ministerial priorities and policies including the national irrigation strategy;
- Donor strategies and programmes;
- NGO policies and interventions; and,
- Existing policy reviews (e.g. Nanthambwe, 2013)

The review provides a description of the context and enabling environment within which local institutions are developed and function. The national and regional review also considered available information on wetlands livelihoods, vulnerabilities and adaptive strategies from both this wetland and other wetlands in the region.

5.2 District and settlement level assessment

The second level of assessment was the district within which the Elephant Marsh wetland is situated (Chikwawa and Nsanje) and key settlements within this, particularly at Group Village level. In order to understand the livelihood context, secondary data was collected and reviewed and interviews conducted with stakeholders and key informants at this level. Examples of the types of information reviewed include:

- Population, demographics and trends - including presence of marginal or nomadic groups;
- Details of key settlements within and around the Elephant Marsh;
- Economic, social and cultural values and functions;
- Main livelihoods characteristics;
- Health information;
- Details of local government and institutional arrangements;
- Land use and water use activities;
- Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects;
- Physical characteristics;

- Social service provision, local conservation, resource management and development plans.

Some of the bibliographical documents reviewed are listed in Box 2 below

Box 2. Government policy documents, NGO project reports and publications relevant for assessing development planning, livelihoods, disaster management and resource management in the Elephant Marsh districts

- Emergency Plan of Action Preliminary Final Report Malawi: Floods (IFRC, 2016).
- National Biodiversity Strategy and Action Plan II (2015 –2025) (GOM, 2015).
- Malawi Drought 2015-1016: Post-Disaster Needs Assessment (PDNA) (GOM, 2015)
- National Contingency Plan Malawi 2012–2013 (GOM, 2012)
- Malawi: Floods. Situation Report No. 02. (Department of Disaster Management Affairs (DoDMA) of Malawi, 2015).
- Policy Sector Review for Incorporating Sustainable Land Management in the Shire River Basin and Development of an Institutional Framework for Sustainable Land Management (GOM, 2013)
- Nsanje District Floods: Disaster Impact Assessment & Transitional Recovery Framework (GOM, 2012)
- Regional Variation in Livelihood Strategies in Malawi (CMI WP 2009: 6) (Hatlebakk, 2009).
- Chikwawa District Rural Water, Sanitation and Hygiene Plan District Strategic Investment Plan (DSIP) (GOM, 2008).
- Malawi's National Adaptation Programmes of Action (NAPA) (Under The United Nations Framework Convention On Climate Change (UNFCCC) 1st Edition (GOM, 2006)
- Chikwawa District Development Plan 2006-2009. (GOM, 2005)
- Malawi Baseline Livelihood Profiles (version 1) (Malawi National Vulnerability Assessment Committee in collaboration & SADC FANR Vulnerability Assessment Committee, 2005).
- Nsanje District Development Plan, 2002-2005 (GOM, 2002)

In addition to information from official documents substantial information was collected and collated for NGO statements and unpublished project reports etc. and interviews with key informants, e.g. Agriculture Extension Officers, health service providers, NGO representatives, academic researchers. More detailed information on the bio-physical nature of the Elephant Marsh is reported in the Hydromorphology and Biodiversity sub-study reports. Additional and more detailed information for the livelihoods report was collected through semi-structured interviews within key settlements in and around the Elephant Marsh. These settlements were selected on the following basis:

- That the locations reflect different bio-physical settings including ecological or agro-ecological context (recognising that landscapes may be human modified), areas with high natural variability (e.g. to flooding) and locations with habitat variation within them.
- That locations reflect the broad patterns of livelihoods within the wetlands (e.g. agriculture and/or fishing) as well as any particular variations in livelihoods or interactions that may be significant in relation to management, e.g. groups that hunt.
- The locations also reflect particular socio-economic and institutional circumstances such as differing degrees of remoteness from markets and/or support services (e.g. Dorwood et al. 2003).

The information on which the selection was based came predominantly from the information that has been generated by the biodiversity survey and hydromorphology survey components. For the purpose of the analysis we focus on four key areas that have been identified based on vegetation types, hydromorphological influences and stages of transformation for cultivation across the marsh (see Brown et al 2016).

