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Does Co-Management programme reconcile community interests and forest conservation:A Case study of Malawi

Chinangwa, Linda

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DOES CO-MANAGEMENT PROGRAMME RECONCILE COMMUNITY INTERESTS AND FOREST CONSERVATION: A CASE STUDY OF MALAWI.

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A Thesis Submitted in Candidature for the Degree of Doctor of Philosophy (PhD)

By
Linda Lindizgani Robert Chinangwa

School of Environment, Natural Resources and Geography,
Bangor University, Bangor,
United Kingdom.

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THESIS ABSTRACT

There is an increasing consensus that access to forests and forest resources can contribute positively to the reduction of poverty among rural households in developing countries. Furthermore, forests contribute global environmental services such as mitigation of climate change through carbon sequestration. Therefore, sustainable management of forest resources is paramount to ensuring that these resources and services are available for current and future generations of nearby rural populations as well as more distant stakeholders. For most governments and their partners one of the key challenges to achieving sustainable forest resources is identifying a forest management approach that reconciles community interests and forest conservation goals.

Currently forest co-management approaches receive support from governments and the donor community because they are hypothesised to have the potential to simultaneously advance community livelihood goals and forest conservation. However, there is limited evidence to support this hypothesis. Therefore this study uses both quantitative and qualitative methods to provide empirical evidence on the extent to which co-management programmes achieve sustainable forest management and reconcile multiple stakeholders' interest in forests and forest conservation goals. The study uses the case study of the Improved Forest Management for Sustainable Livelihoods Programme (IFMSLP) in Malawi, which is funded by the European Union. The study was conducted in with Zomba district (Zomba-Malosa forest reserve) and Ntchisi district (Ntchisi forest reserve).

Household interviews and forest inventory were used to: explore what local actors perceive as criteria for measuring the success of a co-management programme; assess whether co-management can achieved true devolution of powers and responsibilities to local institutions; assess the impact of co-management on forest condition, and; estimate the current livelihood and welfare impacts of the programme. The study shows that, other aspects of co-management and sustainable forest management such as: community participation in decision making; access to and availability of forest resources; and infrastructure development (which are usually not included in forest management impact assessment studies), are also important criteria for assessing a co-management programme from local actor's perspective. The study also reveals that it is difficult for co-management programmes to realize true devolution because governments retain ownership of the forest and there is limited political will among state authorities to devolve rights and responsibilities to local institutions.

The findings of this study suggest that the impact of a co-management programme on forest conditions may vary depending on pre-existing forest conditions as well as on how participating communities understand and interpret the programme. Therefore, due to lack of information on forest condition before the programme, it is difficult to determine the effect of co-management on forest conditions from one-time study data, even with method triangulation. 63% of respondents perceive that co-management has had no impact on their livelihoods. However, 80% are willing to pay) annual membership fees (mean = 812 Malawi kwacha ≈ $2) to participate in the programme, because of perceived possible future benefits. This shows that local people are investing their time and labour in co-management based on optimistic expectations, which puts them at a risk of being taken advantage of by programme initiators as there is no guarantee of a future benefit. Therefore, the opportunity cost of communities' participation in co-management activities which provide global environmental benefits, is an important reason for governments to consider inclusion of Payment of Ecosystems Services (PES) in the programmes. Finally, the finding of this study suggest that forest co-management has the potential to reconcile community interests and forest conservation, however local actors' attitudes; unaccountable institutions; tenure systems and; limited knowledge and skill development among local actors may limit its effectiveness.

DEDICATION

To

Atle-Rodney and Zoe Lindizgani-Rexa

(I wouldn't have done it differently!)

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CFM	Community Forest Management
DFID	Department for International Development
FAO	Food And Agriculture Organization
IFMSLP	Improved Forest Management for Sustainable Livelihoods Programme
IPCC	Intergovernmental Panel on Climate Change
MK	Malawi Kwacha
NTFP	Non-timber forest products
RAISE	Rural and Agriculture Incomes with Sustainable Environment
REDD	Reducing Emissions from Deforestation and forest Degradation
WECD	World Commission on Environment and Development

CHAPTER 1: THESIS INTRODUCTION

1.1 Introduction

Although the total contribution of forests to the world's livelihoods is difficult to quantify (FAO, 2008), forests are still believed to form an important part of rural livelihood strategies for the majority of the rural populations in most developing countries (Agrawal *et al.,* 2013; FAO, 2011a; World Bank, 2001; Arnolds, 2001 and 1998). In Sub- Saharan Africa and parts of Asia (e.g. Nepal and Bangladesh) rural populations depend, directly or indirectly, on forests for their daily subsistence and income needs (Kaimowitz, 2003; Phiri *et al.,* 2012; Shimizu, 2006; Vira and Kontoleon, 2010). Forest resources provide them with a much needed safety net between harvest seasons and during other stress periods such as crop failure, drought and social strife (Appiah *et al.,* 2009; Fisher 2004). Furthermore, McDermott and Schreckenberg (2009) suggest that forests are often the most available local resource, and hence often form the basis for rural community development. Additionally, Agrawal *et al,* (2013), argue that historically, forests have been a significant resource for economic development and growth. Hence, there is a consensus that forests and forest resources can positively contribute to the reduction of poverty among rural households, and community development growth in developing countries (Cavendish, 2000; Vedeld *et al.,* 2007; Sunderlin *et al.,* 2005; Brosius *et al.,* 1998).

Apart from communities living in and around forests, different groups of people (local, regional and global), demand and benefit from the ecosystem services that forests provide (e.g. carbon sequestration). Tillman (1997) and World Resource Institute (2000) argue that the stability, functioning and sustainability of global ecosystems largely depend on the diversity of plant and animal species, and the most diverse plant and animal populations of any terrestrial ecosystem in the world are found in and supported by forests. Additionally, governments and international communities now recognise and appreciate the key role that forests play in world carbon cycles and mitigation of climate change (Myres-Madeira, 2008; World Resource Institute, 2000).

However, forests and forest resources are currently declining substantially, thus threatening the current and future local communities' ability to meet their basic needs from the forest (Appiah *et al.,* 2009; Kanschik and Becker, 2001). It is also estimated that over the last 8000 years the world's forest cover has declined from approximately 62 to 33 million square kilometres (Bryant *et al.,* 1997). FAO, (2010), further estimates that between the years

2000 to 2010, approximately 13 million hectares of forest were lost annually world-wide. The forest loss has been largely attributed to the conversion of forests land to other uses (e.g. agriculture and infrastructure development) and natural causes (e.g. fires and hurricanes). Additionally, it is estimated that Africa alone loses approximately 3.4 million hectares of the forests annually (FAO, 2010; CIFOR, 2005). Furthermore, the negative impacts of deforestation extend beyond local and national scales (Burgess *et al.*, 2012). For example, the decline in forests together with other land use changes (e.g. agriculture and urbanization) is estimated to account for approximately 20% of annual global carbon emissions (Burgess *et al.*, 2012; Myres-Madeira, 2008; IPCC, 2000).

A common narrative in development and environment policy discussions is that the poor are agents as well as victims of deforestation and forest degradation (Fisher, 2004; Wunder, 2001). However, although there is a significant spatial overlap between forests and poverty, there is limited evidence on the relationship between the poor people and forest degradation (Roe *et al.*, 2010). For that reason, Behera and Engel (2006) and Ostrom (1990) argue that the main cause of deforestation is not clearance for agriculture expansion or supply to industries by local communities, but the inability to identify and define sustainable forest management approaches and institutions. However, because of the nature and characteristics of forests as a resource as well as the multiple stakeholders (with different and at times opposing interests) involved in forests and forest management; it is difficult to identify suitable forest management approaches that are sustainable and globally applicable (Kimmins, 1992).

Forests are often referred to as common pool resources[1] because of the difficulty of excluding users from deriving the public benefits of the resource, and its rivalrous consumption characteristics (McKean, 2000; Ostrom, 1990). Hardin, (1968), suggested that common pool resources like forests cannot be managed in poor regions without resulting in a tragedy of the commons[2] (i.e. over-exploitation of the forest resource). However, common pool resources scholars have argued that what Hardin was referring to as common pool resources, is better described as open access resources, where nobody can be excluded and not to be confused with a common property resource, under communal or collective

[1] A common pool resource is a resource characterised by limited excludability and rivalry in consumption (Ostrom, 1999 and 1999).

[2] Tragedy of the commons refer to the depletion or overexploitation of resources as result of individuals use of the resource to satisfy individual needs and interest, without regards to the understanding that their use affects the communal long term benefits from the resource (Hardin, 1968).

ownership (Fannell, 2011; Ostrom, 1990). Although it is costly to exclude beneficiaries from a common property resource, it is not impossible, because communities with tenure rights over the resource can often form institutions that restrict access and resource use to sustainable levels (either formally or informally). In contrast, open access resources symbolizes lack of ownership and control, hence there are no institutions to govern their use and can be accessed by anyone, anytime and without restrictions on utilization levels (Fannell, 2011; Heltberg, 2002). As such open access resources are prone to over-exploitation and degradation. Hence, Hardin's essay failed to recognize the difference between common property with collective ownership, and no property i.e. open access (Heltberg, 2002) and Ostrom (1990), argues that over-exploitation principally occurs when the resource is an open access resource and not a common property resource. However, since users of common property resources may have multiple and differing interests in the resource, a challenge remains in identifying what kind of management approach and under what circumstances the management of common property resources can be sustainable (Fannell, 2011; Meinzen-Dick and Knox, 1999).

The most common forest management approaches include state management (which may tend to open access, de facto), common property resources management (including formal and informal or customary institutions), private management and open access (McCarthy, 2000; Negendra, 2007; Taylor, 2000). In state management, rights of use and management of the forest and forest resources belong to the central government (but may be granted to communities, corporations or individuals), whilst in common property management, the management and user rights and responsibilities belong to a defined group of people or community (McKean and Ostrom, 1995; Taylor, 2000). In private management, the property rights belong to private individuals or corporations, whilst an open access regime is a situation where no rights with regard to use and management are defined, therefore, there is no incentive for conservation and prone to overexploitation (Bromely, 1992; Demsetz, 1967; Heltberg, 2002).

However, the existence of forests under *de jure* open access management may be minimal, since even where no formal rules are defined; *de facto* informal traditional rules might be operational (Berkes *et al.,* 1989). Furthermore, Banana and Ssembajjwe, (2000) argue that regardless of the *de jure* management approach; forest can still be *de facto* open access if rules and regulations governing the management are not enforced. As such, although Heltberg (2002) and Ostrom (1990) argue that forest over-exploitation occurs where management institutions are lacking, studies by Buffum, (2012) and Negendra, (2007) have

shown that over exploitation can still take place in some forests even where some form of management institutions and regimes are in place.

Over-exploitation has often been observed in forests which are under state management (Buffum, 2012). This is attributed to the fact that the nationalization of forests through establishment of forest reserves usually results in marginalization of local communities who depend on the very forests for livelihoods and undermining of traditional forest management systems, consequently causing conflicts between locals and management authorities over the resource (Agrawal *et al.*, 2013; Masozera and Alavalapati, 2004; Negendra, 2007). Furthermore, due to limited human and financial resources, it is costly for government to effectively monitor forest resources against over exploitation and enforcement of rules and regulation for accessing forest products (Agrawal *et al.*, 2013; Meinzen-Dick and Knox, 1999; Odera, 2004). As a result, state forest reserves become *de facto* open access forests, hence susceptible to overexploitation (Banana and Ssembajjwe, 2000).

As such, although state management regimes were popular in the 20th century, there is now growing appreciation that the effectiveness of state forest management approaches could be enhanced or achieved if management and utilization rights are shared with local communities (Negendra, 2007; WECD, 1987; Ostrom, 1990). Persha *et al.*, (2011) suggest that formalized involvement of local communities in forest governance provides an incentive to local communities to use forest sustainably; hence forest management systems that involve local communities are more likely to achieve sustainable or win-win outcomes[3]. Additionally, the recognition that forests have multiple and diverse socioeconomic and ecological benefits have prompted governments and their partners to pursue forest policies that offer a win-win situation, by addressing both livelihoods and conservation outcomes of forest systems (Persha *et al.*, 2011). Therefore there is now a shift from state forest management to community property management approaches. Although, there is limited evidence of its effectiveness, community management approaches are hypothesised to have the potential to produce a win-win situation (i.e. ensure conservation and meet local community and other stakeholders interest in forest management) (Bowler *et al.*, 2012 and 2010; Gibson and Mark, 1995; Western and Wright, 1994), and are being heavily promoted in developing countries as a suitable forest management approach, by both national and international governments (Arnold, 1992; Negendra, 2007). Therefore, using an example of forest co-management programme in government forest reserves in Malawi, this study aims at assessing if co-

[3] Persha *et al.,* (2011) have defined sustainable outcomes of a forest system as a scenario whereby both ecological indicators (i.e. species richness) and livelihoods indicators are above average.

management programmes can reconcile community forest based interest and achieve forest conservation.

1.2 Forest co-management and community based forest management approaches

The concept of community forest management (CFM) can be traced back to the Brundtland report: *Our common future* by the World Commission on Environment and Development (WCED, 1987). The commission advocated the inclusion of local people's needs and livelihoods in natural resources management and conservation programmes. However, though the approach seems recent, local community or traditional forest management institutions pre-dated state control and in some cases continue to operate in the shadow of state management (Berkes *et al.,* 1989; Ostrom 1990; Zulu, 2008). For example, Zulu (2008) states that during the pre-colonial era (before 1964), forests in Malawi were managed by traditional leaders, and even when management was centralized by the state, management of some forest reserves remained in the *de facto* control of traditional leaders. Therefore in such areas (i.e. communities or countries), the commission helped to revive the traditional forest management approaches, and contributed to the legitimization of traditional management institution.

Following the World Commission on Environment and Development (1987) a number of governments, mainly in developing countries mainly in Africa and Asia, have decentralised their conservation policies and institutions, including in the forestry sector (Agrawal *et al.,* 2008; Meinzen-Dick *et al.,* 1999; Zulu, 2008). Molnar *et al.,* (2004), estimates that 370 million hectors of forests are under community forestry in Asia, Africa and Latin and North America. Additionally, Wily (2002), estimated that approximately 30 countries in Africa were implementing some form of community forest management (CFM) projects, involving approximately 5000 communities by the year 2000. Most of the projects are mainly donor funded as international financial institutions such as the World Bank, as well as other international donors, have been supporting the promotion of CFM approaches through financial and technical assistance since its inception (Fisher, 2004; Brosius *et al.,* 1998).

Other recent developments that may support CFM initiatives are linked to global climate initiatives, primarily Reducing Emissions from Deforestation and forest Degradation (REDD). As REDD programmes become prominent in global climate change platforms,

CFM initiatives are also being recognized and promoted on the premise that REDD programmes will be effective if they build on already existing forest management structures especially those that reflect the interests of the local community such as CFM initiatives (Brown, 1999; Springate-Baginski and Wollenberg, 2010).

However, successful implementation of community forestry is not prompt, but a gradual process that requires both time and careful considerations of how local communities should be involved or what form of management relationship should be established between the concerned actors (Lawrence, 2007; Ojha *et al.,* 2009; Springate-Baginski *et al.,* 2003). For example, community forestry in Nepal has been presented as a successful model of community-based forest management, with an estimated 1.6 million hectares of forest land entirely under the management of more than 14 000 Community Forest User Groups (GoN, 2007 in Maharjan *et al.,* 2009; Kumar, 2002; Mahapatra, 2000; Ojha *et al.,* 2009). However, the process of shifting the responsibility and powers over forests to local forest user groups (FUG), has been gradual extending over three decades since the late 1970s to mid-1980s[4] (Maharjan *et al.,* 2009; Ojha *et al.,* 2009; Pokharel, 2012). Dougill *et al.,* (2001) highlight that the initial stages of community forestry in Nepal were not well received by local communities, because the operational and management plans had to follow the management models provided by the government which largely focused on protection rather than livelihood improvement. However, through policy dialogues, legislative development, operational innovativeness, stakeholder negotiations and adaptation, community forestry in Nepal has evolved from primarily conservation focused to reconciling conservation and livelihoods goals of forest management (Ojha *et al.,* 2009; Pokharel *et al.,* 2007). Lawrence, (2007) suggests that the evolution of community forestry follows three generations. In the initial or first generation community forestry, attention is given to structural issues such as tenure, protection, regulation, and the introduction of sound management practises; the second generation the focus is on issues such as equity, benefit sharing, and the wider livelihoods impacts particularly moving beyond subsistence to managing for commercial products; and in the third generation community forestry is more focused on learning, silvicultural experimentation and adaptive management (Lawrence, 2007).

[4] The first community forestry programmes in Nepal were launched in the 1970s in an effort to address forest degradation in the Himalayan forest. In 1989, the Master Plan for the Forestry Sector (MPFS), which recognised the need for local participation in the management of the countries forests was, was formally adopted. Other regulatory developments in support of community forestry in Nepal include the enactment of the 1993 the Forest Act and the Forestry Regulations 1995 which guaranteed the rights of local people in forest management (Kumar, 2002; Ojha *et al.,* 2009; Pokharel *et al.,* 2008; Springate-Baginski *et al.,* 1999).

However, to go through these generations, implementation of community forestry management needs legislative change, reflexivity, context specificity and adaptive institutions, partnership and management (Armitage *et al.,* 2008; Lawrence, 2007; Ojha *et al.,* 2009). For example although both Nepal and Tanzania, have been implementing community forestry programmes over two decades and are said to have made progress in legislative development in support of community forestry as well as scaling up, community-based forestry in Tanzania has been said to still be in the first generation, still young and bound to take time to work, whilst that of Nepal has moved to a second generation and thus a model of success (Blomely *et al.,* 2009; Blomely and Iddi, 2009; Brockington, 2007; Gurung *et al.,* 2011; Ojha *et al.,* 2008). Despite good legislative support, one limiting factor in Tanzania's community forestry evolutionary progress is the lack of adaptive institutions and partnership, as reflected in the absence of change in the culture of forestry department bureaucracies (Brockington, 2007; Schreckenberg and Lutrell, 2009).

Following this evolutionary process and adaptiveness, over the years the concept of community forestry has evolved to take different forms, because of the different social, economic and political contexts in which it is implemented, as well as the diversity of actors (e.g. Local communities, Non-Governmental organizations, and Government and Donor agencies) involved in the dynamics of forest management as a whole. Hence, new models of CFM continue to emerge, and are being practiced in a number of countries (Odera, 2009). These include; community forestry; social forestry; participatory forest management; adaptive co-management; co-management and joint management (Table 1.1). These terms represent the different levels or forms of relationships that governments (through the department of forestry) and local people living in and around forest reserves share in the management of forests (Schreckenberg *et al.,* 2006). Furthermore, forms of community forestry do not only differ with time, but also between and within countries. For example, Nepal has at least five forms of community forestry, including leasehold forestry, collaborative forest management, religious forests, buffer zone community forestry and community forestry (Blomely *et al.,* 2009; Ojha and Timsina, 2008). In the same way, in Tanzania, community forestry (formally known as participatory forestry management), is clearly differentiated into two main approaches, joint forestry management (involving state and communities) and community-based forestry management (taking place on village lands and managed by village council) (Blomely *et al.,* 2009; Mustalahti and Lund, 2010). Similarly, in Malawi a number of community based forestry management approaches have emerged since its inception, in 1996, these include social forestry, forest co-management and

community forest management (e.g. Kaarhus *et al.,* 2003; Kayambazinthu and Locke, 2002; Malawi Government, 2007, 2001 and 1996). It is also important to note that similar models are being applied in other sectors of natural resources and environment management including, fisheries, wildlife, water and agriculture (Bene *et al.,* 2009; Mburu, 2004). However, this thesis focuses on forest co-management approaches.

Table 1.1: Assumptions and underlying principles for different expression of CFM

CBFM Terms	Underlying principles	Sources
Community forestry	• Communities as principal proprietors, decision making and beneficiaries • Locals have moral obligation conserve the resources, better understanding of the ecology and knowledge for management	Arnold, 1992; Brosius, 2005; Agrawal, 2001; RAISE, 2001; Hulme and Murphree, 2001
Social Forestry	• Predominantly for welfare function • Designed to meet the forestry-related basic needs of rural people while reducing pressure on natural resources e.g. fuel wood	Arnold, 1992; Hyde and Kohlin, 2000.
Participatory forestry	• Participation of all concerned actors in forestry decisions from policy formulation to field-level execution and back	Warner, 2000; Borrini-Feyerabend *et al.,* 2000; Pierce-Colfer, 2005; Olsen *et al.,* 2001
Adaptive co-management	• Flexible, tailored to specific places and situations; • Share management responsibilities an on-going process of trial and error	Armitage *et al.,* 2008; Folke, 2005; Pierce-Colfer, 2005; Olsson *et al.,* 2004
Co-management or collaborative	• Sharing of power and responsibility between government and local resource users • Depends on the rights and responsibilities granted to local communities in a given situation	Berkes *et al.,* 2004; Buck *et al.,* 2001; Jentoft *et al.,* 1998; Fisher, 1995; Barrow and Murphree, 2001
Joint Forestry management	• State retains control over the partnership (i.e. Forest officers can terminate the arrangement if their guidance is not followed)	Carter and Grown, 2005; Olsen *et al.,* 2001; Castro and Nielsen, 2001

1.2.1 Defining forest co-management

The literature on forest co-management provides a wide range of definitions and descriptions of the co-management concept or approach (Carlsson and Berkes, 2005; Castro and Nielsen, 2001). For example, The World Bank has defined co-management as "the sharing of responsibilities, rights and duties between the primary stakeholders, in particular, local communities and the nation state; the decentralized approach to decision making and management responsibilities of a given resource, that recognises and involves local resource users in the decision making process as equals with the state" (World Bank, 1999). Borrini-Feyerabend *et al.,* (2000) define co-management as a situation in which two or more social actors negotiate, define, and agree amongst themselves to equitably share the management functions, entitlements, and responsibilities for a given territory or set of natural resources. According to Sen and Nielsen (1996) "co-management is an arrangement where responsibility for resource management is shared between the government and user groups". While, Jentoft *et al.,* (1998) defines it as "the collaborative and participatory process of decision-making among representatives of user groups, government agencies and research institutions over a natural resource. Singleton (2000) defines co-management as a hybrid management approach combining centralized and decentralized regimes and successful where state and local communities alone have failed. However, key to all the definitions is that, in co-management, local communities living in and around government forest reserves are regarded as co-managers, with rights to manage and utilize the forest through the signing of co-management agreements with the government (Wily, 1998). As such actors in co-management are expected to complement each other's strengths and mitigate each other's weaknesses. Furthermore, unlike other community management approaches, co-management recognises the fact that government has an on-going involvement in the management the forest, to facilitate protection of the forest's public services e.g. carbon sequestration and (Oyono, 2004).

However Carlsson and Berkes (2005) and Agrawal (1997) argue that these definitions are limited because they do not reflect the complexities of communities and governments involved in the co-management agreement. They suggest that, in practice, the application of co-management agreements may be complicated, since it may involve multiple government agencies and local stakeholders with multiple and varying interests in the management. Therefore, although the definitions share common ground, co-management's applicability

and effectiveness may vary depending on who is involved, promoting it and even funding the programme (Castro and Nielsen, 2001).

1.2.2 Why co-management

Co-management approaches are appealing because in principle, they link the concerns of conservationists, social scientists, and policy implementers (Barrett *et al.,* 2001; Borrini-Feyerabend *et al.,* 2000; Kellert *et al.,* 2000). Ecologically, the approach is advanced as a means to achieve effective biodiversity protection and conservation (Borrini-Feyerabend *et al.,* 2000; Kellert *et al.,* 2000), whilst social scientists perceive the approach as a means to achieve social justice and livelihood goals for forest-dependent local residents who tend to be socioeconomically marginalized in most countries (Schwartzman and Zimmerman, *et al.,* 2005; Western and Wright, 1994). Therefore, co-management approaches are said to have the potential to address forest conservation issues without compromising on local communities' ability to meet their current and future basic needs from the forests. Furthermore, given the diverse and global ecosystem services derived from forests, co-management has the potential to balance local and broader interests in forest management, as it involves both the local communities to represents local interests and government which represents and protects public interests in the forests. This balanced scenario would otherwise be difficult to achieve, in cases where management involves either state or community member only.

Proponents of forest co-management suggest that involvement of local communities will foster more sustainable forest management than would pure state management, because; 1) their proximity to the resource gives them a comparative advantage in monitoring resource use; 2) they are more knowledgeable of the local environment, which is relevant in designing and implementing management strategies and; 3), they have a vested interest in the long term maintenance of the forest, as their livelihoods depend on it (Bene *et al.,* 2009; Brown, 1999). Since forest co-management allows for local users to formulate rules and regulations for resource management and use that are locally acceptable (Coulabaly-Lingani *et al.,* 2011), they are therefore assumed more effective than state management as national governments are often unable to formulate general rules and regulations to govern the management of common-pool resources applicable across communities (Ostrom, 1999). Furthermore, the approach is considered to be a democratic approach to governance and management of forest resources, since it aims at empowering local communities to make forest management and utilization decisions (Bene *et al.,* 2009; Nielsen *et al.,* 2004; Nygren, 2004). However, other scholars have shown that promotion of forest co-management approaches (and community

management approaches in general) on the basis that locals are better than centralized management is risky as not all communities are interested in conservation, neither are they necessarily interested in the long term sustainability of the forests nor the global benefit and service of forests (Bradshaw, 2003; Tacconi, 2007). Furthermore, some communities may perceive deforestation to be of more benefit to their livelihoods than perceived future benefits of conservation (Tacconi, 2007). For example, removing forests may pave the way for other profitable use of land such as housing, agricultural production, and provide off-farm income through timber and firewood sales. In such cases, some local people may perceive and react to the management and utilization rights given to them through the co-management programme as an opening for exploitation thus, resulting in greater forest loss than state management (Sunderlin *et al.,* 2005).

Co-management approaches aim to secure resource rights, enhance social justice and facilitate equity in benefit distribution for the traditionally marginalized community groups e.g. women and youth (Coulabaly-Lingani *et al.,* 2011; Castro and Nielsen, 2001). Hence they can potentially improve the resource and benefit flows to the poor and further open up new livelihood opportunities for vulnerable community members (Bene *et al.,* 2009; Yavad *et al.,* 2003). Furthermore, Brown (1999) suggests that involving local communities and institutions in forest management may enhance government's accountability in management and regulation of the forest sector therefore reducing negative social impacts of conservation, and improving the capacity of managers and land users to conserve the resource and meet livelihoods and social goals efficiently (Lane, 2001). In this regard, policy-makers and development specialists in most developing countries do not only view forest co-management approaches as a way for improving forest conditions and resource base, but also as a means for alleviating poverty (Kellert *et al.,* 2000). However, Agarwal (1997) points out that in regions and communities where local traditions such as social hierarchies (e.g. caste systems, gender) are strong, forest co-management approaches may result in further alienation of the marginalised groups, instead of achieving social justice and equitable benefit distribution among community members.

Co-management approaches aim to reduce conflict and develop partnership and trust between local communities and governments, which could benefit sustainable management of the forests. However, Castro and Nielsen (2001) highlight that co-management approaches may at times result in more conflicts than state management, because of the difference in interests of the stakeholders. Additionally, apart from conflicts between stakeholders, stakeholders may face internal conflicts as they try to adjust to their new roles. For example,

the forest department staff may face a number of internal conflicts as they adjust from being implementers to being facilitators (Shahbaz, 2009). Furthermore, a key factor in co-management is the development of a partnership between local communities and government's forest staff to manage forests sustainably based on friendly relationship and trust (Shahbaz, 2009). However, the process of developing trust and friendly relationships between state and communities in a co-management programme is rather complex and problematic, due to the earlier forest management approaches where forest staff viewed local communities as enemies of the forest and conservation and consequently communities viewed state forest staff as police (e.g. Brockington, 2007; Schreckenberg and Lutrell, 2009; Gowero, 2003).Therefore, co-management effectiveness in achieving sustainable forest management cannot be guaranteed by just the act of transformation of the management from state to multiple stakeholder co-management approach (Nygren, 2004).

1.3 Rationale of the Study

A number of studies have evaluated and reviewed the effectiveness of forest co-management programmes in forest conservation and local communities livelihood goals (e.g. Tole, 2010; Singh and Pandey, 2010; Mansuri and Rao, 2004; Agrawal, 2001; Kayambazinthu and Lockey, 2002; Kellert *et al.*, 2000). On one hand, some reviews have shown that some forest co-management projects have led to the improvement of both forest conditions and livelihoods of the rural population, hence categorised as successful (e.g. Jumbe and Angelsen, 2006; Gautam *et al.,* 2004; Yadav *et al.,* 2003), while others have shown that some forest co-management initiatives fail to achieve their goals (e.g. Blakie, 2006; Kellert *et al.,* 2000). Therefore, even though forest co-management approaches are receiving huge support from governments, donors and even international financial institutions, there is limited conclusive evidence base on the effectiveness of forest co-management approaches in reconciling the multiple stakeholders' interest in forest management and achieve sustainable management with respect to; forest conservation, improving community livelihoods and welfare standards and transfer of power and responsibilities to local actors (Bowler *et al.,* 2012 and 2010).

Lack of universal criteria and indicators for measuring the success or failure of forest co-management initiatives has been highlighted as one of the potential causes of the mixed reports on the success of the initiatives (Pagdee *et al.,* 2006). Co-management involves diverse actors with varying goals, interest, expectations and perspectives on the programmes,

therefore concepts, perceptions and interpretation of what constitutes a successful forest co-management programme can be different from one researcher to another, and among the different actors involved in the programmes (Castro and Nielsen, 2001; Pagdee *et al.*, 2006), therefore, without universal indicators these differences may contribute to the mixed reports on impacts (success and failure) of the forest co-management initiatives. Therefore, although it would be impossible to generalise how different actors define and measure success of the programme at a larger scale (global or national), understanding how different actors at programme or project level, understand and define criteria for measuring success of the programme is crucial in designing and implementing programmes that meet both conservation objectives and community development goals (Fraser *et al.,* 2006; O'Hara, 2002). Furthermore, following two to three decades of implementation, community forest management programmes should be designed and implemented in such a way that keeps communities at the centre of forest management and more responsive to local situations (Menzies, 2002; Thin and Gardingen, 2003). Therefore, understanding how local communities understand co-management and define criteria for measuring success of the programme could contribute to the design and implementation of programmes that are local community centred and responsive to local situations. Additionally, understanding how local communities define criteria for measuring success of the programme could contribute to the design and implementation of programmes of impact assessment studies, reviews and evidence based studies, such that the outcomes of the studies reflect forest co-management programme aspects that are relevant to both the local community (who are usually the target population), and policy makers. However, few studies have identified what different actors in a forest co-management programme perceive as criteria for measuring success or failure of the programme, and even less at community or local level. Therefore, there is still a lack of information on how local actors participating in forest co-management projects understand and define the criteria for measuring its success or failure (Pagdee *et al.*, 2006; Agrawal, 2001). Hence this study explores how different local actors involved in forest co-management programme define and understand forest co-management programmes.

Co-management as a decentralized approach has both intrinsic and instrumental values (Anderson, 2000). Thus co-management could be *an end in itself*, by achieving the decentralization process (Anderson, 2000; Buchy and Hoverman, 2000) and *a means to an end*, by achieving improved livelihoods and forest conditions. Co-management approaches are considered as decentralized approaches because they aim to devolve both management

responsibilities and powers to local institutions (Agrawal and Ribot, 1999). However, studies by Bene *et al.,* (2009); Blaikie (2006); Platteau, (2004); and Shackleton *et al.,* (2002), suggest that most forest co-management programmes rarely achieve true decentralization, as governments only devolve responsibilities and not powers. As such, it would be misleading to classify and assess such programmes as a co-management programme, when it has not achieved nor aimed to achieve decentralization (Jere *et al.,* 2000). Therefore, assessment of process outcomes, (i.e. whether decentralization has occurred or not), should be part of forest co-management impact assessments studies. However, few forest co-management assessment studies include the process outcomes as part of the overall impact assessment study, therefore resulting in the misinterpretation of the assessment results with regard to whether the overall programme is a success or failure (Jere *et al.,* 2000). Thus in order to assess if co-management can reconcile community interest and forest conservation goal, this study also evaluates if forest co-management can achieve devolution.

A number of studies have assessed the impact of co-management approaches on forest conditions (e.g. Blomley *et al.,* 2008; Phiri *et al.,* 2012; Yadav *et al.,* 2003). However, the evidence based systematic review by Bowler *et al.,* (2010) suggests that the evidence base for co-management impacts on forest conditions still remains very weak. Research designs or methods may influence the outcomes and validity of the impact assessment study and consequently the conclusions drawn from the study**.** Before-after, control-intervention designs (BACI) are considered reliable in ecological or natural resources impact assessment studies (Baker, 2000; Shrestha and Mcmanus, 2008). However, baseline data on forest conditions (before project) of most forest co-management projects are usually not available thus there are few before-after studies currently (Bowler *et al.,* 2012; Shrestha and Mcmanus, 2008). Furthermore, there are few studies that have been done with a treatment and control and often they rely on qualitative data taken from the interviews and group discussions (Bowler *et al.,* 2012 and 2010; Shrestha and Mcmanus, 2008). Qualitative data are important as they provide information on communities' experience, opinions, perceptions and knowledge on issues related to social, economic and institutional aspects, of the programme and also give insights on the process measures of a programme (Patton, 2002; Chambers, 1994). However, using qualitative methods alone in assessing the impacts of co-management approach on forest conditions could produce inadequate information and thus limit the validity of the study's results and conclusions (Murali *et al.,* 2002). Hence, one significant limitation to forest co-management impact studies so far is that they lack validity to sufficiently attribute the observed changes or said achievement to the programme and

programmes activities (Bowler *et al.,* 2010 and 2012; Lund *et al.,* 2010; Shrestha and Mcmanus, 2008). Use of methods triangulation and multiple data types, has been proposed to give a more robust impact assessment, in the absence of historical data (Pandit and Bevilacqua, 2011). However few studies have used multiple data types or methods in assessing the impacts of forest co-management approaches (Lund *et al.,* 2010). Therefore, there is still need for empirical evidence to quantify the impact of forest co-management initiatives on forest conditions (Boyd *et al.,* 2007). Hence this study uses multiple data types to further evaluate the impact of co-management approach on forest conditions.

Although the literature on forest co-management emphasises that the approach has the potential to improve local communities' livelihood and welfare, Bowler *et al., (*2010 and 2012), suggest that there is insufficient evidence to suggest that forest co-management programmes have improved rural livelihoods and welfare. Furthermore, Islam and Sato, (2012), claim that very few forest management impact evaluation studies evaluate the programmes' livelihoods and welfare impacts as the majority of studies focus on the forest conservation aspect of the programme. Therefore, the livelihoods and welfare benefits of forest co-management remain unclear (Bowler *et al.,* 2010, 2012; Gobeze *et al.,* 2009; Vedeld, *et al.,* 2007; Wily, 2001; Zulu, 2008). A few studies (e.g. Chikwuone and Okorji, 2008; Kohlin *et al.,* 2001; Mekonnen, 2000) have assessed the welfare benefits that communities have accrued from co-management programmes, using stated preference techniques. However, using stated preference techniques only does not always provide an explicit indication of what a household has actually gained (Bateman *et al.,* 2002; Pouta and Rekola, 2001; Mitchell and Carson 1989; Whittington, 1996). Hence the need for method triangulation, which could allow for a more comprehensive assessment of co-management livelihood and welfare, impacts (Hanemann, 1994). However, none of the studies reviewed in this study have applied any method triangulation in assessing the livelihoods and welfare benefits of forest co-management approaches. Therefore, there is still need for empirical evidence to quantify the livelihoods and welfare benefits of forest co-management approaches. Thus this study assesses the current livelihood impacts of the forest co-management programmes.

This study differs from other forest co-management studies as the study uses the local people's perspectives to evaluate the effectiveness of forest co-management. Furthermore, this study assesses both the processes (decentralization) and impact outcomes of a co-management programme, which are rarely, combined in quantitative research studies. Addressing both the process and impact aspects together gives a broader insight for designing

appropriate strategies, policies, programmes and other incentives that will facilitate the effective and efficient implementation of forest co-management programmes. Additionally I use methods triangulation, including a multiple-site, plot-based, control-intervention forest survey and community perceptions of forest condition change over time, a robust assessment of impacts of forest co-management on forest conditions in the common situation where baseline data is lacking. Furthermore, I use the sustainable livelihood framework (DFID, 2001) and stated preference techniques-contingent valuation, to analyse the value of welfare benefits and the value that communities attach to forest co-management programme, as compared to state management. Although forest co-management approaches may vary with locations, and may be affected by different environmental, social, cultural, economic and political factors, the underlying principle and policy goals are similar. Hence, the findings from this study are likely to be highly pertinent to other co-management projects as well as to other forms of CBFM initiatives at regional as well as global level.

1.4 Research Objective and questions

1.4.1 Overall study objective

The overall objective of this study is to evaluate whether co-management programmes can reconcile local communities interests in forests and forest conservation goals.

1.4.2. Research questions

The following research questions are addressed in successive chapters:

1. How do different local actors participating in a co-management programme understand, define and measure the success of the initiative?
2. Can co-management of government forest reserves achieve true decentralization?
3. How effective is the forest co-management programme in improving forest conditions?
4. What are the livelihood impacts and welfare benefits of forest co-management among communities participating in the programme?

1.5 Malawi as a case study site

Many countries in Africa (including Tanzania, Sudan, Ethiopia, Kenya, Uganda, Zimbabwe, Malawi, Cameroon, Niger, Nigeria, Gambia, Ghana, Mali and South Africa) are currently promoting and implementing some form of community forestry management programmes (Wily, 2002; Wily and Dewees, 2001). However, although formalised community forestry has been present in some form for over two decades in Africa, many countries in southern and eastern Africa are still in the early stages of developing and enacting policies and legislation to support expansion and implementation of community forest management programmes (Mustalahti and Lund, 2010). For example, countries such as Kenya and Uganda have just recently (i.e. early to mid-2000s), formally permitted participatory forest management[5] (Matiku *et al.,* 2013; Schreckenberg and Lutrell, 2009). Therefore, Malawi, which began the process in 1996, is a good model for what the future may hold for many other countries in Africa who are in the early stages of developing and enacting policies and legislation and the implementation of community forest management programmes.

Community forestry approaches have been said to have the potential to reduce forest degradation and improve rural livelihoods (e.g. (Bowler *et al.,* 2012 and 2010; Gautam *et al.,* 2004; Gibson and Mark, 1995; Negendra, 2007; Persha *et al.,* 2011; Western and Wright, 1994; Yadav *et al.,* 2003; Schreckenberg *et al.,* 2006) and reducing degradation of forests, improving rural livelihoods and enhancing decentralized governance of forest resources are some of the motivating factors behind the implementation of community forestry in most African as well as Asian countries. For example, Springate-Baginski *et al.,* (2003) and Thoms *et al.,* (2003) have highlighted that community forestry in Nepal and India was initially conceived to reverse degradation and poverty alleviation was a further motivation in their progressive development and evolution. Similarly, community forestry in Malawi (Malawi Government, 2007; Malawi Government, 1996), Tanzania (Blomely and Ramadhani, 2006; Blomely *et al.,* 2008; Wily, 1998), Kenya (Matiku *et al.,* 2013) and Uganda (Buyinza and Nabalegwa, 2007), is also promoted in order to combat degradation of forests and improve livelihoods of rural communities living in and around forest areas. Malawi is one of the

[5] The Kenyan forest act, allowing community members around forests areas to participate in conservation and management of state or local authority managed forest was developed and enacted in 2005 (Matiku *et al.,* 2013). And in Uganda, the forestry policy advocating for the participation of local communities in forest management on government, customary and private land was enacted in 2001 (Buyinza and Nabalegwa, 2007).

poorest countries in Africa and the world; ranking 171st out of 187 countries in the United Nations human development index, 2011(UNDP, 2011). Furthermore, Malawi has the highest population density in Africa, with an estimated growth rate of 2.8 % per year, and; is one of the most highly deforested countries in southern Africa with a deforestation rate of 2.8% (UNDP, 2011; FAO, 2001; Jere, 2008; NSO, 2008). Similarly, there is ongoing population growth and deforestation in many of the sub-Saharan African countries, including Mozambique (Sitoe *et al.*, 2011), and Madagascar (Clack, 2012) therefore, Malawi could be a good model of what the future may hold for many other countries in Africa. Furthermore, since, most African countries have, like Malawi, moved or are just moving from centralized system to decentralized system of forest governance, the operational experiences from Malawi with regards to devolution of authority and processes in a forest co-management programme (Chapter 4) could be of significance in the promotion and implementation of decentralized forest management approaches (including co-management) in other countries in Africa.

Methods may influence the results and consequently the conclusions drawn from the study**.** Studies on outcomes of and impact of community forestry management programmes in Malawi have been done on one site, without a control (Non CFM sites), and also without temporal changes in the measured factors, therefore lacking the sufficient evidence that would enable one to conclude that the observed changes in forest condition or improvement of local communities livelihoods in the studied areas are as a result of implementing community forestry management programmes. Outside Malawi, few quantitative studies have assessed the impact of forest co-management approaches using site comparison designs (Bowler *et al.*, 2012; Shrestha and Mcmanus, 2008). The lack of before and after comparison designs and site comparison studies is further exacerbated by lack of integration of a research as a key component of co-management programmes. However, the forest co-management programme evaluated in this study (the Improved Forest Management for Sustainable Livelihoods Programme-IFMSLP), is being implemented in phases. Hence, at the time of the study some forest blocks in each forest reserve (i.e. Ntchisi and Zomba-Malosa forest reserves) were under co-management and other were still under state control. This allowed me to design a multiple-site, comparative control-impact (CI) study for a more robust assessment of the impacts of co-management on forest conditions than would otherwise be impossible. Therefore, given the paucity of empirical evidence on co-management, and the rarity of baseline data, this study using the case of Malawi makes useful empirical and

methodological contributions towards the evidence base of forest co-management impacts on forest conditions.

1.6 Thesis organization

This thesis has been organized in four major sections (Figure 1.1). The second section (Chapter 2) gives background on forest status and forest co-management in Malawi, the forest co-management programme under study, description of the study area and general research methods employed for the study. The third section comprises of four empirical chapters addressing the four research question highlighted above. Chapter 3 uses a mixed methods approach to identify how local communities understand and define forest co-management programme from the local perspective, and explores what socio-economic factors influence householders' perceived understanding of forest co-management programme. Chapter 4 adapts the decentralization framework developed by Agrawal and Ribot, (1999) to determine whether the committee-led forest co-management programme of government forest reserves has achieved devolution. Both qualitative and quantitative approaches are used to elicit community perceptions with regards; a) to whom are the rights, powers and responsibilities devolved; b) to what extent are local communities and representatives empowered to influence decisions and access benefits and; c) to whom are the actors who have acquired responsibilities accountable. In Chapter 5, a multiple-site, plot-based, control-intervention design is used to assess the impact of co-management on forest conditions and to identify processes, such as the level of human activities that may predict the potential direction or trend of impact of co-management programme on forest conditions. Furthermore, local community's perceptions on the status of the forest before and after the management programme was implemented are sought. In Chapter 6, the sustainable livelihood framework (DFID, 2001) is adopted to assess the current livelihood impacts of forest co-management programme and perceived welfare benefits among participating communities are estimated using stated preference techniques (contingent valuation method). The fourth section (Chapter 7) presents a synthesis of all the study results, a summary of the studies key findings, policy recommendations and suggested areas for further research are presented in the final section.

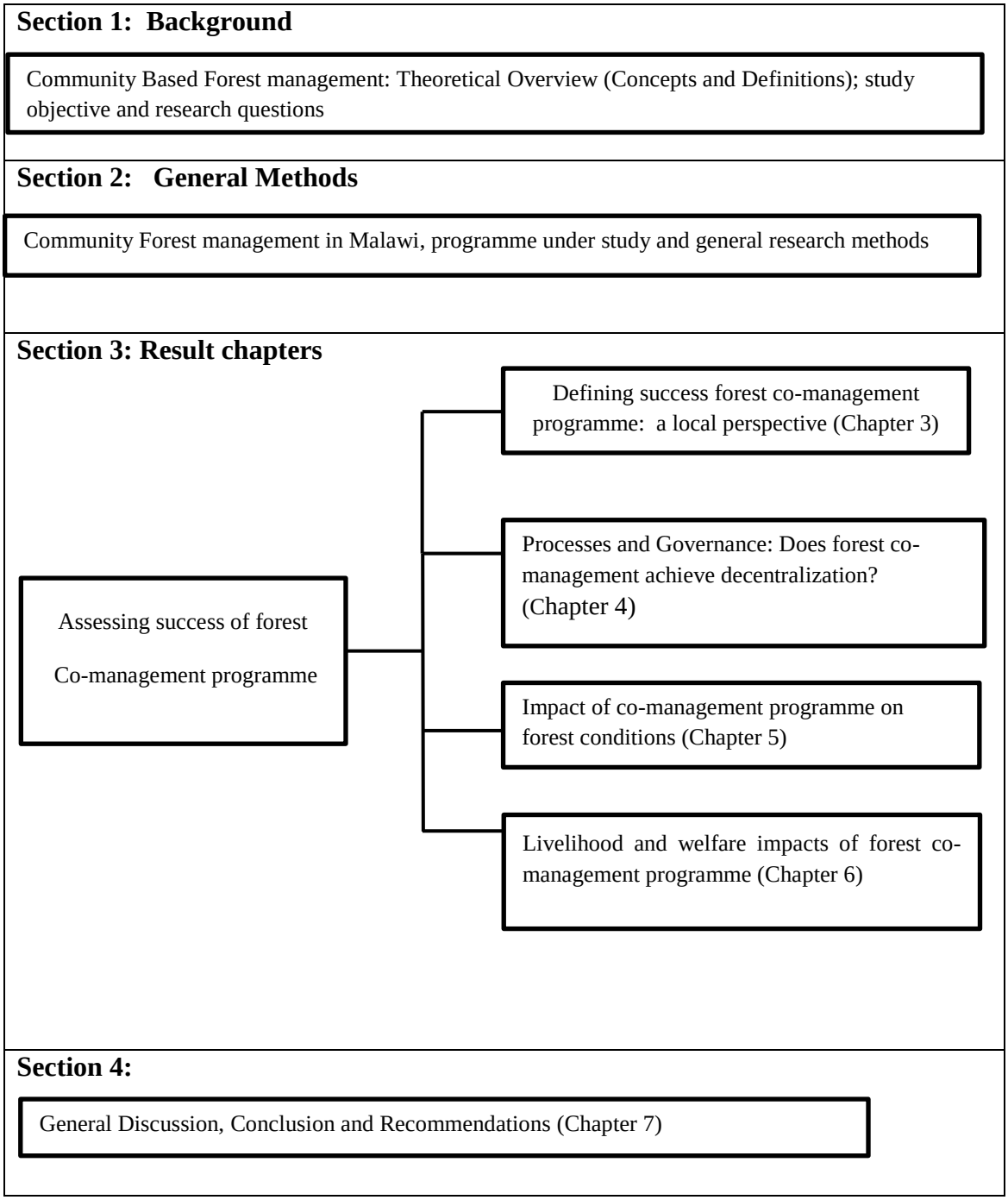

Figure 1.1: Thesis organization

CHAPTER 2: MALAWI FORESTRY SECTOR, STUDY AREA AND GENERAL METHODS

2.1 Forest resources and forestry sector in Malawi

Forests in Malawi are estimated to cover approximately 28% of the total land area, mostly located in upland hilly areas and the rift valley escarpment (Malawi Government, 2010). Natural forests are mainly of miombo woodlands dominated by *Brachystegia* species (Campbell *et al.,* 1996). Forests are unevenly distributed with the northern region of Malawi being the most forested (Table 2.1), and experiencing the lowest pressure for clearance**.** This is because the northern region is estimated to have the lowest population density in the country[6]; hence, although shifting cultivation still exists in the region, supply of land exceeds demand (Malawi Government, 2010 and 1998). The Central region has 39 % of the population and 30 % of forest cover. In the Southern region where half the population lives, there is little forest cover left.