Settlements were identified in all of these regions except the central part of the south/central area. To inform the household/village selection process and also to refine the assessment framework that would be developed and applied at the settlement and household levels contact was made during the study with the District Councils of both Chikwawa and Nsanje districts as well as the fisheries and agriculture officers in each district, the district environmental health officer (DEHO) in Nsanje and representatives of the Department of Parks and Wildlife. These key stakeholders were able to provide a number of important resources related to local institutional arrangements, local livelihoods, development priorities, production figures and marketing arrangements. Locations within each area were selected on the basis that the information generated will provide insights into livelihood dynamics that will be relevant to policy and management at a broader level

At each of the selected locations, the team sought to generate the following information:

- Settlement location (GPS coordinates)
- History of settlement and spatial location;
- Seasonal and temporal changes in settlement patterns;
- Change over time and significant events in settlement history;
- Social stratification;
- Demography;
- Intra-settlement institutions (including community-based organisations), governance processes, leadership and links to external services;
- Main livelihood practices over the course of the year;
- Locations of key resources and ecosystem services (water, medicinal plants etc.);
- Key environmental services (provisioning, supporting, and cultural);
- Key social services available and providers;
- Trends in practices, resource use and dependency; and,
- Resource management practices.

In applying this framework a variety of participatory methods and visualisation techniques were used including key informant and focus group interviews, mapping, ranking, seasonal calendars and village timelines. Where interviews were used the team used guidelines for best practice in interviews and applied techniques such as triangulation, probing and participant validation to ensure the accuracy and robustness of the information generated.

5.3 Village and household level assessment

Within each of the four target areas (Figure 1) the team selected representative villages (permanent or temporary) based on the potential to generate information. For example, selecting sites that have (or are likely to have) different patterns of resource use (e.g. locations that focus on agriculture as well as those that have a fish landing site). Selection was also aimed to be inclusive of different social groups who may have different patterns of resource use, entitlements and cultural relationships with the environment. For example, in the southern/central part of the Elephant Marsh, in particular on the east bank, there are a number of villages where people have settled after fleeing conflict in Mozambique.

As with the settlement level analysis, analysis at the village level explicitly recognised that livelihoods and interactions with the natural environment are based on the nature of the

environment, of social structure and the interactions between these. A focus for this level of the assessment was on understanding the factors that enabled or constrained people's ability to adapt. This was important as understanding how people have survived in the past can provide a useful basis for projecting into the future and will therefore feed into the analysis of future impacts.

The approach also recognised that there may be important differences (e.g. based on gender or age) that give rise to differences in use of wetlands or collection of specific wetland products such as medicinal plants). Information collected at this level included:

- Settlement location (GPS coordinates);
- History of settlement and spatial location;
- Change over time and significant events in settlement history;
- Social stratification;
- Demography;
- Intra-settlement institutions, governance processes, leadership and links to external services;
- Natural resources institutions (including access arrangements and tenure);
- Resource management practices.
- Enforcement, sanctions and evidence of rule breaking;
- Main livelihood practices over the course of the year;
- Key income sources
- Locations of key resources and ecosystem services (water, medicinal plants etc.);
- Key environmental services (provisioning, supporting, and cultural);
- Key social services available and providers (including markets).

Key methods applied at this level included stakeholder analysis (to identify key groups), key informant and focus group interviews along with PRA visualisation techniques to ensure that the approach provided a range of perspectives on the issues and ensured confidence in the findings. Key visualisation techniques that were used included:

- Resource mapping. Mapping was used to capture the key spatial (e.g. settlements, important habitats and resources within the wetlands, currents etc.) Mapping involved people constructing their own maps and also indicating key locations on existing maps of the area.
- Timelines and calendars. Timelines were used to capture key changes and trends over time, including seasonal changes such as farming and fishing patterns, animal abundance and seasonal occupations.
- Ranking was used to explore preferences or priorities of an individual or group.

The combination of methods and information generated are shown below in Table 20.

Table 20: Primary information collected within target villages

Data collected	Method used
Household assets and capabilities Key social services available and providers Wetland resource and service use – quantities, diversity, use Income sources Food sources and food access Access to infrastructure and services (roads, markets, healthcare etc.) Relationships with other households and authorities	Semi-structured interviews

Data collected	Method used
Key shocks, stresses and hazards faced by the household and response to these Effects of resource management practices and institutional enabling and constraining factors	
Trends in practices, resource use and dependency	Timeline
Locations of key resources and ecosystem services (water, medicinal plants etc.) Location of infrastructure and services (markets, healthcare) Location of hazards (e.g. wildlife, deep pools etc.)	Mapping
Main livelihood practices/activities over the course of the year Income sources Food sources	Seasonal calendars and ranking

The original intention had been to supplement interviews with a household survey to gather quantitative data that could be disaggregated by wealth group. The greater emphasis placed on the biodiversity surveys meant that this did not happen so detailed breakdowns are not possible and some of the information from the interviews is supplemented with information available in the literature. In practice, the process of collecting information began with contact with the district councils to discuss the aims of the assessment and site selection, with the aim of visiting the selected settlements during the dry season when access to the selected settlements will be greatest.