Table 2.1: Distribution of forest cover (in square kilometre) and population density across geographical regions in Malawi

Region	Total land area (Km^2)	Total forest cover	Population density per Km^2 (2008)
North	26,931	11,231	63
Central	35,592	7,374	154
South	31,753	7,823	185
Country total	94,276	26,428	139

Source: *2008 National statistics, Malawi Government (2008).*

[6] The northern region has a population density of approximately 63 people per square kilometre (2008 National statistics), as compared to 154 and 185 people per square kilometre in the central and southern region, respectively (Malawi Government 2008).

Land tenure is one of the principal factors affecting the way in which forest resources are managed and the manner in which forest benefits are shared (Meinzen-Dick and Knox, 1999; Mwase *et al.,* 2007). The land policy in Malawi recognizes three land ownership categories namely public land, private land and customary land (Dickerman and Bloch, 1991). Public land comprises land acquired and owned by government, and this includes land gazetted for use as forest reserves, national parks, recreation areas, conservation areas and historic and cultural sites. Private land is exclusively owned, held or occupied under freehold or leasehold tenure for a clearly defined individual, community, corporation, clan or family. The third tenure system is customary land which encompasses all land falling within the jurisdiction of recognized traditional authorities and access and user rights are granted according to the customary laws.

Forest cover on customary land accounts for approximately, 47% of total forest cover (FAO, 2000). However, it is estimated that about two thirds of the forests on customary lands are heavily degraded due to human settlement and agricultural activities (Kayambazinthu and Locke, 2002; Malawi Government, 1998). Approximately 49% of the forests are on government public land (*i.e.* forest reserves, national parks and game reserves). Forest reserves are managed by the state and no human settlement is permitted, but licensed harvesting of forest products is possible under strict control. Private or leasehold land comprises 4% of forest cover, and they are mostly under estates involved in commercial farming of tobacco, tea and coffee (Malawi Government, 1998). The rights to access and use of private forest belong to clearly defined individuals (i.e. individual, community, corporation, clan or family), access to and use of forest products by local communities living around the private forest is limited and strictly regulated (Mwase *et al.,* 2007). Furthermore, since the trees on private forests are raised for a specified use (e.g. poles), to increase productivity, management practices such as thinning, pruning, firebreak maintenance and controlled early burning are generally adhered to (Mwase *et al.,* 2007).

Forests contribute to Malawi's economy and the local population's welfare through the provision of employment, foreign exchange, food and other environmental benefits. It is estimated that the forestry sector in Malawi employs more than 9,000 people in the formal sector and about 20,000 in the informal sector, mainly in carpentry and pit sawing and approximately 130,000 more jobs in wood fuel supply (World Trade Organization-WTO, 2010; Yaron *et al.,* 2010). However, the less commercialized and at times illegal forest

related trades[7] dominate; hence the forestry sector's true contribution to Gross Domestic product (GDP) is understated in official statistics (FAO, 1997 in Yaron *et al.*, 2010). Yaron *et al.*, (2010) further claim that where they are included in official statistics, the values tend to be understated (Table 2.2). Furthermore, in rural areas, natural forests are also valued as cultural and ritual symbols as well as a symbol of status among community members (Kayambazinthu and Locke, 2002).

Table 2.2: Sector contribution to Malawi Gross Domestic product (GDP)

Sector	% contribution to GDP
Agriculture	36.0
Industry	19.8
Manufacturing	12.0
Fisheries	4.0
Tourism	5.8
Mining	3.0
Forestry	***1.8***
Other service	17.6

Notes: (Gross domestic product (GDP) = 4.7 billion US$; Gross National Income (GNI) =2.3. billion US$ and GDP growth rate is at 7.6%)

Source: *World Travel and Tourism Council -WTTC, 2001; World Trade Organization-WTO Malawi country report, 2010, (Biomass Energy Strategy- Malawi) BEST-Malawi, 2009.*

However, with an annual national deforestation rate estimated at 2.8%, supporting and sustaining forest based economies and livelihoods is increasingly becoming a challenge for Malawi (Chiotha and Kayambazinthu, 2009; Dewees, 1994). Walker and Peters, (2001) argue that deforestation rates have accelerated after political democratisation (1994), as the majority of citizens perceived 'democracy' to mean; 1) overthrowing of all confining rules of the old regime and unpopular forest management regulations, and; 2) a reduction in state enforcement capacities. Deforestation in Malawi has also been attributed to: increased

[7] Charcoal and firewood sales are the dominant forest related trades; however they are largely carried out illegally (Yaron *et al.,,* 2010).

subsistence agriculture and substantial expansion in commercial estates farming; over-dependence on forest resources for livelihoods, and; population growth and increased poverty levels (Malawi Government, 1998; Eschweiler, 1993). Heavy reliance on agriculture coupled with a high population growth rate (2.7 % per year)[8] has resulted in increased pressure on the nation's forests, as smallholder farmers often have little option, but to clear forests and grow food crops (primarily maize, the country's staple). Additionally, forests are cleared to provide fuel for processing and curing of tobacco, the country's primary foreign exchange earner[9]. Therefore as the agricultural land area is continuously increasing, forested areas are continually declining (Figure 2.1).

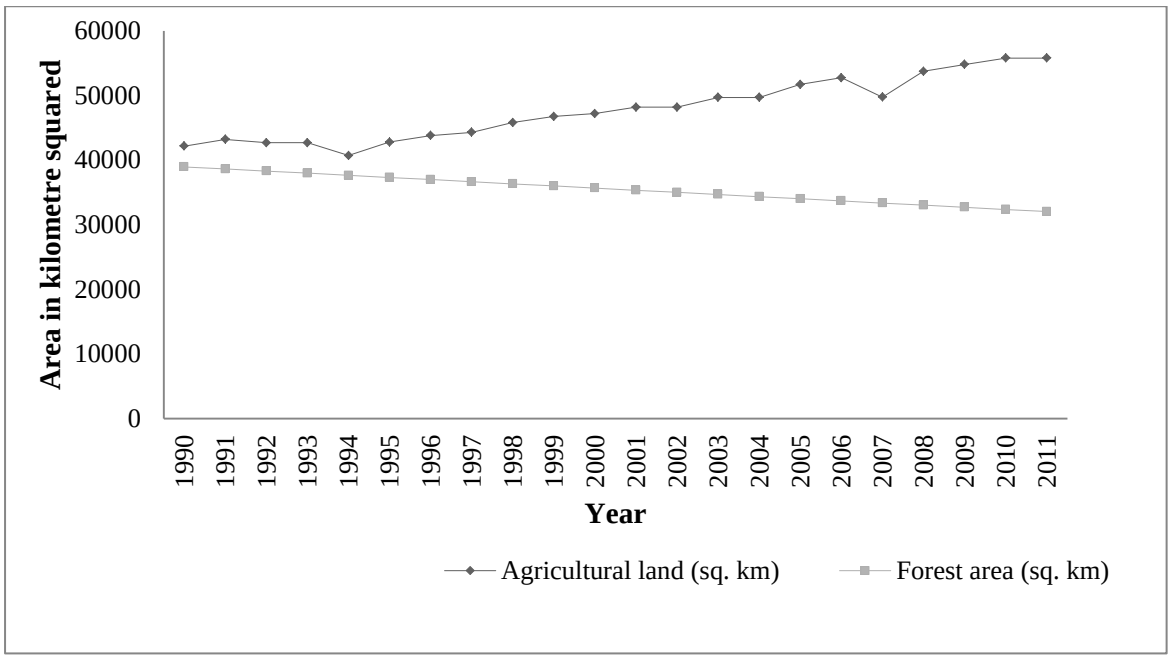

Figure 2.1: Trend in forest and agriculture land areas (in square kilometres), in Malawi. *(Source: World Bank-http://data.worldbank.org/country/Malawi www.tradingeconomics, 2013)*

Intensive extraction of wood to support approximately 90% of the country's total energy needs is also another factor contributing to the decline of Malawi's forests (Fisher and Shively, 2005). Absence of electricity and alternative low cost energy sources in rural Malawi makes firewood the only or most viable energy option (Brouwer, 1998). Furthermore, even households in urban areas tend to use wood fuels (charcoal and firewood) for their domestic energy needs since high taxes on paraffin and electricity, coupled with low incomes levels, makes the use of paraffin and electricity unaffordable (Malawi Government,

[8] Malawi's annual population growth rate is estimated at 2.7 % (National statistics-NSO, 2008).
[9] Tobacco accounts for approximately 80% of the country's export earnings (National statistics-NSO, 2008).

1998). Therefore, throughout Malawi, alternative sources of energy such as electricity and kerosene are not accessible or beyond the financial reach of a majority of the population (Walker and Peters 2001). However, the productivity of miombo woodlands is insufficient to meet the current levels of demand for wood; thus wood harvest rates far exceed sustainable yield (Dewees, 1994; Fisher, 2004). As such, Malawi is reported to be paying a high price for unsustainable natural resource use with an estimated cost of 191 million USD annually, which is equivalent to a loss of up 5.3% of GDP each year (Yaron *et al.,* 2010). However, the trend in deforestation rates has shown a slight decrease in the recent years; from 3.6 % in 1990 to 2.8% in 2006 (Jere, 2008). This could either mean that the forest management systems are improving or the value of clearing forests is declining as the remaining forest is restricted to the least productive lands (steep hills and rocky areas).

2.2 Forest management in Malawi

Malawi has had a long history of controlling and managing forest resources through state mechanisms: to date Malawi has attempted seven main forest management regimes (Zulu, 2008). These are (1) traditional management, with local leaders having overall control of the management and utilization of the resources (abolished in 1891); (2) centralized colonial, 1891–1964; (3) decentralized (district) postcolonial, 1964–1985; (4) centralized postcolonial, 1985–1996 (ongoing in some forest reserves); (5) private ownership and management (from 1965 and continuing); (6) state and community (co management approach), since 1996; and (7) community forest management for customary forest from 1996) (Zulu 2008; Malawi Government, 1996).

In the pre-colonial era, access to and management of forest resources was governed by traditional leaders (village chiefs). However, traditional management systems were abolished in 1891, following which in the mid-1920s forest areas were gazetted as protected areas; to be managed by the central colonial government through its structures e.g. district forest officers, field officers, and forest guards (Kayambazinthu, 2000). The centralized forest management system was characterised by limited and controlled access to forest and forest resources by local communities who depended on the resources for livelihoods, hence resulting in increased conflict between government staff and local communities (Chiumia, 2003). Furthermore, enforcement of the state management rules and regulations (e.g. policing and patrolling for illegal entry and harvesting) was constrained due to limited human and financial resources. Therefore, although forest reserves were under state management,

unsustainable exploitation, increased deforestation and environmental degradation still occurred (Gowero *et al.*, 2003).

Recognizing that social and economic development cannot subsist on a dwindling natural resource base, the Malawi Government decided to revive community forest management approaches following the 1992 United Nations Earth Summit in Rio de Janeiro, where it was agreed that participatory approaches should be considered in rural development and environmental strategies. Following the summit, the Malawi Government formulated the National Forestry Policy (1996) and Forestry Act (1997). In addition to the forest policy and forest act, the government also developed the National Forestry Programme (NFP) (2001), to provide a framework of priorities and actions for improving the management of forest goods and services and for strengthening their contribution to livelihoods and the rural economy.

The forestry policy and act recognise local communities as partners in forest management, with rights to share in the cost and benefits of forest resources management and all other natural resources (Malawi Government, 1996). Furthermore, the forestry policy promotes community forest management as a means for sustainable utilization and conservation of forest resources and reduction of poverty (Meyers *et al*, 2001, Nguluwe *et al.*, 1999). By involving different local communities in the management and utilization of forest resources, community based forest management tries to re-establish some traditional management tools that colonial and central management control regimes severed (Mazur and Stakhanov, 2008). It further contributes to the improvement of rural livelihoods by providing them with the right to access and use forest and forest resources, since forest resources are an important part of the rural livelihoods, development and economy in Malawi (Kayambazinth, 2000). Therefore, the Government of Malawi considers the shift of forest management from state control to co-management as an important part of the country's poverty reduction and rural development agenda (Malawi Government, 2002).

The community forest management approaches are focused on both forest areas under customary control/ownership as well as government owned forest reserves. In customary areas, the programmes are locally known as community based forest management-CBFM programmes (Malawi Government, 2001 and 1996; Kayambazinthu and Locke, 2002). Therefore, through the CBFM programmes, government supports communities by promoting and facilitating production of trees on customary land through the establishment of woodlots and plantations, and provision of extension advice on forest management, tree production and

forest-based commercial enterprise to the communities (Malawi Government, 2001). At community level, activities of CBFM programme are co-ordinated by Village Natural Resources Committee (VNRMC) or Village Forest Committee (VFC). The committees comprise of local representatives elected by fellow community members, to act as a point of contact between the forest extension workers or other government and non-governmental officials and the communities (Malawi Government, 2001). Thus, members of the Village Natural Resources Committee or Village Forest Committee must also be willing to take on the lead role in forest planning, management and administration, development of bylaws for governing their forest management activities and to participate in training and train fellow community members in forest management.

However, since tenure rights to forest reserves are/were entirely held by the government, for community forest management programmes to be implemented in reserves the government enters into agreements with surrounding communities to share both costs and benefits of management of Forest Reserves. This arrangement is known as joint forest management or forest co-management. Before the start of the programme, rights and obligations for each actor or stakeholder (i.e. government and community) are clearly defined and stipulated in a contract agreement. These rights and obligations include, who can access the forest, conditions on the sharing of revenue between government and the community, and the types of forest products that can be legally collected from the forest reserves (Malawi Government, 1996 and 2001). The role of government is mainly to provide guidance, and training to local communities in forest management (Malawi Government, 1996). Although, participation in the programmes is voluntary, households living within the participating communities are thus expected to abide to the local bylaws, and participate in implementing forest management activities (e.g. boundary marking, firebreak maintenance, controlled early burning, firefighting, and supervised harvesting), and attend meetings and patrol to monitor illegal activities. The activities are mostly implemented during the dry season (July-October) when demand for agricultural labour is low and when forest reserves become more susceptible to wild fires. In return, the programme legitimizes participants' access and use of forest reserves as per the co-management contract agreement (Kayambazinthu, 2000). At community level, the implementation of forest co-management programmes is at block level and its activities are co-ordinated by a block management committee (detailed in sections 2.3.2 and 2.3.3 below).

Since 1996, a number of community forest management projects have been initiated in a number of communities surrounding forest reserves in the country, through donor and government support. The pilot projects for community forest management in Malawi were launched in 1996 in Chimaliro and Liwonde forest reserves with support from the World Bank and the United Kingdom's Department for International Development (Mayers *et al.,* 2001). Chimaliro and Liwonde forest reserves are located in the central/Northern and Southern regions of Malawi, respectively. Another project was launched in Blantyre, the Blantyre City Fuel wood Project with support from The Norwegian Agency for Development Cooperation from the years 1997 to 2003. Unlike Chimaliro and Liwonde forest reserves which are of natural miombo woodland, the Blantyre City Fuel wood Project comprises both eucalyptus plantations and old miombo woodlands (Zulu, 2008). Recently, forest co-management projects are being promoted under the Improved Forest Management for Sustainable Livelihoods Programme (IFMSLP), which is the programme under study of this research.

2.3 Description of programme under study and decentralization process in Malawi

2.3.1 Improved Forest Management for Sustainable Livelihoods Programme (IFMSLP)

In order to facilitate the devolution of forest management to the community, the government of Malawi, through the Department of Forestry, with funding from the European Commission, has been implementing the IFMSLP. The programme is aimed at addressing forest degradation and poverty through promoting community involvement in forest management of State owned forest reserves (Malawi Government, 2007). It has four primary objectives: (1) promotion of sustainable livelihood strategies within impact areas; (2) enhancing equitable access to forest resources by increasing the area under sustainable forest management arrangements; (3) strengthening governance of key forest resources; and (4) enhancing communication and advocacy among stakeholder groups within the forest sector. The programme, which was in its 6^{th} and 7^{th} year at the time of the study, is being implemented with communities living around 12 selected forest reserves across the country's 28 districts, (Table 2.3).

Table 2.3: Targeted impact areas (districts and forest reserves) for the IFMSL programme (Study sites in bold).

Region	District	Forest reserve	Year gazetted	Area of reserve (ha)
North	Chitipa	Mughese and Wilindi	1948	1 580
	Karonga	Vinthukutu	1948	2 227
	Rumphi	Uzumala	1948	596
	Mzimba	Mtangatanga/Mperekezi	1948 and 1935	23 203
Central	Dedza	Mua-Livulezi	1929	12 147
	Kasungu	Chawa	Established 1976 (not yet gazetted)	538
	Ntchisi	**Ntchisi**	**1924**	**9 720**
	Ntcheu	Dzonzi and Mvai	1924	8 292
South	Chikhwawa	Masenjere	1930	101
	Machinga	Liwonde	1924	29 473
	Zomba	**Zomba - Malosa**	**1924**	**15 756**
	Nsanje	Matandwe	1930	26 205

Source: Malawi Government, 2007- http://www.ifmslp.org/#-14/10/13.

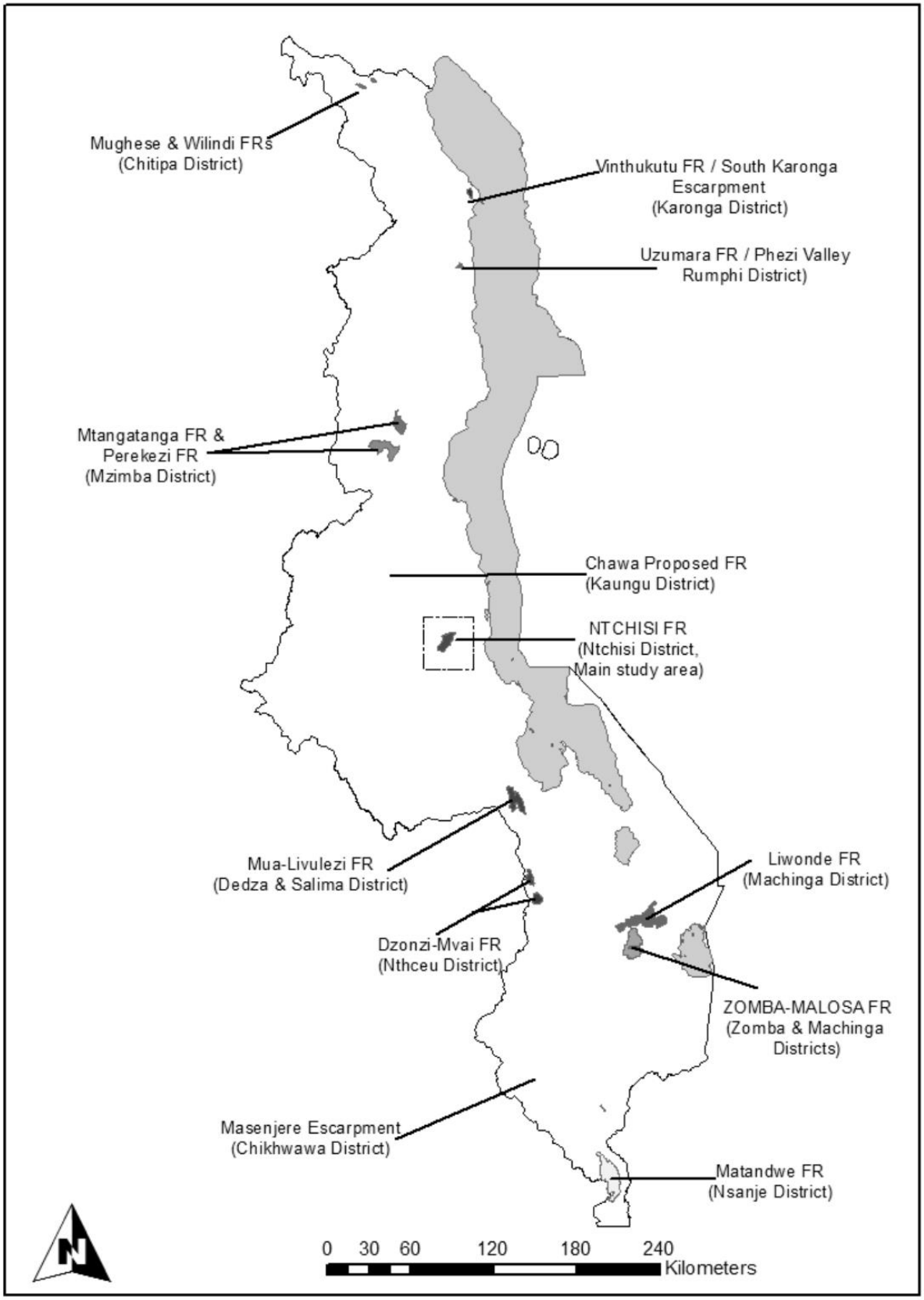

Figure 2.2: Forest reserves currently implementing IFMSL programme- **Ntchisi and Zomba-Malosa** forest reserves are the study site (*source: Zulu, 2013*)

2.3.2. Programme and forestry institutional structure in Malawi

The IFMSL programme has established coordinating and implementing structures within and outside the Department of Forestry to manage and implement the activities of the co-management programme (Figure 2.3). The co-management structures and institutions are established parallel to other existing institutions and structures that mediate ownership, access and utilization of forests and forest resources in Malawi (Zulu, 2008). These include: 1) the local government and traditional leadership; 2) the decentralized local government structure, which is also embedded in the local government and 3) the Department of Forestry. However, the decentralized local government structures have only been partially implemented and are not yet functional; therefore, their operation in relation to the co-management programme has not been detailed in this study.

The forestry department located within the Ministry of Natural Resources Energy and Environmental Affairs is the government institution responsible for forest management. Its principal functions include forest reserve management, plantation management, forest policy development and planning, training, research and extension, as guided by the National forestry policy (1996), Forestry Act (1997) and National forestry programme (2001). The department has three regional forestry offices (i.e. one located in each of the country's three regions, north, central and southern regions) and 26 District Forest Offices with corresponding Regional and District Forest Officers. At the community level, the best known department officials are the forest extension officers, formerly known as forest guards (Figure 2.3). The district forest officers and forest extension officers take a leading role in disseminating forest resources and information to the public especially the local communities and also the management of the reserves including patrolling and fire prevention, with the involvement of the local communities. Additionally, forest extension officers are accountable to district forest officers, whilst district forest officers are accountable to the regional and department of forestry headquarters (Figure 2.3).

In Malawi, government administrative structures are at national, regional and district level. Each district is further divided into traditional authority areas, headed by traditional leaders or paramount chiefs. The flow of power is from the district commissioners (who are employed by government), to traditional authorities, group village headmen and the village heads. Therefore, the lowest administrative institution recognized by the government is the village, which is headed by a village headman. Under the Traditional Authority administrative system, ascendancy to positions of authority is normally hereditary, subject to

confirmation and approval by the government (Chirwa, 1994; Forster, 1994). In many African countries, traditional authorities still have *de-facto* control over access and utilization of natural resources including forests (Bene *et al.*, 2009; Baland and Platteau, 1996). Similarly in Malawi, although the department of forestry has authority over state forests reserves, traditional leaders still exercise limited de facto control over the communities' access to forest (Bene *et al.*, 2009). This ensures that the traditional leaders and chiefs are still in a position of power and able to influence their subjects (Zulu, 2008), since forests are such an important source of livelihoods for majority of community members (Appiah *et al.,* 2009; Phiri *et al.,* 2012; Fisher 2004; McDermott and Schreckenberg 2009). Furthermore, Zulu (2009) suggests that having power over access to forests and forest resources, gives traditional leaders a key source of side payment (locally called *cholowa*) in cases where the provision of access to forest resources is for commercial purposes or to outsiders.

The activities of the IFMSL programme are managed and implemented by a co-ordinating structure within the Department of forestry including, a task force at ministry level; a programme implementation unit located at forest department headquarters; regional coordination offices and district implementation units. The programme has also established a Local Forest Management Board, comprising department of forestry representatives and representatives of other government departments at district level (e.g. agriculture, environment and natural resources, and irrigation and water development), the traditional leaders, representatives of civil society groups and representatives from all block[10] committees in the district. At community level, the block committee members are responsible for the management of the IFMSL co-management programme activities (Figure 2.3). Since the IFMSL co-management programme is participatory, management decisions are expected to be taken collectively by all stakeholders concerned, and accountability has to be both downward to the community and upward to government.

[10] Forest reserves are divided into management sections called blocks and are to be managed by a group of villages located adjacent to the block, therefore block committees comprise of local community members 'elected' and mandated to facilitate implementation of the co-management activities by the block level (*http://www.ifmslp.org/#-14/10/13.)*.

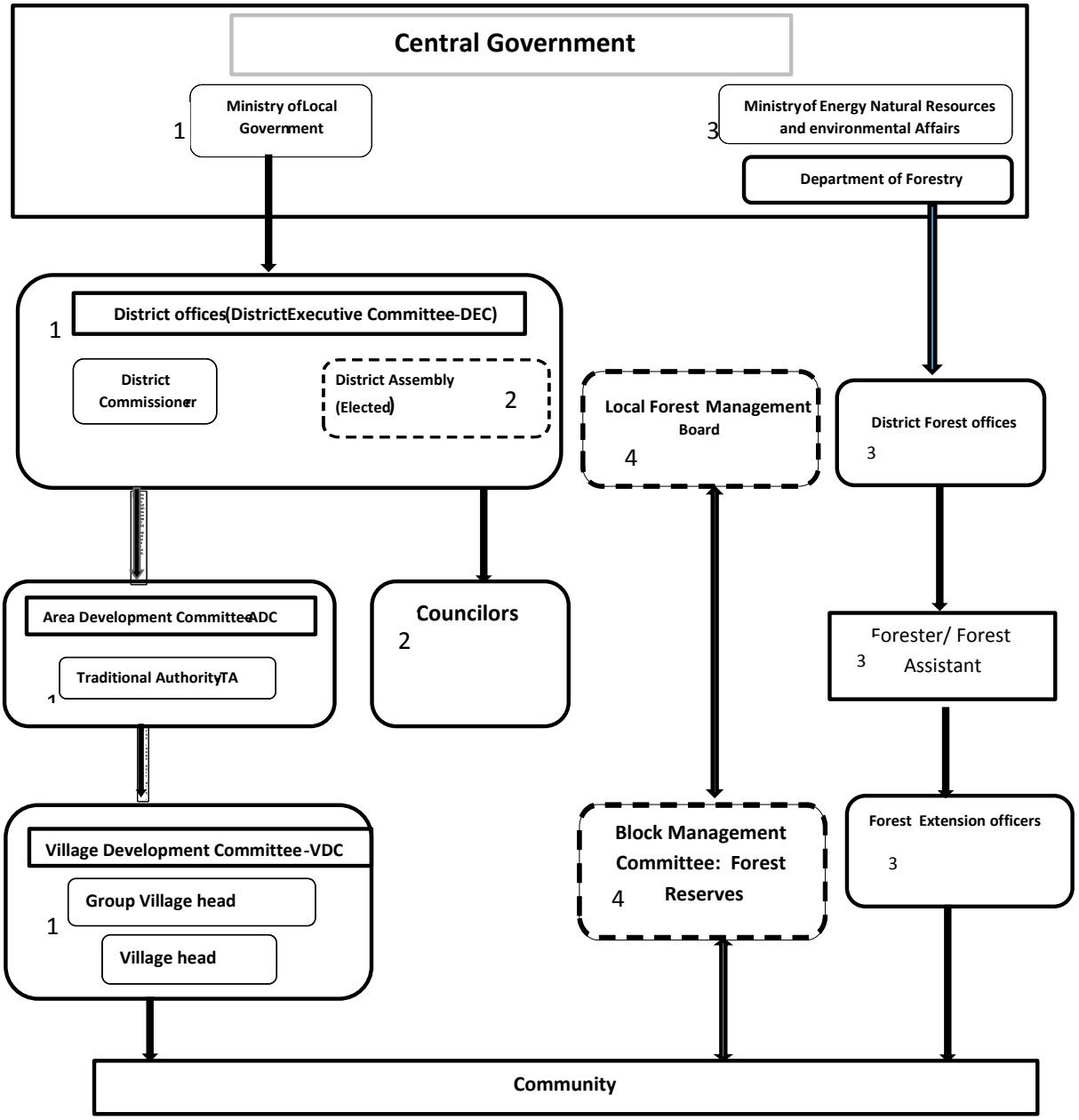

Figure 2.3: Institutional structures governing forest management in Malawi, including: 1) the local government and traditional leadership hierarchy from local government at ministry level to chiefs then individuals or households (the village, headed by village head, is the lowest local government administrative institution); 2) the decentralized local government structure, which is also embedded in the local government, however this has only been partially implemented and are not yet functional hence the dashed lines at district level; 3) the state through the Department of Forestry, which follows a hierarchal structure from the headquarters at ministry level (represented by Director) to forest reserve level, represented by forest extension officers formerly known as forest guards; and 4) New institutions established by the IFMSL co-management programme at district and community level: this also involves representatives from both the community (i.e. block management committee members) and representatives from the government departments and civil society, hence dashed and double pointed arrows (*Personal communication, Department of forestry officers -July, 2012.*

2.3.3 Programme implementation process

For communities to participate in co-management of state forest reserves, a number of stages and procedures are followed. First, government staff selects participating communities and holds "sensitization meetings" about the programme and programme objectives with traditional leaders and members of the selected communities living adjacent and around the forest reserve. Though co-management approaches advocates for a bottom-up approach (Ribot, 2003), the IFMSL programme works with communities in a top-down manner, because government officials select the participating communities. Following the sensitization meeting, the forest reserve is demarcated into sections called forest blocks, with participation of both forest staff and community representatives. The blocks are further divided into sub-blocks of two hectares, known as coupes, which are meant to facilitate forest harvesting process. Next, block committees are established (Chapter 4, explores the block committees are established and by whom, in practice), followed by the development of constitutions to govern the community group (organization), and thereafter registration of the community group as a local organization at the district council. With the facilitation of district forest extension staff, block management plans are then developed, including identification of activities, roles and responsibilities and rules for use of forest resources. With the endorsement of the Local Forestry Management Board (LFMB), the block management plan has to be approved by Department of forestry headquarters. Finally co-management agreements between government (Department of Forest*)* and local communities are signed by their respective representatives.

2.4 Study areas

2.4.1 Site selection

The study was conducted in Zomba-Malosa (Zomba district, southern region) and Ntchisi (Ntchisi district, central region) forest reserves. These are 2 of the 12 forest reserves where the Malawi Government are implementing the IFMSL programme through the department of forestry (Table 2.2; Figure 2.2; Malawi Government: *IFMSLP mid-term review*, 2008). The programme is being implemented in phases; thus within the reserve there are some blocks that are currently being co-managed by adjacent communities and government after the signing management agreements, and some blocks are still under state management as the process is still underway (Malawi Government: *IFMSLP mid-term review, 2008; Personal communication, Department of forestry officers -July, 2011*). To answer

the questions in this study, the study sites had to fulfil the following criteria: 1) the forest block should be under full co-management, which means that communities living in and around the reserves have signed a management agreement with the government and are thus recognized as full participants, and 2) the programme should have sufficiently advanced, such that the participating communities have the potential to harvest and benefit from their designated forest block. Following meetings with forest staff at the Department of Forestry's headquarters and regional and district offices, it was noted that some communities living around Zomba-Malosa and Ntchisi forest reserves have signed the co-management agreement with the government, such that the implementation of the co-management programme in their areas has advanced sufficiently for them to harvest and benefit from their designated forest block.

2.4.2 Description of study forests and districts

2.4.2.1 Zomba-Malosa forest reserve and Zomba district

2.4.2.1.1 General socio-economic characteristics of Zomba district

Zomba district is located in the southern region of Malawi and it covers a total of 2580 square kilometres, 14.7% of which are forests and woodland (Malawi Government-Atlas, 2012). The larger percentage is under agriculture (75%) and the remaining 10.3% is human settlement (Malawi Government-Atlas, 2012). The district has a total population of 583 176 people, which accounts for approximately 4.5 % of the national population (NSO, 2008). The district recognizes three land tenure systems of customary, public and private. Under customary land tenure system, Zomba is predominately matrilineal where a husband stays at their wife's place. Tenure systems have been said to affect community investment in natural resources and forestry systems, with higher willingness in patrilineal than matrilineal systems (Lunduka, 2010; Harrison *et al.*, 2008).

Although the literacy levels of Zomba are rated at 69%, the majority of the population (77.3%) just attended lower primary, hence don't have any qualification (NSO, 2012). Furthermore, the employment rate in the formal sector is small with only 11% of the population having regular monetary income. The 88% have neither regular income nor formal employment, hence depend on seasonal, especially agriculture and casual income. Furthermore, a minimal proportion of the population (6.3%) have access to credit facilities and loans, with the majority of those that have had a loan receiving it from family or friends (NSO, 2012). As such about 70 % of the population in Zomba are said to be living below

poverty line and 41 % are under the ultra-poverty line. This is higher than the national poverty level of 52% and ultra-poverty 22.4% (NSO, 2005). With the high levels of poverty in the district, the health of the population is also threatened, because the majority cannot afford proper housing and nutrition. Hence the life expectancy for male and female population in Zomba is rated at 43.7 years and 46.6 years respectively. And it is estimated that in the years 2010 to 2011, 23% of the population reported incidence of illness and injury and 7.3% suffered from chronic illnesses (NSO, 2012). Furthermore, most of the population face food shortages for two to three months of the year on average (Malawi Government, 2009).

As highlighted above, agriculture forms a large part of the economy and livelihoods for the majority of the population in Zomba. Maize is the most important crop in the study area as it is the staple food. Maize based intercropping dominates in the southern part of Malawi (Makumba 2003). Other important crops are cassava, pigeon peas, groundnuts, beans, soybeans and pumpkins. Smallholder farmers also own vegetable gardens in the dambo areas, for cash income as well as household nutritional supplements. Tobacco and rice are also grown for cash income. Due to small land holding sizes most of the farmers face food shortages on an average of two to three months of the year. Being close to other major towns and with good road network, communities in Zomba are also actively engaged in small to medium scale non agro-based businesses, including forest-based enterprises.

2.4.2.1.2 Environment and Zomba- Malosa forest reserve

Zomba-Malosa forest reserve in the only gazetted forest in Zomba and covers an estimated area of 15,756 hectares of forest, and consists of both miombo woodlands and pine plantations (Malaise, 1978; Malawi Government, 2007). The natural miombo woodland covers approximately 8,932 hectares (approximately 57% of the forest reserve), whilst the pine plantations cover approximately 6,824 hectares (approximately 43% of the forest reserve). The reserve is demarcated into 12 management blocks of differing sizes (Figure 2.4). The Reserve was gazetted in 1924 for catchment conservation (Kamwendo and Dudley, 2004). Zomba–Malosa forest reserve is a catchment for some of the major lakes and rivers in the country of Lake Malawi, Lake Chilwa and Lake Chiuta and the Shire River. Furthermore, five of the major rivers in Zomba district originate from the reserve, thus making the reserve a significant source of water (both for domestic and agricultural use) for a majority of the population in Zomba (Malawi Government, 2009). Zomba-Malosa forest reserve is also a source of wood energy in the form of charcoal and firewood to a majority of households in

Zomba district as well as neighbouring districts and some further away (e.g. Blantyre, Machinga, Chiradzulu) (Malawi Government 2009). Zomba has a relatively good road network, and the forest reserve is located near a major road (**M3** which connects to the country's central road-**M1** at both ends, i.e. Balaka and Blantyre respectively). Hence forest resources such as charcoal, firewood and timber are easily sold to travellers from other areas. The easy access and increasing demand by travellers for forest resources contribute to the acceleration of deforestation and a reduction in the availability of forest products to local users (Malawi Government, 2007). In addition, the reserve is being encroached upon in the peripheral areas for both settlement and agriculture, hence resulting in further loss of the forest and forest resources. It is estimated that 300 hectare of Zomba-Malosa forest reserve have been turned to agriculture land (Mauambeta *et al.*, 2010) The majority of the population in and around the reserves depend on forest based resources for subsistence and income. Approximately, 22.2% of all the enterprises in the district are forest based (NSO, 2012). Furthermore, Government reports indicate that 90% of Zomba's population depend on forests for their livelihood (Malawi Government, 2009). Apart from supporting local livelihoods, the forest reserve also attracts tourists. Considering that forests form an important part of the livelihoods and economy in the district, there have been efforts to carry out afforestation through different programmes. For example under the Malawi Social Action Fund, which has facilitated an afforestation programme in Chikomwe hills (25ha) and currently the IFMSLP promoting afforestation and establishment of woodlots in the target area.

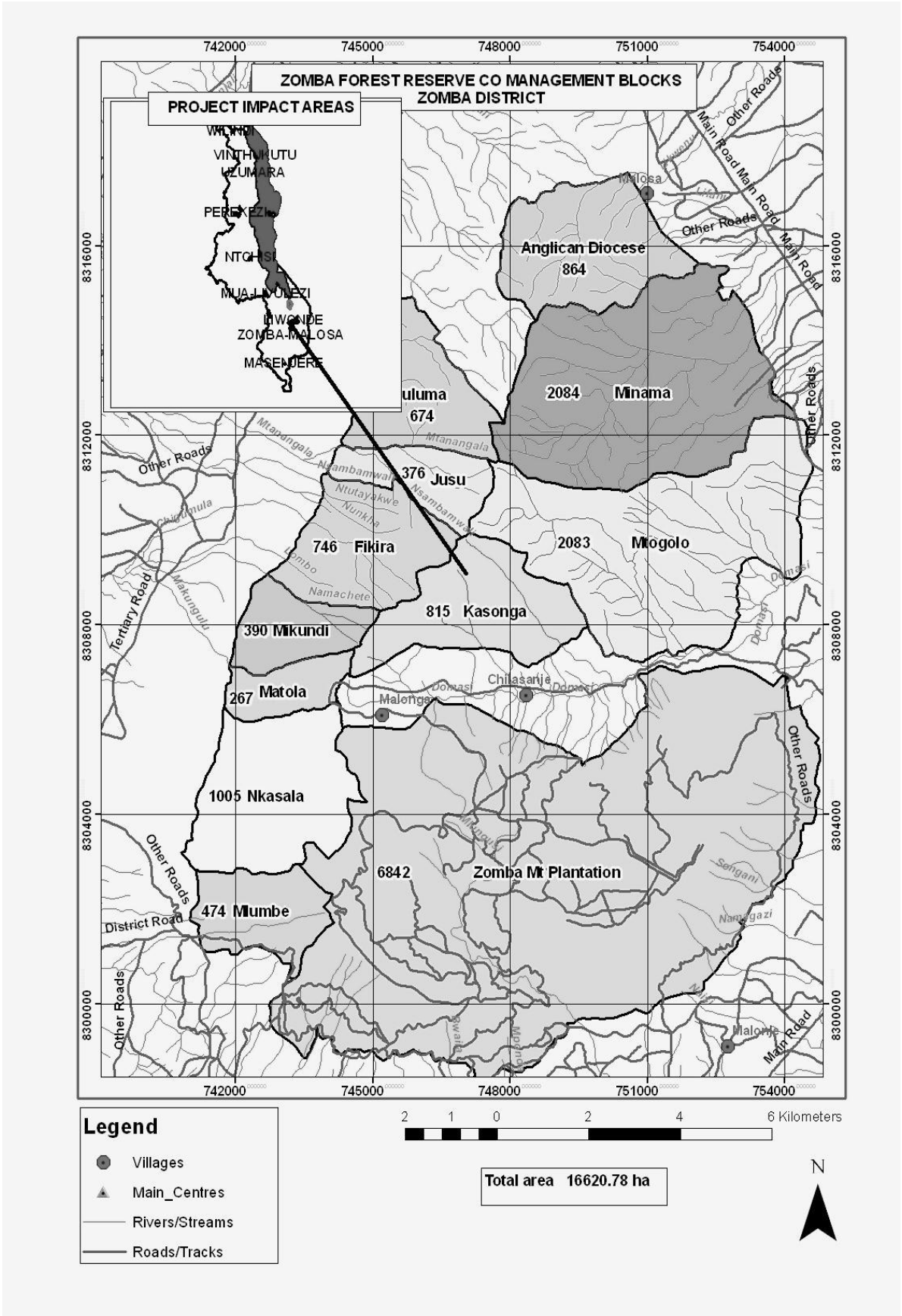

Figure 2.4: Map of Zomba-Malosa forest reserve showing the various forests management blocks (*source: Department of Forestry*)

2.4.2.2 Ntchisi forest reserve and Ntchisi district

2.4.2.2.1 General socio-economic characteristics of Ntchisi district

Ntchisi district is located in the central region of Malawi, and it covers a total of 1 655 square kilometres, 19.5% of which are forests and woodland (Malawi Government-Atlas, 2012). The larger percentage is under agriculture and rural settlement (78.3%) and the remaining 2.2% is urban built-up human settlement (Malawi Government-Atlas, 2012). The district has a total population of 224 098 people, which accounts for approximately 1.7 % of the national population (NSO, 2008). The district recognizes three land tenure systems of customary, public and private. Under customary tenure system, Ntchisi is predominately matrilineal, however with a majority, approximately 63% having virilocal residence. Thus although inheritance devolves through the daughters and husbands are supposed to stay at their wife's place, the majority of the families choose to stay in the husband's village (Lunduka, 2010; Kishindo, 2010). Additionally, NSO (2007) indicate that approximately 24.3% of the population follow the patrilineal system.

The literacy levels in Ntchisi district are reported at 68.4%, with approximately 82.9% of those who have been to school only attending the lower primary levels and hence not having any qualification (NSO, 2012). The employment rate in the formal sector is estimated at only 18.8% (NSO, 2005). Thus approximately 81.2% of the population have neither regular income nor formal employment, hence depend on seasonal and casual income. However, a small proportion of the population (19.9%) have access to credit facilities and loans, with the majority of those that have had a loan receiving it from family and friends and informal lenders (Haarstad *et al.,* 2009; NSO, 2012). About 47.3 % of the population in Ntchisi are reported to be living below the poverty line and 41 % are under the ultra-poverty line (NSO, 2012). With the high levels of poverty in the district, the health of the population is also threatened, because the majority cannot afford proper housing and nutrition. Hence the life expectancy for male and female population in Ntchisi district is rated at 46.5 years and 52.6 years respectively (NSO 2005). And it is estimated that in the years 2010 to 2011, 23.5% of the population reported incidence of illness and injury and 7.2% suffered from chronic illnesses (NSO, 2012).

The agricultural sector is estimated to account for almost 80% of the district economy and livelihoods (Haarstad *et al.,* 2009; Malawi Government, 2005). The most common commercial crop grown in the area is tobacco, which requires a substantial amount of farmland, as well as wooden poles for processing. It is also estimated that approximately 2.6

% of the households in the district depend on forests and forest products for their livelihoods, and approximately, 22.7% of all the enterprises in the district are forest based (NSO, 2012). Key forest based activities that the local communities are involved in include harvesting timber, poles and fuel wood.

2.4.2.2.2 Environment and Ntchisi forest reserve

The district has 3 gazetted forest reserves, namely Ntchisi, Kaombe and Mndilasadzu forest reserves, covering an area of 15,150 hectares (Malawi Government, 2005). Ntchisi forest reserve is the largest covering an estimated area of 9,720 hectares, whilst Kaombe and Mndilasadzu forest reserves are estimated to be 3,880 and 1,550 hectares, respectively. Ntchisi forest reserve (which is one of my study sites) is demarcated into 19 management block of differing sizes (Figure 2.5). The reserve is located in the remote and rural part of the district, approximately 32 km from the district centre. The reserve is comprised of miombo woodlands, montane evergreen forest and riverine forest adjacent to perennial streams. The montane forest is of high biodiversity value, thus making the reserve a tourist destination (though on a small scale). Like the majority of the population in the district, communities around Ntchisi forest reserve depend on farming for substance and cash-income. The reserve is also a source of non-timber forest products (NTFP) such as mushrooms, fibre and edible caterpillars. Harvesting of edible caterpillars is said to be a significant cause of tree felling in the reserve *(personal communication, District forest extension officer-July, 2012).* The reserves are also a source of water for communities living around the reserve and other surrounding areas. The reserves attract a small number of tourists annually. However, the reserve resources are currently declining and degrading mainly due to tree cutting in search of edible caterpillars (*matondo*) (Malawi Government, 2005).

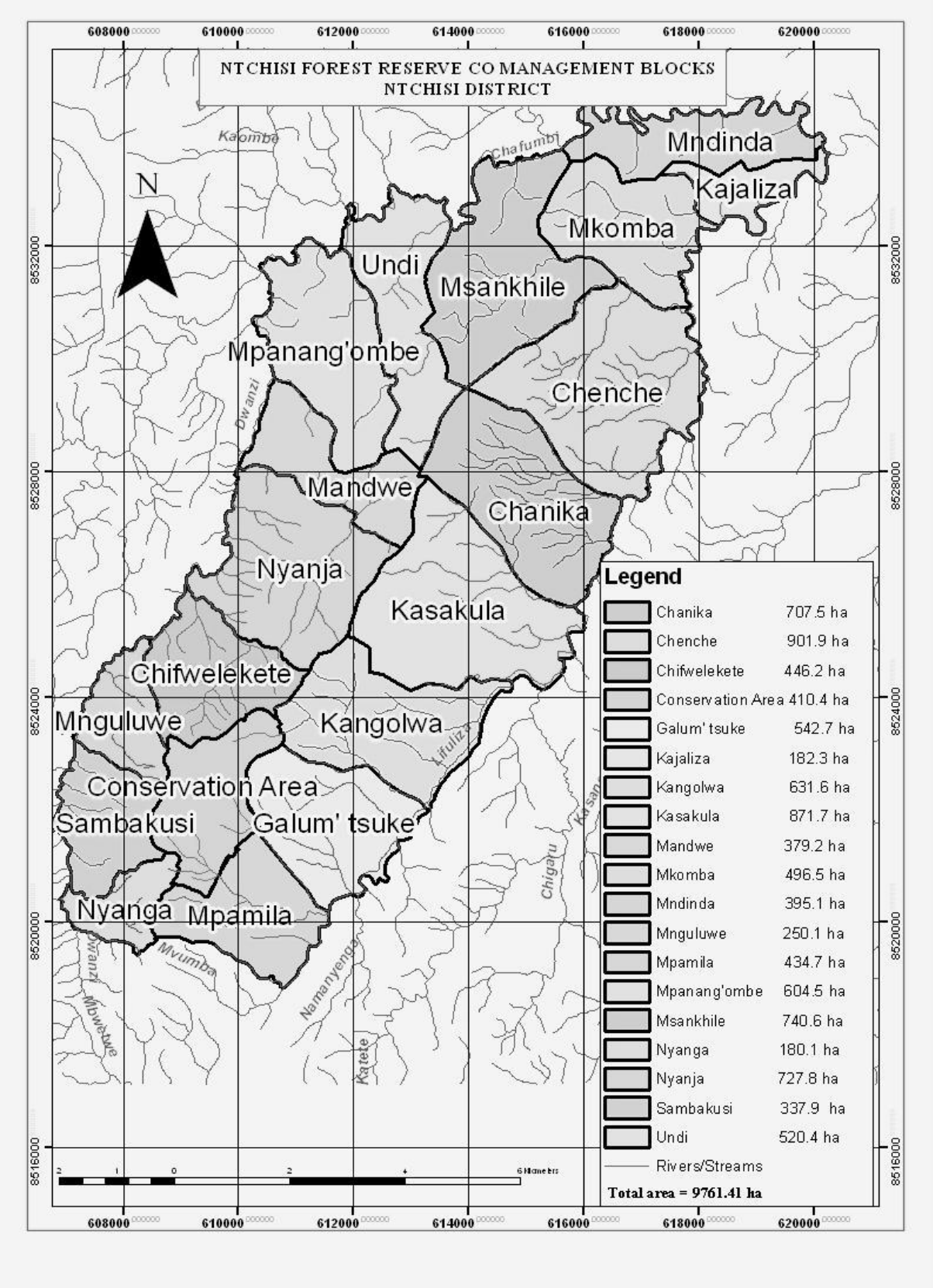

Figure 2.5: Map Ntchisi forest reserve showing the various forest management blocks (*source: Department of Forestry*)

2.5 Study approach

The study was done in two phases, with the first phase in August to September 2011, and second phase in August to October, 2012. The field studies started with meetings with forest staff at headquarters and regional offices. The meetings aimed at sourcing information about the general context of the programme, including; 1) how did the programme start and when, and why?; 2) Where is the programme being implemented and how were the sites selected; 3) what is the implementation process and at what stage of implementation is the programme in each of the targeted sites, and 4) what kind of activities are they implementing. These meetings also helped in the selection of the study sites for this research and were followed by similar meetings with district forest officers in the study sites (i.e. Zomba and Ntchisi), to obtain a more in-depth understanding of the programme implementation at both district and community level. The meetings with district forest staff helped to confirm the selected study areas as suitable for providing the data to answer of the study questions, and the selection of study communities or blocks.

Prior to the questionnaire-based surveys, meetings were held with village leaders and forest block committee members (both field study 1 and 2). The aims of these meetings were; 1) introduce the objectives of the study to leaders and communities, to assure them that there was no link between the research study and the government (department of forestry), any other government agencies or the programme funders, and; 2) to compile a list of participating communities from which representative villages and households were randomly selected.

The first field study aimed at collecting information to answer the study research questions 1 and 2; which focus on; 1) exploring how local actors define criteria for measuring success of the forest co-management programme (research question 1; Chapter 3) and; 2) determining if the co-management programme has or is achieving devolution (research question 2; Chapter 4). The data to answer research questions 1 and 2 (Chapter 3 and 4), is based on local people's perceptions, elicited through both qualitative and quantitative methods for a more comprehensive inquiry and understanding of forest co-management programmes at implementation level. The qualitative approaches include focus group discussions and key informant interviews, while individual interviews using a structured questionnaire (with both closed and open-ended questions) were conducted to obtain quantitative data.

The second field work was done to collect information to answer the research questions 3 and 4, which focus on; assessing the impacts of co-management on forest conditions (research question 3; Chapter 5), and exploring the programme's livelihood impacts and community willingness to pay (research question 4; Chapter 6). To assess the impact of co-management on forest conditions, three data types were collected. These were; 1) tree density and species richness as indicators of forest condition; 2) physical signs of human activities in the forest reserves as potential indicators of the current and future impact of co-management on forest condition and 3)local peoples' perceptions of the impact of co-management on forest conditions. The forest condition data was collected using forest surveys (details of the inventory procedure in chapter 5), whilst local people's perceptions were collected using a structured questionnaire (with both closed and open ended questions). Structured interviews were also used to elicit information on co-management programme livelihood impacts and welfare benefits. The livelihood impacts and welfare benefit questions were developed based on the sustainable livelihood framework (DFID, 2000) and stated preference techniques.

2.5 .1 Piloting

All data for the study was collected by the researcher (LC) and five trained enumerators. The enumerators were trained for a day before the start of each field study. The questionnaires were first developed in English and later translated into Chichewa[11]. The enumerators were (who were fluent in both Chichewa and English) were trained how to present questions in both English and Chichewa. Following the training, the study tools (for both field study 1 and 2), were pre-tested in Lilongwe, in Dzalanyama forest reserves and with communities living around the forest reserve. Communities around this reserve are participating in a community forest management programme, but not under the IFMSLP. Therefore, pre-testing assisted in the revision of questions, standardising the units of measurements and how questions were to be asked in Chichewa, and establishing the average interview duration.

2.5.2 Data collection procedures and methods

The study used primary data, collected through both qualitative and quantitative methods. The qualitative methods included meetings, key informant interviews, focus group discussion, whilst the quantitative methods included: household interviews and forest inventory data collection techniques. All focus group discussions and interviews were done in

[11] Chichewa is the local language in Malawi and widely spoken by among the study communities.

Chichewa, and no interpreters were used, since the researcher and the trained enumerators are fluent in Chichewa. Although the study area and sampling procedures are common to all results chapters; the study designs and methods, sample sizes and some data collection methods, were not common for all the result chapters. Therefore, only the general methods common to all chapters are presented in this section, whilst chapter specific study design and methods, sample sizes, data collection methods and analytical procedures are detailed in respective chapters.

2.5.2.1 Qualitative methods

2.5.2.1.1 Key informant interviews and focus group discussions

Qualitative data collection tools, including key informant interviews and focus group discussions were used to obtain; 1) general information on the social and institutional context of the local communities and co-management programme, and; 2) the programme's livelihoods impact at community level (Schreckenberg and Luttrell, 2006; Ellis and Mdoe, 2003). At community level, key informant interviews were done with members of the block committee, some older members of the community (a minimum of 40 years[12]), representatives of specific forest-based entrepreneurs or traders (e.g. timber traders, firewood groups, bee keeping groups; pottery group and mushroom traders) and representatives of the community based organizations where present. Community level key informants were supposed to be members of the communities studied and were selected based on; 1) their level of programme involvement; 2) knowledge of the programme's implementation processes and activities; and/or, 3) knowledge of the social and institutional context of the local communities, and livelihood scenarios through time, to capture any existing dynamics and changes in the communities livelihood scenarios and social context. To supplement information obtained from community key informants, additional interviews were done with field forest extension officers and other government staff where possible. A total of 17 (first field study period) and 33 (second field study period), were interviewed (Table 2.4). To get a wider perspective and representation of the issues discussed with the key informants and to avoid repetitions for each field study (i.e. phase one, 2011 and two, 2012) effort was made to interview different individuals from each key informant category. However, this was difficult for block committee members as the same members were still occupying the committee

[12] A minimum of 40 years of age was chosen as it was perceived that they would have adequate experience and understanding of the changes in the social and institution context of the local communities, forest status and management systems beyond 1996 (i.e. before the community based approached were revived), and the livelihood scenarios through time.

positions; hence some members were interviewed as key informants during both field studies. Therefore, although I planned to interview the same number of key informants from each category during both field studies; one additional committee member was interviewed during the second field study.

Focus group discussions were done with community members in each study area at block level before the start of the household surveys, for both study visits (Table 2.5). On average, the discussions involved 20-30 individuals, including village leaders, block leaders and other community members of different gender and socio-economic classes. Additional focus group discussions were held with specific community interest groups including traders, women and the youth, separately (Table 2.5). To answer the questions of this study the focus group discussions and key informant interviews discussed the following; local institutions and tenure, community livelihoods and welfare, status of forest at different time periods or change in forest conditions over time, availability of and access to forest and forest products, forest product use, implementation of the forest co-management programme, governance and impacts of co-management on both the forest and community livelihoods, programme stakeholders or who is involved in the programme implementation, and perceived indicators to measuring success or failure of the programme (detailed check list-appendix 1). Additionally, key informant interviews and focus group discussions also helped in the development of a wealth indicator which was used in the regression. Furthermore, the information obtained from the key informant interviews, meetings and focus group discussions: 1) contributed to the final development of questionnaires used in the study, and; 2) was used to supplement information gathered through household survey. All key informant interviews and focus group discussion were recorded on paper, flipcharts and audio tape. Each session was summarised at the end to ensure an even and fair reflection of opinions. The analysis of focus group data was done at both group and individual level. At group level the analysis focused on identifying shared understandings and common views on specific issues discussed. However, specific attention was also paid to identifying any opposing views, and any change or modification of views in the course of discussion, and what factors led to these changes or opposing views. Furthermore, interactions within the group members during the discussions were noted so as to detect if members of the group were indeed in agreement with what had been presented as a common view, or whether they were afraid to disagree due to the position of the individuals who contributed or some existing tensions within the community.

Table 2.4: Number of key informants interviewed by block in Zomba-Malosa and Ntchisi districts.

Key informant category	Number of informants interviewed							
	Zomba-Malosa				Ntchisi			
	Mtuluma		Jusu	Fikira	Nyanja		Nyanga	Mpamila
	Study 1	*Study 2*			*Study 1*	*Study 2*		
Block committee members	2	3	2	2	2	3	2	2
Older members of the community and village heads	4	2	2	2	4	3	2	2
Representatives of forest-based entrepreneurs or traders	1	1	1	0	2	2	1	0
Representatives of the community based organizations	1	0	0	0	1	0	0	1
Total	8	6	5	4	9	7	5	5

a. The first field study included only Mtuluma and Nyanja, hence the number of key informants interviewed has been subdivided according to field study 1 (2011) and field study 2(2012).

b. Forest-based entrepreneurs or traders varied across all study communities; hence the number of representatives interviewed was different for all study communities.

c. Although I managed to interview representatives of community based organizations in Mtuluma and Nyanja, during the first field study I was unable to interview any during the second field study, as they had other commitments.

Table 2.5: Number of focus group discussions conducted in each block in Zomba-Malosa and Ntchisi districts.

Focus groups	Number of group discussions							
	Zomba-Malosa				Ntchisi			
	Mtuluma		Jusu	Fikira	Nyanja		Nyanga	Mpamila
	Study 1	*Study 2*			*Study 1*	*Study 2*		
Block level	1	1	1	1	1	1	1	1
Women only	1	1	1	1	1	1	1	1
Youths	1	0	1	1	1	0	1	1
Entrepreneurs or traders	1	1	1	0	1	1	1	0
Total	4	3	4	3	4	3	4	4

Note: Although I managed to have group discussions with a group of youths (aged 15 to 25 years) in Mtuluma and Nyanja, during the first field study I was unable to interview any during the second field.

2.5.2.1.1.1 Wealth Indicator development

Chitinga and Nemarudwe (2003) identify a household's wealth status, among others (e.g. age, education level, gender and residency), as one of the factors that contribute to divergence in opinions on forest management approaches, and access to benefits from forest management programmes, among most communities in Africa. Therefore to ensure that the range of opinions and livelihood circumstance in the study community has been fairly represented respondents wealth status was determined and used in the regression analysis. Whilst respondent's age, education level, gender and residency can easily be obtained through direct questioning, it is difficult to obtain household's wealth status through direct questioning. Therefore, a number of techniques and indicators have been developed and applied in generating or categorizing rural households into different wealth or well-being categories. These include; participatory well-being or wealth ranking conducted with local key informants, size of land owned by households, number of months households are food secure, and scoring scales based on a combination of different livelihood factors such as number of months food secure, land size, income levels, employment status, income sources and land ownership (e.g. Barrett *et al.*, 2005; Hargreaves *et al.*, 2007; Morris *et al.*, 1999; Schreckenberg and Luttrell, 2009; Stifel, 2010; Vyamana, 2009).

Although I acknowledge that the use of all the methods and indicators highlighted are credible in determining rural households' wealth status, during the study key informants and community members participating in focus group discussions revealed that households' house or dwelling characteristics i.e. type of walls, roof, floor and window, can reflect the wealth status of an individual or household. Key informants and focus groups highlighted that households that are capable of investing in the quality of their house are better off or wealthier than households that can't afford to. A basic rural Malawian dwelling has mud walls, a grass thatched roof and usually no windows or just small holes or openings on the walls. These were therefore described as the characteristics of the poorest households in the community. However, houses built with burnt bricks, a cemented floor, iron sheet roofing and glass windows, were described as belonging to wealthy households. It was noted that as household's wealth status begins to improve, the type of dwelling also changes; from mud walls to burnt bricks, from mud floor to cemented floor; from grass thatched roof to iron sheets, and also a house without windows or just small holes or openings on the walls to wooded windows and then glass windows. Hence, it is easy to note or observe the different transitional stages of households' wealth status over time and in space. It is also important to

acknowledge that key informants also highlighted that the size of land owned by a household and income levels could indicate household wealth status. However, some scholars (e.g. Morris *et al.,* 1999), discredit the use of size of land owned by a household alone, as an indicator of household wealth, because the economic and production value of land is determined by both the quality (i.e. soil type, slope) as well as quantity. Furthermore, land size based on estimates may not always be reflective of the real situation. Similarly, rural households' income levels are difficult to estimate because wages are usually negligible, not always in cash form and susceptible to fluctuations, hence the estimated income levels may misrepresent household wealth status (Alemu, 2012; Morris *et al.,* 1999). Furthermore, Alemu (2012) has highlighted that rural household rarely disclose their income levels: responses on income levels are prone to strategic biases. For example, if they believe that aid might be distributed respondents might give a lower income value, with intent to influence the study outcome in their favour. Therefore, I opted to use households' house characteristics for determining household wealth indicators score or status because; 1) it is easier to collect and validate as it is based on characteristics that can easily be observed by the researcher, as opposed to land size and income level which are largely based on estimates and may not always be reflective of the real situation, and; 2) it applies the PRA wealth- ranking procedures (local key informants) to generate wealth scores or indicators that are based on local perceptions hence more reflective of what the local perceive as wealthy or poor household[13]. Additionally, Hargreaves *et al.,* (2007) and Morris *et al.,* (1999) have also highlighted housing quality as one of the important indicators of household wealth.

Therefore, in this study, to develop the wealth status score for households based on housing quality, the key informants and groups were asked to score the different parts of a house or dwelling depending on the type of material they are made from, with a 1 being the lowest score and a 4 being the highest score. Thus household wealth indicator (used in the regression) was created based on aggregate scores assigned to different household characteristics (Table 2.6). Wealth indicator ranged from 4 to 11, a score of 4 representing the poorest and 11 being the richest household. The process was firstly done with the key

[13] The participatory well-being or wealth ranking was conducted with local key informants in groups of 4-6 people (e.g. Hargreaves *et al.,* 2007; Schreckenberg and Luttrell, 2009; Vyamana, 2009). Households' well-being categories are developed based on well-being indicators defined by the key informants. Following which participants are asked to rank households in the different well-being categories. This could hence be used in the sampling frame so that differences across well-being categories are captured.

informants and then repeated with each of the focus groups, separately, to ensure that the scores are representative, and reflective of the communities.

Table 2.6: Scoring of different house or dwelling characteristics used in generation of household wealth indicator

House Characteristics	**Scores**			
	1	2	3	4
Wall	Poles and mud	Sundried bricks	Compacted earth	Burnt bricks
Roof	Grass	Iron sheets		
Floor	Mud	Cement		
Window	None/openings	grass	Wooden/glass	

2.5.2.2 Quantitative methods

2.5.2.2.1 Sampling of respondents

In each village, a systematic random approach was used in selecting the households to participate in the survey interviews. In each village, a village register was requested and provided by the communities' village heads. However in cases where the list was unavailable from the village heads, a list of all households in the village was compiled by the researcher with the help of key informants. In both cases, attention was paid to ensure that the lists do not follow a particular order or social hierarchy (e.g. wealthy status or kinship), so as to ensure that the selected sample is representative of the true population characteristics. The total household list formed the sampling frame from which every fourth household on the list was selected to form part of the study.

To investigate how perceptions and impacts varied across different socio-economic strata in a community, stratified sampling method would be a fitting approaching in selecting the sample for the survey. However, although this study explores how community perceptions with regards to co-management programme and the livelihoods impact of the programme, vary across various socio-economic characteristics, (including gender, age, residency, wealthy status, education levels and land ownership), it would not be possible to fairly partition the population into homogenous groups representing the different socio-economic variables tested in this study. Furthermore, with lack of baseline data on the study sites, I didn't have any information to use as a guideline for the stratification prior to the

interviews. Hence using systematic random sampling was a suitable sampling approach to ensure that all the different socio-economic characteristics of a heterogeneous community that may influence community perceptions on co-management and the programme livelihoods impacts are included and tested in the study.

Where all members of the household were absent, or unwilling to participate, the next household on the list was chosen. For the first field study, a total of 134 ordinary community members from 87 households were interviewed, representing approximately 33% of the households in the two study sampled communities (Table 2.7). For the second field study, a total of 213 households were interviewed in both Zomba and Ntchisi districts, representing approximately 32% of the total household population in the selected study communities (Table 2.8). For the first field study, the surveys were conducted with only two participating communities (at block level), whilst six participating communities' were involved in the second field study. Additionally, though I planned to resurvey all first phase field study respondents (at household level) in the second field study, it was difficult to resurvey all of them because of various reasons including migration and unavailability of the study dates. Therefore only, 19 (Zomba) and 16 (Ntchisi) households were resurveyed.

Table 2.7: Number of individuals interviewed by block in Zomba and Ntchisi districts (first field study).

District	Block name	Total no. Households in blocks	Number of individuals interviewed				
			Household heads		Other adults		Committee members
			Male	Female	Male	Female	
Zomba	Mtuluma	134	33	15(2)	4	25	10
Ntchisi	Nyanja	127	29	13(1)	8	10	11
Total		261	62	25(3)	12	35	21

a. *Total number of households refers only to the total number of households in study community, where our sample was drawn from.*

b. *Bracketed numbers indicate the number of households that refused to be interviewed or pulled out during the course of the interview.*

Table 2.8: Number of households interviewed by block in Zomba and Ntchisi districts (second field study).

District	Block name	Total no. Households in blocks	Number of households interviewed		
			Household heads		
			Male	Female	Total
Zomba	Mtuluma	134	23	17	40 (3)
	Jusu	104	20	15	35 (4)
	Fikira	118	25	14	39
Ntchisi	Nyanja	124	22	14	36 (5)
	Nyanga	98	20	15	35 (3)
	Mpamila	87	18	10	28 (2)
Total		665	128	85	213(17)

a. *Total number of households refers only to the total number of households in study community, where our sample was drawn from.*

b. *Bracketed numbers indicate the number of households that refused to be interviewed or pulled out during the course of the interview.*

In Zomba-Malosa, all forest management blocks under co-management included in this study are situated in the western side of Zomba-Malosa forest reserve in T/A Mlumbe. Mtuluma block is managed by communities under group village headman Mtuluma. Although Group Village Headman Mtuluma has a total of 14 villages in this area only 9 villages are involved in the management of the forest block and are direct beneficiaries of the co-management programme. The size of the block is 679 hectares; however, communities have access to only 225.45 hectares. The remaining 453.55 hectares are reserved for regeneration and conservation. Similarly, Jusu block is managed by communities under the under group village headman Jusu, T/A Mlumbe. The group village head has 15 villages, but only 2 villages are involved in the management of the forest block and are beneficiaries of the co-management programme. The size of the block is 375.35 hectares; however communities have access to 154.18 hectares whilst 221.35 hectares are reserved for regeneration and conservation. Fikira management block is managed by the communities of under group village headman Fikira, T/A Mlumbe. In under group village headman Fikira there are 12

villages, and all the 12 villages are involved in the management of the forest block and are direct beneficiaries of the co-management programme. The block covers an area of 745.92 hectares. However, communities have access to 361.26 hectares whilst 384.66 are reserved for regeneration and conservation. The dominant tree species in Mtuluma, Jusu and Fikira forest blocks include *Brachystegia species, Diplorrhynchus condylocarpon, Uapaka kirkiana, Bauhinia thonningii, Cussonia arborea* and *Cordya africana.* In the harvestable areas, communities have access to both timber and non-timber products, including bamboos, wild fruits, mushrooms, wild animals, grass and stones. Under the co-management programme, harvesting of forest products is to be done following the harvesting management plan as per resource rules. Apart from the forest reserve, each village is supposed to establish or manage a communal Village forest Areas (VFA), to supplement their forest needs. Mtuluma under group village headman has 18 VFAs, whilst Jusu and Fikira group village heads have 17 and 8 village forest areas, respectively. The Village forest areas are of varying sizes and composed of trees of varying ages. Management and access to village forest areas is under the authority of village natural resources committees and the village head. Additionally, households are encouraged to establish woodlots in their homestead as well as farming plots (Malawi Government, 2008). The blocks also serves as catchment areas for rivers and streams within the block and beyond, which are a major source of irrigation farming for both the participating communities and their surrounding area.

In Ntchisi the study was done with communities living adjacent to Nyanja, Nyanga and Mpamila co-management forest blocks. Nyanja forest management block is managed by communities in under group village headman Nyanja, T/A Nthondo. The under group village headman has a total of 13 villages, but only 9 villages are involved in the management of the forest block and are direct beneficiaries of the co-management programme. The size of the block is approximately 727.8 hectares. However the participating communities have access to only 350.8 hectares, from where they can collect forest products for both domestic and commercial use while the remaining 377 hectares are for conservation hence community access is restricted. The forest block is dominated by *Brachystegia* species and *Julbernardia* species. In addition to the forest reserve, community members in Nyanja block have 6 village forest areas of varying sizes and composed of both mature and young trees of varying ages and are currently planting trees around homesteads. Nyanga forest management block is managed by communities in under group village headman Nyanga, T/A Vuso-jere. The under group village headman Nyanga has a total of 6 villages, which are involved in the

management of the forest block and are direct beneficiaries of the co-management programme. Like Nyanja forest block, the forest block is dominated by *Brachystegia* species and *Julbernardia* species. The size of the block is approximately 180 hectares. Communities have access to 100 hectares, from where they can collect forest products for both domestic and commercial use. However, the 80 hectares are largely steep slopes, riverine areas hence demarcated for conservation. Nyanga block has 5 village forest areas, of varying sizes and composed of trees of varying ages. Mpamila forest management block is managed by communities in under group village headman Mpamila, T/A Kasakula. The Group Village Headman has a total of 25 villages, and all the 25 villages are involved in the management of the forest block and are direct beneficiaries of the co-management programme. The size of the block is approximately 434.7 hectares. Participating communities have access to only 95 hectares, from where they can collect forest products for both domestic and commercial use. However, the remaining 339.7 hectares are comprised of an evergreen forest which is the major tourist attraction in the area and has steep slopes, riverine areas and water catchment areas, hence protected for conservation. Similar to Nyanja and Nyanga forest block, Mpamila forest block is dominated by *Brachystegia* species and *Julbernardia* species. In addition to the forest reserve, for their forest needs, community members in Mpamila block have 4 village forest areas of varying sizes.

2.5.2.2.2 Questionnaire-based survey

Face to face structured interviews using questionnaires (Appendices 1.1 and 1.2) were conducted with randomly selected households and local community members. Where all members of the selected household were absent, or unwilling to participate, the next household on the list was chosen. For each respondent, the interviews were done in isolation to reduce the risk of influencing each other's answers. Due to differences in resource use and extraction among different gender groups, as well as influences of cultural norms and practices among rural communities (Colfer and Capistrano, 2005; Fisher *et al.*, 2012; Mawaya and Kalindekafe, 2007), I expected difference in responses between household heads and other adult members of the community. Therefore, for the first field study period (Chapter 3 and 4), in each village, interviews were first conducted with household heads. The household heads were usually male, however, in some cases widows, divorcees, or women whose husbands are working away were regarded as household heads as they do all almost all of the work customarily done by men. Upon finishing the interview with the household head, a request was made to interview any other adult members of the household separately, on a

different day. Although all household heads agreed, it was difficult to interview the spouse or older child as many were not available on the agreed time and date; others simply declined to be interviewed. Hence, unequal numbers of household heads and other adults were interviewed (Table 2.7). However, after the initial analysis of the data showed no obvious difference in opinions and perceptions between household heads and other adult members of the community, household heads and other adult members were treated as one category (i.e. ordinary community members).

On average, each interview lasted for 1 hour, 30 minutes. For field study 2 (Chapter 5 and 6), only household heads or their representatives (e.g. their spouse) were interviewed and on average each interview lasted for 1 hour. The household survey forest co-management programme (2011) questionnaire was used in the first field study, in only two participating communities Mtuluma in Zomba district and Nyanga in Ntchisi district (Table 2.7; Appendix 2.1), whilst the household survey forest co-management programme (2012) questionnaire (Appendix 2.2) was used in the second field study, in six participating communities (Table 2.8).

2.7 Ethical procedure

Before the start of each interview, each respondent was briefed on the objectives of the study. They were made aware that the interview would cost them time, their participation in the interview was voluntary, and they could opt out of the interview at any time. The respondents were assured that the information collected would not be disclosed nor released in any form that would allow their identity to be disclosed. In cases where reference has to be made to a particular respondents, their identity has been disguised (e.g. by use of letters or numbers), so as to ensure confidentiality. Consent to conduct the interview was sought and recorded, before the start of each interview. In cases where respondents were unwilling to participate or decided not to continue in the course of the interview, the interview was cancelled. For the first study phase, only two households were unwilling to participate, and one decided not to continue in the course of the interview, whilst for the second phase, 15 households were unwilling to participate, and two decided not to continue in the course of interview. The study was approved by the Bangor University College of Natural Sciences Ethics Committee.

CHAPTER 3: UNDERSTANDING CRITERIA FOR ASSESSING FOREST CO-MANAGEMENT PROGRAMMES IN MALAWI: A LOCAL PERSPECTIVE

Abstract

Criteria for assessing success or failure of forest co-management programmes may vary among different participating actors. Local communities are important actors in co-management, thus understanding their perceived criteria are important in evaluating forest co-management programmes. 134 community members and 21 committee members participating in a forest co-management programme were interviewed in order to understand how local actors in a co-management programme perceive, understand and define or identify criteria for assessing the forest co-management programme. Local actors identified five criteria that included the conservation, utilization and empowerment aspects of the programme. Local actors perceived community participation in decision making, access and availability of forest resources and infrastructure development as important criteria for assessing a co-management programme, in addition to impact on community livelihoods and forest conditions. Perceived criteria significantly differ between ordinary community members and management committee members, and are influenced by household socio-economic characteristics including the district or community of respondents, gender of household heads, wealth status and level of education.

***Keywords**: criteria, co-management, ordinary community members, committee member, actors.*

3.1 Introduction

Success and failure are terms commonly used in describing the status of forest co-management programmes (Axford *et al.*, 2008; Pagdee *et al.*, 2006). However, there are currently no globally agreed criteria or indicators for measuring the success or failure of forest co-management programmes (Bowler *et al.*, 2012; Pagdee *et al.*, 2006). Therefore, the criteria and indicators vary depending on how "success" has been defined and understood and by whom (e.g. Pokharel and Suvedi, 2007; Crook and Decker, 2006; Pagdee *et al.*, 2006).

A number of actors with diverse interests and goals are involved in the planning and implementation of forest co-management programmes, including community members (who are a diverse group in themselves, comprising committee members and ordinary community members, each with diverse interests), forest extension staff and donors. The different community groups and actors may perceive forest co-management programmes differently depending on their interest in the programme and socio-economic status (Castrol and Nielsen, 2001). Therefore, depending on their perspectives, each actor group as well as individual within the group, can identify different criteria for assessing co-management programmes, and defend their chosen criteria as the correct one (e.g. Pokharel and Suvedi, 2007; Crook and Decker, 2006; Pagdee *et al.*, 2006).

While acknowledging that all actors are important in the successful implementation of forest co-management programmes, community members (both committee members and ordinary community members), are said to be the main actors at implementation level (Agarwal, 2001; Pokharel and Suvedi, 2007; O'Hara, 2002; Shackleton *et al.*, 2002), thus important in determining its success or failure (Gibson *et al.*, 2000; Ostrom, 1999). Therefore, identifying their perspective and opinions as to what constitutes successful co-management is crucial for reconciling conservation objectives and community development goals in a forest co-management programme (O'Hara, 2002). Furthermore, identifying local perspectives facilitates the development of programme evaluation criteria and indicators that reflect elements that are important to local actors (the implementers or targeted community) as well as national or regional interests (Fraser *et al.*, 2006). Additionally, limited understanding of local communities' perceptions, and opinions with regards to forest management approaches (including co-management), and lack of integration of local people's views in forest management plans, could escalate forest exploitation and degradation (Wily, 2000; Weiss 2000).

However, few studies have identified local criteria for assessing success of forest co-management programmes (e.g. Guthiga, 2008; Pokharel and Suvedi, 2007). Additionally, researchers have often assessed the effectiveness of forest co-management using sets of criteria determined through literature reviews and based on the theoretical attributes of co-management, which at times do not reflect the interests of the participating local actors (Pinkerton 1989; Pokharel and Suvedi, 2007). Furthermore, forest co-management research and evaluations tend to be based on forest inventory data, with minimal consideration of the views of the local communities (Obiri *et al.*, 2010a). Therefore, using the case of a

committee-led forest co-management programme of government forest reserves in Malawi, this study presents quantitative data on; 1) criteria for assessing the success of a forest co-management programme from local perspectives; 2) the socio-economic factors influencing local criteria, and 3) the differences and commonalities between ordinary community members and committee members in identifying criteria for assessing the success of a forest co-management programme.

This study therefore contributes to the existing literature on community forest management, by improving our understanding of what local communities consider to be important criteria for assessing forest co-management. The knowledge gained will contribute to future assessment and evaluation of forest co-management programmes at both project implementation levels and national as well as regional levels, and furthermore the information gained could be applied in the development of effective evidence-based impact reviews, strategies and policies. Section 2 sets out the study's conceptual framework and hypotheses; section 3 describes the study area, methods and models used in data analysis. Results are presented and discussed in sections 4 and 5, and conclusions and recommendations for future co-management studies and policies in Section 6.

3.2 Study hypotheses

The hypotheses of this study are drawn from literature on: 1) local communities' perceived attitudes towards forest and forest management approaches (e.g. Htun *et al.,* 2011; Macura *et al.,* 2011; Mehta and Heinen, 2001; Mehta and Kellert, 1998; Obua *et al.,* 1998) and; 2) sustainable criteria and indicator (C&I) development (e.g. Jalilova *et al.,* 2012; Gelcich *et al.,* 2008; Pokharel and Larsen, 2007; Reed *et al.,* 2006; Napier *et al.,* 2005).

The study tests if criteria for assessing forest co-management differ with individual associations or actor groups (i.e. between committee members and ordinary community members). At the community level, the activities of a co-management programme are usually co-ordinated by a committee (Agrawal and Ribot, 1999; Malawi Government, 2007). Although committee members are part of the communities, they often have greater contact and communication with forest staff through training and formal meetings, than the ordinary community members. The increased contact with forest extension staff may enhance their knowledge and understanding of the project objectives as well as their appreciation for forest conservation (Bhattarai *et al.,* 2005; Pokharel and Suvedi, 2007). At times committee members may comprise only the elite of the society, e.g. wealthy individuals, educated, and

belonging to an upper caste or high class of a social hierarchy (Agarwal, 2001; Agrawal, 1997; Vyamana, 2009). Therefore it is plausible to expect that criteria for assessing forest co-management identified by committee members may conform to project objectives and differ from those identified by ordinary members of the community.

Attitudes, opinions towards, and understanding of co-management approaches may vary between communities as well as among individuals within a community depending on individuals' specific roles with regards to forest use and management, and socio-economic status (Agrawal and Gibson, 1999; McFarlane and Boxall, 2000; Mehta and Kellert, 1998; Poteete, 2004). Therefore, it is necessary to understand the variations in opinions among the actors as well as the casal relationships between the individuals' socio-economic characteristics and the variations in opinions towards forest management approaches (Obiri *et al.,* 2010a). Hence, the study further explores if individual characteristics determine individuals' choice of criteria for assessing success or failure of a forest co-management programme. The individual characteristics include; age, education level, major income source, wealth status, land ownership, gender (men and women), location. Chitinga and Nemarudwe (2003) highlight that age, education level, wealth status, gender and residency are usually a source of diverging opinions on forest policies, governance and management approaches among communities in most African countries.

Age is often used as a proxy for experience and knowledge, thus is an important factor in understanding local people's attitudes towards forest management approaches (Pokharel, 2012). Older individuals are expected to have better knowledge, understanding and experience levels of traditional forest management and conservation. For example, Dolisca *et al.,* (2006) found that whilst younger individuals may participate in forest management to contribute to decision making, older individuals may participate to contribute to conservation. Thus the study will investigate whether older individuals will identify criteria that are oriented to conservation and management activities, whilst younger individuals will identify criteria that are oriented to decision making aspects of the programme.

Although a number of studies have shown that levels of education may influence individuals' attitudes toward forest and forest management initiatives (e.g. Shrestta and Alavalapati, 2006; Lise, 2000), the direction of influence is inconsistent. For example, Mehta and Heinen (2001), found that formal education had a positive and significant influence on individual's attitudes toward forest conservation in some communities, however in other communities no significant relationship between formal education and individual's attitudes

toward forest conservation was observed. Shrestta and Alavalapati (2006) and Lise (2000), have argued that formal education enhances an individual's ability to obtain and understand information; hence educated individuals are more likely to identify with forest management programmes that are aimed at conservation. Furthermore, educated individuals may be more willing to participate in decision making activities as they may be better able to speak in meetings with forest extension staff than less educated individuals (Dolisca *et al.,* 2006). Therefore, more educated individuals[14] are expected to identify criteria that are based on conservation outputs and empowerment aspects of the programme (e.g. forest conserved and increased levels of participation in decision making activities), more than individuals with no formal education.

Lise (2000) and Mehta and Kellert (1998) found a positive relationship between household wealth and favouring forest management programmes that promote conservation. Wealthier households are often less likely to depend on forests for their livelihoods, hence it is expected that the criteria measuring success of co-management programmes identified by wealthy individuals will be conservation oriented rather than utilisation and access related. Similarly, individuals that depend on forest for their income source and livelihood often have positive perceptions of forest management approaches that allow resource harvesting and utilization (Lise, 2000; McFarlane and Boxall, 2000; Mehta and Kellert 1998). Therefore it is plausible to hypothesise that, individuals whose major source of income and livelihood is forest based, are more likely to identify with criteria that allow for resource harvesting.

Land ownership could be an indicator of individual or household's wealth status: individuals who own land and have bigger land holdings are regarded as wealthier than those with small land holdings (Kishindo, 2010). Furthermore, Lise (2000) and Mehta and Kellert (1998) suggest that landless individuals or those with small land holdings are dependent on forest and forest related activities for their livelihood and income. Thus I hypothesise that individuals with bigger land sizes will identify criteria that are conservation oriented, whilst those without land or with small land holding sizes will identify criteria that are oriented to access and use of forest resource.

Women and men have different perceptions towards natural resource conservation and forest management approaches (Colfer, 2005; Lise, 2000; Mehta and Kellert, 1998). Mehta and Kellert (1998) found that while men had positive and favourable attitudes towards community forest programmes, women's attitude were less favourable, due to varying needs

[14] Individuals with more years in formal education

and use of forest resources. In most developing countries, women in rural communities heavily depend on the forest for daily needs; hence prefer forest management initiatives that provided for their livelihood needs and interests (Colfer, 2005; Mwangi *et al.*, 2012; Raik and Decker, 2007). It is therefore plausible to hypothesize that women are more likely to identify criteria that allow for extractive use of the forest, than men.

Individual characteristics and social norms such as major livelihoods and income sources, land holding sizes, gender roles, are often influenced by geographical locations. Thus, people living in a similar location are more likely to share similar perceptions and attitudes towards the forest management initiatives (Macura *et al.,* 2011). For example, communities located in remote areas, may have more gender segregated roles than in urban areas, and communities close to urban areas may have less land holding than those in rural settings, as such having different attitudes towards forests and forest management approaches. Therefore, I expect an individual's community or location (i.e. Zomba or Ntchisi district) to affect their perceived criteria for assessing forest co-management programme.

Based on the literature and hypotheses discussed in this section two major hypotheses are tested in this study, namely:

1) Criteria for assessing forest co-management differ with individual association or actor group (committee members and ordinary community members).
2) Individual characteristics determine individuals' choice of criteria for assessing success or failure of forest co-management programmes.

3.3 Study methods

3.3.1 Data collection

The study was conducted from July 2011 to September, 2011, in communities living around Zomba-Malosa (Zomba District, Southern Region) and Ntchisi (Ntchisi District, Central Region) forest reserves, 2 of the 12 forest reserves within which the Malawi Government, through the Department of Forestry, is implementing the IFMSLP programme (see Chapter 2, Section 2.7). In Zomba the study was conducted in communities belonging to Group Village Mtuluma responsible for co-management of Mtuluma Block in the reserves, whilst in Ntchisi, it was conducted in the communities belonging to Group Village Nyanja, responsible for co-management of Nyanja Block in the reserves (see Chapter 2; Table 2.4).

Both qualitative and quantitative methods were used for a comprehensive inquiry and understanding of how different local actors define criteria for measuring success and failure of the co-management programme. The qualitative approaches included focus group discussions and key informant interviews, while individual interviews using a structured questionnaire were conducted to collect the quantitative data. A preliminary study to pre-test the survey questionnaire was undertaken before the start of the survey (Section 2.6.1).

3.3.1.1 Key informant interviews and focus group discussions

Prior to the questionnaire-based surveys, meetings were held with village leaders and block committee members to gather general information for identifying the different local actor categories in the co-management programme at local level and their potential interests and objectives, to supplement the data gathered through the questionnaires. Focus group discussions were done with community members in each study area before the start of the household surveys, to obtain general qualitative information about the programme and possible success or failure criteria from the community. Also, prior to the study a possible list of criteria and indicators was developed through literature review (e.g. Pokharel, 2012; Pokharel and Larsen, 2007; Pokharel and Suvedi, 2007; Crook and Decker, 2006; Pagdee *et al.,* 2006; Napier, 2004). Therefore, focus group discussions and key informants interviews further helped in identifying likely local or community level criteria for measuring the success or failure of the forest co-management programme and further informed in the development of the final individual questionnaire. The discussions further facilitated in identifying criteria or indicators representing a common underlying concept. Firstly, groups were asked to list all possible criteria or indicators, by naming things or elements that they thought would indicate that the programme is a success and then to naming elements that they thought would indicate that the programme is a a failure. Following this, each item or element was further discussed in order to understand what each mentioned criterion means from the local community's perspective. This was important because all identified criteria were used in regressions as dependent variables, hence when several items or criteria tap the same underlying concept, including them all separately in a regression can lead to problems of multicollinearity and increased measurement errors (Hamiliton, 2004).

3.3.1.2 Questionnaire-based survey

Face to face, structured interviews were conducted with a total of 134 ordinary community members and 21 committee members, across both study communities in Zomba-Malosa and Ntchisi districts (see Chapter 2; Table 2.4). Ordinary community members comprise household heads and other adult members of the community who do not have any leadership position on the programme block committee, whilst the committee members' actor group consisted of members of the block committee.

The questionnaire included both closed and open ended questions (Appendix 2.1). For the closed questions, respondents were prompted to give additional responses if the options given did not fit their perceptions. The questionnaires gathered information on respondents' perceived criteria for assessing success or failure of co-management and basic socio-economic and demographic characteristics including: age, gender, major income sources, education level. The individual socio-economic characteristics and demographic information were used in exploring factors that determine individuals' perceived criteria for measuring success or failure of co-management (Table 3.1).

3.3.2 Data analysis

Chi-square tests were used to test if perceived criteria for measuring success or failure of co-management differed between ordinary community members and block leaders. To explore socio-economic factors that determine individuals' perceived criteria for measuring success or failure of the co-management programme, logistic regression models were used[15]. The logistic regression model presents the log-likelihood of the explanatory variables on the success criteria, and was used with an assumption that each of the criteria was mentioned independently of the other, i.e. the choice of one criterion does not influence the choice of another. According to Wooldridge, (2002) the logit regression equation is specified as:

$$Logit[(Y=1)] = \alpha + \beta_1 district + \beta_2 wealth + \beta_3 sex + \beta_4 education + \beta_5 landsize + \beta_6\ forestlivelihood$$

The dependent variables were drawn from the questions or responses on what criteria respondents would use to measure success or failure of the co-management programme (Section 3.3.1.2*).* Dummy variables (i.e. *1=yes, 0=no*) were created for each of the criteria identified by respondents. For some criteria (i.e. conserved forest and improved livelihoods, *see section 3.4.1*), a number of aspects with the same underlying principle were combined to form a category, so as to avoid multicollinearity and increased measurement errors. The

[15] Only data from ordinary community members were included in the regression models

internal consistency of the categories was further measured by the reliability coefficient, Cronbach alpha (Cronbach, 1951), which ranges from 0 to 1; the larger the value, the greater the reliability of the scale (Spector, 1992). The alpha values for conserved forest and improved livelihoods were 0.7637 and 0.6254, respectively, suggesting that the aspect or elements combined to represents these concepts or criteria are reliable.

A number of studies have found or hypothesised that socio-economic factors including age, sex of respondent, major income sources, education level and community[16], have been found or hypothesised to affect community members' attitudes towards co-management (e.g. Htun *et al.,* 2011; Jalilova *et al.,* 2012; Macura *et al.,* 2011; Gelcich *et al.,* 2008; Pokharel and Larsen, 2007). Therefore the explanatory variables in our logistic regression are: district or community, wealth indicator, gender of household head, number of years in school, land size and forest based livelihood source. Tests for multi-collinearity were done for the different explanatory variables included in the models. The Variance Inflation factor (VIF) scores of ≤ 2 and Tolerance ranging from 0.67 to 0.81 indicate a weak correlation between the explanatory variables (Appendix 3.1; Allison, 1999). Bootstrapping (1000 resamples) was used in estimating the coefficients (Wooldridge, 2002). All the data analyses were conducted using STATA version 11.2.