5.4 Mapping of livelihood usage zones

The nature of use of wetland areas changes over the course of the year and can differ by village. Stratified semi-structured interviews and focus group discussions with key informants from each wealth group (that included both men and women) using visualisation and participatory GIS techniques provided additional detail on the local level spatial use of the wetlands and the types of environmental services that are accessed by different groups at different times of the year. Interrogation of the maps with the key informants confirmed the utility of the areas identified in Figure 1 based on differences in resource utilisation. It also confirmed the difficulty of providing maps at greater resolution because of the way in which people move around and modify their farming activities (including the location of cultivated fields) according to the flood cycle. The interviews highlighted local features of the different areas and the ways in which these were utilised to secure contributions to households (e.g. to food, income, health).

Annex 3 List of individuals and groups interviewed and sourced information from

Name	Position and Organisation
TA Ngabu	Traditional Authority
TA Mlolo	Traditional Authority
TA Maseya	Traditional Authority
TA Mlilima	Traditional Authority
Newton Munthali	M & E Officer, Chikwawa
Kelvin Harawa	Director of Planning and Development, Chikwawa
Peter Magombo	Environmental Officer, Chikwawa
Ms Chilongozi	Director of Adminstration, Chikwawa
Betterson Tito	District Council Chairman, Chikwawa
	Nsanje Agriculture Officer
	Nsanje DC's Office
Dr. F. Njaya	Assistant Director, Department of Fisheries
Patrick Zakeyo	District Fisheries Officer, Chikwawa
L. Mang'anda	Fisheries Extension officer, NE Elephant Marsh
F. Kimu	Fisheries Extension officer, NW Elephant Marsh
Laban Silli	District Fisheries Officer, Nsanje
Amos Malowera	STO, Bangula Fisheries
H. Kachale	Fisheries Assistant, Bangula Fisheries
D. Binga	Fisheries Assistant, Bangula Fisheries
Charles Beka	Fisheries Extension officer (SW Elephant Marsh)
Foster Kuloweka	Fisheries Extension officer (SE Elephant Marsh)
Duncan Magwira	District Agriculture Development Offier (DADO), Chikwawa
Bastien. S. Chilembwe	CTO, Mbewe EPA, Chikwawa

G. Chilumpha	CTO, Mikalongo EPA, Chikwawa
M.B. Nakhumwa	CTO, Dolo EPA, Chikwawa
Laston. N. Gama	CTO, Livuzu EPA, Chikwawa
Mr. Muna	CTO, Makhanga EPA
Nakwanje	CTO, Magoti EPA
Biswick Chabwera	STO, Somo Section, Mikalongo EPA
Maknight Sakhulani	STO, Lalanje section, Dolo EPA
Esnat Longwe	STO, Masanduko Section, Dolo EPA
Lorita Kantchewa	TO, Tizola 2, Mbewe EPA
M. Songwe	TO, Lalanje section, Magoti EPA
Alfred Mwale	TO, Livuzu section
Chindebvu	TO, Mlambe section, Makhanga EPA
Ruth. Mwenye	TO, Mitole EPA
Felix Chokha	Veterinary Officer, Makhanga EPA
Patrick Makombola	Veterinary Officer, Magoti EPA
M. Mitawa	(acting for Programme Manager), Shire Valley ADD
Mangadzuka	Livestock, Shire Valley ADD
R. Taibu	Crops, Shire Valley ADD
M. Nyamuka	Planning, Shire Valley ADD
Mark Allan	Commodity Supervisor, World Vision, Chikwawa
Jester Nyirenda	D. Director, Parks & Wildlife (project coordinator)
Ramjee Nyirenda	Consultant,
Alick Makanjira	Parks and Wildlife Officer (EE)
	Parks and Wildlife Officer (Extension) and staff at the Lengwe National Park
Dr. A. Majidu	District Health Officer, Chikwawa District Hospital

I. Mtambalika	Environmetal Health Officer, Chikwawa District Hospital
D. Madeya	District Health Management Information System Oficer, Chikwawa District Hospital
H. Kaufa	S District Health Management Information System Oficer, Nsanje District Hospital
Ms. Ndasowa	Matron, Montfort Hospital (private, Catholic)

Focus group discussions

village	**GVH**	**EPA**
Thomu 1	Chipakuza	Mbewe
Tizola 2	Tizola 1	Mbewe
Mitondo Market	Sabvala	Livuzu
Sabvala	Sabvala	Livuzu
Mmodzi	Mmodzi	Livuzu
Mwanawanjovu	Mwanawanjovu	Dolo
Champhanda	Champhanda	Livuzu
Faniza	Kalonga	Makhanga
Chisamba 1	Chisamba	Magoti