Table 3.1: Description and summary statistic of explanatory variables used in the logit model

Variable	Mean	Std. Dev.
District (*1=Ntchisi, 0=Zomba-Malosa*)	0.54	0.49
Wealth indicator (*ordinal scale, 4-11*)	8.76	2.19
Gender of respondents (*1= male, 0=female)*	0.51	0.50
Age of respondents (in years)	37.31	13.59
Number of years in school	5.73	3.94
Land size (in hectares)	0.95	0.77
Forest based livelihoods (*yes =1; 0 = no*)	0.10	0.18

a. Wealth indicator ranged from 4 to 11, a score 4 representing the poorest and 11 being the richest household. The wealth indicator was created based on aggregate scores assigned to different house characteristic or type of dwelling house (see Chapter 2; section 2.5.2.1.1)

[16] In this study community is represented by district (i.e. Zomba or Ntchisi)

3.4 Results

3.4.1 Perceived criteria for measuring success (*or failure*) of co-management

During the discussions and individual interviews, respondents were asked to mention what things or elements indicated success of the co-management programme, followed by those that they perceive to indicate failure of the programme. However, I found that the criteria for failure were just the reverse of the aforementioned success criteria. For example, if a respondent or representatives in a focus group mention *improved access to forest resources (Fuel wood and NTFP)* as a criterion for measuring success, then the respondents or the group would most likely or certainly mention *reduced access to forests resources* as a criterion for failure. In some cases during the individual interviews, when respondents were asked what things or elements will indicate a failure of the co-management programme (i.e. following the success criteria), they would simply replied that "the opposite of what I have just said". Thus although indicators for success and failure were given equal weights; and I also initially planned to identify if any difference exist between what local actors will perceive as success and failure criteria of co-management programme, the results only present success criteria as the reverse is true for failure criteria (Table 3.2).

Criteria were either represented by a single item or by multiple items, both during the individual interviews and the focus group discussions. Participation in decision making and management; better access to forest resources (fuel wood and NTFP), were each presented as a single response in both Zomba and Ntchisi (i.e. as presented in Table 3.2). Similarly, common to sites, the criterion 'development projects and infrastructure' was represented by a single element, namely construction of roads. However, conserved forest and improved livelihoods as criteria for measuring success were represented by multiple items or elements with a common underlying concept, both by individual respondents and from the focus group discussions. The combinations of items or indicators with a common underlying concept representing each of the criteria (i.e. conserved forest and improved livelihoods), was first determined during the focus group discussions. Additionally, internal consistency of the categories was further tested by the reliability coefficient, and the alpha values for conserved forest and improved livelihoods were 0.7637 and 0.6254, respectively. This suggests that the combined items represent the criterion concept. Conserved forest as a criterion was represented by the following responses; no or reduced deforestation, increase in number of trees and regrowth/ seedlings and saplings and reduced tree felling. Thus conserved forest

mainly focused on deforestation and not degradation. Improved livelihoods as a criterion was represented by the following responses; increase in income level, increase in livelihood sources, increase in employment opportunities, establishment of income generating activities; provision of credit services; food security and improved knowledge and skills in both forest management and entrepreneurship.

A total of five criteria for assessing success of the co-management programme were identified by ordinary community members, in both Zomba and Ntchisi districts. These are; conserved forest, access to forest resources, community participation in decision making and management, establishment of community infrastructure and improved livelihoods (Table 3.2). Perceived criteria for measuring success of the programme were significantly different between ordinary community members and committee members in both Zomba and Ntchisi districts. Ordinary community members' emphasis was on access to forest resources and improved livelihoods, whilst committee members' emphasis was on forest conservation (Table 3.2).

Table 3.2: Criteria for measuring success or failure of forest co-management programme, as perceived by ordinary community members and committee members in Zomba and Ntchisi district

	Percentage response (%)			
	Zomba		Ntchisi	
Criteria	Ordinary members	Committee member	Ordinary members	Committee member
Conserved forest	25.4	96.7***	36.5	89.1***
Access to forest resources (Fuel wood and NTFP)	67.7	0**	86.3	9.8**
Participation in decision making and management	7.3	0	4.1	0
Development projects and infrastructure	4.9	6.6	4.3	5.8
Improved livelihood	58.9	33.7	66.8	35.3

Note: Asterisks indicate significant difference between actor groups with regard to participation in different programme activities (chi-square tests), at 1% (***) and 5% (**) level of significance.

Similarly when asked which one was the most important indicator, the majority of ordinary community members highlighted access to forest resources and improved livelihoods, whilst the majority of committee members highlighted forest conservation, and the difference was statistically significant in both Zomba (χ^2= *11.79, p= 0.036)* and Ntchisi districts (χ^2 = *8.97, p = 0.042)* (Table 3.3).

Table 3.3: Most important criterion for measuring success or failure of forest co-management programme, as perceived by ordinary community members and committee members in Zomba and Ntchisi district

	Percentage response (%)			
	Zomba		Ntchisi	
Criteria	Ordinary members	Committee member	Ordinary members	Committee member
Conserved forest	15.2	66.7	6.5	59.1
Access to forest resources (Fuel wood and NTFP)	41.7	0	56.3	9.8
Participation in decision making and management	7.3	0	4.1	0
Development projects and infrastructure	4.9	6.6	4.3	5.8
Improved livelihood	30.9	26.7	28.8	25.3

A majority of ordinary community members in Zomba (68%) and Ntchisi (63%) indicated that their perceived criteria are based on household goals, whereas, a majority of committee members in Zomba (76%) and Ntchisi (62%) indicated that their perceived criteria are based on programme goals (Figure 3.1), and these differences were significant (χ^2= 13.51 p = 0.001).

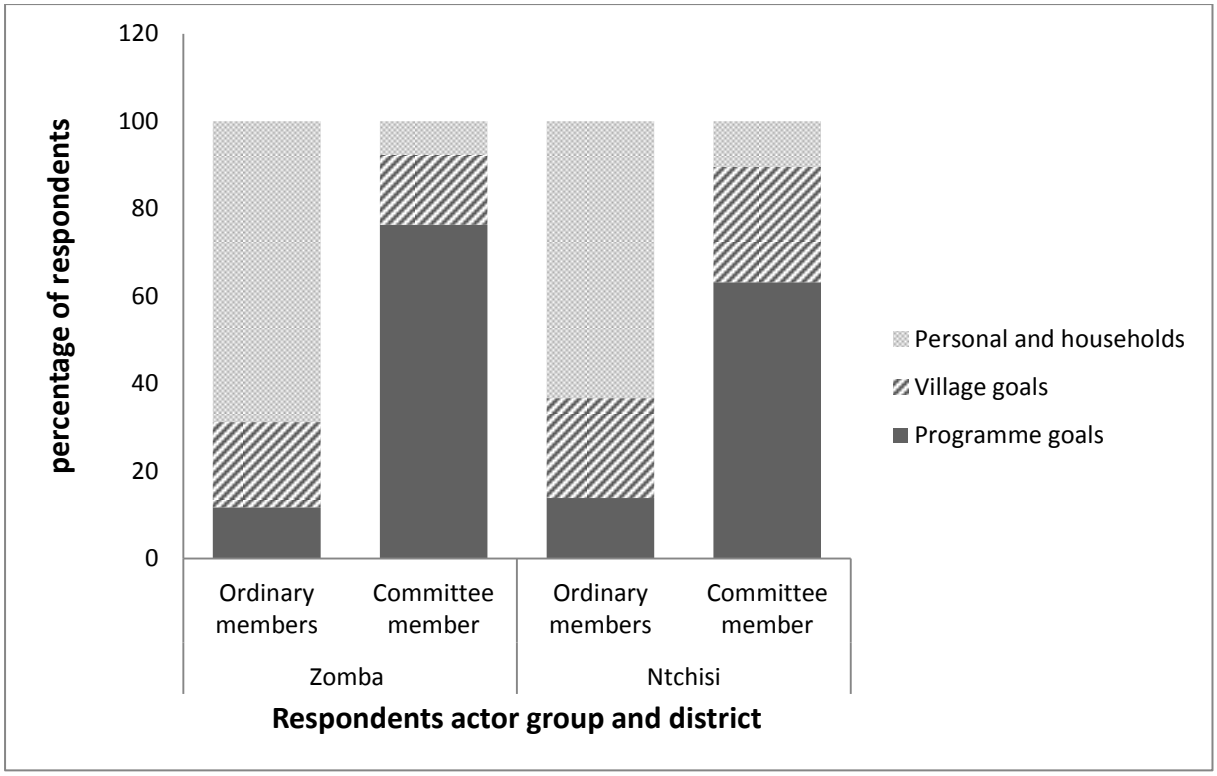

Figure 3.1: Percentage response of committee members and ordinary community members with respect to what forms the basis of their perceived criteria for measuring success or failure of forest co-management programme, in Zomba and Ntchisi district.

In Zomba district, comparison of means between ordinary community members and committee members shows that there is a significant difference in the number of years in school between ordinary community members and committee members (Table 3.4). Committee members in Zomba are more educated than ordinary community members. However, there is no significant difference in age, size of land owned, household size and wealth status between ordinary community members and committee members (Table 3.4). In Ntchisi district, however, comparison of means shows that there is a significant difference in age, size of land owned, education (number of years in school) and wealth status between ordinary community members and committee members (Table 3.4). Committee members in Zomba are older; more educated; wealthier and with larger land holding sizes than ordinary community members (Table 3.4).

Table 3.4: Comparison of means of individual characteristics variables between ordinary members and committee members

Variable	Zomba			Ntchisi		
	Ordinary members	Committee members	*t-statistic*	Ordinary members	Committee members	*t-statistic*
Age of household head (*in years*)	41.78	42.39	-0.39	39.81	43.12	-1.74**
Land size (*in hectors*)	0.7	0.88	-0.41	0.65	1.43	-1.64***
Household size (*number of adults and children*)	4.89	4.78	0.44	5.52	5.21	1.09
Number of years in school	4.83	5.55	-1.53*	4.64	6.78	-3.57***
Wealth indicator (*ordinal scale, 4-11*)	7.34	7.44	-0.45	6.87	7.75	-1.74*

*a= Significance levels *=10%; **=5%; *** =1%*

b= Wilcoxon-Mann Whitney test was used for the non-parametric variables (wealth indicator).

3.4.2 Determinants of perceived indicators for measuring success of the programme

The likelihood of perceiving conserved forest as a criterion for measuring success of a forest co-management programme is lower for respondents in Ntchisi than those in Zomba-Malosa ($p = 0.05$) and increases with increasing wealth status ($p = 0.10$), number of years in formal education ($p = 0.01$) and the size of land owned ($p = 0.001$). The odds of perceiving access to forest and forest resources as a criterion is higher for respondents in Ntchisi ($p = 0.001$) and female respondents ($p = 0.01$) and decreases significantly with increasing land holding size (Table 3.5). Perceiving community participation in decision making and management activities as a criterion is significantly higher for male respondents ($p = 0.001$), respondents with more years in formal education ($p = 0.01$). There is no evidence to suggest that any socio-economic characteristics significantly influence the perception of community development projects as a criterion for measuring success of the programme (Table 3.5). However, perceiving improved livelihoods as a criterion significantly decreases with increasing wealth indicator scores ($p= 0.001$) and number of years in formal education ($p = 0.1$).

Table 3.5: Factors explaining individual perceived criteria for measuring success or failure of co-management programme (Coefficients from logistic regression)

	Conserved forest		**Access to forest and forest resources**		**Participate in decision making and management**		**Development projects and infrastructure**		**Improved food security**	
	Coef.	*Std.Errors*	*Coef.*	*Std.Errors*	*Coef.*	*Std.Errors*	*Coef.*	*Std.Errors*	*Coef.*	*Std.Errors*
District (*1=Ntchisi, 0=Zomba*)	-0.34**	(0.25)	1.31****	(0.27)	0.57	(0.38)	0.05	(0.74)	-1.58	(0.32)
Wealth indicator (*ordinal scale, 4-11*)	0.07*	(0.03)	-0.04	(0.03)	0.04	(0.05)	-0.16	(0.12)	-0.14***	(0.04)
Gender (*1=female, 0=male*)	0.08	(0.30)	0.96***	(0.29)	-1.47****	(0.42)	-0.25	(1.01)	-0.07	(0.32)
Age (*in years*)	0.01	(0.01)	-0.01	(0.01)	-0.02	(0.02)	0.04	(0.03)	-0.01	(0.01)
Number of years in school	0.10***	(0.03)	0.01	(0.03)	0.14***	(0.05)	-0.13	(0.11)	-0.07*	(0.04)
Land size (in hectares)	0.09****	(0.03)	-0.05*	(0.03)	0.01	(0.03)	-0.08	(0.09)	-0.04	(0.04)
Forest based livelihoods *(1=yes; 0= no)*	-0.16	(0.36)	0.05	(0.34)	0.13	(0.42)	-0.52	(1.13)	0.23	(0.38)
Constant	-1.84***	(0.61)	0.88	(0.63)	-3.61****	(0.94)	-3.06	(1.91)	-0.59	(0.66)
Prob > chi^2	0.03		0.00		0.00		0.08		0.00	
Number of observations	134		134		134		134		134	
Log likelihood	-229.22		-218.10		-140.43		-40.31		-180.74	
Pseudo R^2	0.05		0.13		0.13		0.14		0.1188	

a. **= Significance levels (*=10%; **=5%; *** =1%; ****=0.01%)*

b. *All coefficients and standard errors are boot strapped*

3.5 Discussion

Whilst ordinary community members in Zomba-Malosa and Ntchisi identified five criteria for measuring success of forest co-management programmes, committee members identified only 3 (Zomba-Malosa) and 4 (Ntchisi) criteria. Conserved forest and improved livelihoods were the two criteria common to both ordinary members and committee members. These are also major policy goals and objectives of forest co-management programmes both at national and international level (Blomley *et al.,* 2008; Malawi Government, 2007). However, this study shows that in addition, other aspects of co-management and sustainable forest management such as: community participation in decision making; access to and availability of forest resources; and infrastructure development (which are usually not included in forest management impact assessment studies), are also important criteria for assessing a co-management programme from an ordinary community member's perspective.

As expected, perceived criteria differ significantly between ordinary community members and committee members, which is consistent with the findings of Pokharel and Suvedi (2007) and Sherry *et al.,* (2005), who found that important criteria and indicators for measuring success of forest co-management programmes differ between local communities and those in local authorities. Similarly, criteria identified by committee members, in both Zomba-Malosa and Ntchisi districts, are in agreement with the general programme objectives as outlined in programme baseline and midterm review documents and also the general or globally agreed policy of co-management programmes (Blomley *et al.,* 2008; Malawi Government, 2007). This supports the hypothesis that committee members' stated objectives for co-management programmes conform to project objectives and expected outcomes. However, this may reflect that committee leaders may just be imitating or copying the objectives of the state as presented to them and also government dominance in the programmes.

Committee members are elected as coordinators of the programme activities on the ground as well as representatives of the community. Whilst household goals and objectives form an important benchmark for identifying and defining criteria for measuring success of forest co-management programmes among ordinary community members, committee members largely define the criteria based on programme goals. Therefore the difference in perceived criteria and the basis for defining criteria show that the committee members are not necessarily representative of, and downwardly accountable to their constituents. This is

further evidenced by findings from focus group discussions and household interviews as ordinary community members reported a lack of formal or informal community forest management meetings with block committee members. Furthermore, I was unable to access any records of meetings in both Zomba-Malosa and Ntchisi. Therefore, there is an absence of a platform where the views of ordinary community members could be gathered by the committee members, and also where committee members could be held accountable by their constituents.

Additionally, although in theory every individual in the participating community can be elected as committee member; Table 3.4 shows committee members are more educated in both Zomba and Ntchisi. Furthermore in Ntchisi committee members were dominated by the affluent members of community. This corroborates the findings of Vyamana (2009), who found that committees in Joint Forestry Management communities in Tanzania were dominated by the rich. Related tendencies of elite dominance in community or participatory forest management committees have also been observed in Nepal (Agarwal, 2001; Agrawal, 1997). This suggests that the difference in perceived criteria for measuring success of forest co-management programme, between ordinary community members and committee members, may be due to the pre-existing differences in their socio-economic characteristics rather than their position in the programme. Furthermore, this suggests that committee members' affluent status in their respective communities and their education level was the main reason they were elected to be on the committee. This is further evidenced by findings from the key informant interviews, where a chairman and secretary of a block committee indicated that they held similar positions in other community development committees including health; school development; and home-base care groups for orphaned children and the elderly. The failure to represent ordinary community members, may therefore limit the programme's ability to address ordinary community members' interests and goals effectively, thus alienating them from the programme and potentially resulting in conflicts (Negendra, 2007; Rastimbazafy *et al.*, 2012).

Considering that committee members have more contact and communication with forest staff through training and formal meetings than the ordinary community members, it was expected that the views of committee member will be closer to the specific objectives of the programme than the views of committee members. However, the criteria identified by ordinary community members for measuring success of the programme were considerably

closer to the programme objectives (as outlined in Chapter 2; Section 2.3.1)[17] than those highlighted by committee members. This could suggest that ordinary community members were just mimicking what was presented to them by government in the initial stages of the programme (introduction and sensitization meetings), or what they heard from friends as objectives of the programme. However, during the focus group discussion, there was a general feeling that the initial activities (i.e. Sensitization meetings), were done with a limited number of individuals, especially those in leadership positions including group village heads, with the intention that the leaders will in turn sensitize their constituents. However, although key informant interviews with some village leaders indicated that they carried out the sensitization meetings with their constituents, the majority of community members both during focus group discussion and household interviews said that they have never attended community forest co-management meetings in both Zomba-Malosa and Ntchisi districts[18]. Furthermore, ordinary community members said that their perceived criteria are based on individual or household goals. Therefore, it is plausible to assume that the criteria for measuring success of the programme identified by ordinary community members are considerably closer to the programme objectives, because the programme designs took into account the needs of local people either based on literature or experiences from earlier projects in Malawi (e.g. Chimaliro and Liwonde forest co-management project with support from World Bank and United Kingdom-DFID from the years 1996 to 2003). This further suggests that the community forestry management programme in Malawi is evolving from the first generation community forestry which focused on structural issues such as tenure, protection, and regulation, to second generation community forestry that gives attention to issues such as equity, benefit sharing, and the wider livelihoods impacts (e.g. Lawrence, 2007). Additionally, the limited closeness of committee members views to specific objectives of the programme (as outlined in Chapter 2; Section 2.3.1), may also reflect that criteria given by committee members were those they perceived as culturally acceptable (social desirability bias), i.e. a desire to demonstrate that they value the desirable attributes of the programme (e.g. Loureiro and Lotade, 2005).

[17]The four primary objectives of the programme: (1) promotion of sustainable livelihood strategies within impact areas; (2) enhancing equitable access to forest resources by increasing the area under sustainable forest management arrangements; (3) strengthening governance of key forest resources; and (4) enhancing communication and advocacy among stakeholder groups within the forest sector.

[18] This is also reflected in the results presented in chapter 4; Table 4.4.

Community participation is one of the key principle components of a co-management programme, and as such is an important factor in the programme's success or failure. Interestingly, none of the committee members identified community participation as a criterion for measuring success. Similar findings have been shown by Pokharel and Suvedi (2007), who also found that ordinary communities are more likely than programme leaders to support participation in governance and decision making of forest programmes as criteria for success. Committee members are already in decision making positions, therefore less likely to consider participation in decision making and management as a criterion of success. Additionally, they may view ordinary community members' participation in decision making as a threat to their level of authority and other privileges that may come with their positions (e.g. training, access to new income sources and revenue). For example Zulu, (2008), suggests that the traditional leaders, who had '*de facto'* control over the resource, perceived the introduction of committee members in forest management as a threat to their '*de facto'* powers over the forests and forest resources. Thus, in a similar manner, current committee members may also view that their powers and privileges will be reduced if ordinary members actively participate in decision making. Ordinary community members are not in decision-making positions therefore would appreciate the ability to participate and influence decisions in the programme, hence ensuring that their interests are heard and/or addressed (Mmehta and Heinen, 2001; Gillingham and Lee, 1999).

Ordinary community members perceived access to forest and forest resources and improved livelihoods as major criteria for measuring the success of the programme. Forest resources form an essential part of their livelihoods, therefore attaining legal access to forest resources is an important benefit and one of the major reasons for communities' participation in co-management programmes (Cronckleton *et al.*, 2012; Napier *et al.*, 2005; Pomeroy *et al.*, 2001). Thus it is understandable that ordinary community members identified access to forest and forest resource, and improved livelihoods as criteria for measuring success of co-management. It is important to note that access to forest and forest resources as an indicator for success did not imply unrestricted harvesting of forest products, because the focus group discussions revealed that communities in both Zomba-Malosa and Ntchisi would prefer that access to forest should be controlled so as to allow continued use of the resources by the current and future generations. However, there were some differences within and across the discussion groups with regards to who should control access, as some members indicated that they would prefer if control of access were returned to government forest staff, whilst others indicated that the block committees should control communities' and user groups access to

forest resources. Additionally, ordinary community members acknowledge forest conservation as an important aspect for ensuring continued and future use and utilization value of the forest. This is evident as some ordinary community members identified conserved forest, as a criterion for measuring success of the co-management programme.

A very small number of respondents, both ordinary community members and committee members, identified community development projects and infrastructure as an important criterion of success of the co-management (Table 3.2). However, this does not imply that infrastructure development is of less importance to the communities, because, during the focus group discussions, development of a road network was highlighted as an important indicator of a successful programme in both Zomba-Malosa and Ntchisi districts. A road network, like any other community development project, has to meet community or in this case village goals so that it benefits the whole community. Therefore, it is plausible that only a few ordinary community members identified it as criterion, as a majority of ordinary community members expressed that they define the criteria for assessing success of forest co-management programme based on individual or household goals, not village goals (Figure 3.1).

Logistic regression shows that respondents in Ntchisi are less likely to perceive conserved forest as criteria for measuring success of forest co-management programme, than those in Zomba-Malosa. Poteete and Ostrom (2004) suggest that among other factors, community members may be willing to participate in conservation or motivated to conserve forests if they perceive their forest as degraded, otherwise if they perceive the forest resources as abundant, they may see no reason for restricting usage or employing strict conservation measure. Zomba-Malosa forest reserve is relatively more degraded than Ntchisi forest reserves (Chapter 5)[19]. Furthermore, during focus group discussions in Ntchisi community members said that their forest has mature and harvestable resources which they have just been tending, *de-facto*, over the years without accruing any benefits, hence they expected to be able to harvest some resources. Those in Zomba-Malosa said that their forest is very degraded, hence the need for regeneration and reforestation. Therefore, for community members in Zomba-Malosa, conservation of the available trees and improvement of the forest condition is a priority and thus a more important criterion for measuring success of the forest co-management programme than for communities in Ntchisi. Similarly, the

[19] The impact assessment result in chapter 5 shows that on average, Ntchisi forest reserve has more tree counts per plot (*mean*= 27 mature tree/ plot), than Zomba –Malosa forest reserve (*mean*= 11 mature trees/plot).

logistic regression shows that communities in Ntchisi are more likely to define access to forest and forest resources as a criterion for measuring success of co-management programme than those in Zomba-Malosa (Table 3.5). Thus communities that do not perceive their forest as degraded are more likely to define access to forest and forest resources as a criterion for measuring success of co-management programme. Consequently, therefore community's perception of the status of the forest will have an effect on the outcomes of the programme, as communities may interpret and respond to the rights that are transferred and given to them depending on their perceptions of forest stock and achievement of personal goals. For example, communities who perceive their forest as degraded may respond to the management and utilization rights given to them, by taking charge to conserve the forest, whilst those that perceive their forest as abundant may take advantage of the utilization right, by harvesting to meet their individual goal which if not done sustainably could result in forest degradation.

Individuals with larger land holdings are more likely to perceive forest conservation, and less likely to perceive access to forest and forest resources, as criteria. Individuals with large land holdings can ably meet their livelihood needs from agriculture; hence are likely to identify with conservation objectives outcome of co-management (Reij and Waters-Bayer 2001). However, for individuals with small land holdings, forest resources are an important supplementary livelihood source to agriculture (Poteete and Ostrom, 2004; Lise, 2000). This supports the study hypothesis that households with small land holding are less likely to identify forest conservation as a criterion for a successful forest co-management programme.

Female respondents are more likely to identify access to forest and forest resources as a criterion for measuring success of forest co-management than male respondents. The difference is due to differences in resource use and extraction among different gender groups (Colfer and Capistrano, 2005). This was also revealed during focus group discussion as participants indicated that women and youthful household members are largely responsible for collection of firewood and NTFP, and more involved in forest based livelihood strategies than men. However, Fisher *et al.,* (2012) and Mawaya and Kalindekafe (2007), suggest that even under a co-management programme, women's empowerment to exercise the utilization rights is limited, which further limits their level of investment (i.e. in time and labour) in programme activities. Thus, if women perceive that co-management enhances their rights of access and utilization (current or future), they may not only view or classify the programme as a success, but will be willing to invest more in programme activities, than if they perceive otherwise. Therefore, in designing forest co-management programmes, rights of use for all

actors and user groups should be clearly defined (Fisher *et al.,* 2012; Poteete and Ostrom, 2004; Ostrom, 1990).

Female respondents are less likely to perceive participation in decision making and management as a criterion. This is expected as due to cultural norms and practices, female members of community rarely assume decision making positions and rarely contribute during public decision making forums (e.g. Mawaya and Kalindekafe, 2007). This was also noted in the mixed gender focus group discussion, as women rarely contributed, unless specifically requested by the facilitator or during women only group discussions. Furthermore, Upadhyay (2005) argues that due to cultural norms and practices, male community members hardly appreciate female members' contribution in decision making, such that even in women only community forest projects, men still make the final management decisions. Therefore, cultural norms and practices influence local perceptions and attitudes towards forest management programmes including co-management approaches (e.g. Salomao and Matose, 2006; Shackleton *et al.,* 2002). However, this does not imply that women do not want to contribute in decision making, but highlights the need for establishment of appropriate forums, that could enable the marginalized in society to be heard and benefit from programme effectively (Meinzen-Dick and Knox, 2001). Similarly, evaluation and impact assessment studies and reviews should be designed to capture both the elite and marginalized perspectives and experiences.

The logit results support the hypothesis stating that individuals with more years in formal education are more likely to identify with criteria that are conservation oriented (Table 3.5). This further supports the claim that formal education is thought to enhance positive perceptions towards forest conservation and management in an individual (e.g. Samdin *et al.,* 2010). However, community knowledge in forest conservation and benefits cannot be limited to attendance in formal education only, but could also be enhanced through other informal trainings, awareness meetings, constant contact with conservation experts (e.g. forest extension staff) and transfer of local knowledge among community members both in time and space (Charnley *et al.,* 2008; Bhattarai *et al.,* 2005). Therefore, capacity building with regards to forest and forest management among participating communities is essential for achievement of forest co-management conservation objectives. Furthermore, capacity building should also integrate traditional and local knowledge with regards to forest conservation and utilization (Berkes, 2009; Charnley *et al.,* 2008).

Finally, individuals with more years in formal education are less likely to perceive improved livelihoods as a criterion for assessing success of the forest co-management programme. This is attributed to the fact that attaining formal education is positively associated with individuals' ability to get employment and diversify their income sources (Hatlebakk, 2012), hence less likely to depend on forest as their major source of livelihood and income. The wealth indicator also shows a similar trend, in that richer individuals are more likely to perceive conserved forest as a criterion for measuring success of co-management, yet less likely to perceive improved livelihoods as criteria for measuring success of co-management.

3.6 Conclusion

Five criteria for measuring success of the programme namely; improved livelihoods, access to forest resources, community participation in decision making and management, conserved forest and establishment of community infrastructure were identified. A majority of ordinary community members measure success or failure of the co-management programme based on how the programme is addressing or can meet their individual goals. From a local perspective a successful forest co-management programme should address both the utilitarian value of the forest and ecological conservation. Indicators for measuring success or failure of forest co-management differ with individual characteristics and actor group. In addition to livelihoods and forest conditions indicators, assessments of forest co-management should thus include the criteria and indicators that reflect local actors' perspectives. A community's perception of the status of the forest may affect their criteria and the outcomes of the programme, as communities may interpret and respond to the rights that are transferred to them according to their perceptions of forest condition. Community perceptions of criteria for measuring success or failure of programmes may be determined by a number of household socio-economic characteristics, including district/ community, gender of household heads, wealth status and education. Evaluation and impact assessment studies should be designed to capture perspectives and experiences across social strata (e.g. gender, wealth) within a community. Cultural norms and practices influence local perceptions and attitudes towards forest management programmes therefore co-management programmes should be able to create appropriate fora that will enable the marginalized in society to be heard and benefit from the programme. Furthermore, for a programme to be effective it must

be understood and implemented within the existing local social, cultural, economic and ecological status or environment.

CHAPTER 4: CAN CO-MANAGEMENT OF GOVERNMENT FOREST RESERVES ACHIEVE DEVOLUTION? EVIDENCE FROM MALAWI

Abstract

Forest co-management programmes involve devolution of decision making powers to local institutions. The decentralization framework developed by Agrawal and Ribot (1999) was adapted to determine whether the forest co-management programme in Malawi has achieved devolution. 134 community members and 21 committee members were interviewed about their perceptions of how powers and management rights are devolved, to whom, and how those with power, are accountable. I found that while co-management has established elected local institutions, they are not yet empowered to actively participate in decision-making. I also found a lack of downward accountability of leaders to their constituents, which has limited devolution.

Keywords: *Decentralization, devolution, power, benefit sharing, participation, forest co-management*

4.1 Introduction

Community-based approaches to natural resource management, which include forest co-management, have formed part of a wider trend of decentralization of governance (Cronkleton *et al.,* 2012). Decentralization of forest management refers to the transfer of authority and management functions from central to local governments and local users (Tacconi, 2007). Decentralization approaches in forest management are typically promoted on the grounds of improving equity in decision making, resource management and benefit distribution (Coulabaly-Lingani *et al.,* 2011; Bene *et al.,* 2009). Additionally, they are often assumed to be effective for forest resource conservation and sustainable utilization, as those who are dependent on the resource are expected to be more responsible in their management and use if they own the resource (Bene *et al.,* 2009), though evidence for this remains scarce (Bowler *et al.,* 2012 and 2010). Thus, proponents of decentralization argue that co-management allows governments to protect forests and improve local livelihoods by providing communities with the legal and political authority needed to enforce rules and systems formulated by the community for the community (Nielsen *et al.,* 2004).

However, Colfer and Capistrano (2005) suggest that in terms of process change and the level of power and responsibility transferred from central to local governments and local users, decentralization has taken many forms including (in increasing order of power transfer) deconcentration, delegation and devolution (these terms are discussed further in section 2). Gregersen *et al.,* 2005; Edmunds *et al.,* 2003; and Ribot, 2003, argue that co-management of forest resources should take the form of devolution as it should involve transfer of both decision making powers and responsibilities to local institutions. Yet real devolution is rarely achieved, because governments often transfer only responsibilities and not decision making powers (Bene *et al.,* 2009; Bhattacharya *et al.,* 2010; Blaikie, 2006; Platteau, 2004; Shackleton *et al.,* 2002). Thus, few examples of successful devolution exist in forest management (Fisher, 1999).

This chapter assesses whether the committee-led forest co-management programme of government forest reserves in Malawi has achieved true devolution using the decentralization framework developed by Agrawal and Ribot (1999), which is introduced and adapted in Section 4.2. Section 4.3 describes the case study and the qualitative and quantitative approaches used to elicit community perceptions of three important elements of decentralization: a) to whom are rights, powers and responsibilities devolved in the programme; b) to what extent are local communities and representatives empowered to influence decisions and access benefits and; c) to whom are the actors and local institutions accountable. Section 4.4 presents findings of the study, including on the role and place of traditional leaders in the programme. The results are discussed in section 4.5, and in section 4.6 I draw conclusions and make recommendations about the interventions necessary to achieve true devolution in co-management programmes for natural resources.

4.2 Forms of decentralization and conceptual framework

4.2.1 Defining forms of decentralization

A number of terms and definitions are associated with decentralization and have been used to refer to different decentralization processes, at different stages and in different contexts. However, although these terms are widely used, different authors have interpreted them differently and use them to refer to different things (Yuliani, 2004). In this study only three forms of decentralization were considered: deconcentration, delegation and devolution, and this section briefly defines the terms as they will be used in this chapter (Figure 4.1).

Deconcentration occurs when power is transferred from central governments to lower level government implementation entities or local government agents (Sayer *et al.,* 2005). The actors (government field agencies) to whom the responsibilities are allocated are upwardly accountable only to the central government (Ribot, 2003; Larson, 2005). Gregersen *et al.,* (2005) and Poteete (2004), argue that deconcentration does not involve transfer of decision making powers to the actors, but only a shift and redistribution of responsibilities. Hence the field agents only execute policies that have been centrally defined by forest officials at headquarters (Gregersen *et al.,* 2005).

However, if limited decision making authority and responsibilities shift to other public organizations outside normal Government forest headquarters' control or semi-independent units, then the reform may be termed delegation (Gregersen *et al.,* 2005; Poteete, 2004; Ferguson and Chandrasekharan in Colfer, 2005). These could be provincial governments, parastatal agencies, Non-Governmental Organisations (NGO's) and their representatives, forest cooperatives and project implementation units for donor funded projects. However, these actors still do not assume significant decision making power and remain subordinate and upwardly accountable to government (Rojas, 1999).

For devolution to occur, independent local actors must gain decision-making authority, and central government should also transfer power on management and utilization to local actors that are accountable to local people (Bergh, 2004). This form of decentralization is considered by Ribot (2003) and Agrawal and Ribot (1999) to provide the greatest benefits to communities and to increase popular participation in local decision making. Forest co-management approaches should therefore assume this form of decentralization (devolution), as it should involve transfer of real powers to local institutions that are downward accountable to local citizens through electoral processes (Agrawal and Ribot 1999; Babin and Bertrand, 1998; Edmunds *et al.,* 2003; Larson, 2005; Pomeroy *et al.,* 2001).

4.2.2 Decentralization framework

I adapt Agrawal and Ribot's (1999) framework for analysing decentralization of forest management in order to identify whether co-management of government forest reserves in Malawi has achieved devolution (Figure 4.1). The framework identifies three principal elements of decentralization in forest and natural resources management. These are; a) to whom are the powers or responsibilities transferred (actors, structures and institutions);

b) what is being transferred (decision making power and/or responsibilities) and; c) to whom are the new institutions accountable (Figure 4.1).

4.2.2.1 Elements of decentralization

4.2.2.1.1 Actors

For a co-management programme to achieve true devolution; the actors should be: local (not in central government's control hierarchy); empowered to make or contribute to management decisions; and accountable to their constituents, i.e. downwardly accountable. Actors in co-management projects may include appointed or elected officials, NGOs, chiefs, individuals, and committees. However, allocating powers to actors that are already in power, such as chiefs and other administrative committees, may compromise the representation of communities and the achievement of a democratic decentralization (Ribot, 2003). Coulibaly-Lingani *et al.*, (2011) found that communities expressed opposition to, and dissatisfaction with, letting existing local institutions govern the management of forest. Thus, the establishment of new representative institutions and actors may be necessary for community representation and inclusion (Zulu, 2008; Ribot, 2003). Therefore, I identify to whom the various powers or responsibilities are transferred.

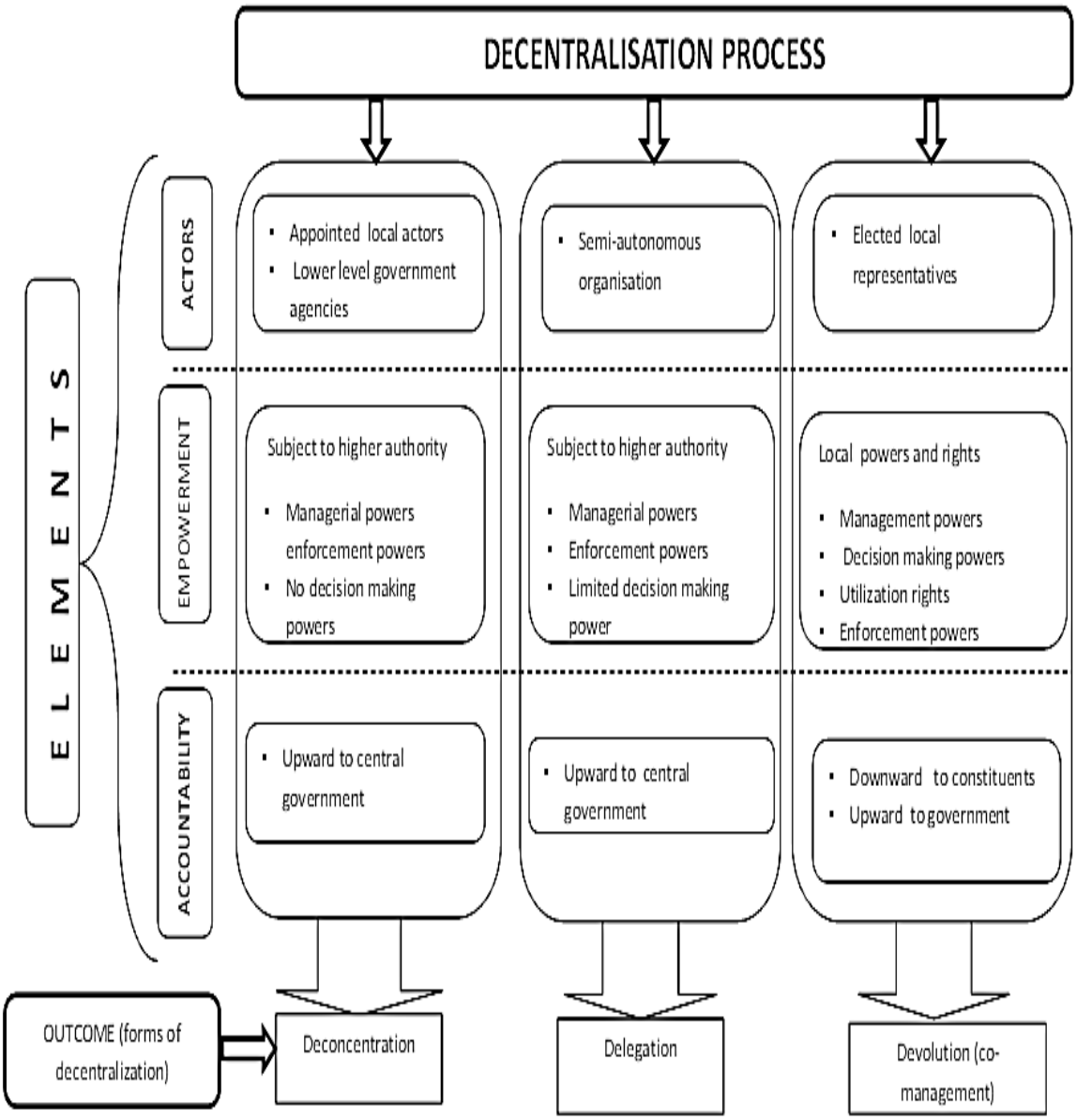

Figure 4.1: Conceptual framework of decentralisation, developed from the decentralization framework proposed by Agrawal and Ribot (1999).

4.2.2.1.2 Empowerment

Decentralization of natural resource management requires the devolution of both responsibilities and power (Agrawal and Ribot, 1999). Furthermore, communities should have powers to access, utilize and benefit from the resource equitably (Bene *et al.,* 2009; Cronkleton *et al.,* 2012). Thus, empowerment of communities to actively participate in policy, management and utilization decisions is a basic premise of community-based management approaches (Bene *et al.,* 2009). Power refers to rights possessed by an individual or groups of individuals that allow them to influence the course of action or events and alter the behaviour of others (Cirera and Lovett, 2006). Power shapes the interactions among structures, processes, rules, and traditions that determine how responsibilities are distributed, how decisions are made, and how various actors are involved (Hempel, 1996). Agrawal and Ribot (1999) noted that without understanding the powers that different actors possess, the domains in which they exercise them and to whom and how they are accountable, it is impossible to learn the extent to which decentralization has taken place.

Agrawal and Ribot (1999) recognised four broad powers of decision making crucial in natural resources. These are powers to: a) implement management activities; b) make decisions on management and utilisation; c) create and modify rules and regulations and ensure compliance of the formulated rules and regulations, and; d) solve disputes (Figure 4.1). Therefore, these powers should be exercised accessibly and without systematic bias and should be applicable even at the lowest level of the implementation structure in a co-management programme. Central to the transition from centralized natural resource management to decentralization is the involvement of local people in decision making (Feeny *et al.,* 1990). The possibility of attaining decision-making power is also believed to be one of the major reasons why local people may decide to participate in co-management of forests (Buchy and Hoverman, 2000). Therefore, we identify the level of empowerment of the participating actors by determining: in which activities the different actors participate; what powers and right do they exercise; and who benefits from the activities and how.

4.2.2.1.3 Accountability

Accountability is crucial to the effectiveness of decentralization, whether in political governance or in forest co-management (Tacconi, 2007; Ribot *et al.,* 2006). Accountability means having to answer for one's action or inaction, and depending on the answer, to be exposed to potential sanctions (Oakerson, 1989). In devolution, accountability allows one to be both accounted to and account to others (Oyono, 2004). Agrawal and Ribot (1999) suggest that powers should be decentralized to actors who will be accountable both downward to the

community and also upward to superior authorities (Agrawal and Ribot, 1999). Downward accountability is the primary dimension of decentralization since it can broaden the participation of local populations (Agrawal and Ribot, 1999). Downward accountability focuses on how recipients of power and authority (e.g. committee members), are accountable to their constituents (Larson, 2005, Ribot *et al.*, 2006). Actors' downward accountability could be enforced through: electoral processes; third party monitoring; auditing and evaluations; and public reporting. Therefore, the framework assumes that accountability in decentralization of forest management can be determined by identifying how the actors are appointed and monitored and how often. Furthermore, the existence of sanctions that are enforced would also ensure accountability in devolution of natural resources management.

However, in co-management programmes, there is also a need for some degree of upward accountability of appointed and representative actors to the government, to facilitate protection of the forest's public services, e.g. watershed protection and soil conservation (Oyono, 2004). Furthermore, in a co-management programme of government forest reserves there is, normally, continued involvement of state actors who have to facilitate the implementation on the ground; therefore, these have to be both upwardly accountable to the headquarters as well as downward accountable to the communities.

Transparency and accountability in the handling of revenue is an integral part of devolved governance in forest management (Lund and Treue, 2008; Tacconi, 2007). Zulu (2008) found that forest management committee members often hid financial records from both community and government, leading to a loss of trust and community participation. Therefore we also pay attention to how forest committees handle revenue as well as their expenditures.

4.3 Study methods

The study was conducted between July and September 2011. The study was conducted in Zomba-Malosa (Zomba district, Southern region) and Ntchisi (Ntchisi district, Central region) forest reserves, 2 of the 12 forest reserves within which the Malawi Government, through the Department of Forestry, is implementing the IFMSL programme (see Chapter 2, Section 2.5). In Zomba the study was conducted in communities belonging to Group Village Mtuluma responsible for co-management of Mtuluma Block in the reserves. Whilst in Ntchisi, it was conducted in the communities belonging to Group Village Nyanja,

responsible for co-management of Nyanja Block in the reserves (see section 2.6 for full details of the study sites).

A number of authors have argued that, in most cases, devolution of forest co-management programmes occurs only on paper and not in reality on the ground (e.g. Bhattacharya *et al.,* 2010; Bene *et al.,* 2009; Blaikie 2006; Platteau, 2004; Shackleton *et al.,* 2002). Therefore, it would have been plausible to use observational data collection methods (e.g. observing committee and community meetings and other co-management activities and events) in order to assess whether the co-management programme can or is aiming to achieve devolution. However, it was not possible for me to sit in on any committee or community forest management meetings because they apparently did not take place during both fieldwork periods (July to September 2011, and August to October, 2012.) Furthermore, an effort was made to access evidence of these meetings in the form of records as to when and where the meetings took place and who attended the meeting. However, I was unable to get any records of meetings at either committee and district level, as the organisations were unable to supply me with any during the time of study. This led me to suspect that forest management meetings did not take place regularly in the study area. Therefore, the data presented here are based on participating communities' perceptions of co-management, elicited through both qualitative and quantitative methods for a more comprehensive inquiry and fuller understanding of community perceptions with regard to co-management processes and implementation, which is not easily achieved if either method is applied alone (Babbie, 2001). The qualitative approaches include focus group discussions and key informant interviews, while individual interviews using a structured questionnaire were conducted to collect quantitative data. A preliminary study to pre-test the survey questionnaire was undertaken, before the start of the survey (Section 2.6.1).

4.3.1 Data Collection

4.3.1.1 Key informant interviews and focus group discussions

I conducted key informant interviews with village leaders and forest block committee members, as well as focus group discussions with community members in each study area before the start of the household surveys. The key informant interviews and focus group discussions were done to obtain qualitative information on: how the co-management

programme is being implemented in the area; who are the actors[20] or who is involved in the implementation; and the general community perceptions of processes and implementation of the co-management programme. Separate focus group discussions were also conducted with the different local actor groups identified, e.g. local leaders, committee members, and traders groups, to further capture how the programme process and elements are perceived within the groups. In addition, discussions with women and youth only groups were conducted to ensure that perceptions from all gender and age groups informed the study.

4.3.1.2 Questionnaire-based survey

Individuals belonging to different groups or stakeholder categories may have different perceptions and opinions with regard to functional processes and operations of the co-management programme (Pagdee *et al.*, 2006; Pokharel and Suvedi, 2007). At community level, actors in the co-management programme in Malawi can be categorised into two groups of local people. These are committee members and ordinary community members. Committee members are local people in leadership positions and they co-ordinate the activities of a co-management programme at local community (Agrawal and Ribot, 1999; Malawi Government, 2007). Thus they are more often in contact with forest staff, than ordinary community members. Furthermore, communities tend to select committee members who are the elite of their society e.g. wealthy individuals, educated, and those belonging to high class of a social hierarchy (Agarwal, 2001; Agrawal, 1997)[21]. Thus opinions and perceptions of the forest co-management identified by committee members may differ from those of ordinary community members. Therefore, to capture these dynamics and the perceptions of all actors in the co-management programme at community level, the respondents to the face to face, structured interviews were grouped into committee members, and ordinary community members. Additionally, the main point of contrast in this study is committee members versus other ordinary community members so as to capture issues of committee accountability to ordinary community members, elite capture in participation and benefit flows of the programme, and what has been devolved and to whom in the co-management programme, in practice.

[20] Actors were defined as all individuals or groups of people who are interested and involved in the activities of the forest co-management programme, including management and utilization (e.g. Obiri *et al.,* 2010)

[21] An example I found in Ntchisi (Nyanja block) is that the chair of the co-management block committee, is also the chair for the community education, health and development committees. One of the reasons for this is that, he is capable of reading and writing (former primary school teacher).

The committee member actor group consists of block committee members and leaders whilst the ordinary community members comprise household heads and other adult members of the community who do not have any leadership position on the programme committee. The ordinary community members were also subdivided into actor groups (e.g. household heads[22] and other adults), to capture any user group differences in perceptions and opinions of of the co-management programme that may exist within a household and which may not be captured or revealed if all individuals within a households are treated as one homogenous group. Therefore, face-to-face, structured interviews were conducted with a total of 134 ordinary community members and 21 committee members across both study sites (see Chapter 2; Table 2.4).

The questionnaire included both close and open-ended questions, covering: 1) basic demographic information; 2) local actors' knowledge of the programme; 3) their opinions and perception of how the programme was being implemented; 4) local actors' participation in programme activities including decision making processes and formulation of rules; 5) what rights they possess; 6) what benefits they accrue from the rights; 7) how benefits are distributed, and; 8) their perceptions of how accountable the block committee is and to whom they are accountable (Appendix 2.1). Furthermore, the questionnaire was used to identify individual perceptions as to what has been devolved and how transparent and accountable the committee is with regards to revenue. The data was analysed based on the three elements of devolution, namely actor, empowerment and accountability (Figure 4.1). Data was analysed in STATA version 11.2.

4.4 Results

Although I expected a difference in responses between household heads and other adult members of the community (i.e. sub groups within the ordinary community member actor group), the initial analysis of the data showed no difference in opinions and perceptions between household heads and other adult members of the community. Therefore, responses, opinions and perceptions from household heads and other adult members were lumped together as ordinary community members. Thus, the focus of contrast for all the results in this section is between ordinary community members and committee members.

[22] In Malawi, household heads are usually male, however, in some cases widows, divorcees, or women whose husbands are working away are regarded as household heads as they do all almost all of the work customarily required to be done by men (or household heads).

4.4.1 Actors in the programme

Both committee members and ordinary community members in both Zomba-Malosa and Ntchisi identified multiple actors operating at different levels of the programme, with different roles and responsibilities (Table 4.1 and Table 4.2). The actors included: elected block committee members, ordinary community members, village heads and forest extension staff. Focus group discussions also revealed that committee members and community members operate at block or community level, whilst forest extension staff operate at both block or community level and district level. Additionally, small entrepreneurs' and traders were also highlighted as actors in co-management programmes during key informant interviews and focus group discussions in both Zomba- Malosa and Ntchisi forest reserves (Table 4.2).

Table 4.1: Actors in the co-management programme in Zomba-Malosa and Ntchisi districts, as perceived by ordinary community and committee members.

	Percentage response (%)			
	Zomba-Malosa		Ntchisi	
Actors **Respondents** →	Ordinary members	Committee members	Ordinary members	Committee members
Block committee members	88	100	84	100
Ordinary community members	74	100	78	100
Village leader	64	56	68	46
Forestry extension staff	77	100	72	100

a. *Percentage doesn't add up to 100; question was open for all possible responses.*

Table 4.2: Actors in co-management programme, their interests and roles and responsibilities, as perceived by participating community members in Zomba-Malosa and Ntchisi districts

Actors	Interest	Roles and Responsibilities
Ordinary community members: *(Local people without any position of leadership in the programme)*	• Subsistence; • Income and employment; • NTFP • Firewood	• Users and beneficiaries of CFM; • Management activities • monitoring •
C**ommittee members**:*(Block Management Committee members and Village Natural resources Committee members)*	• Management of activities • Subsistence; • Income and employment; • Development projects	• Management of forest • Monitoring • Rule enforcement • Conflict resolution- managing conflict within or among communities. •
Traditional Leaders: *(Group Village heads and Village heads)*	• Power and influence • Conservation of resource • Development project	• Supervision • Conflict resolution- managing conflict within or among communities. •
Government: (*Field and extension staff)*	• Conservation of Forest resources, and biodiversity; • Revenue collection; • Custodian of law	• Guidance in management and implementation of CFM activities ; • partners in management of the Forest; • Training communities • Provision of funds
Small entrepreneurs-*user groups (Firewood groups, timber traders group, beekeeping group)*	• Timber or Wood • Wood and NTFP processing, • Markets • Raw materials	• Entrepreneurial investment in forest development and forest-based industries • Capital, expertise and market access.

4.4.2 Actor empowerment

4.4.2.1 Participation in management, decision making and benefit sharing

Respondents in both Zomba-Malosa and Ntchisi identified a number of management activities and operations that community members (i.e. both ordinary community members and block committee members) implement in the co-management programmes. These activities were classified into four major activity groups: 1) forest management; 2) decision making; 3) benefit sharing; and 4) capacity building (Table 4.3).

Table 4.3: Major co-management activities, processes and operations identified by respondents

Activity group	Activities
Forest management	• Boundary Marking; • Fire break maintenance; • Reforestation; • Monitoring and patrolling
Decision making	• Participation in meetings; • Planning the activities/work plan formation • Formulating rules and regulations
Benefit sharing and resource utilization	• Harvesting products • Employment • Financial benefits (e.g. income generating activities)
Capacity Building	• Training

Forest management activities being implemented under the co-management programme include boundary marking and construction, firebreak maintenance, controlled early burning, firefighting, controlled harvesting, reforestation and monitoring and patrolling. Boundary marking and construction, fire break maintenance, controlled burning, controlled harvesting, are mostly implemented during the dry season (July-October) when demand for agricultural labour is low and when forest reserves become more susceptible to wild fires. Re-forestation activities start with the establishment of communal tree nurseries in July, so that the seedlings are ready for transplanting during the rainy seasons (December to March). The seedlings are planted in and around the reserve, on communally designated village forest

areas, or in individual homesteads[23]. It was indicated that monitoring and patrolling is an on-going activity throughout the year, as illegal harvesting (e.g. timber cutting and charcoal burning), could take place at any time of the year.

Focus group discussions and key informant interviews in both Zomba-Malosa and Ntchisi, revealed that decision making activities in a co-management programme include, drawing up forest block management plans, local bylaws to govern the community group, developing and establishing management practices for specific forest products. The management plan and practices include dividing the forest block into coupes or forest management units (these facilitate in deciding which areas can be harvested and those that cannot be harvested), what products can or cannot be harvested and in what quantity and when harvesting can be done. For example, grass and mushrooms can be collected from all forest management units, whilst timber can only be harvested from designated units which have mature and adequate harvestable stock, as determined by forest inventories. Additionally, communities have to develop and agree on a management plan or practice, specific for each forest product that they are allowed to harvest. The plan should include, when to harvest (i.e. months of the year), quantity permitted, fees per quantity depending on whether it is for domestic or commercial use, and who should issue the permits for harvesting. (Appendix 4.1: an example of a management plan for grass, which is an important building resource for most village households in the study area and throughout rural Malawi). Additionally, decision making involved deciding what forest management activities will be done, who will do them, when the activities will be done and what are the output indictors for the implemented activity. Furthermore, participating communities have also to agree on rules to govern the forest management co-management programme. Each rule agreed upon was accompanied by penalties, to be enforced when the rule is contravened (Appendix 4.2). Focus group discussions in both Zomba-Malosa and Ntchisi, revealed that block committee members are responsible for ensuring that the rules are followed as well as enforcing the penalties and sanctions to transgressors.

In return, for participating in sustainable forest management activities, the programme legitimizes participants' access and use of forest reserves to collect various forest products. These include collection of fuel wood (i.e. from dead trees), thatch grass, poles, fodder, mushrooms, wild fruits and other non-timber forest products (NTFP). Collection of these

[23] Some communities indicate that, they share some of the raised seedlings with households or individuals who took part in establishing and raising the nursery, so that they can plant in their respective homesteads.

products from the forest reserves has to be according to what has been stipulated in the management plans and the contract agreement with the forest officials or Government. The committee is mandated to control who and how these products are accessed, by issuing permits. Examples of various forest products permit fees are presented in Appendix 4.3. In Ntchisi forest reserves, timber could also be harvested from designated tree species in specific forest management units. The participating communities also have access to financial benefits at community level, sourced from the access permit fees and penalty fees. During focus group discussions and interviews with committee members it was revealed that the financial benefits are used for village development, village loans with 10% interest and forest management. Typically, committee members manage the revenue on behalf of their respective constituents. Additionally, local people within participating communities could have access to wage employment during construction of fire breaks and forest roads. Individuals participating in the wage employment, earn approximately MK 200 per day (approximately USD 0.69[24]). Furthermore, the study revealed that community members could also have access to other forest-based and non-forest based income generating activities that are being initiated and promoted by the programme in both Zomba-Malosa and Ntchisi districts. These include, timber trading, firewood trading, pottery, mushroom cultivation and bee keeping. The programme provided the communities with the initial capital (e.g. materials and transportation of the goods) and basic training for the specific income generating activity. During focus group discussion, it was highlighted that access to the income generating activities is group based, not individual. However, in both Zomba-Malosa and Ntchisi, it was not clear from either the qualitative or quantitative data on what procedures were followed for one to join a specific trade. However, during group discussions with specific trade groups, it was noted that the majority of individuals participating in these discussion were the same for all trade groups.

The programme also funds and provides a number of capacity-building activities including training in forest management or silviculture practices to community members. However, I found that the trainings only involve a few individuals at a time. At most times trainings target committee members, with an understanding that following the trainings they will in turn train their constituents. The programme is also initiating and promoting forest based income generating activities to facilitate diversification of household livelihoods and income sources, hence I also found out that the programme has so far provided participating

[24] Exchange rate was MK 288.73 =1 US$ at the time of study.

communities with basic business and entrepreneur trainings, including visits to potential markets districts and areas. For example, in Ntchisi some members of timber and firewood user groups indicated that the programme organised a visit to Kasungu district for them to meet potential buyers and middlemen.

Although all community members (i.e. both ordinary community members and committee members) are expected to participate in all the four major programme activities, I found that participation in activities such as decision making, benefit sharing and capacity building, significantly differed between ordinary community members and committee members in both Zomba-Malosa and Ntchisi (Table 4.4).

Table 4.4: Actors' participation in different co-management activities and operations in Zomba and Ntchisi districts

	% of respondents participating in each activity			
	Zomba-Malosa		Ntchisi	
Activities	Ordinary members	Committee members	Ordinary members	Committee members
Forest management activities	76.4	50.2	75.3	56.7
Decision making	38.5	68.4**	31.5	67.3**
Benefit sharing and resource utilization	1.5	25***	12.4	42.3***
Capacity building	4.4	100***	3.6	100***

Asterisks indicate significant difference between actor groups with regard to participation in different programme activities (chi-square tests), at 1% (***) and 5% (**) level of significance.

In Zomba-Malosa, committee members are more likely to participate in decision making, benefit sharing, resource utilization and capacity building, than ordinary community members. Similarly, in Ntchisi both communities, committee members are more likely to participate in decision making benefit sharing and resource utilization and capacity building, than ordinary community members. Although a chi-square test showed no significant differences between ordinary community members and committee members' participation in forest management activities, the results show that, whilst approximately 76% (Zomba-Malosa) and 75% (Ntchisi) of ordinary community members participate in forest management activities, only 50% (Zomba-Malosa) and 56% (Ntchisi) committee members participate in forest management activities.

However, participation in all the four major co-management activities and operations did not differ by gender in either Zomba or Ntchisi districts. Similarly, participation in all the four major co-management activities and operations did not differ by district. Additionally, although key informant interviews revealed that government forest staff provide forest management training to the committee members with the hope that they will eventually train their community, none of the committee members in both Zomba-Malosa and Ntchisi reported to have carried out any forest management training or awareness meeting with their constituents (i.e. ordinary community members).

Furthermore, approximately 70% (Zomba-Malosa) and 81% (Ntchisi) of ordinary community members indicated that planning and coordination of activities is done by committee members and forest extension staff. Ordinary community members in both Zomba and Ntchisi indicated that forest staff are involved in all the programme activities including, forest management activities (42%), decision making (39%) and benefit sharing (55%). There is a weak and negative correlation between wealth indicator scores and participation in forest management activities ($r = -0.17$, $p = 0.004$). However, there is a weak and positive correlation between wealth indicator scores and participation in decision making ($r = 0.18$, $p = 0.05$); benefit sharing ($r = 0.12$, $p = 0.03$) and capacity building activities ($r = 0.11$, $p = 0.01$).

4.4.2.2 Formulation of rules and regulations

Ordinary community members and committee members differed in their perceptions with regards to who formulates rules and regulations in both Zomba-Malosa ($p = 0.001$) and Ntchisi ($p = 0.021$). 100% (Zomba-Malosa) and approximately 86% (Ntchisi) of committee members stated that all actors participate in the formulation of rules and regulations, whilst a large proportion of ordinary community members in Zomba-Malosa (46%) and Ntchisi (44%) perceived that rules and regulations are formulated only by committee members and forest staff (Figure 4.2). Additionally, community members in both Zomba-Malosa (63%) and Ntchisi (61%) consider traditional leaders to be involved in formulation and enforcement of rules and regulations.

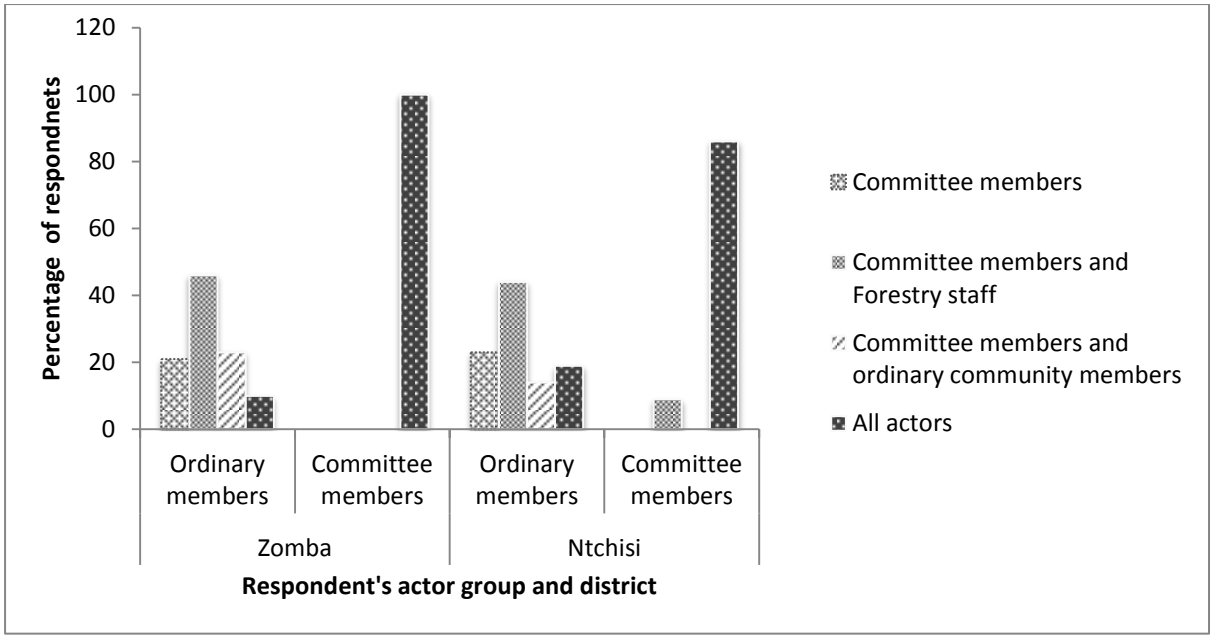

Figure 4.2: Actors who participate in formulation of rules and regulations, as perceived by ordinary community members and committee members

4.4.2.3 Enforcement and compliance

88% (Zomba-Malosa) and 91% (Ntchisi), of ordinary community members indicated that the project has sanctions which committee members enforce when individuals fail to comply with programme rules and regulations. These included penalty fees, community work, confiscation of tools and being taken to the police. Penalty fees both in kind (chickens or goats) and money were the most common form of punishment as reported by approximately 72% (Zomba-Malosa) and 85% (Ntchisi), of ordinary community members respectively. These punishments were said to be exercised following: absence from forest management work such as fire break maintenance; boundary marking and afforestation activities; unauthorised timber cutting; and tree felling. However, committee members in Zomba-Malosa and Ntchisi were unable to provide records of punishments they have given so far. Although no records of offences and enforcement of sanctions were provided, key informant interviews and focus group discussions revealed that offences against co-management rules occur. For example, in Ntchisi, a key informant revealed that they were able to confiscate an axe from an illegal tree harvester. At the time of the study, the tool was still in the control of the committee awaiting the offender's payment of the penalty fees of a goat or cash equivalent. Another example was highlighted during a group discussion in Zomba-Malosa, where a charcoal burner was caught burning charcoal in the co-management block, the kilns were destroyed, and the burnt charcoal and offender were taken to a police

unit. Additionally, a number of challenges to rule enforcement were highlighted during the focus group discussions as well as during key informant interviews in both Ntchisi and Zomba-Malosa. This included; lack of identifications (e.g. identity cards to show that they are committee members or community members participating in a co-management, and mandated to enforce rules and regulations with regards to forest use), lack of protective gear and tools for community members participating in the forest patrols, limited human resources for monitoring, and difficulty in excluding non-participating communities who often claim ignorance of existing boundaries, and harvesting rules and regulations.

4.4.3 Accountability

4.4.3.1 How are committee members appointed and how often?

A majority of ordinary community members in Zomba-Malosa (65%) and Ntchisi (87%) districts reported that the committee members are elected by the community (Figure 4.3). However some community members stated that committee members are appointed by government, whilst others expressed ignorance to how the committee members assume positions (Figure 4.3). Furthermore, two of the committee members in Zomba-Malosa indicated that they were appointed to their positions by forest extension staff and the group village head. However, in both Zomba-Malosa and Ntchisi neither ordinary community members nor committee members were able to define the term of office for the committee members, nor indicate when another election will be held.

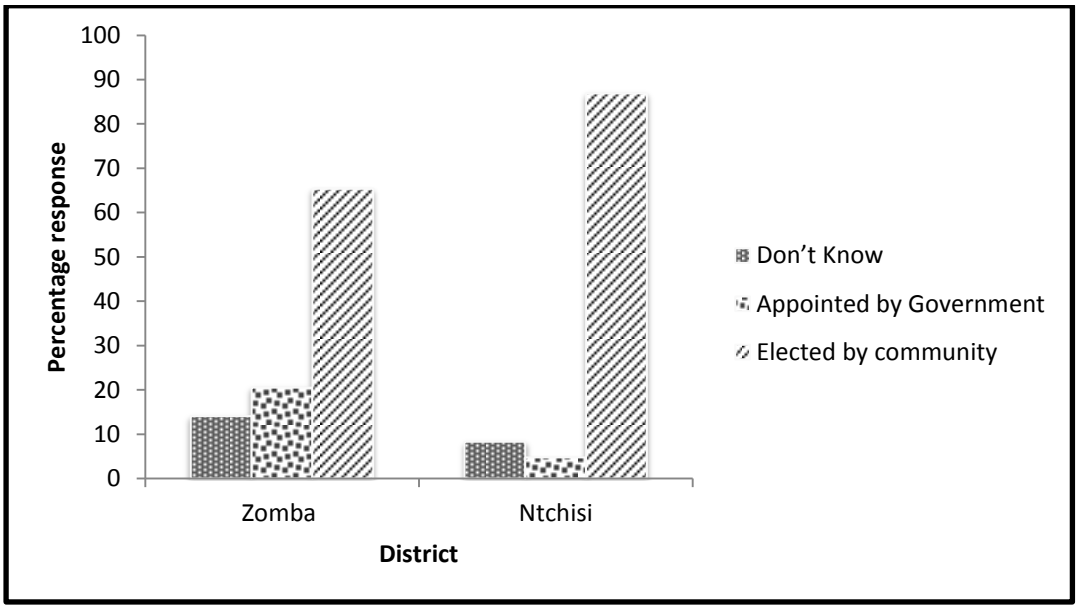

Figure 4.3: Ordinary community members' perceptions of how committee members assume positions

4.4.3.2 How are benefits distributed?

According to committee members, revenue collected from the reserve through timber concessions and fuel wood permits are to be shared between the communities (60%), local management board (10%) and forest department (30%). The revenue retained by the community is deposited in a bank, and is meant for community development. Committee members stated that part of the money is utilized as a revolving fund for soft loans among community members. Although committee members in both Zomba-Malosa and Ntchisi reported that they have records of all the revenue and how it is distributed, they were unable to show any documented evidence of the records. All ordinary community members interviewed expressed ignorance on; 1) how much revenue has been collected so far; 2) how it has been utilised or; 3) how many individuals have accessed soft loans through the block committee. Thus, approximately 81% (Zomba-Malosa) and 62% (Ntchisi) of ordinary community members perceived their committee to be inactive with regards to benefit sharing. Approximately 71% (Zomba-Malosa) and 64% (Ntchisi) of the respondents perceived that benefits accrued from the co-management programme do not trickle down to ordinary communities members. This has caused some ordinary community members (41% in Zomba-Malosa and 43% in Ntchisi), to reduce their levels of participation or withdraw from programme activities. Furthermore, approximately 69% (Zomba-Malosa) and 59% (Ntchisi) of ordinary community members indicate that they only participate in management activities that the village head asks them to participate in.

4.5 Discussion

The forest co-management programme in Malawi has established local institutions and actors that participate in the management as well as utilisation of the forest reserves. The programme has partially elected community representatives, called block management leaders, who are responsible for coordinating the programme at community level. Additionally, the results show that communities are aware that apart from committee members, government and other ordinary community members are also actors in the programme.

Although the results show that both ordinary community members and committee members are involved in all activities and operations of the co-management programme; ordinary community members are largely involved in management activities, whilst committee members are largely involved in decision making and capacity building activities. In a co-management programme, management decisions should accommodate views and

objectives of all participating actors (Mendoza and Prabhu, 2005) which may require time, wider consultations and a representative participation from all actor groups including ordinary members. Furthermore, McDermott and Schreckenberg, (2009) and Ribot (2003) and highlight increases in local participation in decision making is a key to effective decentralization and access to programme benefits. However, the weak and positive correlation between wealth status (indicator) and participation in decision making, benefit sharing and capacity building activities, may suggest elite dominance in the co-management programme. Thus limited participation by ordinary community members in decision making and benefit sharing in the co-management programme limits the level of local empowerment and sense of ownership (Mendoza and Prabhu, 2005), thereby affecting willingness to participate and effective implementation of the decisions and rule enforcement (Buchy and Hoverman, 2000; Klooster, 2000).

According to policy and programme documents, government staff are supposed to assume an advisory and supervisory role (Malawi Government, 2006; Ribot, 2003). However, the community members in both Zomba-Malosa and Ntchisi perceive that government forest extension staff are actively involved in all co-management activities including decision making roles concerning the programme, planning and rule formulation, monitoring and patrols, and implementation of management activities. The presence of forest extension staff at all levels and stages of the co-management programme may be attributed to the fact that the government retains ownership of the reserve (Nyondo, 2002). Hence to protect and safeguard those rights and forest public services, government staff should still feature in most roles and responsibilities, but as facilitators or advisors, not implementers (Ribot, 2003).

However, although there could be justification for the presence of government forestry extension staff in all the major activities of a co-management programme, it may limit the amount of power and level of influence, the committees and community may exercise with regards to activity planning, rules and regulation formulation (Colfer, 2005). This is further exacerbated by the fact that the Forestry Act (1997) and IFMSLP recognises the Director of the Forest Department as the person responsible for establishing and endorsing rules as well as giving the final approval to the block management plans and contracts (Malawi Government, 2008). Thus, in order to ensure their plans are approved, elected committee members often copy what the government has prescribed as management activities, rules and regulation (Cronkleton *et al.,* 2012; Ribot *et al.,* 2006). Similarly, Shackleton and Campbell (2001) observed that rule formulation for implementing joint

management on government forest reserves in Malawi was done mostly by the state and not the communities.

None of the respondents (either committee members or ordinary community members) in either Zomba-Malosa or Ntchisi identified any external institution or non-governmental partners as actors in the programme (Table 4.1). This may be because the programme only involves these actors at district level in local forest management boards and not at community or implementation level, hence knowledge of their role in the programme is limited among communities. However, this is in contrast to what is stipulated in the programme outline, which highlights participation of non-government partners, such as NGO's, as well as other related government departments, as an important element of the programme at all levels (Malawi Government, 2008). Independent external institutions and partners may act as power brokers or mediators between communities and government, thus help communities to actively participate and benefit fully from the programme (Shackleton *et al.,* 2002). Since government determines the nature of responsibilities to devolve and the types of power to transfer, lack of external partners' participation in the programme at community level could allow governments to be unaccountable in devolving responsibilities and decision making powers to elected leaders and responsible local communities. Thus external institutions and partners are crucial for communities' empowerment and negotiating ability in a co-management programme (Oyono, 2003).

Many village level structures have been said to lack coordination, knowledge and capacities **(**Davis *et al.,* 1994). Only a few ordinary community members in the study sample have received or participated in training programmes. Limited participation in training programmes, coupled with low literacy levels, limits their capacity to effectively implement the management activities as well as make decisions independently. Thus a lack of competent individuals at local level compromises the effective empowerment of local communities and effective devolution of responsibilities to local institutions (Coulibaly-Lingani *et al.,* 2011; Mendoza and Prabhu, 2005).

Pretty (2003) argues that rules and sanctions ensure that group interests are protected: individuals take responsibility and are accountable for their actions and as such promote individual investment in group activities. Although, I found that rules, regulations and sanctions exist in the communities participating in the co-management programme, there is little evidence to suggest that these sanctions are formally and transparently exercised. Nevertheless, the lack of records does not imply that no offences are committed, or that sanctions are enforced, because the qualitative data reveal that some sanctions were applied.

Therefore, there is need for record keeping in order to enhance accountability and transparency. It is also important to note that, like any common pool resource, excludability of non-participants remains a challenge in a co-management programme. This is further exacerbated by the fact that the institutions of co-management do not have the legal mandate to prosecute violators of forest regulations and contract (if violators are from non-participating communities); hence the long term security of forest resources and its products are not ensured (Kayambazinthu, 2000).

The election of office bearers to the block committees enhances downward accountability of the committee members. However, although committee members in the study area appear to be largely elected by the community, lack of clearly defined terms or schedules for the next election may compromise their accountability. Furthermore, the presence of some members who were just appointed by either government officials or village leaders reduces accountability of the committee; as such members are likely to be loyal to the interest of leaders and superiors, other than the community or their constituents. Thus, the appointed members may exercise control over the elected members (Oyono, 2003). The block committee and local people belonging to different trade user groups are not financially independent and still depend on the government (forest department) for financial support as well as material resources, tools and inputs, (e.g. transport for fuel wood to market areas). This makes it difficult for the committees to act independently of the forest extension staff and be accountable to the communities. Thus devolution of decision making power could easily fail if local authorities lack financial resources (Manor, 2004).

Handling of finances and benefit sharing procedures are other crucial components in ensuring accountability and trust in the programme. Although committee members articulated a clear benefit sharing procedure between communities, the results showed that ordinary community members are ignorant of revenues collected and their use. Hence, there is a general perception among ordinary community members that they are only involved in the forest management aspect of the programme, and only influential members of the community, such as committee members and chiefs, share the benefits. Unaccountable and non-transparent management of programme revenue and funds results in local communities perceiving the distribution and benefit sharing as unfair. Similar concerns of unaccountability and non-transparent committee handling of forest revenue by forest committee members have been observed in another community forest management project in Malawi (Zulu, 2008).

Lack of accountability has been cited as the major cause of failure of community based natural resource management approaches (Coulibaly-Lingani *et al.*, 2011; Zulu, 2008; Tacconi, 2007). This reduces local people's motivation to participate in co-management activities, which could negatively impact on the success and sustainability of the programme. This is also evident in the study area, as a number of ordinary community members indicated that they have either reduced their levels of participation or withdrawn from programme activities. This is further exacerbated by the notably unfair distribution of financial benefits, especially in accessing new income generating activities, as few members of the community have access to income generating activities. This is evidenced by the composition of participants in the user group or trade specific focus group discussions, who were largely one and the same. Another possible consequence of inequalities in benefit sharing processes and unaccountable leadership could be increased illegal activities in the forest management block. For example, studies in Ghana have shown that where locals perceived the distribution of forest funds as unfair, attempts are made to gain the funds and income through illegal logging (Colfer, 2005). Bigombe (2003) suggests that public distribution and handover events of forest funds to local actors enhanced downward accountability and helped address transparency issues. Similarly, public hearings and public audit sessions[25], could facilitate accountability and transparency of the committee members in their decision making and benefit sharing processes (Gentle *et al.*, 2007; Maharjan *et al.*, 2009). Examples of successful public hearings and public audit sessions in community forest management programmes, can be drawn from Nepal, where it has been reported that the practice of public hearing and public audit has contributed in recovering misappropriated or misused funds in the Community Forestry User Groups (CFUG) and in reverting decisions that were not in favour of the general community (Gentle *et al.*, 2007).

Although the programme documents don't recognize the traditional leaders as actors to whom powers and responsibilities should be devolved (Malawi Government, 2008), in this study community members perceive traditional leaders (village heads), as key actors and that they are actively involved in decision making, planning, rule formulating and enforcement. This may show how local institutions and power hierarchies are grounded and valued amongst study communities or alternatively be evidence of elite capture of co-management institutions. Furthermore, the results of the study show that although community members

[25] Public hearing and public audits sessions, allow for assessment of the performance of the committee and review of financial transactions in a manner that is acceptable to the general community (Gentle *et al.,* 2007; Maharjan *et al.,* 2009).

may not be willing to participate when asked to by block committee leadership, they are still persuaded to participate in management if their traditional leaders ask them to. Similar findings have been reported by Bene *et al.,* (2009) and Njaya (2007), who noted that traditional leaders play a critical role in co-management programmes by supporting the empowerment of local communities and ensuring local community participation.

Traditional leaders may however affect co-management negatively (Bene *et al.,* 2009), especially where they feel insecure, or where devolution alters powers relations and doesn't advance their interests (Zulu, 2008). Traditionally, significant final authority over forests lay with chiefs and even under centralized management, traditional leaders still exercised limited *de facto* control for the communities' access to forest resources. Therefore the introduction of new structures and institutions such as a co-management programme may threaten those actors such as village leaders who are already in power. Hence, co-management programmes should recognize, consider and incorporate where desirable, local communities' governance structures, institutions and norms.

4.6 Conclusion and recommendations

The co-management programme in Malawi has partially established elected local institutions. However, for the co-management programmes to fully achieve devolution; all leaders (e.g. committee members) should be duly elected by their constituents not appointed by the chiefs or government staff, so as to enhance downward accountability, and local elected institutions as well as the ordinary communities should be empowered to fully participate in decision making and forest utilization. Empowerment of local institutions and communities to independently make decisions, develop management plans and implement forest management activities could be enhanced through training programmes in forest management skills or silviculture, accounting and record or book keeping, and enterprise development. Ordinary community members should also be involved in capacity training programmes, so as to facilitate community representation in decision making beyond committee members. The co-management programme provides participating communities with a range of benefits including access to forest products (e.g. firewood, timber, NTFP), access to new income sources (i.e. income generating activities initiated and subsidised by the programme), and revenue from permits/fines), therefore there is a need to develop a clear and transparent benefit sharing mechanism to ensure accountability of local institutions and committees, and continued motivation of ordinary community members to participate in

programme activities. Therefore, I recommend introduction of public hearings and public audit sessions in the co-management programme so as to enhance accountability and transparency of the committee members in their decision making and benefit sharing processes.

Limited knowledge among community members with regard to terms of office or schedules for the next election compromises the accountability of committee members to their community. Therefore, increased local awareness on these matters could ensure that downward accountability within the communities is not compromised. Although the government is mandated to regulate the forest management plans and activities, government staff should only serve as facilitators, not implementers, and should be willing to empower the community representatives to independently make decisions.

CHAPTER 5: IMPACT OF FOREST CO-MANAGEMENT PROGRAMMES ON FOREST CONDITIONS IN MALAWI

Abstract

Forest co-management programmes aim to conserve forest resources and improve forest conditions through more sustainable management and utilization. However, there is still little evidence of the effectiveness of co-management when compared with state management. This study assesses the impact of co-management approaches on forest conditions in Zomba-Malosa and Ntchisi forest reserves in Malawi. A multiple-site, plot-based, control-intervention design was used to compare forest condition in state managed plots with plots converted to co-management. Tree density and species richness were measured as indicators of forest condition. Human activities in the forest reserves were used as indicators of the past, present and future impact of co-management on forest condition. Local peoples' perceptions of the impact of co-management on forest conditions were also sought to triangulate the inventory information. The study also took into account the difference in forest reserve locations which may indicate the pre-existing difference in forest conditions and type as well as the varying socio-economic conditions of communities living around them. Co-managed forest plots have higher tree density than state managed plots. In Zomba-Malosa forest, evidence of human disturbance was significantly lower in plots under co-management than in state managed plots, while in Ntchisi forest reserve evidence of human disturbance was significantly higher in plots under co-management. A majority of respondents perceive the co-management programme to have had a positive impact on forest conditions against a general worsening trend. However, even with method triangulation, the lack of information on forest condition before the programme and short time since its implementation limits the quantification of co-management impacts on forest conditions.

Keywords: *community forest management, conservation, biodiversity, sustainable use.*

5.1 Introduction

Traditionally, the management of forests was separated from development programmes and much effort expended in separating people from vulnerable environmental resources (Mayers *et al.,* 2001; Scherr *et al.,* 2003). Particularly in Africa, conservation has been dominated by an authoritarian approach, where permission to use forest resources could only be acquired from government officials**.** This approach has also been labelled a *'fines and*

fences' approach (Hughes and Flintan, 2001) or *'fortress conservation'* (Hulme and Murphee, 1999), because of restricted rights of access and use, accompanied by sanctions for non-compliance. Controlled access to protected areas escalated conflicts between local communities and management authorities, especially in places where local communities were heavily dependent on forests for their subsistence (Masozera and Alavalapati, 2004). Thus the approach negatively affected communities' livelihoods and welfare, in some cases resulting in overexploitation of forest and natural resources (Buffum, 2012; Alavalapati, 2004; Mayers *et al.,* 2001). Therefore, convinced that state controlled natural resource management approaches were ineffective in conserving forests and natural resources, between the 1970s and the present day, governments and their development partners have searched for alternative forest management measures (Arnold, 1992). One such approach is forest co-management, which explicitly recognizes the basic needs of local people in and around forests, (Gibson and Mark, 1995; Western and Wright, 1994).

One of the primary policy objectives for implementing forest co-management programmes is to improve forest conditions through sustainable management and utilization (Agwaral and Chhatre, 2006; Blomley *et al.,* 2008; Carlsson and Berkes, 2005; Malawi government, 2008). However, although some studies have shown that co-management approaches can conserve and improve forest conditions (e.g. Phiri *et al.,* 2012; Yadav *et al.,* 2003), the evidence base remains very weak (Bowler *et al.,* 2012, 2010). Furthermore, although the baseline data (before project) required for before-after comparisons are rarely available, few quantitative studies have assessed the impact of forest co-management approaches on forest conditions even using site comparison designs (Bowler *et al.,* 2012; Shrestha and Mcmanus, 2008). For example, despite its global scope, the systematic review by Bowler *et al.,* (2010) found only 12 studies with a site comparison design between participatory management and state management. Therefore, there is insufficient evidence to conclude whether forest conditions generally improve with implementation of co-management programmes (Bowler *et al.,* 2012 and 2010; Shrestha and Mcmanus, 2008), and a need for more empirical data to quantify the impacts of co-management programmes on forest conditions. This study uses a multi-site, plot-based site comparison design to assess the impact of co-management approaches on forest conditions. As for the vast majority of co-management projects (e.g. Hecht, 2008; Zulu, 2010), no baseline data is available for the co-management programme studied here. Therefore, physical signs of human activity in the forest were also collected, in order to quantify current pressures, and provide a cross-check on observations of forest condition. Furthermore, local peoples' perceptions are also a useful

tool for constructing baseline data in the absence of historical data to validate the comparison study (Goswami *et al.,* 2011; Raymond *et al.,* 2010; Pandit and Bevilacqua, 2011). Therefore the study further assesses the impact of co-management approaches on forest conditions based on local community's perception on the status of the forest before and after the management programme was implemented.

Though co-management programmes and activities could vary with location, the underlying principle and policy goals are similar. Thus, our methods and findings could be adapted and applied to other co-management projects as well as to other forms of community-based forest management initiatives at a global level with similar underlying principles and goals.

In order to achieve the objectives of the study, the following research questions were addressed:

1. What is the difference in forest condition between forest blocks under co-management and under state management?
2. What are the differences in presence of human activities or disturbances in forest areas or blocks that are under co-management and forest blocks under state management?
3. How do local communities participating in forest co-management programmes perceive the status of the forest before and after the management programme was implemented?

5.2 Study methods

5.2.1 Study design and approach

A before-after control-impact (BACI) study design has been suggested as most suitable for assessing the impacts of forest co-management approaches (e.g. Bowler *et al.,* 2012). However in this study, as is commonly the case, there is no baseline data; therefore the study took advantage of the IFMSLP implementation plan to design a comparative control-impact (CI) study (Baker, 2000; Blomley *et al.,* 2008). The IFMSLP is being implemented in phases; thus some communities are co-managing blocks having already signed their contracts, whilst some blocks are still under state control as communities living adjacent to these blocks have yet to sign any management agreement with government. Therefore, within a forest reserve, blocks that are currently under co-management were regarded as treatment, while those that are still under state management act as control. Data on forest conditions

were collected using forest inventory procedures adapted from Ahrends (2005); Blomley *et al.*, (2008); Bracebridge *et al.*, (2004); Doody *et al.*, (2001); Gobeze *et al.*, (2009); Hetherington, (1975); Malimbwi, (1994); Mwase *et al.*, (2007); Obiri *et al.*, (2010b.); Gobeze *et al.*, *(*2009); Phiri *et al.*, (2012); Tachibana and Adhikhari, (2005); Wayerhaeuser and Tenningkeit (2000). Forest inventories were also used to collect data on human activities in the forest and verify information on forest management activities provided by communities during the focus group discussions, key informant and household interviews. Additionally, community perceptions of the impact of co-management on forest conditions were elicited through face to face interviews with a random sample of household heads from the two communities (e.g. Agrawal and Yadama, 1997; International Forestry Resources and Institutions, 2008).

A number of factors may vary between the forest blocks currently under co-management and the management blocks that are still under state management, which may confound any comparison between the sites (Bowler *et al.*, 2010). The confounding factors considered in the design of this study include proximity to the nearest main road (i.e. access to markets for forest products), distance between forest boundary and nearest villages, conditions of the forest before the programme (i.e. degraded, suffering from deforestation). Additionally considering that the forest blocks currently under co-management (i.e. treatment sites) are in close proximity to some management blocks that are still under state management (i.e. control sites), there is a risk of leakages or displacement effects[26] (Vyamana, 2009; Somanathan *et al.*, 2009), hence confounding the impact assessment results. Although distance between the forest boundary and the nearest villages was considered in the design of the study, after the initial analysis of the data, it was observed that in all sites (Zomba-Malosa and Ntchisi) the distance between the forest boundary and the nearest villages ranged from 1.5 to 2 kilometres, hence I regarded the distances as close enough not to biase the study results. Similarly, despite all effort, I was unable to access baseline data, information on selection criteria for the co-management programme targets sites and any information with regard to differences in forest composition and status prior to the programme. Hence it is difficult to control for confounding factors that are a direct effect

[26] Leakage effect means that although a programme or intervention (in this cases the co-management programme) aimed at reducing forest exploitation and deforestation, may successfully achieve this objective in its targeted forest management block or reserve, by basically shifting the exploitation to the adjacent management block, hence the net conservation is zero 9(Bowler et al., 2010; Vyamana, 2009; Somanathan *et al.,* 2009).

result of pre-existing differences in the comparison sites (co-managed and state managed), prior to the programme starting and not to the difference in management differences.

5.2.2 Data collection, methods and procedures

5.2.2.1 Forest inventory

In each of the two forest reserves, three co-managed forest blocks and three state managed forest blocks, of varying sizes, were randomly selected (Table 5.1). It was expected that the disturbance rate will differ with gradient[27] and accessibility, as one moves from forest edge or the start of the reserve (i.e. where the customary or village land ends and the forest reserve starts) going towards the centre of the reserve. Thus it was expected that the forests would be more degraded or more heavily harvested and disturbed close to the forest edge as this is closest to the village and to paths or roads for easy transportation of the harvested products. Furthermore, local communities mostly start to encroach in the periphery of the reserves, before moving towards the inner forests as they establish new settlements and expand farming plots (Malawi Government, 2007). Therefore, to ensure that any pre-existing differences between plots due to gradient and accessibility have been taken into account, inventory plots were located along a transect at fixed distances from the forest edge. Additionally, it was assumed that laying-out inventory plots along transects allow for capturing and quantifying variations across gradient or distance, as hypothesised above. Thus, in each selected block, the starting point of each transect was located at the edge of the forest reserve, where the customary or village land ends and forest reserve start (Figure 5.1).

[27] The topography of both Zomba-Malosa and Ntchisi forest reserves is mountainous, therefore, the gradient is higher as one moves from the forest edge going towards the centre, which is at thetop of the mountain.

Table 5.1: Forest management blocks sampled for the forest inventory in Zomba-Malosa and Ntchisi Forest reserves

Forest Name	Management type	Block Name	Area in hectares
Zomba-Malosa	State management	Anglican	864
		Minama	2084
		Matola	267
Zomba-Malosa	Co-management	Fikira	745.9
		Jusu	375.4
		Mtuluma	679
Ntchisi	State management	Chanika	707.6
		Kasakula	871.7
		Mandwe	379.2
Ntchisi	Co-management	Mpamila	434.7
		Nyanja	727.8
		Nyanga	180.1

The location of transects in a block and positions of the plots, in both the state managed (control) and co-managed (intervention or treatment) forest blocks, were matched. Therefore, within each sampled forest block, a total of three transects moving away from the forest boundary line to the centre of the reserves were located along the forest or block boundary (Figure 5.1). The first transect in each block was located at the start of the block (i.e. bordering another forest management block, length-wise) and the second transect was located in the middle of the block and the last transect was close to the other end 9i.e. near the edge of bordering with another forest management block, length-wise). Similarly, along each transect three rectangular plots (50m long by 20m wide) were systematically placed 50m apart. The first plot was started from the boundary line, thus the second plot was located 100m and the third at 200m from the boundary line. However where accessibility was hindered by thickets, rocks, permanent rivers and steep slopes, the transect line went only up to the accessible point. Therefore, only a total of 106 plots were sampled instead of a targeted 108 plots, across the two forest reserves.

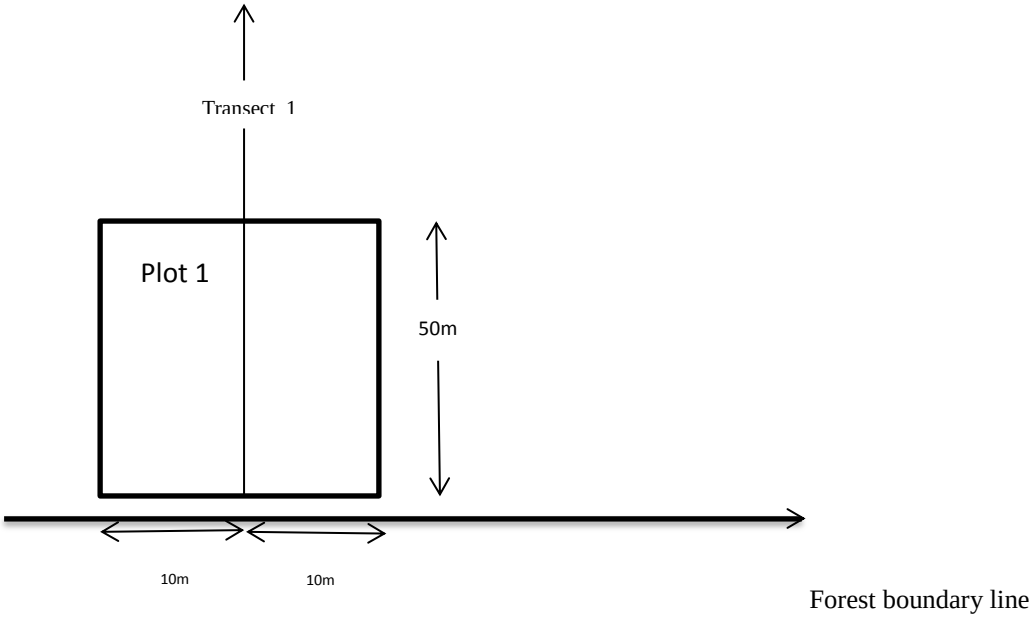

Figure 5.1: Transect and plot layout within a block

A number of factors have been measured as indicators of impacts of community forest management approaches (including co-management) on forest condition. These include changes in forest cover and area, tree basal area, tree density, species richness, animal density and diversity, number of cut stems and tree size class distribution (e.g. Phiri *et al.,* 2012; Giliba *et al.,* 2011; Obiri *et al.,* 2010b; Gobeze *et al,* 2009; Blomley *et al.,* 2008; Mwase *et al.,* 2007; Aggarwal *et al.,* 2006; Meshack *et al.,* 2006; Ahrends, 2005; Gautum *et al.,* 2004; Wayerhaeuser and Tenningkeit, 2000). Considering that this study (i.e. Chapter five: impact of co-management on forest conditions), was part of a larger study that looked at both the outcomes of co-management (i.e. both forest conditions and livelihoods), and the processes and institution under co-management programme, it was not feasible to measure all forest condition outcome indicators. Since tree density is one of the indicators that has been widely used, I felt the use of tree density (i.e. number of trees per plot) as an indicator of the impact of the co-management programme on forest conditions was appropriate for the purposes of this study. Therefore, tree density (i.e. number of trees per plot) was measured to reflect the impact of the co-management programme on present condition of the forest (Table 5.2). Additionally, a high density of seedlings and saplings could indicate either a recovering forest or current heavy harvesting of mature trees (degraded forest) (Phiri *et al.,* 2012; Blomley *et al.,* 2008; Mwase *et al.,* 2006; Ahrends, 2005; and, Werren *et al.,* 1995). Therefore, number of seedlings and saplings per plot were also collected to reflect past and present condition of

the forest (Table 5.2). The seedlings and saplings count included those from roots, stump and seeds. Species density or species richness, indicated by number of tree species per plot and number of seedlings and sapling species per plot (e.g. Spellerberg and Fedor, 2003) were also recorded. Higher tree species richness/density was considered to indicate reduced disturbance and better forest conditions (e.g. Obiri *et al.,* 2010b; Mwase *et al.,* 2007), while recognizing that increase in seedlings and saplings species richness could be a direct result of forest disturbances (Werren *et al.,* 1995). Furthermore, ecologically, community forest management approaches including forest co-management, are advanced as a means for achieving more effective biodiversity protection and conservation (Borrini-Feyerabend *et al.,* 2000; Kellert *et al.,* 2000), hence species richness is of interest and an important outcome to be included and measured in impact assessment studied of forest co-management programmes. Names of trees and all woody species were first recorded in their vernacular names, and then later their scientific or English names were identified (Appendix 6). The vernacular names (and at times scientific or English names) were identified in the field, with the help of district forest assistants, field assistants and local representatives from adjacent communities[28]. The forest officials are knowledgeable and skilled in identifying tree species, based on their professional and academic background as well as familiarity with the local ecology and the reserve. The local representatives were identified by fellow local community members (key informants in each block), based on whom they consider to be knowledgeable in identification and names of the different trees in the reserve.

In cases where the district forest assistants, field assistants and local representatives did not agree on the identity of a specific tree, or failed to identify and name a tree, specimens or vouchers including leaves, barks and twigs, were collected. Additionally, pictures of the specimen were taken. Additionally, an individual tree where the specimen was collected was marked and the sites were also noted, for future reference (i.e. if more material had to be collected). 11 (Ntchisi) and 8 (Zomba-Malosa) tree vouchers were collected. The collected voucher specimens were then later taken to the Forest Research Institute of Malawi (FRIM) and National herbarium and botanical gardens in Zomba, for identification. Furthermore, one tree species could have more than one vernacular name, hence if the field team referred to one particular tree species with different names, all the names were recorded and voucher specimens were collected for subsequent verification through literature review (e.g.

[28] For species identification, I planned to include a Botanist in the forest inventory team. However, due to limited financial resources, I relied on the knowledge and skill of district forest staff, and representatives of the local community.

Kambewa *et al.*, 2007; Gowela *et al.*, 2005) and consultations with the National herbarium and botanical gardens.

Changes in tree population may take time to respond to different management approaches (Yavad *et al.*, 2003). Considering that the programme had only been implemented for 7 years at the time of the study, use of vegetative parameters may be inadequate. Therefore, the study also collected additional parameters including: level and presence of human activities and disturbances, and forest management activities (Table 5.2), on the basis that good forest management practices and controlled human activities in the forest facilitate improvement of forest conditions and may help explain current forest conditions in the absence of baseline data (Phiri *et al.*, 2012; Damodaran and Engel, 2003). In addition to forest inventory, efforts were made to access any baseline data, previous inventory data and forest resource mapping for the study sites, as a reference point on the status of the forest reserves over time. However, baseline data, previous inventory data and forest resource mapping were unavailable.

Table 5.2: Parameters for assessing the impact of co-management on forest conditions

Indicators	Parameters	Reference
Change in condition of the forest and forest resources	1. Number of trees per plot[29]. 2. Number of seedlings and saplings per plot[30]. 3. Number of tree species, per plot 4. Number of seedlings and saplings species, per plot	Blomley *et al.,* 2008; Lund *et al.,* 2010; Mwase *et a.,* 2006; Ahrends, 2005; Meshack *et al.,* 2006.
Presence of human activities or disturbances	1. Number of tree stumps 2. Number of felled trees present 3. Number of pit-saw timber harvesting sites, 4. Number of charcoal production pits, 5. Number of trees debarked 6. Number of farming plots 7. Number of settlement plots 8. Presence of fire (*1= present or evidence; 0= no evidence*) 9. Evidence of grazing(*1= yes; 0= no evidence*) 10. Number of hunting pits	Blomley *et al.,* 2008; Ahrends, 2005; Antinori and Rausser, 2007.
Evidence of good forest management practices	1. Marked boundaries and fire breaks (*1= present; 0= not present*) 2. Number of forest nurseries 3. Planted trees in and around the forest reserve (*1= present; 0= not present*) 4. Number of village forest areas and afforestation	

[29] Trees are defined as all woody plant with a stem height of ≥1.5 m and DBH of ≥ 10cm DBH (e.g. Kelbessa and Soromessa 2004 in Gobeze *et al.,* 2009; Doody *et al.,* 2001; Obiri *et al.,* 2010; Gautum *et al.,* 2004)

[30] Seedlings and saplings are defined as all woody plants with height of < 1.5 m, with DBH< 10 cm (e.g. Kelbessa and Soromessa 2004 in Gobeze *et al.,* 2009).

5.2.2.2 Household interviews

Household surveys were used to collect information on local people's perceived changes in forest conditions since the co-management programmes started. The questionnaire included both closed and open ended questions (Appendix 2.2). The questionnaire also gathered basic information about households; perceived impact of the programme on forest conditions. For each individual the interviews were done in isolation to reduce the risk of influencing each other's answers. A total of 213 household heads in six participating communities were interviewed, 106 households in Zomba-Malosa and 99 in Ntchisi (see Chapter 2; Table 2.8). A preliminary study to pre-test the survey questionnaire was undertaken, before the start of the survey (Section 2.6.1).

5.2.3 Data analysis

ANOVA was used to compare means of indicators for forest condition in state managed and co-managed blocks, and for the different locations. Forest conditions may be affected by pre-existing forest conditions and socio-economic characteristics of participating communities (Bowler *et al.,* 2012). Therefore, the data for each forest reserve in the different districts were analysed separately, to ensure that forest- or district-specific effects are not masked. Descriptive statistics were used to compare and present the perception-based data. All the data were analysed using SPSS 19 and STATA version 11.2.

It is also important to note that, this study has a few possible limitations which could have been done differently given the time and resources. Most of the limitations are methodological and/or design related and and analytical in natures. However, one of the major limitations in this chapter is that results presented in this chapter (Section 5.3.), do not analyse the difference in tree basal area and tree class distribution between forest management blocks under co-management and those under state management, which if included would have made the assessment of impacts of co-management on forest conditions more robust and informative.

5.3 Results

5.3.1 Forest condition in co-managed and state managed forest blocks

5.3.1.1 Tree and seedlings and saplings density in co-managed and state managed forest blocks

Tree density per plot was significantly higher ($p<0.001$) in Ntchisi than Zomba-Malosa forest reserve, whilst seedlings and saplings density was significantly lower ($p = 0.04$) in Ntchisi than Zomba-Malosa forest reserve. In Ntchisi forest reserve the average tree density per plot was 23.58 and the average seedlings and saplings density per plot was 131.75; whilst in Zomba-Malosa the average tree density per plot was 7.45 and the average seedlings and saplings density per plot was 283.38. However, comparisons of co-managed and state-managed blocks in the two reserves are presented separately. In both Ntchisi and Zomba-Malosa, tree density per plot was significantly higher in co-managed than in state managed blocks ($p <0.001$, $p = 0.01$ respectively, Figure 5.2a.). Although the difference was not significant, the mean density per plot for seedlings and saplings was higher in co-managed plots than in state managed forest blocks in Ntchisi ($p = 0.43$, Figure 5.2b.). However, in Zomba-Malosa forest reserve, the mean density per plot for seedlings and saplings was significantly higher in state managed than in co-managed forest blocks ($p <0.001$, Figure 5.2b.). In Ntchisi forest reserve, tree and seedlings and saplings density did not significantly differ with plot location along the transect moving away from the forest boundary in either state managed ($p=0.641$; $p=0.562$) or co-managed forest blocks ($p=0.832$; $p=0.907$), respectively. Similarly, in Zomba-Malosa forest reserve, tree and seedlings and saplings density did not significantly differ with plot location along the transect moving away from forest boundary (i.e. boundary, and middle or toward centre) in either state managed ($p=0.382$; $p=0.413$) or co-managed forest blocks ($p=0.586$; $p=0.593$), respectively.

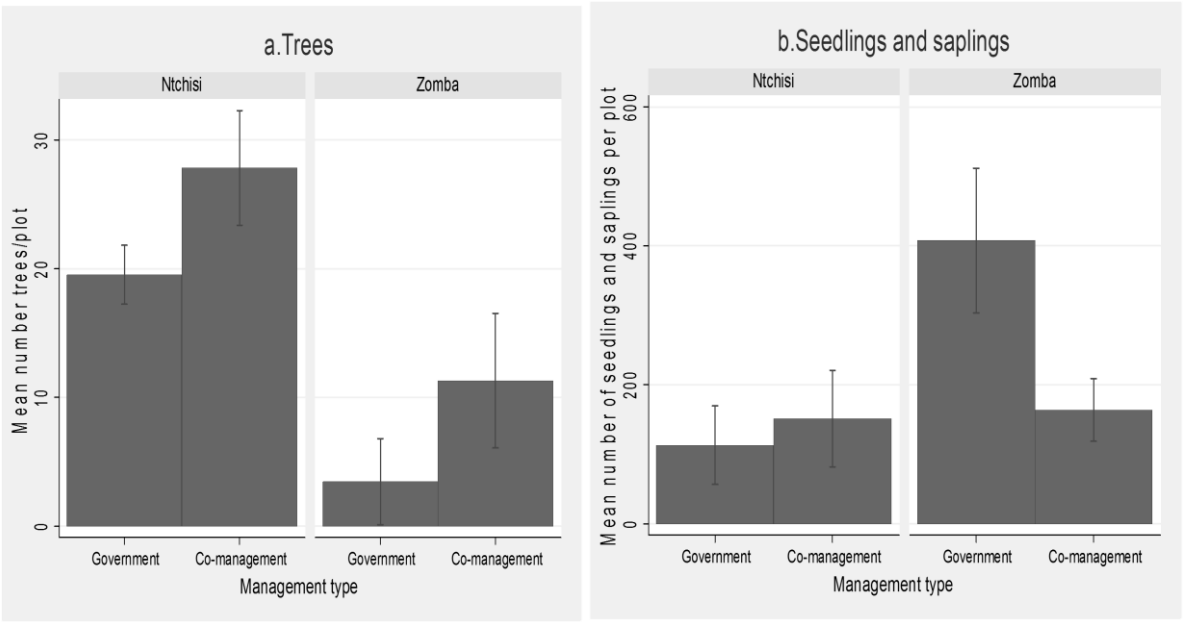

Figure 5. 2: Mean number of; a) trees; and b) seedlings and saplings per plot in forest block under Government and co-management in Ntchisi and Zomba-Malosa Forest Reserves.

5.3.1.2 Relationship between tree density and seedling and sapling density in co-managed and state managed forest blocks

There is an inverse relationship between tree density and seedlings and saplings density in both state managed and co-managed forest block in Ntchisi and Zomba-Malosa forest reserve (Figure 5.3). However, linear regression results showed that the inverse relationship was only significant in co-managed blocks in Ntchisi forest reserve ($p = 0.02$) and state managed blocks in Zomba-Malosa forest reserve ($p = 0.09$) (Appendix 7).

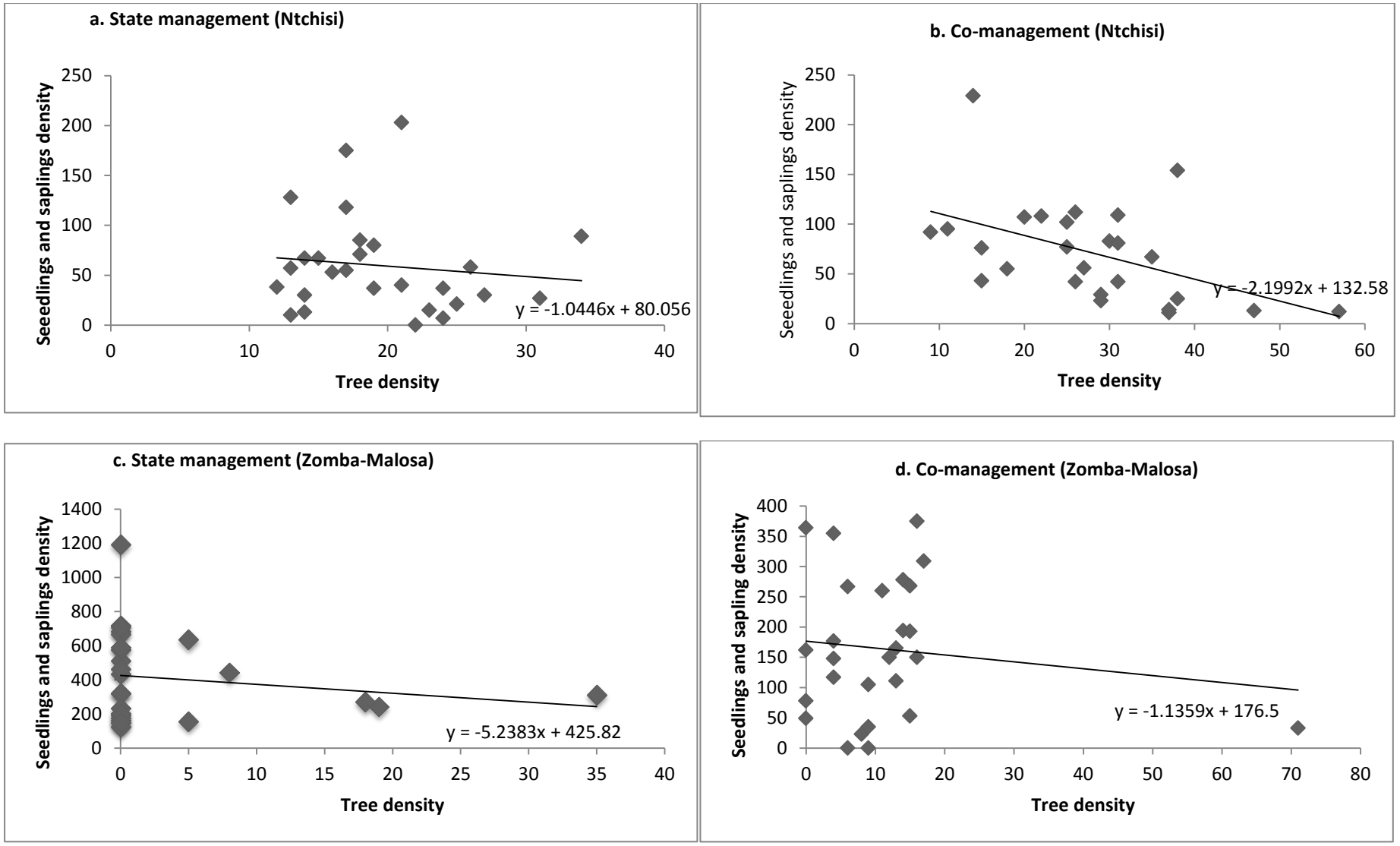

Figure 5.3: Scatter plots showing the relationship between tree and seedling and sapling density in Ntchisi and Zomba-Malosa forest reserves.

5.3.1.3 Variability in tree and seedling and sapling density within management type

Significant differences in seedling and sapling density per plot were observed among forest blocks under co-management in Ntchisi and Zomba-Malosa, as well as among forest blocks under state management in Ntchisi forest reserve (Table 5.3). Significant differences in tree density per plot were observed among forest blocks under state management in Zomba-Malosa forest reserve (Table 5.3). The variation in tree density per plot among forest blocks under state management in Zomba-Malosa are largely due to the difference in tree density within blocks, such that, whilst no tree count was recorded in block 1 (Minama), a high number of *Uapaca kirkiana* trees (35), were recorded in one plot in block 2 (Anglican).

Table 5.3: Summary of ANOVA results on tree and seedling and sapling density between blocks within management type in Ntchisi and Zomba-Malosa forest reserves

Forest Name	Management type	Variable-(Density)	ANOVA-Significance	
			F	*(p-value)*
Ntchisi	State management	Tree	1.300	0.291
		seedlings and saplings	9.907	0.001
	Co-management	Tree	1.300	0.291
		seedlings and saplings	5.590	0.011
Zomba-Malosa	State management	Tree	4.737	0.019
		seedlings and saplings	0.984	0.389
	Co-management	Tree	1.687	0.206
		seedlings and saplings	8.379	0.002

5.3.1.4 Tree and seedling and sapling species richness in co-managed and state managed forest blocks

Tree species richness per plot was significantly higher in Ntchisi forest reserve than in Zomba-Malosa forest reserve ($p < 0.001$). There was no significant difference in tree species richness ($p < 0.09$) or seedling and sapling species richness ($p < 0.13$) between co-managed and state managed forest block in Ntchisi forest reserve (Figure 5.4). In Zomba-Malosa, co-management forest blocks have a significantly higher tree species richness than state managed forest blocks ($p < 0.001$, Figure 5.4a.). A total of 24 tree species were observed in co-managed forest blocks, whilst only 7 tree species were observed in state managed forest blocks in Zomba-Malosa forest reserve. However, co-managed forest blocks have

significantly lower seedling and sapling species richness than state managed forest blocks (p = 0.01, Figure 5.4b.). In Ntchisi forest reserve, tree and seedling and sapling species richness did not differ significantly with plot location along the transect moving away from forest boundary (i.e. boundary, and middle or toward centre) in both state managed (p=0.841; p=0.752) or co-managed forest blocks (p=0.731; p=0.707), respectively. In Zomba-Malosa forest reserve, tree and seedling and sapling- species richness did not differ significantly with plot location along the transect moving away from forest boundary (i.e. boundary, and middle or toward centre) in both state managed (p=0.652; p=0.443) or co-managed forest blocks (p=0.543; p=0.577), respectively.

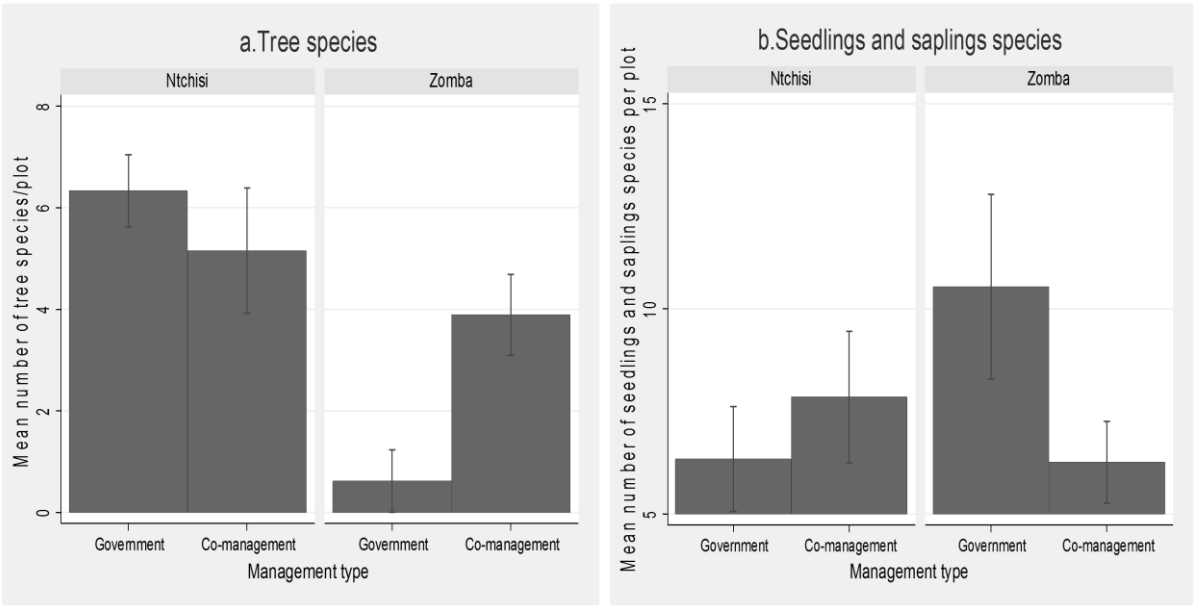

Figure 5.4: Mean number of: a) tree species; and b) seedling and sapling species, per plot in forest block under Government and co-management in Ntchisi and Zomba-Malosa Forest Reserves.

5.3.2 Presence of human activities or disturbances

Indicators of human activities or disturbances observed in both the co-managed and state managed forest block of Ntchisi and Zomba-Malosa forest reserves include: tree stumps, felled trees, farming plots, settlement plots, charcoal pits, debarked trees, lopped trees, hunting pits, evidence of fire and evidence of grazing (Table 5.4)**.** In Ntchisi, a significantly higher number of tree stumps ($p < 0.003$) were recorded per plot in co-managed forest blocks

than in state managed forest blocks (Table 5.4). In Zomba-Malosa, the number of tree stumps ($p = 0.05$), farming plots ($p < 0.002$) and charcoal pits ($p = 0.04$) per plot was significantly lower in co-managed forest blocks than in state managed forest blocks. However, the number of felled trees ($p = 0.04$) and debarked trees ($p < 0.001$) per plot was significantly higher in co-managed forest blocks than in state managed forest blocks in Zomba-Malosa forest (Table 5.4).

Table 5.4: Average counts of human activity indicators observed in state managed and co-managed blocks in Ntchisi and Zomba-Malosa forest reserves

Indicator	Ntchisi forest reserve		Zomba-Malosa forest reserve	
	State management (n=27)	Co-management (n=26)	State management (n=26)	Co-management (n=27)
Tree stumps	5.78	12.27**	13.73	6.81**
Felled trees	1.04	1.73	1.88	0.74**
Debarked trees	1.59	2.04	0.54	2.48**
Lopped trees	3.11	1.88	4	5.00
Farming plots	0	0	1.31	0.08**
Settlement plots	0	0	0.12	0
Charcoal pits	0	0	1.96	0.13**
Fires *(categorical scale yes=1; no=0)*	0.56	0.58	0.73	0.48*
Grazing*(categorical scale yes=1; no=0)*	0.29	0**	0	0

***-presence of indicator significantly different in plots under state management and co-management at 5% level of significance*

Chi-square tests show that in Ntchisi forest there was no significant difference in the presence or evidence of fire between co-managed and state managed forest blocks, (χ^2=0 .025, p = 0. 875). However, in Zomba-Malosa forest reserve, the evidence of fires was higher in state managed (19 observations) than in co-managed forest blocks (13 observations), and the difference was significant at 10% level of significance (χ^2= 3.441, p = 0. 064). No evidence of grazing was observed in Zomba-Malosa forest reserves (i.e. both in state managed and co-managed forest blocks). However, in Ntchisi forest reserve, whilst evidence

of grazing was observed in some plots (n=8) under state management, no evidence of grazing was observed in plots under co-management.

In both Ntchisi and Zomba-Malosa, the debarking and lopping observed in both state and co-managed forest blocks were mostly heavy, such that it could result in the tree drying out (Figure in Appendix 8). In Zomba-Malosa, there was a significant difference in observed farming plots with plot location along the transect moving away from forest boundary (i.e. boundary, and middle or toward centre) in both state managed ($p=0.013$) and co-managed ($p=0.042$) forest blocks, respectively. Therefore, farming plots were largely observed in the plots along the forest boundary line, in both state managed and co-managed forest blocks. Likewise, settlement plots in Zomba-Malosa forest reserve were observed in the plots along the forest boundary line, in state managed forest blocks. Settlement plots in Zomba-Malosa forest reserve were observed only in state managed forest blocks and none in co-managed forest blocks (Table 5.4). However, the presence of tree stumps, felled trees, charcoal pits, debarked trees, lopped trees, hunting pits, evidence of fire and evidence of grazing per plot did not differ significantly with plot location along the transect moving away from forest boundary (i.e. boundary, and middle or toward centre) in either state or co-managed forest block, in both Ntchisi and Zomba-Malosa forest reserves.

5.3.3 Management activities under co-management and state management

A number of forest management activities are being carried out in both the co-managed and state managed blocks in both forest reserves. These include firebreak establishment (both within the forest and around the edge of the forest), boundary marking, establishment of forest nurseries and tree planting (Table 5.5). In Ntchisi, management activities such as firebreak construction, boundary marking and planted trees in and around the forest block, were not present nor observed in both the co-managed or state managed forest blocks (Table 5.5). Furthermore, no planted trees were observed in the periphery of the forest (approximately within a distance of 50 to 100 metres from the forest boundary), nor the field's adjacent co-managed blocks. However, some planted trees, mostly small in size, were observed in homesteads further away from the forest reserve. Only 2 communal forest nurseries were observed in communities that are participating in the co-management

programme (Table 5.5). A total of 11 Village Forest Areas (VFA) located within communities participating in the forest co-management programme were also observed[31].

Table 5.5: Total number of forest management activities observed in and around state and co-management forest blocks and surrounding communities in Zomba-Malosa and Ntchisi forest reserves

Activity	Ntchisi		Zomba-Malosa	
	State management (n=26)	Co-management (n=27)	State management (n=26)	Co-management (n=27)
Firebreaks	0	0	2	10
Marked boundaries (constructed)	0	0	2	11
Number of forest nurseries	3	2	2	2
Presence of planted trees	0	0	6	0
Village Forest Areas	4	11	14	23

n = total number of plots.

In Zomba-Malosa, management activities such as firebreak construction and maintenance, boundary marking and establishment of forest nurseries are mostly done in co-managed blocks and in communities that are participating in the co-management programme (Table 5.5). However, no planted trees were observed in or around co-managed forest blocks (Table 5.5). Furthermore, no planted trees were observed in the peripherals of the co-managed block nor the field's adjacent to co-managed blocks, in Zomba-Malosa. However, some planted trees mostly of smaller sizes were observed at random in homesteads. A total of 37 VFA's of varying sizes were observed mostly composed of mature natural trees in communities living around Zomba-Malosa forest reserve. The majority of the VFA's were located in communities participating in the co-management programme (Table 5.5).

[31] Village forest areas are forest patches of either natural or planted forests on customary land, which are owned and managed by the community. Village heads are responsible for the management of village forest areas. However, the forest department provide the technical assistance in the establishment and management of the forests (Malawi Government, 2007).

5.3.4 Perceived impacts of co-management on forest and forest conditions

In Ntchisi district, approximately 73% of respondents perceive the co-management programme to have had positive impact on forest conditions in the forest reserve. Approximately 47% perceive an increase in seedlings and saplings or regrowth, 42% a decline in illegal cutting and 11% report the introduction of reforestation and afforestation schemes, since the programme started. However, Table 5.6 shows that the perceived positive impact has not translated into increase in forest tree stocks. Thus, whilst acknowledging that the co-management programme has had a positive impact on forests, a majority of respondents in Ntchisi indicated that the current status of the forest (quantity and quality) is worse than before co-management started, i.e. before 2005 (Table 5.6). The majority of respondents that perceived a decline in tree population in Ntchisi district attributed the decrease to careless cutting during the edible caterpillar (Matondo) harvesting season (48%), charcoal and firewood for tobacco curing (28%) and poor leadership among committee members or programme leaders (24%).

Table 5.6: Perceived changes in tree population over time in co-managed blocks of Ntchisi and Zomba-Malosa forest reserves

Time period	Percentage response by district					
	Ntchisi (N=99)			Zomba-Malosa (N=106)		
	Decreasing	No change	Increasing	Decreasing	no change	Increasing
Before 2005 (Prior to co-management programme)	31.3	2.1	66.7	52.8	0.6	46.5
From 2005 to 2010 (first 5 years of co-management programme)	73.8	13.8	12.4	68.2	5.1	26.8
Current	63.4	11.1	25.5	50	3.1	46.9

In Zomba-Malosa district, approximately 84% of respondents perceive the co-management programme to have had a positive impact on forest conditions. Respondents perceive an increase in seedlings and saplings or regrowth (39%), increase in tree stems (16%), a decline in illegal harvesting (19%), introduction of reforestation and afforestation programmes (17%), and improved river flow and water availability (9%), since the programme started. Furthermore, respondents perceive the current status of forest to have

been restored to how it was before co-management programme. In Zomba-Malosa, the majority of respondents that perceived a decline in tree population attributed it to charcoal production for sale (74%), timber and pole cutting (15%), poor leadership among committee members or programme leaders (8%) and encroachments for settlement and farming (3%).

5.4 Discussion

The higher tree density per plot in Ntchisi forest reserve than in Zomba-Malosa forest reserves, show that Ntchisi forest reserve is a closed canopy forest whilst Zomba-Malosa is an open forest (Figure 5.2). Co-managed forest blocks in both Ntchisi and Zomba-Malosa forest reserve have had higher tree density than state managed forest blocks. Additionally, a majority of respondents in both Zomba-Malosa and Ntchisi also perceive the co-management programme to have a positive impact on forest conditions, against a general worsening trend in forest stocks (Figure 5.2 and Table 5.5). Due to lack of information on forest conditions before the programme started, the observed difference in forest conditions between blocks under co-management and those under state management could be attributed to: 1) selection bias at the start of programme (i.e. that the tree density and forest conditions were not equal at the start of the programme, and/or; 2) differences in subsequent management, assuming that the forest conditions and tree density were equal throughout the reserve at the start of the programme (e.g. Gobeze *et al.,* 2009; Phiri *et al.,* 2012).

Considering that the programme has only been implemented for seven years at the time of the study, the higher tree density and species richness in co-managed forest blocks could suggest that co-management has resulted in conservation of the mature trees present at the start of the programme, if equal forest conditions and tree density throughout the reserves at the start of the programme is assumed. Government are limited in both human and financial resources, to effectively monitor forest resources against over exploitation (Agrawal, *et al.,* 2013), hence involvement of local communities in co-management is hypothesised to facilitate forest management (i.e. in terms of human resources) and contribute to conservation. Therefore, the lack of community involvement in the management of the state managed forest blocks of Ntchisi and Zomba Malosa forest reserves may have resulted in continued exploitation of the mature trees hence the decline in tree density and species richness. Furthermore, this may imply occurrence of leakages or displacement effects in the blocks under different management types (Vyamana, 2009; Somanathan *et al.,* 2009). As such, it is possible that the introduction of the forest co-management programme in phases

and having co-managed and state managed block within a single reserve has had negative effects on state managed forest areas. Therefore, the higher tree density in co-managed forest blocks could suggest that stricter harvesting and management conditions in these blocks resulted in opening up of the state managed block for exploitation, hence translating into low forest density and species richness. In case of Zomba-Malosa forest reserve, this is further supported by the higher presence of human disturbances and activities in state managed forest block than in co-managed forest block in forest reserve (Table 5.4). However, in the case of Ntchisi forest reserve, there is no further evidence to support that the higher tree density and species richness in co-managed forest blocks is a direct result of either the co-management programme or occurrence of leakages, since the results on human disturbance (Table 5.4) show a higher presence of human disturbances and activities in co-managed forest blocks than in state managed forest block of forest reserve. Therefore, the higher tree density and species richness in co-managed forest blocks in Ntchisi forest reserves could be a factor of existing forest conditions and tree density prior to and at the start of the programme.

Respondents in Zomba-Malosa further attributed the decline in presence of human activities and disturbance (e.g. tree felling, charcoal making and encroachment) in the forest reserve to improved monitoring and enforcement of harvesting laws by the block committee and communities living in and around the reserve. This suggests that co-management can result in sustainable forest management (Blomley *et al.,* 2008; Phiri *et al.,* 2012). Additionally, tree density is significantly different within some blocks under state management in Zomba-Malosa forest reserve. In plots where high tree densities were recorded (e.g. Anglican block), the species were largely *Uapaca kirkiana*. *Uapaca kirkiana* fruits significantly contribute to the rural diet during the food shortage period and sales generate cash incomes for purchasing household goods, farm inputs and meeting social obligations, and hence the trees are rarely felled (Akinnifesi *et al.,* 2004; Kadzere *et al.,* 2006).

The higher seedling and sapling density in state managed blocks in Zomba-Malosa forest reserve indicate that state managed blocks are more heavily exploited than co-managed blocks, as higher presence of seedlings and saplings is often correlated with lower numbers of full grown trees (Figure 5.3 c.). This is also evident in the low number of tree counts observed in state managed blocks of Zomba-Malosa forest reserve (Figure 5.2a.). This corroborate findings by Warren *et al.,* (1995) showing that seedlings and saplings as well as smaller trees flourish when the tree density is minimal or in the absence of bigger trees,

because there is less competition for light and nutrients. In Zomba-Malosa forest reserve, the heavy exploitation in state managed blocks than in co-managed blocks could also be as a result of differences in the block proximity to the main road and accessibility to markets for forests products. For example in Zomba-Malosa forest reserves, two of the state managed blocks included in this study, Anglican and Minama management blocks, are located close to the main road; **M3** which connects to the country's central road-**M1** at both ends, i.e. Balaka and Blantyre respectively (Figure 2.4), whilst all the co-managed blocks are further away from the main road. Therefore, community members living adjacent to Anglican and Minama management blocks, (as well as non-community members) can easily harvest forest products (e.g. charcoal, firewood and timber) and easily sell by the roadside to travellers from other areas or transport to other markets in other area (e.g. Zomba town and Blantyre city). Therefore the easy access to main road and increasing demand for forest products by travellers could contribute to the differences in tree density and deforestation levels between co-managed and state managed forest blocks in Zomba-Malosa forest reserve. However, the high density of seedlings and saplings in the state managed forest block indicate a potential for tree population recovery, given proper silviculture management practices and sufficient enforcement of rules and regulations (Obiri *et al.,* 2010b).

In Ntchisi forest, evidence of human disturbance was significantly higher in plots under co-management than in state managed plots. However, the opposite was observed in Zomba-Malosa forest reserve. This could indicate that, in Ntchisi, co-management may have opened up the reserve for utilization and markets, as during the focus group and key informant interviews, communities in Ntchisi indicated that co-management has brought or introduced new forest based income sources including, timber sales, firewood sales and pottery (clay pots) sales. However, in Zomba-Malosa communities may have reacted to the management and utilization rights under co-management by taking charge and conserving the forest. Therefore, it is possible that co-management programmes may not always be understood or interpreted equally by different communities and hence even though the approach is similar may not always produce equal results (Bowler *et al.,* 2012 and 2010; Poteete and Ostrom, 2004). However, it is also important to note that this could be due to the difference in harvestable forest stocks between Ntchisi and Zomba-Malosa forest reserves (Figure 5.2a).

The increase in human activity in co-management forest blocks in Ntchisi forest could also be attributed to limited labour and high time cost for effective monitoring to prevent illegal harvesting in the forest blocks as participation is voluntary. Additionally, the higher

presence of physical signs of human activity in co-managed forest blocks of Ntchisi forest reserve and the decline in tree density since the co-management programme began as perceived by the majority of the respondents in Ntchisi, could also be attributed to poor leadership among programme leaders, since approximately 24% of respondents in Ntchisi who perceived a decline in forest status attributed the decline to poor leadership. Poor leadership has also been highlighted as one major contributing factor to failures of participatory forest management programmes by Poteete and Ostrom, (2004); Tacconi, (2007); Ostrom, (1990); and Zulu, (2008).

A majority of respondents in Ntchisi, perceived tree density to have been higher before co-management began. This could be attributed to the fact that, during state management, access and utilization was limited, hence this allowed for conservation and an increase in tree density in the reserves. Instead, the co-management programme supports forest-based enterprises among the participating communities, hence resulting in increased exploitation. Therefore, the higher evidence of human disturbance and activity observed in co-managed forest blocks in Ntchisi forest (Table 5.4) also explains why the majority of community members in Ntchisi perceived tree density to have been higher before the co-management programme began and think there has been a decrease in tree density since the co-management programme began (Table 5.6). Furthermore, the perceived decline in tree density since co-management began could be as a result of other factors such as increase in demand of forest products due to population growth in the communities, over time.

Participating communities are allowed to collect dead trees for firewood in protected sections of co-managed forest blocks, but some individuals may debark or lop a tree heavily and let it die, just to come back and collect it as dead wood. Therefore, long term improvement in tree and woody populations could be compromised by heavy debarking and lopping. Thus, there is a need for a proper monitoring mechanism and to ensure that management and utilization rules and regulations are adhered to by all local communities. Additionally, there is a need to identify alternative trees and wood sources, so as to reduce the current pressure on the existing reserves, and also to allow for the recovery or regeneration of harvested forest areas. One such alternative tree and wood source is the establishment of VFA's, which were observed in communities living around both Zomba-Malosa and Ntchisi Forest reserve. Furthermore, VFA's could also present the communities with an investment opportunity for a sustainable flow of forest products for subsistence and commercial value (Blomley *et al.,* 2008b).

The results show that forest boundaries were clearly marked and firebreaks constructed in co-managed forest blocks of forest reserve. However neither marked and constructed boundaries nor firebreaks were observed in Ntchisi forest reserve. Lack of marked boundaries in Ntchisi forest reserves was attributed to the fact that natural relief forms such as rivers and streams are used to mark block boundaries. However, a number of stream and small rivers, both annual and seasonal, flow through Ntchisi forest reserve; hence unless one is well aware of the reserve, it is difficult to recognise the boundaries especially the inner boundaries. This therefore results in difficulties in identification of and exclusion from protected sections, thus making adherence to and enforcement of forest harvesting laws difficult (Ostrom, 1990).

5.5 Conclusion and recommendation

Due to the lack of information on forest condition before the programme and block selection criteria, short implementation time, and also the mixed results on indicators of forest condition as well as local people's perceptions, it is difficult to; 1) quantify the current impact of co-management programmes on forest condition, and; 2) predict the future direction of co-management impact on forest condition based on the presence of human activities or disturbances recorded in this study alone. Therefore a follow-up forest inventory study to allow for attribution of the differences in forest condition to differences in management approaches is recommended. Thus forest data in this study provides a baseline which could be repeated. In addition to baseline data, there is need for a better understanding of the site selection criteria at the start of programme, as this informs the sampling criteria and methods. Furthermore, all possible confounding factors (e.g. leakages and distance between forest and community) that may affect the comparability of study sites and outcome of the programme should be investigated and considered in planning an impact assessment programme. Co-management outcomes will vary depending on pre-existing forest condition as well as on how participating communities understand and interpret the programme. Hence forest co-management programmes may not always be a solution to degradation, and it can also enhance degradation in other areas. Therefore, co-management programmes should not be considered a universal package; as such it should not be automatically applied in the same way in the different districts. However the programmes should instead be designed to take into account the socio-economic characteristics of the specific participating community and the pre-existing condition of the forest. Community perceptions are an important tool in

eliciting information on forest conditions, however, it is difficult to get a conclusive assessment if they are used on their own. The combination of methods in this study allows a more robust assessment of the impacts of co-management than would otherwise be possible. However, even with method triangulation, it is very difficult to determine the effect of co-management on forest conditions from one-time study data; therefore, this reinforces the need for baseline data, and before and after study designs in forest co-management impact studies.

CHAPTER 6: LIVELIHOODS AND WELFARE IMPACTS OF FOREST CO-MANAGEMENT

Abstract

Co-management programmes are gaining popularity among governments as one way of improving rural livelihoods. However, evidence of their effects on the livelihoods and welfare of local people remains unclear. The sustainable livelihoods framework and stated preference techniques were used to assess the livelihoods and welfare impacts of forest co-management on 213 households participating in a forest co-management programme in Zomba and Ntchisi districts. The results show that a majority (63%) of respondents perceive that, overall, co-management has had and is having no impact on their livelihoods. However, the programme is enhancing financial capital among participating communities members by introducing income generating activities in the programme areas, which are externally subsidised by the programme donors. The study also reveals that the programme has enhanced human and social capital among some members of the participating communities. Despite the negative perception of the overall livelihoods impact, a majority of households (80%) are willing to pay annual membership fees to participate in the programme (mean = 812 Malawi kwacha), most likely because of perceived potential future benefits, rather than perceived current benefits. Education, gender of the household head, a positive perception of current livelihoods benefits and a position on the committee increases household willingness to pay membership fees. Based on the programme's positive effects on financial and social capital, coupled with positive willingness to pay among local people, forest co-management programmes have the potential to improve community livelihoods and welfare. However, the positive willingness to pay despite the negative perception of overall livelihoods impacts may also demonstrate the weaknesses of relying on stated preference surveys alone in estimating welfare effects.

Key words: *Livelihoods, welfare, willingness to pay, forest co-management.*

6.1 Introduction

Forest co-management programmes are meant to improve the livelihoods and welfare of rural communities (Tsi *et al.,* 2008). Although rural people in developing countries are heavily dependent on forest resources, there is limited evidence that forest co-management programmes have resulted in improved livelihoods and welfare among rural communities participating in the programmes (Bowler *et al.,* 2010, 2012; Vedeld *et al.,* 2007).

Although their livelihoods and welfare benefits remain unclear, forest co-management approaches are gaining popularity and wider acceptance by government and donors in the developing world as a prerequisite for conservation and development policies (Gobeze *et al.,* 2009; Wily, 2001; Zulu, 2008). Furthermore, the initiatives are now part of the larger economic and institutional reforms being pursued by many governments under IMF and World Bank conditionality lending since the 1990s (Tole, 2010). Other developments include increased donor financial and technical support towards forest co-management initiatives (Fisher, 2004). Given this continued popularity among governments and policy makers, it is important to understand how co-management affects livelihoods and welfare of participating communities, to ensure effective and efficient implementation and resource allocation (Tsi *et al.,* 2008). Therefore, using the case of forest co-management programmes in government forest reserves in Malawi, this study aims to assess the livelihoods and welfare impacts of forest co-management on participating communities.

To assess the impact of co-management programmes on community livelihoods the study adopted the sustainable livelihoods framework (e.g. Ali *et al.,* 2007; Dev *et al.,* 2003; Vyamana, 2009) combined with a contingent valuation (stated preference) question to estimate a household's 'willingness to pay' (WTP) for participation in the programme (e.g. Mekonnen, 2000). This combination of approaches is essential for obtaining a more comprehensive view of the livelihoods and welfare impacts, which would otherwise be difficult to achieve if each method is used on its own. For example, although stated preference techniques (contingent valuation and choice experiments) are widely used in valuing natural resource and environmental welfare benefits, due to their hypothetical nature they do not provide an explicit indication of what a household has actually gained, and are vulnerable to hypothetical and strategic biases (Bateman *et al.,* 2002; Pouta and Rekola, 2001; Mitchell and Carson 1989; Whittington, 1996). Furthermore, household WTP may reflect either present welfare benefits accrued or expected future benefits (Hanley *et al.,* 2007). By using stated preference techniques alone, it would be difficult to identify whether a household's WTP reflects present welfare benefits or perceived future benefits for them or

future generations. Therefore, by using both the livelihoods framework and stated preference techniques, it is possible to externally validate the welfare benefit as well as quantify the household's intentions for WTP (Hanemann, 1994).

The overall objective of this chapter is to assess the current livelihoods impact of forest co-management programmes and estimate the programme's perceived welfare benefits among participating communities. The specific objectives of the study are:

1. To identify the perceived impacts of the forest co-management programme on the livelihoods of communities participating in the programme.
2. To assess the perceived welfare impacts of forest co-management as measured by households' willingness to pay to participate in the programme.
3. To explore determinants of households' willingness to pay to participate in forest co-management programme activities.

This chapter is organised as follows: section 2 gives a brief description of measuring livelihoods and welfare impacts using the sustainable livelihoods framework and stated preference techniques, followed by description of study methods in section 3. Section 4 presents results and discussion. Finally, conclusions and recommendations are described in section 5.

6.2 Measuring livelihoods and welfare impact

6.2.1 Sustainable livelihoods framework

Livelihoods have been defined as means, activities capabilities, assets and entitlements by which people build a living (Chambers and Conway, 1991; Das, 2012; DFID, 1999). Therefore, livelihoods comprise both material and social resources (Chambers and Conway, 1991). Conventionally, assessing the livelihoods impact of development policies or projects only focused on households' income and consumption, hence disregarding the social aspect of households' wellbeing or livelihoods (Das, 2012). However, the sustainable livelihoods framework (DFID, 1999), aims to address the role that development policies or programmes (in this case the forest co-management programme), play in improving households' social and economic wellbeing. Thus, the sustainable livelihoods framework offers a logical point for assessing the livelihoods impacts of a co-management programme on local households, since co-management programmes aim at improving both the social and economic wellbeing of local communities (Dev *et al.*, 2003).

The sustainable livelihoods framework describes five types of capital upon which livelihood impacts can be assessed. These are, natural, financial, physical, social/political and human (Table 6.1). The framework is founded on the assumption that in order for households to achieve positive livelihoods outcomes, a range of assets or capital categories are required, since no single asset category can sufficiently meet households' multiple and varied livelihoods needs (DFID, 1999). Therefore, at a given time households may draw on the different assets base to pursue a range of livelihood strategies, at times managing a portfolio of various part-time activities, so as to yield positive livelihoods outcomes (Das, 2012; Dev *et al.*, 2003; Maharjan *et al.*, 2009).

Table 6.1: Livelihoods capitals and their definitions

Capitals	Definition	Reference
Natural	• The natural resources and environmental services that form the basis for human survival and economic activities (e.g. forests, water, soils and pollution sinks).	DFID, 1999; Ellis, 2000; Scoones, 1998
Financial	• Capital base that enable a household to pursue a particular livelihoods strategy (e.g. cash, credit, income, and savings)	DFID, 1999
Physical	• Basic infrastructure (e.g. transport, communications), housing, as well as any means and equipment of production	DFID, 1999; Ellis, 2000
Social/political	• Aspects of the society or community upon which households depend, when pursuing different livelihoods strategies requiring coordinated actions (e.g. networks, social claims, social relations, affiliations, associations, norms and trust)	DFID, 1999; Jagger and Luckert, 2008; McCarthy *et al., 2004*; Woolcock, 2001
Human	• Skills, knowledge, ability to labour, good health and physical capability, that enables one to pursue different livelihoods strategies	DFID, 1999; Scoones, 1998

Although a household's choice of livelihoods strategy may in part be determined by the household's preferences and priorities, it may also be influenced by trends (e.g. population and resources trends), shocks (e.g. droughts) and seasonality (e.g. shift in prices and employment opportunities), which are beyond their control (Baumann and Sinha, 2001; DFID, 1999). Additionally, availability of and access to assets or capitals is regulated by the existing transforming structures and processes (i.e. institutions and policies) (DFID, 1999). Therefore, household livelihoods strategies and outcomes are based on the available capitals, as well as the given opportunities and capabilities to access and acquire the capitals, within the context and dynamics of vulnerabilities, and transforming structures and processes (Chambers and Conway, 1991). Thus, although a co-management programme is not an asset or capital base in itself, it has the potential to provide opportunities and capabilities for accessing the different types of capital that forest and forest systems provide and support (Nath and Inoue, 2010). By using the opportunities, capabilities and activities provided by the programme, households could develop livelihoods strategies that respond to their specific needs and constraints, and this could eventually translate into improved livelihoods outcomes (Shimizu, 2006). For example, compared to state management, co-management gives communities legal rights to access and use forests and forest products sustainably, hence it has the potential to provide new livelihoods opportunities and income sources, which could eventually lead to improved household or community livelihoods (Dev *et al.*, 2003). Furthermore, by improving access to and sustainable utilization of forest products, a co-management programme can reduce the risks and vulnerabilities that local communities face, since forest products play an important role as a safety net in stress periods such as crop failure, drought and social strife (Appiah *et al.*, 2009; Fisher 2004; McDermott and Schreckenberg 2009). Additionally, a co-management programme introduces policies and processes (e.g. rights to access and utilize), that enable households to access different capitals and build their livelihoods strategies (Das, 2012; Maharjan *et al.*, 2009; Dev *et al.*, 2003).

Studies on livelihoods (e.g. Das, 2012; Go swami *et al.*, 2011; Nath and Inoue, 2010; Phiri *et al.*, 2012; Vyamana, 2009), have identified and described various indicators for assessing impacts of co-management programmes on the different livelihoods capitals (i.e. opportunities and capabilities that forest co-management programmes could provide to participating communities in order to improve their livelihood) (Table 6.2).

Table 6.2: Indicators of forest co-management opportunities and capabilities for the different livelihood assets

Livelihood Capitals	Indicators of co-management opportunities and capabilities
Natural	• Improved availability and access to forest resources: (e.g. timber, firewood trees, poles)
Financial and income	• Increased livelihoods and income sources • Increased income levels • Access to loans • Employment • Ability to accumulate savings
Physical capital	• Development projects (e.g. road building) • Accumulation and acquisition of assets (e.g. land, house)
Social capital	• Friendly relationships and social organization • Degree of participation in local communal activities (i.e. collective action and cooperation)
Human capital	• Training and knowledge development

Natural capital is largely assessed based on changes in the availability, quantity and quality of forest resource stocks (i.e. timber trees, NTFP and improved forest conditions) (e.g. Goswami *et al.*, 2011; Schreckenberg and Luttrell, 2009). However, Das, (2012) also argues that the natural capital base for the forest-dependent households is basically their access to the forest resources. Therefore, in addition to availability of forest resources, this study also assesses local people's perceived changes in the access to forest resources before and after the implementation of the programme as an indicator of the impact of forest co-management on natural capital. Impacts on financial capital have been evaluated in terms of perceived changes in livelihoods and income sources, income levels, ability to access loans, employment opportunities and ability to accumulate savings (e.g. Das, 2012; Goswami *et al.*, 2011; Schreckenberg and Luttrell, 2009; Phiri *et al.*, 2012; Reddy *et al.*, 2004; Vyamana, 2009).

Impacts on physical capital have been assessed at both community and household levels (Table 6.2). At community level, the study evaluates differences in infrastructure projects (e.g. roads) before and after the co-management programme was initiated (e.g. Maharjan *et al.*, 2009; Vyamana, 2009). Whilst at household level, physical capital is assessed based on various assets that households have acquired and own because of their participation in the programme, for example land and farm implements and household durable assets (Goswami *et al.*, 2011; Maharjan *et al.*, 2009).

Although a number of indicators for measuring social capital have been suggested (e.g. Paxton, 1999), Woolcock and Narayan (2000) and Kramer (2007) argue that there is no consensus on appropriate indicators for measuring social capital due to the multidimensional nature of social capital, and its ability to change with time and contexts. Furthermore, DFID (1999) suggest that measuring social capital benefits may be difficult for an outsider and may require a lengthy analysis over time. Thus in an attempt to assess the impact of forest co-management on social capital, the study used the degree of participation in local communal activities (i.e. collective action and cooperation) as an indicator for social capital (e.g. Maharjan *et al.*, 2009; Nath *et al.*, 2010).

Human capital comprises education, knowledge and skills, health and food security. However, in this study human capital has been assessed based on perceived changes in training and knowledge development (e.g. Nath and Inoue, 2010). This is based on literature that suggests that the direct impact of forest co-management activities on health are limited and confounded with other factors, hence are difficult to quantify (e.g. Vyamana, 2009). Furthermore, other aspects of human health such as vaccinations and provision of health care are not part of the co-management programme in Malawi (Malawi Government, 2008). Therefore, based on this information on programme components and the limited evidence of forest management programme impacts on human health, this was excluded *a priori.* Additionally, it is also important to note that the capitals can also be linked, and can thus be converted into each other (DFID, 1999; Shimizu, 2006). For example, financial capital can be converted to human capital by improving the purchasing power for food products. Similarly, human capital in terms of food and nutrition can be reflected in the assessment of natural capital through changes in access to, and availability of, forest products. Therefore, while acknowledging the importance of food and nutrition as an indicator for human capital, to avoid duplication and double assessment, food and nutrition was *a priori* considered to be directly linked and reflected in the natural capital benefits in terms of access and availability of forest products which include fruits and vegetables and medicinal plants. Therefore, this

study evaluated human capital impacts of forest co-management programme based on changes in training and knowledge development before and after the implementation of the co-management programme.

Furthermore, it is important to note that livelihoods can only be described as sustainable if they can cope with and recover from stresses and shocks, and also maintains or enhance their current and future assets base, without undermining the natural resource base (Carney, 1998). In addition households may use different combinations of available livelihood capitals and activities in order to meet their livelihoods needs and reduce their vulnerability to risks (Ellis, 2000; Shimizu, 2006). Thus, it is difficult to draw a conclusion on the overall impact of the co-management based on the changes in the individual livelihood capitals alone (Maharjan *et al.,* 2009). Therefore, in addition to perceived changes in the different livelihoods opportunities and capability indicators, local peoples' perceptions or assessment of the overall impact of the co-management programme on their livelihoods was also sought.

6.2.2 Stated preference techniques – the contingent valuation method

Contingent valuation method (CVM) is a survey-based stated preference method used to value goods and services that are not traded on the market (Bishop, 1999). The approach uses hypothetical scenarios with a defined payment vehicle to elicit respondents' willingness to pay (WTP), which estimates the utility gained from the described service (Mekonnen, 2000). The underlying assumption is that, although respondents are presented with a hypothetical scenario, their behaviour and responses reflect their behaviour in real situations (Bateman, 1996). I used contingent valuation method rather than a choice experiment in this study because the study was not interested in exploring and valuing different attributes and levels of co-management, but rather valuing the existing programme.

The hypothetical questions in a CVM survey could be presented as; 1) dichotomous format (e.g. Kim *et al.,* 2012); 2) open-ended format (e.g. Balistreri *et al.,* 2001), or 3) by starting with dichotomous format, followed by the open-ended format (e.g. Bateman, 1996; Jones *et al.,* 2010). Dichotomous formats are normally the preferred format in CVM studies because they are said to simplify data collection as questions are straight forward and minimise biases which are inherent to using CVM (Mitchell and Carson, 1989; Hanemann, 1994). However, dichotomous formats require large data sets to be statistically efficient (Mitchell and Carson, 1989), which is infeasible in many co-management settings.

Due to its hypothetical nature, stated preference surveys are prone to biases including hypothetical bias, strategic bias and social desirability bias. Hypothetical biases arise when the hypothetical situation presented to respondents fails to reflect the real situation, hence results in WTP values that usually overstate the real value, (Bateman *et al.*, 2002). As such, at the time of answering, respondents fail to account for any budget constraints that they would otherwise consider if the situation was real. Therefore, studies using hypothetical situations work better where respondents are familiar with the payment vehicle and the good being valued (Loomis, 2011). A strategic bias occurs when respondents respond to the question with intent to influence the study outcome in their favour, for example, if they believe that the hypothetical scenario may become a reality (Mitchell and Carson, 1989). Social desirability bias, usually associated with face-to-face interviews, occurs when respondents give responses that they perceive as culturally acceptable or to be liked by the interviewer, with a desire to appear that they relate to the socially desirable attributes of the programme (Loureiro and Lotade, 2005).

In addition to biases, other limitations of stated preference surveys pertinent to this study include the difficulty in validating the estimated values externally, and uncertainties associated with using the method in developing countries because of the low income and illiteracy of respondents. Illiteracy is said to limit a respondent's ability to understand and respond to the hypothetical questions (Dixon and Sherman 1990 in Mekonnen, 2000). However, despite the biases and limitations associated with contingent valuation (and other stated preference) surveys, it remains a useful method for estimating welfare impacts of natural resource management policies in both developed and developing countries if it is properly designed, implemented and triangulated with other forms of data to evaluate the validity of the survey (Bateman *et al.*, 2002; Mitchell and Carson, 1989; Whittington, 1996).

6.3 Study methods

6.3.1 Data collection

The data for this study was collected from communities around Zomba-Malosa forest reserve in Zomba District and Ntchisi Forest reserve in Ntchisi district. The forests are among the 12 reserves where the IFMSL programme is being implemented (Malawi Government, 2007).

6.3.1.1 Preliminary study and general survey procedures

Prior to the household survey, pre-testing was done in order to assess the acceptability of the payment vehicle; the response rate to the open-ended CVM question and how the hypothetical scenarios would be presented to respondents. Before the start of each survey session, focus group discussions with community members and key informant interviews with members of the committee, some older members of the community, traders and representatives of the community-based organizations (where present), were conducted in each study community to gather more information on the programme to supplement the information from the questionnaire survey. A total of 213 household heads in participating communities were interviewed (114 in Zomba-Malosa, 99 in Ntchisi) (see Chapter 2; Table 2.8).

6.3.1.2 Questionnaire survey design and procedure

6.3.1.2.1 Socio-economic and livelihoods questionnaire

The questionnaire first gathered the socio-economic and household characteristics of the respondents, including age, education, location and major income source and wealth indicator (Appendix 2.2). The socio-economic variables were collected to determine what factors affect or predict households' responses to the contingent valuation question. Although studies on willingness to pay in forestry have shown that a number of household socio-economic characteristics determine household willingness to pay (e.g. Adekunle and Agbaje, 2012; Bateman, 1996; Mekonnen, 2000), the direction of influence is not consistent for the different studies. Therefore, the expected direction of influence is not defined nor hypothesised a priori. Household socio-economic characteristics were also tested as predictors for perceived overall programme impact and access to programme benefits, in order to determine benefit distribution across community members and factors affecting access to benefits.

Following the socio-economic questions, respondents were asked to indicate their perceptions of changes in the different livelihoods capitals before and after the forest co-management programme were introduced. These included changes in: 1) accessibility to and availability of forest resources; 2) livelihoods and income sources; 3) ability to save and access loans; 4) acquisition of assets; and 5) social relationships. Furthermore, the respondents were asked to indicate their perception of the current overall impact of co-management on their livelihoods (i.e. whether they were benefitting or not). The response to this question was also tested as a determinant for the households' willingness to pay.

6.3.1.2.2 Contingent valuation of the co-management programme

Following the livelihoods questionnaire, the contingent valuation question was presented to respondents. This used the annual membership fee as a payment vehicle to elicit household willingness to pay to participate. Many individuals in the study area belong to small village groups (e.g. village banking group, irrigation farming groups), to which they are required to pay an annual membership fee, to show commitment. Therefore, respondents are familiar with the payment vehicle adopted in this study, which should help minimize occurrences of hypothetical bias. The hypothetical scenario was presented as:

> *'Imagine that the Government and its partners will no longer be in a position to fund some of the activities of the programme, thus they would like to ask each community member to contribute in the form of a membership fee, so as to ensure that the activities of the programme continue in the community…*

The hypothetical situation adopted in this study is common and familiar to most communities, hence minimizes the hypothetical bias in the responses. To avoid strategic, compliance and social desirability biases, before the interview, respondents were made aware that the situation being presented to them is hypothetical, developed for the purposes of the study only and that the research was not directly connected to the implementers of the project (Department of forestry or EU programme implementation unit). However, in order to obtain informed consent I explained that the outcomes of the study would be made available to the programme coordinators for their reference. Additionally, respondents were allowed to ask and were also asked questions to ensure that they had understood the hypothetical scenario, before the questions on willingness to pay were asked. Thus, although the hypothetical scenario adopted was common and familiar to most respondents, respondents required clarification on a number of issues when presented with the scenario and the willingness to pay question. Some of the issues frequently asked about included: 1) what will the money be used for, and who will use it; 2) what will the payment mean to them in terms of access to forest resources (i.e. does it mean they have open access to all materials, since they are now paying membership fees or will harvesting still be controlled); 3) whether they are being asked to pay as individuals or as a household; 4) to whom will the money be paid (i.e. the committee or government); 5) what will the alternative management regime be, if they don't pay. It was explained to respondents that; the money will be used by the community for

administrative purposes of their community forest management organisation[32], including purchasing of book keeping materials and facilitating forest management and enterprise trainings (which are currently funded by the donors). Respondents were also informed that payment is at household level, rules and regulations with regard to benefits and access to resources will remain as agreed in their current forest co-management plan, and that the alternative approach was going back to state management (since my interest was measuring welfare benefits of a co-management programme against state management). During the preliminary survey it was noted that issues regarding whom they pay or who will be responsible were complex for most respondents (i.e. the committee or government).[33] For example, some respondents indicated that they will only be willing to pay if a new committee was established. In such cases, to allow respondents to value co-management against state management, (as opposed to valuing their feelings about the committee); we hypothetically adopted their suggested institution. [34]

The ability to ask questions and to suggest additional or changes to other aspects of the scenario before responding to the hypothetical WTP questions was a positive indicator that respondents were able to understand the questions and think through such issues and constraints that they would consider in a real situation before making a payment decision. Furthermore, adopting their suggested changes to the institutions also eliminates the fear that the WTP value given is for their feelings and perceptions of the current administrations of the programme, and not for the co-management programme.

Following presentation of the hypothetical scenario, respondents were asked whether or not they would be willing to pay a membership fee. If the response was "no", they were asked to give reasons for their response, and the interview was terminated. All such responses were considered as zeroes. If the respondents answered "yes", they were then asked how much they would be willing to pay per year. An open-ended question was used because: 1) it would have been impossible to have sufficient sample size within communities participating in forest co-management programme for a dichotomous choice question; 2) during the preliminary survey it was observed that respondents did not have significant problems in stating an amount they are willing to pay, as the payment vehicle is common and familiar to

[32] Communities participating in the co-management programme at community level (i.e. all the villages at group village headman level) form a community group which is registered as a local organization at the district council (Chapter 2, section 2.3.3).

[33] Observed in the study and thus included in results section.

[34] It was explained then that assuming a new institution or if government is responsible for the payment, will you be willing to pay membership fees to participate in the co-management programme.

most communities (e.g. Jones *et al.*, 2010); and 3) being a heterogeneous community open-ended questions provide more information on WTP that would enable us assess the credibility of the responses (Jones *et al.*, 2010).

6.3.2 Data analysis

6.3.2.1 Probit model

A probit regression model was used to explore factors that predict whether households: 1) perceive a positive overall livelihoods impact of co-management, 2) accessed new income sources initiated by the programme, and 3) were willing to pay membership fees to participate in forest co-management. According to Wooldridge, (2002) the probit model equation is specified as;

$$\Pr(Y = 1 | X) = \Phi(X\beta),$$

$$Y = \begin{cases} 1 \\ 0 \end{cases}$$

Where Y (dummy variable) is equal to 1 for households giving a positive response, and zero if otherwise. Φ is a cumulative density function, X are household and individual characteristics and β are parameters to be estimated.

6.3.2.2 Ordinary least square regression (OLS) and tobit regression model

Factors affecting open-ended WTP estimates can be explored using Ordinary Least Squares (OLS) regression. However, the use of OLS regression might lead to biases in parameter estimates and misleading inferences depending on the number of zero WTP responses in the data set (Wooldridge, 2002; Halstead *et al.*, 1991). Furthermore, if zero responses are excluded from the data set, the use of OLS on the censored data set may also result in sample selection bias, as the remaining data set (with positive WTP only) is unlikely to be a random sample, even if the initial sample (all included) was random, and thus may provide inconsistent parameter estimates (Wooldridge, 2002). Therefore, in case of relatively large numbers of zero WTP, the censored regression model, known as tobit, is the theoretically preferred model (Halstead *et al.*, 1991). A tobit model with selectivity allows decomposition of the data set to examine more closely the effects of the independent variables on positive WTP observations (Halstead *et al.*, 1991). However, so far there is no clear guide in the literature as to what number of zero WTP observations require the use of

tobit regression in place of OLS. Therefore both OLS regression (including the zero WTP), and tobit regression (censored at zero WTP) are represented in this chapter (Section 6.4).
The general description of the OLS model is:

$$Y^* = X_i\beta + \varepsilon_i$$
$$\varepsilon_i \approx N(0, \sigma^2)$$

Where Y^* is the amount the household indicated that they are willing to pay. OLS regression assumes that the dependent variable Y^* is linear and continuous. X are characteristics of the household and the head of household and β are parameters to be estimated. The error term ε is assumed to be normally distributed with mean zero and variance σ^2.

The Tobit model follows the OLS regression equation, however, the observed willingness to pay *(Y*)* represents the latent variables censored at WTP greater than zero. Therefore the tobit equation follows:

$$Y_i^* = X_i\beta + \varepsilon_i$$
$$Y_i = \begin{cases} Y_i^* & if \quad Y^* > 0 \\ 0 & if \quad Y^* \leq 0 \end{cases}$$

For both the OLS and Tobit regression models, the dependent variable is the annual amount households are willing to pay as a membership fee, measured on a continuous scale. Table 6.3 gives the description and summary statistics of the explanatory variables included in all the models tested (probit, OLS and tobit). To avoid multi-collinearity of the explanatory variables, multi-collinearity test was done for the different combinations of explanatory variables included in all the final models. The Variance Inflation factor (VIF), scores were less than 10 and tolerance scores ranged from 0.64 to 0.91, which according to Allison (1999), indicate weak correlation between the explanatory variables (Appendix 3.2 a and b). Therefore, independence of the explanatory variables was assumed. For all the regression models, bootstrapping (1000 resamples) was used in estimating the coefficients (Wooldridge, 2002). This method was used to correct for any distributional and asymptotic errors and to ensure that the results are valid, accurate and closer to the population parameters (Wooldridge, 2002). Data were analysed using STATA version 11.2.

Table 6.3: Descriptive statistics of variables used in the regression models

	Zomba-Malosa (N=106)		Ntchisi (N=99)	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Gender of household head (*1=female, 0= male*)	0.53	0.50	0.43	0.49
Marital status (*1= married, 0= not married*)	0.73	0.44	0.83	0.38
Age of household head (*in years*)	43.26	14.70	40.54	13.96
Household size *(number of adults and children)*	4.92	2.33	5.33	2.05
Land size (*in hectares*)	0.76	0.58	1.12	0.64
Wealth indicator *(ordinal scale, 4-11)*	7.43	1.91	6.94	1.23
Number of years in formal education	4.9	3.72	5.48	4.12
Perceived overall livelihoods impact of the program (*1 = benefiting, 0= not benefiting)*	0.43	0.49	0.28	0.45
Committee member, (*1= yes, 0= no*)	0.36	0.48	0.29	0.46

Wealth indicator ranged from 4 to 11, a score of 4 representing the poorest and 11 being the richest household. The wealth indicator was created based on aggregate scores assigned to different household characteristic or type of dwelling house (see Chapter 2, Section 2.5.2.1.1).

6.4 Results and discussion

6.4.1 Perceived forest co-management livelihoods impacts

Approximately 43% (Zomba-Malosa) and 28% (Ntchisi) of the respondents perceive that the co-management programme has had or is having a positive impact on their livelihoods (Figure 6.1). However, approximately 57% (Zomba-Malosa) and 71% (Ntchisi) perceive that the co-management programme has had no impact on their livelihoods (Figure 6.1). None of the respondents in Zomba-Malosa indicated a negative livelihoods impact, however a small percentage of respondents in Ntchisi (approximately 1%) indicated that the co-management programme has had or is having a negative impact on their livelihoods. One major reason for these negative impacts (although highlighted by a very small percentage of respondents), is the loss of access to forest resources due to patrolling by the committee, as expressed by a key informant in Ntchisi (who is also a timber and firewood trader). This is

also corroborates the response given by 24% (Ntchisi) of respondents who attributed the reduced access to forest resources (Table 6.4 below) to the strict laws and regulations being enforced under the co-management programme. However, it is also important to note that the co-management programmes have introduced income generating activities in the programme areas, which are externally subsidised by the programme donors, e.g. transport (Table 6.4). Hence, the far from universal positive impact on livelihoods even with this subsidy creates uncertainties for the long term livelihoods impact of the co-management programme among the local communities when the donor or external funding is withdrawn.

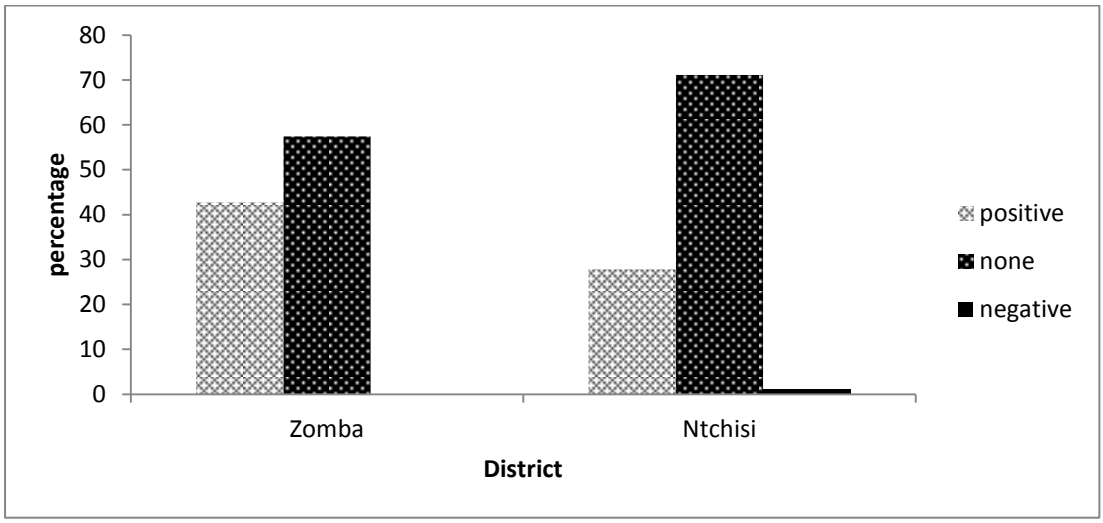

Figure 6.1: Respondents' perception of the forest co-management programme's overall impact on their livelihoods.

A majority of respondents in both Zomba-Malosa and Ntchisi perceive that the availability and accessibility of firewood and timber trees has reduced since the co-management started (Table 6.4). The reduction in availability and access to firewood and timber trees after the introduction of a co-management programme could be attributed to small levels of harvestable stock in the forest reserves due to the general declining trend in forest and forest resources over the years. During the focus group discussions and key informant interviews, the community revealed that forest and forest resources are continually declining due to population growth resulting in encroachment of forest areas for both settlement and farming. Similarly, results in Chapter 5 show that local people perceive that the status of forests has been declining over the years. Additionally, Chiotha and Kayambazinthu, (2009), Dewees, (1994), Malawi Government, (2010) have also described the forest and forest resources status in Malawi to be declining, due to population pressure, unsustainable harvesting and over dependency on forest resources for livelihoods, among

other factors. Furthermore, the time period for the implementation of the co-management programme at the time of the study (7 years), would not be long enough to allow for rehabilitation or conservation of the forests to a level that would yield adequate harvestable stock, since changes in tree population may take time to respond to different or new management approaches (Yavad *et al.*, 2003). However, approximately 32% (Zomba-Malosa) and 24% (Ntchisi) of respondents attributed the reduced access to forest resources to the strict laws and regulations being enforced under the co-management programme. This strict enforcement of rules and regulations in the initial years of the programme might also be necessary, to allow for the regeneration of resources in the reserves (Schreckenberg and Luttrell, 2009). Therefore, the perceived reduction in availability and access to firewood and timber trees after the introduction of a co-management programme could be as a result of both the co-management programme (i.e. strict accessing rules and regulations introduce by the programme), as well as other factors outside the programme (i.e. the decline in forest resource due to factors such as population pressure and unsustainable harvesting). It is also important to note that although the strict forest utilisation laws and regulations being enforced under the co-management programme may enhance forest conservation, it may limit the achievement of community livelihoods goals (Blomley *et al.*, 2008b).

Approximately 31% (Zomba-Malosa) and 32% (Ntchisi) of respondents indicated that the co-management programme has helped them to attain new income sources, such as; a) wage labour during firebreak construction and maintenance; b) income generating activities, e.g. timber sales, firewood sales and pottery (clay pots) sales, and; c) indirect benefits in the form of dry season irrigated agriculture (Table 6.4). Similarly, there is a relative increase in the number of households accessing loans and saving in the local village banks since the programme started (Table 6.4). The estimated amount in savings ranged from MK 500 (US$ 1.7)[35] to MK 10000 (US$ 34.4) in Zomba-Malosa and MK 500 (US$ 1.7) to MK 6000 (US$ 20.8) in Ntchisi district. The loans are further linked to the programme's enhancement of social capital within the participating communities, as the loans are accessed from a local community bank initiated by the co-management programme.

Approximately 36% (Zomba-Malosa) and 29% (Ntchisi) of the respondents indicated that they have managed to acquire assets (e.g. household utensils and furniture, bicycles and farm equipment) as a result of their participation in co-management programme activities (Table 6.4). The programme activities include: wage labour for firebreak and forest road

[35] The exchange rate at the time of study, Malawi Kwacha (MK) 288.7347=1US$

constructions and participation in the forest-based business groups initiated by the programme (e.g. timber, firewood and pottery trading groups). However, only 31% (Zomba-Malosa) and 32% (Ntchisi) of the respondents have accessed new income and livelihood sources (Table 6.4). Furthermore, the income generating activities that are being promoted in the area, e.g. firewood sales and pottery are low value-added activities (Fisher, 2004; Pokharel *et al.,* 2006); hence the minimal impact on household income levels. Additionally, from the focus group discussion, in both Zomba-Malosa and Ntchisi districts, it was noted that there was limited investment in improvement of physical capital at community level. Common to both communities, accessible forest roads were highlighted as a major infrastructure development, the communities require (see similar findings in chapter 3). The communities were of the view that, even if the forest reserves were to have significant high value timber trees, with potential to generate community revenue, the current poor road infrastructure would limit community member's access to economically viable markets. Additionally, lack of infrastructure development may limit the programme's potential to positively improve community livelihoods, even beyond the programme implementation period (Nath and Inoue, 2010).

Table 6.4: Perceived livelihoods status before and after co-management programme in Zomba-Malosa and Ntchisi.

Livelihoods Capitals	Indicators	Percentage response by district				Notes
		Zomba-Malosa (n=106)		Ntchisi (n=99)		
		Before co-management	After co-management	Before co-management	After co-management	
Natural Capital	Better availability of and access to firewood and NTFP	55	24	51	27	
	Better availability of and access to timber and pole trees	56	33	71	19	
Financial Capital	Accessed loans	5	35	0	30	Village banks initiated by the programme
	Saving	7	39	3	24	
	Access to new income sources	N/A	31	N/A	32	
	• Wage labour	N/A	43	N/A	17	During firebreak and forest road constructions, participants are paid.
	• Forest based businesses/Income generating activities	N/A	19	N/A	70	Due largely to transport, initial inputs and materials provided by project,
	• Irrigation agriculture	N/A	39	N/A	14	Perceived improvements in water flow due to improved forest condition
Physical capital	Have acquired assets	N/A	36		29	Through their participation in various wage labour or forest-based business initiated by the programme
Social capital	Participation in communal activity	10	39	20	49	
Human capital	Trainings and skill development	12	76	15	63	

However, the programme has contributed to the development of human capital, as a majority of community members perceive that training and skill development activities have improved since the programme started[36](Table 6.4). Although the programme does not provide formal education, the programme contributes to development of human capital by facilitating training in forest and tree management. The programme also facilitates and enhances the development of social capital through establishment of village committees and initiating regular community meetings, where issues relating to forest management and other developmental issues are discussed, and by promoting community participation in community activities (Table 6.4). The committees allow for regular interaction with Government forest staff and other stakeholders, hence increasing their social network base (Nath *et al.*, 2010).

6.4.2 Who has benefited?

The probability of perceiving the overall impact of co-management on the household's livelihoods as beneficial is 89% higher for households that live in Zomba-Malosa than those in Ntchisi (Table 6.5, column A). Similarly, households that perceive better access and availability to firewood and NTFP are approximately 59% more likely to perceive the programme to be having a positive impact on their livelihoods. Firewood and NTFP are essential for day-to-day livelihoods strategies for rural households in Malawi (Kayambazinthu and Locke, 2002), therefore improved access to, and availability of, the forest resources directly and positively affects households' livelihoods. Correspondingly, poor access to forest resources is a discouragement to communities' participation in forest management and conservation as communities tend to perceive that their investments into the programme activities are not beneficial if they cannot access the forest (Chikwuone and Okorji, 2008).

[36] Although these results indicate that trainings and skill development activities have improved, this does not directly mean that more members are participating in the trainings, because results in chapter 4 indicate that participation in trainings is limited to committee members.

Table 6.5: Probit regression result on factors affecting of perception of programmes overall impact and accessing new income sources

	Perceived overall impact A		**Accessing new income sources B**	
Covariates	Coefficients	Bootstrapped Std. errors	Coefficients	Bootstrapped Std. errors
District *(Ntchisi=1;Zomba=0)*	-0.89****	(0.25)	-0.24	(0.24)
Better access to and availability of timber tree *(1=yes; 0= no)*	0.06	(0.13)	0.32**	(0.13)
Better access to and availability of firewood trees *(1=yes; 0= no)*	0.49****	(0.14)	-0.18	(0.13)
Better training and skill development *(1=yes; 0= no)*	0.07	(0.15)	-0.21	(0.14)
Better participation in communal activity *(1=yes; 0= no)*	0.34**	(0.16)	0.40**	(0.18)
Committee member *(1=yes; 0= no)*	0.40*	(0.23)	0.687***	(0.21)
Acquired assets *(1=yes; 0= no)*	0.50*	(0.26)		
Access to new income sources *(1=yes; 0= no)*	0.92****	(0.23)		
Accessed loans *(1=yes; 0= no)*	0.69	(0.81)	0.78*	(0.56)
Saving *(1=yes; 0= no)*	-0.14	(0.22)	0.19	(0.21)
Married *(1=yes, 0= no)*	0.09	(0.12)	-0.23	(0.13)
Gender of household head *(1= Female, 0=Male)*	-0.07	(0.23)	-0.33	(0.21)
Age of household head (*in years)*	-0.01	(0.01)	0.01	(0.01)
Household size (*number of adults and children*)	0.03	(0.05)	-0.10	(0.05)
Land size (*in hectares*)	0.09	(0.03)	0.02	(0.03)
Wealth indicator (*ordinal scale, 4-11*)	0.03	(0.06)	-0.03	(0.06)
_cons	0.04	(0.78)	-0.37	(0.71)
Prob > chi2	0.00		0.01	
Number	213		213	
Pseudo R2	0.24		0.14	
Log Pseudo likelihood	-101.11		-110.57	

a. *Significance levels *=10%; **=5%; *** =1%;****=0.01%)*

In this study, households that perceive better participation in communal activities as a result of the programme are 34% more likely to perceive that the overall programme impact has been beneficial to them than those who didn't (Table 6.5, column A). This suggests that communities do not only measure perceived benefits in terms of economic benefits, but also in social and non-cash benefits. This contrasts with suggestions by Phiri *et al.*, (2012) that communities perceive that participation in forest management programmes has no or limited benefits because they only measure livelihoods benefit in terms of monetary or tangible economic benefit.

Access to new income sources increases a household's probability of describing the overall programme impact as positive by approximately by 92% (Table 6.5, column A). This is expected as access to new income sources initiated by forest co-management programmes can potentially translate into increased household incomes levels and improved livelihoods (e.g. Gobeze *et al.*, 2009; Vyamana, 2009). Another aspect of improved household livelihood is the ability to withstand shocks and stress (Ellis, 2000). Access to new income sources may diversify household livelihoods sources hence reducing household's vulnerability to stresses (e.g. failure in crop production), (Ellis, 2000; Warner, 2000).

The probability of accessing new income sources initiated by the programme is higher for: households that perceived better access to and availability of timber trees and better participation in communal activities, committee members and households that have accessed loans (Table 6.5, column B). Thus, households that there is perceived that better access to and availability of timber trees since the co-management programme are 30% more likely to have had access to new income sources. Similarly, households that perceived that participation in communal activities is better since the co-management programme started are 40% more likely to have access to new income sources. Households where the head is a committee member are 60% more likely to access new income sources and thus more likely to perceive the overall impact of the programme as beneficial (Table 6.5, column B). This is perhaps not surprising, but raises questions about the equity and fairness of benefit sharing among community members. Apart from being a committee member, there is no further evidence from the probit model to suggest that access to new income sources is influenced by household characteristics or social status (e.g. wealth status, gender and age). Lastly, access to new income sources is positively and significantly related to access to loans. This is expected as usually households opt for loans for investment purposes including agriculture inputs and small businesses, rather than consumption (e.g. Vermeulen and Cotula, 2010).

6.4.3 WTP to participate in forest co-management programme

6.4.3.1 Are households WTP a membership fee?

Although a majority of respondents perceive that they are not currently benefiting from the programme, approximately 83% of respondents in Zomba-Malosa and 81% in Ntchisi are willing to pay (WTP) membership fees to participate in the forest co-management programme. The mean annual amount that respondents are willing to pay is approximately MK 1,000 (US$ 3.5) in Zomba-Malosa and and MK 400 (US$ 1.4)[37] in Ntchisi, respectively. The mean annual membership fee that respondents are WTP is approximately five times (Zomba-Malosa) and two times (Ntchisi), the daily minimum wage rate[38]. Additionally the mean annual membership fee represents approximately 6% (Zomba-Malosa) and 4% (Ntchisi) of the average estimated annual earning of the respondents[39]. Considering that rural Malawi is characterised by high poverty levels, high unemployment rates, heavy reliance on smallholder agriculture, susceptibility to shocks and limited disposable income such that 20% of the rural population struggle to even afford the daily recommended food requirements (Synman, 2013)[40], the WTP values represent a substantial proportion of households' annual income. This suggests that although they perceive no current livelihoods and welfare impacts of the programmes for the majority of households expect substantial future livelihoods and welfare benefits from the programme.

However, this may be unlikely because despite externally subsidising the income generating activities it promotes among the participating communities, the programme is failing to have a positive impact on the livelihoods of the majority of respondents, and external funding is not indefinite. Hence it is doubtful that the co-management without (or with reduced) subsidy will be able to deliver substantial livelihoods impact in the future[41]. Therefore, it can be argued that, the estimated WTP is due to respondents' optimism (optimism bias), perhaps reflecting ignorance of external funding of the programme.

[37] Exchange rate was MK 288.73 =1 US$ at the time of study.

[38] Daily wage rate in urban communities is estimated at MK 200, however the Malawi government stipulated daily wage rate in rural areas is at MK 98 (Malawi employment act 2000).

[39] The estimated annual earning for respondents in Zomba-Malosa is MK15000; whilst for respondents in Ntchisi is MK9000.

[40] Approximately 75% of Malawians live under the poverty threshold of under US$ 1.25 a day. Furthermore 28% of the rural households (which is 85% of total population) are characterised as ultra-poor, with limited access to employment as 75% earn their living only from smallholder farming, and those on wage employment the income is so minimal, hence the disposable income is very low. Additionally the infrastructure is poor hence people have limited or even no access to financial services such as credits, which further limits their economic growth and spending pattern (Synman, 2013).

[41] The programme is in two 6 year funded phases. At the time of the study, it was in its first year of the second and final donor funded term depending on review.

Interestingly, a majority of respondents who are not willing to pay a membership fee to participate in both Zomba-Malosa (87%) and Ntchisi (72%) attributed their decision to the fact that they have not benefited from the programme. Other reasons for not being willing to pay membership fees included lack of trust in the leadership with regard to use of the funds and an inability to pay.

It is also important to note that one relevant issues or consideration to respondents willingness to pay was who will be responsible for the fees collected (i.e. current block committee, government or new committees will be established) as reflected in data from both the household interviews and focus group discussions. For example, respondent **"A"** in Ntchisi indicated that, he will only be willing to pay if a new committee responsible for collection and management of the fees is established parallel to the existing block committee. Similarly, whilst exploring the possibility for introducing membership fees with key informants in Zomba, and some user group (e.g. women only and youth) focus group discussion in Ntchisi, it was revealed that introduction of membership fees will be difficult if the current block committees will be responsible for the management of the collected fees. Thus, in order for communities or local people to positively respond to payment of membership fees, government, non-government organizations or new committees should be responsible for the management of fees. This suggests communities' lack of trust in the existing block committees, especially with regards to accountability and handling of revenue. This could have a negative effect on how the local people perceive and access the current livelihoods benefit of the co-management programme, and consequently, how they value the programme's welfare benefits relative to state management regime. This is also reflected in Chapter 4 (section 4.4.3.2), which shows that committee members in both Zomba-Malosa and Ntchisi were unable to show any documented evidence of revenue management, and ordinary community members interviewed expressed ignorance on how much revenue had been collected and been utilised so far.

Comparison of means between respondents that were willing to pay and those not willing to pay show that respondent's number of years in school and wealth status/indicator were significantly different (and negative), between respondents' that were willing to pay membership fees and those not willing to pay (Table 6.6). This suggests that households willing to pay and those not willing to pay may not be similar in characteristics.

Table 6.6: Comparison of means of variables for respondents not willing to pay membership fees and respondents willing to pay membership fees

Variable	Mean WTP=0 *(not willing to pay)*	Mean WTP=1 (Willing to pay)	*t-statistics*
Age of household head (*in years*)	44.7	41.5	1.29
Land size (*in hectares*)	0.8	0.9	-0.92
Household size (*number of adults and children*)	5.1	5.2	-0.24
Number of years in school	3.6	5.5	-2.99***
Wealth indicator (*ordinal scale, 4-11*)	6.8	7.4	-2.11**

*a= Significance levels *=10%; **=5%; *** =1%*

b= Wilcoxon-Mann Whitney test was used for the non-parametric variables (wealth indicator).

6.4.3.2 Factors affecting household decision to pay membership fee

The probit regression shows that households that perceive that the co-management programme has had or is having a positive impact on their livelihoods are 43% more likely to be willing to pay to participate than households that perceive otherwise (Table 6.7). Thus households that perceive that they are currently benefiting from a forest co-management programme may be willing to pay so as to secure livelihood benefits and benefit flows (Hanley *et al.*, 2007; Mekonnen, 2000).

An increase in households' wealth indicator by 1 point increases household probability for WTP>0 by 10% (Table 6.7). This could suggest that wealthier households are more appreciative of forest co-management and forest conservation, as they are less dependent on the forest for their livelihoods, than poor households. This is also reflected in the chapter 3 results, which show that individuals with high wealth indicators (richer) are more likely to perceive forest conservation as an indicator for successful co-management, yet less likely to perceive improved livelihoods as criteria for measuring success of co-management (see Chapter 3.4.2 and 3.5). Additionally, this could also suggest that wealthier households are the ones benefiting from the programme, as reflected in chapter 4 results which show that there is a weak but positive correlation between household wealth indicator scores and benefit sharing ($r = 0.12$, $p = 0.03$).

Table 6.7: Factors affecting households' WTP a membership fee to participate in co-management programme in Zomba and Ntchisi districts.

	Probit Model (WTP=1)	
	Coefficients	Bootstrapped Std. errors
Perceived Overall impact dummy (1=*benefiting, 0= not benefiting*)	0.43*	(0.23)
Wealth indicator (*ordinal scale, 4-11*)	0.11*	(0.08)
Number of years in school	0.07**	(0.03)
Committee member (1=yes, 0= no)	0.36*	(0.25)
Land size (*in hectares*)	0.03	(0.03)
District (1= Ntchisi, 0= Zomba)	0.17	(0.22)
Gender of household head (1= female, 0=male)	-0.20	(0.22)
Married (1=yes, 0= no)	0.07	(0.12)
Household size (*number of adults and children*)	0.03	(0.05)
Age of household head (*in years*)	-0.00	(0.01)
_cons	-0.82	(0.79)
Prob > chi2	0.02	
Number of observations	213	
Pseudo R2	0.10	
Log pseudo-likelihood	-95.13	

= Significance levels (*=10%; **=5%; * =1%)*

The probit regression shows that an increase in a household head's number of years in school increases household probability of being WTP a fee by 7% (Table 6.7). Mekonnen, (2000) and Samdin *et al.*, (2010) suggest that more years in formal education enhanced respondents' ability to understand and respond to the WTP hypothetical questions. Therefore, the positive effect of schooling on WTP may not necessarily indicate that educated people are more likely to acquire welfare benefits and as such value the programme or participate more than households with uneducated household heads, but may reflect that respondents with more years in school may have understood the hypothetical question better than those with less.

Committee members are more likely to be willing to pay membership fees to participate in co-management (Table 6.7). Committee members are usually trained in forest management and usually in constant contact with forest staff, hence have a broader knowledge of the overall benefits of the programme. However, committee member's likelihood of being willing to pay to participate in co-management activities may not only be explained by access to training, but also (perhaps) better access to programme benefits, as

probability regression results in Table 6.5 (column B) suggest that being a committee member increases households' probability of accessing new income sources by approximately 68%. However, it is worth noting that committee members' responses to the willingness questions may be affected by social desirability bias, i.e. they may view positive ('yes') willingness to pay as an acceptable and favourable answer, since they are programme co-ordinators at community level.

6.4.3.3 Factors affecting how much households are willing to pay as membership fees

Although the tobit model has been suggested as the theoretically correct method for analysing WTP rather than using OLS (Halstead *et al.*, 1991; Chikwuone and Okorji, 2008; Kohlin *et al.*, 2001; Mekonnen, 2000), the results of this study show no significant differences between the two models except for size of coefficients (Table 6.8). Furthermore, Halstead *et al.*, (1991) argue that coefficient size and coefficient direction estimated using tobit analysis may differ from those estimated using OLS. However, in this study the direction of the coefficients estimated using Tobit analysis and OLS is not different (Table 6.8) probably due to the small proportion of zero willingness to pay (approximately 20%; Wilson and Tisdel, 2002). Both the OLS and tobit regressions suggest that respondents' district, wealth indicator score, gender of household head, and land size significantly affect households' decisions with regard to how much they are willing to pay as membership fees to participate in co-management programme (Table 6.8).

Households in Zomba-Malosa (*mean WTP = MK 989 per year*) are willing to pay more than households in Ntchisi, (*mean WTP = MK 400 per year)*. This could be attributed to socioeconomic variation across communities, and how dependent the communities are on the forest for their livelihoods. For example, whilst an estimated that 80% of the Ntchisi district economy and livelihoods are said to be agriculture based, it is estimated that 90% of the Zomba-Malosa population are dependent on wood for their livelihoods (Malawi Government, 2007; Malawi Government, 2005). Therefore it is plausible that those communities in Zomba-Malosa are likely to be willing to pay more than those in Ntchisi to secure their livelihoods and welfare flow. Thus community and household livelihood strategies may influence households' WTP for forest co-management programme.

Table 6.8: Factors affecting how much households' WTP as membership fee to participate in co-management programme in Zomba and Ntchisi districts (in Malawi Kwacha).

	OLS model		***Tobit Model***	
	coefficients	Bootstrapped Std. errors	coefficients	Bootstrapped Std. errors
District (1= Ntchisi, 0= Zomba)	-697.60**	(304.77)	-646.07**	(347.16)
Household size (*number of adults and children*)	-11.56	(44.93)	-26.00	(56.93)
Wealth indicator (*ordinal scale, 4-11*)	298.69**	(132.17)	412.54**	(191.84)
Gender of household head (*1= female, 0=male*)	-520.47**	(322.91)	-610.48**	(-587.61)
Number of years in school	-15.41	(73.70)	-32.15	(79.03)
Married (*1=yes, 0= no*)	146.18	(128.76)	210.23	(152.19)
Age of household head (*in years*)	-4.66	(17.73)	-11.26	(21.29)
Committee member (*1=yes, 0= no)*	-366.79	(269.37)	-280.87	(318.15)
Land size (*in hectares*)	60. 59*	(35.10)	89.54*	(48.23)
Perceived Overall impact dummy (1=*benefiting, 0= not benefiting*)	172.68	(338.46)	333.89	(421.54)
_cons	-15.13	(690.11)	-1479.25	(1293.83)
sigma _cons			2736.98****	(831.17)
Prob > chi2	0.01		0.02	
Number	213		213	
R-squared	0.07			
Root MSE	2435.68			
Pseudo R2			0.01	
Log likelihood			-1599.19	

a. *Significance levels *=10% ; **=5%; *** =1%;****=0.01%)*

An increase in households' wealth indicator by 1 point increases the annual membership fee amount households are willing to pay by approximately MK 298 (OLS) or MK 412 (Tobit model). Wealthy households' willingness to pay may be associated with household ability to pay (Chikwuone and Okorji, 2008). As households' wealth status improves, they probably have higher income levels and increased assets and are therefore likely to be willing to pay more than poorer households (Farreras *et al.,* 2005; Hatlebakk, 2012). Similar trends have been observed by Chikwuone and Okorji (2008) who using an example from Nigeria, show that households in the medium wealth category are willing to pay more for forest management than those in lower wealth categories.

Female-headed households are willing to pay approximately MK 298 (OLS) or MK 610 (Tobit model) less than male headed households. This could suggest that female-headed households could be marginalised from benefiting from the co-management programme including access to new income sources; hence they have less welfare benefits from the programme than male headed households. Mawaya and Kalindekafe (2007) also showed that due to cultural norms, women are marginalised from accessing and benefiting from forest resources and forest management programmes. However, this is in contrast to findings by Chikwuone and Okorji (2008), who have shown that women depend more on forest resources for their livelihoods than men; hence female-headed households are more likely to be willing to pay more for community forestry than male-headed. Furthermore, since female-headed households have limited access to benefits they may have lower income levels and are more prone to risks and uncertainties in terms of income sources than male-headed households (e.g. Quisumbing *et al.*, 1995). Therefore, female-headed households are likely to pay less than male headed household, as the amount households are willing to pay tend to increase with increase in income levels (e.g. Mekonnen, 2000).

The amount households are willing to pay as a membership fee to participate in forest co-management is significantly and positively related to land size. This could be because, households with small land holdings may be encroaching into the forest to increase their land holdings hence may not be engaged or interested in the conservation activities under co-management, as they may be viewed as conflicting with their individual goals. This is also reflected in chapter 3, which shows that, households with bigger land sizes are more likely to perceive forest conservation as a criterion for measuring success of forest co-management programme, than those with small land holdings (see Chapter 3.4.2 and 3.5).

6.5 Conclusion

The findings of this study suggest that forest co-management programmes can potentially improve household livelihoods by: introducing profitable income generating activities; facilitating local lending and savings; enhancing social capital and; development of human capital through training. The positive effect on a household's likelihood of accessing new income sources from the programme when the household head is a committee member, coupled with the positive effects on WTP of household land holdings and wealth indicators, suggest that access to and distribution of programme benefits may be affected by households' socio-economic status. Livelihoods diversification away from traditional agriculture through access to new forest-based and non-forest-based income sources could reduce a household's vulnerability to stresses, hence eventually result in protection of the forest resources through reduced pressure and increased management and conservation activities by the participating communities. However, these efforts should be complemented with investment in physical capital and financial incentives, at community level, to enable community members to access economically viable markets and ensure that the programme's impacts are sustainable beyond the programme. The impacts of forest co-management programmes often take a long time to materialise because there is a need to re-establish the conservation status of the forests to yield harvestable stock, and the need to develop effective management practices that are appropriate to the needs of the community. Therefore, although the current livelihoods impacts of the programme are minimal, it does not imply that the co-management programme is a failure. Therefore, there is a potential for better or higher livelihoods benefit from the programme in future, if proper management and utilization strategies are followed. Similarly, although the livelihood impacts of co-management are currently minimal and restricted to a subset of the community, community members may be willing to pay a membership fee to participate in forest co-management programme because of their perceived future benefits of the programme. This also demonstrates the danger of relying on stated preference surveys alone to estimate welfare effects, because the WTP values given by respondents could represent a number of things and may not always reflect respondents' present gains from the policy change or programme. Furthermore, this shows that communities could be investing time and labour in the forest co-management programme based on an overly optimistic view that in future the net welfare benefits from the programme will increase, which puts them at a risk of being taken advantage of by programme initiators in setting up CFM projects. Therefore, although contingent valuation methods remain important in estimating economic value of non-use values (e.g. community utility derived from policy changes such as state

forest management to forest co-management), the sustainable livelihoods framework is more reliable at representing the real impacts or benefits of co-management on community livelihoods, than the contingent valuation method.

CHAPTER 7: THESIS DISCUSSION AND CONCLUSION

7.1 Introduction

One of the main policy objectives of forest co-management programmes globally is to improve forest conditions through promotion of sustainable utilization (Bowler *et al.*, 2012 and 2010; Blomley *et al.*, 2008; Wily, 2002). Historically, over exploitation and deforestation have been attributed to a failure of traditional community forest management systems (among other factors (e.g. population growth, industrialization) (Banana and Ssembajjwe, 2000; Buffum, 2012; Hardin, 1968; Negendra, 2007). Thus, one of the policy responses to over-exploitation and deforestation has been the introduction and promotion of state forest management (Heltberg, 2002; Meinzen-Dick and Knox, 1999). In order to ensure forest conservation, the state forest management approach focused on separating people from vulnerable forest by restricting people's rights of access and use, accompanied with sanctions for non-compliance (Hughes and Flintan, 2001; Hulme and Murphee, 1999). However, deforestation has also occurred in state managed forest despite the strict *de jure* access and utilization regulations. This has been attributed to; 1) marginalization of local forest users (which leads to conflict between state and local communities), and; 2) the *de facto* open access status of the reserves due to limited resources for management and enforcement of rules and regulation (Banana and Ssembajjwe, 2000; Buffum, 2012; Negendra, 2007).

Therefore, co-management of forest reserves was introduced to allow government to protect public interests in forest management and to address the limitations of state and private management (i.e. marginalization of local forest users and the *de facto* open access status), by involving the local people in management of the forest reserves (Ostrom, 1990). In co-management programmes, participating communities jointly manage forest and forest resources with government, by carrying out a number of management activities that can potentially result in improved forest conditions including; boundary marking, firebreak maintenance, forest patrols and controlled harvesting (Phiri *et al.*, 2012; Yadav *et al.*, 2003). In return, the programme legitimizes participants' access to, and use of, forest reserves to collect various forest products such as fuel wood, and other non-timber forest products (NTFP), which are vital to the subsistence and income of households (Kayambazinthu, 2000). Thus, co-management has the potential to provide new livelihood opportunities and income sources and improve livelihoods for rural communities (Dev *et al.*, 2003). Therefore, in principle co-management offers a *'win-win'* situation by promoting forest conservation,

improving local livelihoods and ensuring that external stakeholders' interests and the public services of the forests (e.g. watershed protection and carbon sequestration) are safeguarded.

Although in theory forest co-management offers a '*win-win'* scenario, it is hard to find evidence of this (Cao *et al.,* 2009). Furthermore, some authors (e.g. Buffum, 2012; Tacconi, 2007) have argued that in some cases, a forest co-management may result in overexploitation and increased deforestation, rather than forest conservation. Using both quantitative and qualitative methods, this study assessed the effectiveness of a forest co-management programme in achieving the devolution process, forest conservation and improved community livelihoods and welfare. It further explored how different local actors understand and define criteria for measuring the success of a co-management programme. The findings of this study (Chapters 3 to 6) further suggest that although forest co-management has a potential for achieving a win-win, the approach may fail to achieve forest conservation as well as livelihoods and welfare benefits. Furthermore, co-management outcomes will vary depending on pre-existing forest conditions as well as on how participating communities understand and interpret the programme. Hence forest co-management programmes may not always be a solution to degradation, as in some cases it can also enhance degradation thus limiting forest-based livelihoods benefits for current and future communities.

Drawing on the qualitative and quantitative data of this study, four factors or aspects of the co-management programme came up repeatedly in the data chapters (Chapter 3 to 6) as issues and challenges that could limit the the programme's achievement of a win-win. These include; 1) local actors' attitudes; 2) unaccountable institutions; 3) tenure systems and state control in disguise, and; 4) limited knowledge and skill development among local actors (discussed in section 7.2, below). Therefore, section 7.2 of this chapter discusses how these four factors could contribute to forest co-management programmes, failure to achieving a win-win, by synthesising the evidence based drawn from the findings of this study, with the existing literature. This chapter further presents a summary of the study key findings in section 7.3, discusses policy recommendations in section 7.4, and suggested areas for further research are presented in the final section.

7.2 Study synthesis: Factors contributing to forest co-management programmes, failures to achieving a *win-win*

7.2.1 Local actors' attitudes

Local actors' attitudes, opinions and perception, affect the effectiveness and outcomes of community based programmes including forest co-management (Western and Wright, 1994; Alison *et al.,* 2005). However, attitudes toward the forest resources and forest management programmes differ across locations, communities and socio-economic strata (Htun *et al.,* 2011; Macura *et al.,* 2011). Thus, whilst some participating individuals or households may perceive co-management as a conservation tool, others may consider it as an opening to access the forest and forest resources. Chapter 3 shows that respondents in Zomba are more likely to identify "conserved forest" as a criterion for measuring the success of co-management than those in Ntchisi, whilst those in Ntchisi are more likely to identify improved access to forest and forest resources. These results, may explain the findings in chapter 5, that whilst co-management has led to a reduction in human activities and disturbances in the co-managed forest blocks of Zomba-Malosa forest reserve, in Ntchisi, human activity and disturbances are higher in the co-managed forest blocks than state management blocks. Therefore, in cases where communities do not perceive forest conservation as an important outcome, giving them rights to utilise the resource under the co-management programme may result in increased exploitations of the forest and deforestation.

7.2.2 Unaccountability of local institutions

Accountability of local institutions may positively contribute to the success of co-management programmes (Coulibaly-Lingani *et al.,* 2011; Mapedza, 2006; Zulu, 2008; Tacconi, 2007). Likewise, lack of accountability among community leaders in a co-management programme, especially with regards to handling of revenue and benefit sharing procedures, negatively affects local people's participation in management activities, which could eventually affect the outcomes and effectiveness of the programme negatively. Chapter 4 shows that there is a common perception among ordinary community members that they are only involved in the forest management aspect of the programme, and only prominent members of the community, such as committee members and chiefs, share the benefits. As such some members of the community withdrew their participation and support for the programme, which could result in flouting of rules and regulation of the programme and attempts to gain access to the resources and income illegally. Similar examples have been observed by Colfer (2005) and Zulu (2008), who have shown that if members of the

participating communities perceive that their leaders are unaccountable they tend to consider themselves as not part of the programme, and hence flout harvesting rules and engage in illegal logging. Additionally, due to a lack of knowledge and limited awareness among community members with respect to terms of office or schedules for the next election and benefit sharing procedures (Chapter 4), the accountability of committee members to their community is compromised, and local communities fail to demand and access the benefits from their programme effectively. Therefore, unaccountable local institutions threaten the achievement of equity in benefit distribution and forest conservation in the co-management programme (Cronkleton *et al.*, 2012; Oyono, 2003).

Accountable local institutions should also be representative of their constituents (Oyono, 2003; Ribot, 2003). However, Chapter 4 suggests that the extent to which committee members are democratically representative of their constituents is limited or compromised, because while some are duly elected by the community, some members are appointed by the government. The appointed committee members are likely to be loyal to the interest of government rather than the community or their constituents, and may exercise authority over the elected members (Oyono, 2003). Furthermore, the activities of the programme are externally funded and income generating activities are externally subsidised (Chapter 6), which limits the level of downward accountability and empowerment of the local institutions (Coulibaly-Lingani *et al.*, 2011; Oyono, 2003). This also echoes findings in Chapter 3 which showed a significant difference in 1) perceived criteria for assessing the success of forest co-management programme, and; 2) basis for identifying the criteria, between ordinary members and committee members. Whilst criteria identified by ordinary members are based on individual or household goals, the criteria highlighted by committee members are based on programme goals and not village goals as might be expected of leaders that are representative of their constituents. This also corroborates Pokharel and Suvedi's (2007) finding that indicators for assessing the success of a joint co-management programme identified by community leaders are similar to those of programme objectives and state representatives. This also corresponds to what Mapendza, (2006) observed in Zimbabwe: institutional arrangements in co-management were often upwardly accountable representing interest of government and donors rather than the community. Therefore, failure to represent ordinary community members' interests limits the programme's ability to address the livelihoods goals of community and further alienates the marginalized community members. This could potentially result in conflicts, and in deforestation (Negendra, 2007; Rastimbazafy *et al.*, 2012).

7.2.3 Tenure systems and state control in disguise

Tenure systems are thought to be crucial in ensuring that forests and forest resources are managed in an equitable and sustainable manner (e.g. Westholm *et al.,* 2011). Secure tenure rights clearly define who owns, who can use, manage and make decisions about forest resources, and who is entitled to transfer the rights to others and how, in a way that the tenure holder is assured of benefiting from their investment in the resource (FAO, 2011b; Westholm *et al.,* 2011). In co-management programmes of state-owned forest reserves, the government retains ownership rights apparently to promote protection of the forest's public services, whilst local actors are given management and user rights (e.g. Agrawal and Ribot, 1999; Cronkleton *et al.,* 2012; Malawi Government, 2007; Ribot, 2003). Although government retains the ownership rights, according to policy and programme documents, government staffs are supposed to assume an advisory and supervisory role only (Malawi Government, 2007; Ribot, 2003). However, Chapter 4 showed that, despite the official transfer of management and utilization rights to local actors, government personnel are still leading most activities including appointment of some the block leaders[42], formulation of rules and regulations, and planning activities. Furthermore, all management plans have to be approved by the government (e.g. Malawi Government, 2007). I found that participating communities often implemented what the government has prescribed for them, as suggested by other studies (e.g. Cronkleton *et al.,* 2012; Ribot *et al.,* 2006; Zulu, 2013; Mapedza, 2006; Pulhin and Dressler, 2009). This is further exacerbated by a lack of independent external institutions and partners to act as power brokers or mediators between communities and government and promote empowerment of local actors to exercise and defend their rights (Chapter 4). Therefore, due to the tenure arrangement (state ownership), co-management programmes fail to eliminate the power imbalance inherent in top-down approaches. Additionally, the failure to transfer decision making, as well as management powers, from state to local institutions, could in practice mean that co-management is just state management in disguise[43]. This fails to provide local actors with the security and assurance that they will be able to benefit from their investments in the programme (i.e. time and labour for participating in management activities) without interference (Wiersum and Ros-Tonen, 2005). Furthermore, since state institutions are still actively operating, communities' access to the livelihoods benefits may be limited, as the focus of governments is usually oriented toward conservation rather than

[42] Although, block leaders are supposed to assume leadership positions through local elections, some leaders indicated that they were appointed by the forest extension staff (Chapter 4)

[43] As they local institutions and community members may just be fulfilling governments' and external stakeholders' interests, and none of their own.

extraction (Chapter 4 and 5). Therefore, the lack of ownership rights, lack of independence and disguised state control could instil fear, uncertainty and suspicion of government and the co-management strategy among participating communities, as such eroding their motivation and commitment to protect and manage their forests (Cronkleton *et al.,* 2012; Guiang and Castillo, 2006).

7.2.4 Limited forest management knowledge and skill development among local actors

Community awareness of forest management skills, their rights, benefits and obligations in a co-management programme could be key to communities' empowerment, and ability to make decisions and implement the management activities independently, without government interference (Coulibaly-Lingani *et al.,* 2011; Mendoza and Prabhu, 2005). However, this study shows that there is inadequate training and skill development among ordinary members of the communities participating in the co-management programme (Chapter 4 and 6). Although approximately 70% of community members indicated an increase in training and skill development activities since the start of the programme (Chapter 6), only 2% (Zomba) and 16% (Ntchisi) of ordinary community members have actually participated in any training programme organized by the programme (Chapter 4). Therefore, although government forestry staff often train the committee leaders, with the hope that the leaders will eventually train their community members (Malawi Government, 2008), rarely do committee members conduct training sessions for fellow community members (Chapter 4). However, forest management knowledge and skill development among local actors is not limited to formal trainings only, because, Berkes, (2009) and Charnley *et al.,* (2007) argue that traditional or local forest management knowledge may also play a vital role in sustainable forest management. However, this study did not find any evidence to suggest the integration of local forest management skills in the programme activities. Therefore, limited community participation in forest management training programmes (and in some cases, coupled with little or no integration of local management techniques), would limit the effectiveness of forest co-management programmes in achieving forest conservation (Mendoza and Prabhu, 2005).

7.3 Key thesis findings and conclusions

The findings of this study are unique and holistic because the study integrated a variety of research methods (both qualitative and quantitative) for a robust assessment of both the impact and process outcome of a co-management programme. Hence the findings of this study give useful empirical and methodological contributions that are likely to be applicable to other co-management projects and studies as well as to other forms of CBFM initiatives at regional as well as global level. This study finds that forest co-management has the potential to reconcile community interests and forest conservation. However, a number of factors determine its effectiveness including; local actors' attitudes; accountability of actors; tenure systems; and capacity of local actors. This study finds that, in addition to the impact on community livelihoods and forest conditions, other aspects of co-management and sustainable forest management such as community participation in decision making, access and availability of forest resources and infrastructure development are important criteria for assessing a co-management programme, from an ordinary community member's perspective. The perceived criteria also differ among different actors and may be determined by a number of household socio-economic characteristics, including district/community, gender of household heads, wealth status and education. The difference in perceived criteria may also affect how different local actors react to the co-management programme and subsequent outcomes and impacts of the programme. Thus, the research shows that forest co-management outcomes will vary depending on how participating communities understand and interpret the programme. Hence co-management programmes and activities should not be considered as having uniform impacts.

The difference in perceived criteria at community level also reflect the complexities involved in defining universal indicators for measuring the success of co-management programmes. Hence, it has implications for how global evaluation or evidence based forest co-management studies are designed and interpreted, because the indicators and criteria for success could be subjective. Nevertheless, I argue that, although complex, local evaluation and impact assessment studies should be designed to capture perspectives and experiences across social strata within a community, as well as other stakeholders near and far from the programme areas.

This study shows that the realization of true devolution in a forest co-management programme is difficult because of the existing tenure arrangements, which gives the government the ownership rights and legal mandate to regulate and determine the forest management plans. In addition to the tenure arrangement, this study shows that there is little

political will to enhance accountability and transfer of responsibilities from government to the local institution (which the programme and tenure system allow) since government still takes some leading roles in the programme including appointment of community leaders. Therefore, there has been even less devolution than there would have been if government and other community leaders (e.g. village heads) had transferred powers and responsibilities to communities as envisaged in the programme documents. Government's failure to transfer power to community erodes local actors' motivation to protect and manage forests, and access and utilize the forest resources sustainably.

Local people's motivation or incentive to continually participate in forest management could also be negatively affected by the lack of livelihoods and welfare benefits. I found mixed evidence on the current livelihoods impacts of the co-management programme. For example, whilst the programme has led to an improvement in community ability to access loans from, and save in, village banks initiated by the programme, there is limited evidence to suggest an increase in household income and/or economic benefits due to the programmes activities. Furthermore, there is limited evidence to suggest that the programme has had a positive impact on natural capital (i.e. forest conditions) and physical capital. However, although the current income or benefits from the programme are minimal, most households are willing to pay for membership. The positive willingness to pay may reflect that; 1) communities expect that there will be an increase in co-management livelihoods and welfare impacts, in future, and; 2) communities, WTP can be contingent on respondents' optimism rather than reality. Furthermore, the use of WTP may be an imperfect measure of benefits, due to non-excludability of costs and benefits. For example in this study, household's may derive benefits (or costs) without being a member of the programme, however, because of the use of a realistic payment vehicle, the WTP may only reflect a households benefit from being a member of the programme, and not the net-benefits of the programme existing. Furthermore, the findings of this study suggest that the sustainable livelihoods framework is relatively more reliable at representing the real impacts or benefits of co-management on community livelihoods (i.e. in terms of increase or decrease in their assets base), than the contingent valuation method. Therefore, this finding supports the need for methods triangulation in valuation studies using stated preference techniques. The study reveals that education, male household head, wealth, perceived current benefits and position in the committee all positively affect households' willingness to pay a membership fee and how much they are willing to pay annually to participate in forest co-management programme activities. This suggests that access to and distribution of programme benefits

may be affected by households' socio-economic status. Therefore, in design and implementation of forest co-management programmes, rights of use for all actors and user groups should be clearly defined and enforced, to ensure that the marginalized in society benefit from the programme effectively.

Finally, biological indicators of conservation (e.g. tree density and species richness) take time to respond to management programmes; therefore the inclusion of physical signs of human activities in the forests as indicators to predict potential impact of the programme on forest condition is essential in evaluation studies. This study supports the use of method triangulation and multiple data types in forest co-management impact studies as it allows for a more robust assessment, and should be widely applicable to other evaluation studies. However, the study also demonstrates that, even with method triangulation, it is difficult to determine the effectiveness of co-management on forest conditions from one-time study data.

7.4 Policy recommendations

The findings of this study suggest a number of lessons and recommendations for policy makers, donor agencies, development practitioners, non-governmental organizations (NGOs), civil society and community based organizations to take into consideration in order to achieve effective co-management programmes and sustainable forest management.

7.4.1 Exploring and building on local attitudes

Local people's attitudes towards and expectations from forest management programmes are diverse and dependent on socio-economic characteristics and individual goals (Chapter 3). Therefore, it is necessary for co-management programmes to explore and build on the attitudes and perceptions of the majority of intended participating communities, rather than using blanket recommendations. Findings in chapter 3 and 4 suggest that the inclusion of local communities' perspectives, goals, socio-economic and cultural factors in the designs and implementations of forest co-management programmes could; 1) avoid conflicts (which may result in increased deforestation) as the issues of equity and benefit sharing would be best addressed from the intended beneficiaries' perspective; 2) allow programme designs that are community specific or beneficiary oriented. Similarly, when evaluating impacts or effectiveness of the forest co-management programmes, the local community criteria and indicators should be included, in addition to policy and programme criteria and indicators.

One possible approach to building on local actors' attitudes is the adoption of an adaptive management approach. Adaptive management is a flexible management approach that involves continuous adjustment of management decisions and implementation plans in response to local actors' demands, thus making the programme relevant and acceptable (both socially and economically) to the majority, or all the relevant local actors (Kotwal and Chandurkar, 2002; Wollenberg *et al.,* 2000). The adjustment is based on periodic monitoring and evaluation based on criteria and indicators developed by all relevant actors, as well as social learning among actors (Kotwal and Chandurkar, 2002; Wollenberg *et al.,* 2000). Therefore, it is plausible to suggest the adoption of an adaptive co-management approach so as to enhance sustainable conservation and improvement of livelihoods among participating communities, and enhance collaboration among the multiple stakeholders involved in the programme.

7.4.2 Economic incentives

The results in Chapter 6 show that, despite the minimal livelihoods and welfare benefits, there is a positive willingness to pay to participate in programme activities among community members. This shows that communities are willing to invest in managing the forest reserves, which could potentially enhance forest conservation and global environmental benefits including carbon sequestration (Bowler *et al.,* 2010; Klooster and Masera, 2000). However, this could also put communities at a risk of being taken advantage of by programme initiators, as they could be investing time and labour in the forest co-management programme without accruing any benefits or just based on an overly optimistic view that in future the net welfare benefits from the programme will increase. Thus, since many of the environmental benefits or services from the conserved trees are public goods or externalities, which communities or landholders may not account for, the opportunity cost of communities' participation in co-management and implementing forest management activities to provide environmental services is an important reason for governments to consider inclusion of Payment for Ecosystems Services (PES) in the programmes. The economic or cash incentive from a PES scheme could enhance households' financial benefits from the programme, motivate them to participate in management and could also minimize the pressure on the forest and forest products as they would be able to meet their income needs from the scheme. However, there is still a need for further research on how the incentive-based schemes could be integrated in a co-management programme (i.e. How are

the incentives going to be distributed and how the current tenure arrangement will affect the integration).

Currently the programme is promoting forest-based income generating activities (e.g. sustainable timber and firewood harvesting for sale), in order to improve livelihoods and incomes among participating communities (Chapter 6). However, findings from Chapters 3 and 6 suggest that to enhance economic benefits from the forest based income generating activities, the programmes should also invest in infrastructure development especially roads, as the lack of proper infrastructure limits participating communities' access to viable markets and improvements on their income and livelihoods strategies.

7.4.3 Social capital

Social capital enhances human and financial capital among households since communities are able to form village banking groups and further access loans from the banks (Chapter 6). Additionally, Bhattarrai *et al.,* (2005) and Nath and Inoue (2010) argue that enhancement of social capital through meetings with external stakeholders, gives local communities a platform to contribute to forest policies that affect their livelihoods. Therefore, co-management should promote social capital among communities by creating fora that would allow and encourage communities to meet regularly and facilitating community linkages and networking with external actors and organizations (e.g. local civil society groups, NGO's and local lending institutions).

7.4.4 Rights and empowerment

At present government is still actively controlling the management of the forests and lacks the political will to transfer authority and responsibilities to communities participating in a co-management programme (Chapter 4). However, although government retains the ownership rights, for co-management to achieve devolution, empower local communities and motivate communities to participate fully in and benefit from the programme, governments should be willing to empower and transfer authority and responsibilities to local institutions (Tacconi, 2007; Ribot, 2003). This includes allowing communities to make management plans, formulate and enforce rules, as well as choose their own leaders without government interference (McDermott and Schreckenberg, 2009). Therefore, forestry extension staff should also be made aware of their role in a co-management programme (i.e. facilitators not implementers).

7.4.5 Capacity building

The failure of some forest management programmes, including co-management, to improve rural livelihoods and forest conditions does not necessarily mean that the approach is intrinsically weak, but rather the failure may be due to the lack of coordination, knowledge and capacity among implementers to carry out the programme activities efficiently (Engida and Teshoma, 2012; Coulibaly-Lingani *et al.,* 2011; Mapedza, 2006; Zulu, 2013). Hence capacity building activities including training and awareness meetings on sustainable forest management should be a key component of co-management programmes. However, the training and awareness meetings should not be limited to committee members only, but should also include ordinary community members. Furthermore, communities should be made aware of their rights within the co-management programme and empowered to exercise and retain them, in order to minimize the risk of elite dominance (Engida and Teshoma, 2012).

Additionally, the complexities of culture and traditional systems may affect and influence forest management processes and environmental and livelihoods outcomes (Salomao and Matose, 2006). For example, due to traditionally defined gender roles and norms, women do not participate in decision-making roles (e.g. Mawaya and Kalindekafe, 2007; Upadhyay, 2005). An individual's gender may influence their perception of decision making and participation as criteria for measuring the success of the programme (Chapter 3) and willingness to pay (WTP) to participate in programme activities (Chapter 6). However, for these groups to benefit from the programme effectively, they should be empowered to actively participate in decision making especially on issues that directly affect their livelihoods. Therefore, co-management programmes should also direct attention to understanding the complexities of culture and traditional systems and providing mechanisms and forums that ensure that the culturally marginalized groups in the community are represented and are able to access the benefits. Similarly, training should not only be limited to committee members, but should also include ordinary community members, including the traditionally marginalized user groups (e.g. youth and women), and integration of traditional forest management techniques should be promoted among participating communities.

7.4.6 Enhance accountability and transparency of local institutions through public hearing and public audits sessions

The results in chapter 4 suggest a lack of accountability and transparency among local institutions with regards to decision making, financial management and sharing of benefits. This results in ordinary community members withdrawing their support for the programme. Hence, drawing from examples from Nepal (e.g. Gentle *et al.*, 2007; Maharjana *et al.*, 2009) I recommend the introduction of public hearing and public audit sessions in the co-management programme implementation areas, as well as other districts where community forest management programmes are being implemented. The public hearing and public audit sessions should be conducted periodically by members of participating communities so as to enhance accountability and transparency of the committee members in decision making and financial management. This should be facilitated by either trained local resource persons or registered auditors.

7.4.7 Research as part of co-management programme

The current trend in environmental policy and management calls for promotion and implementation of evidence based policy and strategies (Pullin and Knight, 2009; Sutherland *et al.*, 2004). Similar to the conclusion of Bowler *et al.*, (2010; 2012), the results in Chapter 5, show that without BACI (before-after-control-intervention) study designs it is difficult to conclusively attribute changes in forest conditions observed in forest blocks to the presence or absence of co-management. Furthermore, the findings in Chapter 5 and 6 accord with those of with Bowler *et al.*, (2010 and 2012) that there is a need to integrate research into the programmes in order to get quantifiable evidence of impacts of forest co-management. For example, **e**ven with methods of triangulation, the study was unable to unambiguously quantify the effects of co-management on forest conditions, due to a lack of baseline data and non-random selection procedures (Chapter 5). However, with research as a key component, it would be relatively unproblematic to evaluate and attribute the observable changes both in time and space to the programme and also establish the other drivers of changes that are area specific. This would provide evidence to inform future designs and strategies for effective implementation of co-management programmes. Hence, it is plausible to recommend integration of research as part of the programme.

Research and professional researchers are usually costly (Danielsen *et al.*, 2005), one possible reason why research is often not included as a component of a co-management programme. However, Danielsen *et al.*, (2007) and Skutsch (2005), suggest that local

members of communities, even those with minimal levels of formal education are capable of collecting comprehensive forest condition and intervention data, for decision making and impact assessment. Thus, to enhance evidence based assessment and evaluations, local people should be directly involved in research and continuous programme monitoring and evaluations by equipping them with simple data collection tools (e.g. field diaries[44]) (Danielsen *et al.,* 2007; Wollenberg *et al.,* 2000). Therefore, I recommend the initiation of participatory research (i.e. where local people are involved in data collection alongside the professional researcher), and adoption of an adaptive management approach, in forest co-management programmes.

7.5 Suggested areas for further research

7.5.1 Follow-up forest condition impact assessment

As mentioned in the previous section, even with methods triangulation, the study was unable to quantify and conclude the effects of co-management on forest conditions, due to lack of baseline data, lack of information on selection procedures and the short implementation period (Chapter 5). However, the data collected would enable a follow-up forest inventory study, to allow for; attribution of the differences in forest condition to differences in management approaches. Furthermore, there is currently limited empirical evidence with regards to major drivers of the degradation, specific for each location. Further research to establish major drivers of the degradation, specific for each location, would inform future designs and strategies for effective implementation of co-management programmes in the areas.

7.5.2 Relationship between co-managed and state management forest areas

In this study, the close proximity of state managed forest blocks and those blocks converted into co-management formed a good basis for comparison. However, this may also maximise leakages or spill over effects of human activities between the sites that stricter harvesting and management conditions in co-managed forest blocks may have led to increase in human activities and over exploitation of state managed forest blocks (Bowler *et al.*, 2012; Vyamana, 2009; Somanathan *et al.*, 2009). Although the findings of this study (Chapter 5),

[44] The field diary method is aimed at assessing changes in forest conditions and it involves standardised recording of observations in changes of various forest condition and disturbance indicators (including the species or human resource use and the number of individuals or the quantity of resources), during routine monitoring or patrols (Danielsen *et al.,* 2007).

suggest the possibility for occurrence of spill overs or leakages in the study area, there is need for further evidence. Therefore, further research to understand the interactions between forest areas under government management and those converted to co-management is recommended. This should not only be limited to effect on the forest conditions, but should also include an assessment of the forest-based livelihoods and welfare benefits between communities participating in a co-management programme and those communities not participating[45].

7.5.3 Formal education and community participation in forest co-management activities nexus

The findings of this study suggest a relationship between an individual's years in formal education and positive attitudes toward conservation outcomes of the programme and willingness to pay to participate in co-management activities (Chapter 3 and 6). This is consistent with the findings of Kobbail, (2012), Macura *et al.,* (2011) and Ratsimbazafy *et al.,* (2012), who show that formal education enhances positive attitudes towards conservation among communities. However, although there is evidence to suggest that there is a relationship between education and positive attitudes towards co-management and forest conservation, it fails to show any evidence that education increases participation in the management activities. Therefore, further studies to investigate actual role of education in enhancing local community participations in forest management activities, are needed.

7.5.4 Devolution in co-management programmes

The current tenure arrangement limits achievement of true devolution in a co-management programme (Chapter 3). Furthermore, the programmes are externally funded which also affects local peoples' empowerment to make decisions with regards to management and utilization of the resource independently (Coulibaly-Lingani *et al.,* 2011). Therefore, there is a need for further studies to explore possible funding mechanisms that will empower communities to participate in decision making independently, demand and exercise their management and utilization rights, enhance downward accountability and ensure continuance of the programme beyond donor support. One alternative source of funding could be the introduction of a PES scheme to the co-management programme. Therefore,

[45] Communities not participating refer to; 1) those communities living adjacent to forest areas still under state management and; 2) those communities dependent on and in close proximity to the forest but not included at target communities of the programme.

further research on how schemes could be integrated in a co-management programme is recommended.

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APPENDICES

Appendix 1: Topic checklist for focus group discussions with communities in Zomba-Malosa and Ntchisi- 2011 (field study 1) and 2012 (field study 2)

1. **General information**
    a. Name of T/A, group village head.
    b. Local institutions, cultural norms and tenure systems in the community.
    c. Major livelihood sources and welfare.
    d. Natural resources available in the community
    e. Wealth indicators for households.
2. **Forest and forest use**
    a) Importance of forest and forest products to the community Forest status over the years and management.
    b) Village forest areas- establishment, ownership, control and management.
3. **Co-management programme**
    a. General programme information
        i. What is the co-management programme,
        ii. Introduction of the co-management programme?
        iii. Name of Block, area of block, number of coupes in the block
        iv. Number of villages and households with access to the block resources
    b. Implementation procedures; activities; governance and benefit sharing
        i. Activities under the co-management programme?
        ii. Implementation procedures of the activities (i.e. who plans the activities, who implements, how is each activity carried out and when)
        iii. Rules and regulations: Who formulate?; What are the rules?;How are they enforced; and Sanctions for trespassing
        iv. Trainings and meetings under the programme
        v. Access to the forest and forest resources
        vi. Benefits and benefit sharing under the programme
            1. List of benefits
            2. How are the distributed and who distributes

vii. Forest based enterprises: formation of groups; access to the resources; availability and access to markets
viii. Block committee
ix. Does the CFM programme/ project have a committee?
x. How are the committee members come into position?
xi. How do committee members assume positions?
xii. For how long are committee members in their position?
xiii. How often are committee members elected?
xiv. What is their role (how active are they?)
xv. How accountable and to whom

4. Developing indicators for measuring success or failure of programme

a. What things or element will indicate that the programme is a success?
b. What do each of these mean to for the community
c. What things or element will indicate that the programme is a failure?
d. What do each of these mean to for the community
e. Based on the response in question above, do you think the programme is a success?
f. Which aspects need a change or improvement?

5. Co-management programmes perceived impacts

a. What were your expectations of the co-management programme when it started; and what are your expectations of the co-management programme now that the programme has started?
b. Forest condition impacts
    i. How would you describe the state or extent of the forest and trees before and after the co-management programme
    ii. Do you think co-management programme has had any impact or influence on the current state of the forest and why?
c. Community livelihood impacts
    i. Has the co-management programme had any impact or influence on the welfare and livelihoods of the community?
        1. accessibility to and availability of forest resources before and after programme
        2. Change in livelihood and income sources;

3. Market opportunities: employment; credit facilities; enterprise development and Income generating activities, and; infrastructure.
4. Social relationships within the community (including how much the community trust the committee's leadership does).
5. Participartion in training and skill development
6. Participartion in village meetings

6. Success stories of the programme
7. Challenges of the programme
8. Lessons learnt
9. Exploring the future: membership fees; payments; accountability
10. Anyother issues and comments.

Appendix 2: Study questionnaire

Appendix 2.1: Household survey forest co-management programme (2011)

HOUSEHOLD IDENTIFICATION	NAME
Household head	
Name of village	
Traditional Authority	
District	
Region	
Name of Enumerator	
Name of data entry	
Date of interview	Date:……/……/2011 Start time:……..:…….. Finish time:……:……..

A. Details of respondents

Name A1	Sex A2	Marital status A3	Age/ year of birth A4	Education A5		Household size A6
				No. of years in school (I)	*Highest class attended (II)*	

A2:1=female 2=male;

A4: 1=Married 2= Single (widow, divorced, separated and never married)

A5 (II): 0=none 1=std 1-4; 2= std 5-8; 3= Attend sec; 4=MSCE; 5=Techn. College; 7=University

1: What are the major livelihood activities and sources for the household?

Kodi ndi ntchito/zinthu ziti zomwe banja lanuli limagwira/limachita kuti muzipeza zofunika pa moyo wanu wa tsiku ndi tsiku?

1. *Salaried employment;*
2. *Wage labour,*
3. *Trade;*
4. *Farming*
5. *Forest related business*
6. *Family support;*
7. *Others*

A2 (i): What is your major source of labour?

Kodi mumadalira ndani pogwira ntchito zanu?

1=Hired; 2=Family

A2(ii). What is the source of hired labour?

Aganyuwo/Antchitowo mumawapeza kuti?

1= local; 2= other villages; 3= both

A3. Do you own land?

Muli ndi munda?

1= yes, 0=No, if yes what is the estimated size?

A4 (i): Do you own a house?

Kodi muli ndi nyumba yanuyanu?

1= yes, 0=No,

A4(ii): Quality of house;

Nyumbayo ndiyomangidwa/ mawonekedwe bwanji?

1)Walls: *1= Poles and mud; 2= Sundried walls; 3= compacted earth ; 4=burnt bricks walls; 5= plastered and painted walls*

2) Roof: *1=Grass Thatched; 2=Iron sheets; 3=Tiled; 4=cement sheets*

3) Floor: *1=cement; 2=mud*

4) Window: *1=wooden; 2=glass; 3=grass; 4=without windows; 5= opening*

A5: What kind of assets do you own?

Kodi muli ndi katundu wanji?

No.	Assets name

B. FOREST CO-MANAGEMENT PROGRAMME

B1: Who is involved in the forest co-management programme?

Kodi amene amatenga nawo mbali pa ndomomenko yakusamalira nkhalango yanu ndi ndani?

B2: What activities are being carried out under the programmes activities and when are they carried out?

Kodi ntchito zanji zomwe zimagwiridwa mu ndondomekoyi ndipo zimagwiridwa mu nyengo iti?

	Activity	*When they are carried out*	*How many times? (a year/ month)*
1			
2			
3			
4			
5			
6			

B 3: Who is responsible for each of the activities you have mentioned above?

Kodi ndi ndani amene amagwira nawo ntchito komanso mu njira yotani pa ndondomeko imeneyi?

	Activity	*Responsible Actor*
1		
2		
3		
4		

B4 (i): Do you participate in any of the activities are you involved in?

Nanga inuyo mumatenga nawo mbali iri yonse pa ntchitozi?

1= yes, 0=No,

B4 (ii): If *yes*, which activities do you participate in?

Ngati mumatenga nawo mbali, Mumatenga mbali yanji?

B4 (iii): If yes, how did you (or they) start to participate in the project?

Kodi chiyambi chake potenga nawo mbali mu ndondomekoyi nchotani?

1= individual interest;

2= was just told to join by chief;

3= was told to join by government (forest staff);

4= other (please specify)

B5 (i): Does the CFM programme/ project have a committee?

Kodi pali komiti yoyendetsa ndondomekoyi?

1=yes; 0=no

B5 (ii): Are you a member of the committee (or any household member)?

Kodi inuyo kapena wina ali yense pa banja panupa ndi membala mu komitiyi?

1=yes; 0=no

B5 (iii): If yes, do you hold any position in the committee?

Ngati muli membala, muli ndi udindo mu komitiyi?

1= yes; 0= no

B6 (i): How do committee members assume positions?

Kodi pali ndondomeko yanji yomwe imatsatidwa kuti munthu akhale membala?

1= elected by villagers; 2= appointed by chief/ government; 3=don't know

B6 (ii): For how long are committee members in their position?

Kodi mamembala amakhala nthawi yaitali bwanji pa udindo?

B6 (iii): How often are committee members elected?

Kodi pamapita nthawi yaitali bwanji mamembala amasankhidwe?

B7 (i): Does the community hold any meeting under the forest co-management programme?

Kodi anthu a mmudzimu amakhala ndi misonkhano pa ndondomeko imeneyi ya kasamalidwe ka nkhalango?

1= yes; 0= no

B7 (ii): If yes, how often are the meetings held?

Ngati zili choncho, ndondomeko ya misonkhano imachitika motani?

1= every week; 2= twice a month; 3= once a month; 4=every two months; 5= quarterly; 6= semi-annually; 7= once a year; 8= others

B7 (iii): Do you attend the meetings and contribute?

Kodi mumakasonkhana nawo mu misonkhanoyi komanso nkunenapo nfundo?

1= yes; 0= no

B8: Who plans the activities of the project (with regard to forest management)?

Kodi amapanga dongosolo la kayendetsedwe/kagwiridwe ka ntchito mu ndondomekoyi (kasamalidwe ka nkhalango) ndi ndani?

1= the committee; 2= forestry officials; 3= the committee and other villagers; 4=forestry and committee; 5= forestry, committee and other villager; 6= no plan,

B9. Does the programme have any rules and regulations for governance?

Kodi pali malamulo oyendetsera ndondomekoyi?

1=yes; 0=no

B10: Who formulate/participate in formulating the rules?

Kodi anapanga nawo kapena kutenga mbali popanga malamulowa ndi ndani?

B11: Did or do you participate in in formulating the rules and regulations?

Nanga inuyo munatenga kapena mumatenga nawo mbali popanga malamulowa?

B12 (i): Do you have any punishment/ for defaulters?

Kodi mu malamulowa zokhudza zilango kwa ophwanya malamulowa zilipo?

B12 (ii): If *yes,* what kind(s) of punishment?

Ngati zilipo, kodi ndi zilango zotani?

B12 (iii): Has anyone ever been punished?

Kodi wina analangidwako?

1= yes; 0= no

B12 (iv): Which are the 3 most commonly rule broken by majority of community member/ don't know if to include none members?

Perekani zitsanzo zitatu za malamulo omwe mamembala kapena anthu wamba amawaphwanya?

B13 (i): Are there any benefits in participating in the programme activities?

Kodi pali phindu lili lonse lomwe lingapezedwe potenga nawo mbali mu ndondomekoyi?

1= yes; 0= no

B13 (ii): If yes what are they?

Ngati zili choncho mungafotokoze phindulo?

B13 (iii): Have you benefited?

Kodi inuyo mudapezako phindulo?

1= yes; 0= no

Please explain
(Tafotokozani)*:*_____

B13 (v): How are benefits distributed and who is involved in the distribution?

Kodi magawidwe a phindu lopezekalo amakhala otani kwa mamembala ndipo amagawa ndi ndani?

B13 (vi): Have you ever participated in distribution or sharing of programmes benefits?

Kodi munayamba mwatengako mbali pogawa phinduli mu ndondomekoyi?

B14 (i): Since the start of the programme have there been any changes in number of participating individuals?

Kodi chiyambire ndondomekoyi kuno, pakhala kusintha kuli konse pa nambala ya mamembala?

1= increased; 2= no changes; 3= declined

B14 (ii): If participation has increased, which of the following factors have contributed to this?

Ngati chiwerengero chakwera kodi chapangitsa ndi chiyani mwa izi?

Satisfied with 1= leadership; 2= activities of project; 3= benefits in participating; *4= others*

B14 (iii): If participation has declined, which of the following factors have contributed to this?

Ngati chiwerengero chatsika, chapangitsa nchiyani?

Not Satisfied with 1= leadership; 2= activities of project; 3= benefits in participating; *4= no longer interested; 5= involved in other activities (specify); 6= others*

B14 (iv): How would you compare your level of participation or commitment to programmes activities (at the start of the programme and now)?

Kodi mungasiyanitse bwanji za kutenga nawo mbali kwanu mu ndondomekoyi kuyambira poyambirira kufikira lero lino?

1= increased; 2= no changes; 3= declined

Please explain (Fotokozani):

_____

B14 (v): Are you willing to continue in participating in the CFM project activities?

Kodi ndinu olola kupitiliza kutenga nawo mbali mu ndondomekoyi?

1= yes 0= no

Please explain
*(Fotokozani):*_____

C. DEFINING SUCCESS AND UNDERSTANDING SUCCESS

C1. How would you assess or measure success of forest co-management programme (what thing or element will indicate that the programme is a success or a failure)?

Kodi mungaike pa muyeso wotani pofotokozera za kupambana kwa kasamalidwe ka kankhalangoku (Kodi mungapereke zitsanzo ziti zofotokozera kuti ndondomekoyi yapambana kapena yolephera kukwaniritsa cholinga

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C2. Which criterion is the most impotant for measuring success of forest co-management programme?

Ndimuyeso wuti wome uli wofunikira kwambiri ?

C3: Why do you define it as such?

Kodi mwafotokoza choncho bwanji?

1= they are programme goals,

2= these are the village goals

3= this is what is important to me and my household

4= others (specify)

C4. Based on the response in question above, do you think the programme is a success?

Molingana ndi yankho lanuli kodi mukuganiza kuti ndondomekoyi yapambana/yachita bwino?

1= yes 0= no

Please explain (Fotokozani):

_____

Thank you for your time and responses.

Appendix 2.2: Household survey forest co-management programme (2012)

A1. INDIVIDUAL DETAILS

Name of respondent	
Name of village	
Traditional Authority	
District and Region	
Region	
Sex of respondnet: *1= Female, 2=Male*	
Marital Status *1=Married 2=Widowed 3=Divorced 4= separated 5=Never married*	
Age or year of birth:	
Household size:	
Highest level of education/ highest class attended: *0=none 1=std 1-4 2= std 5-8 3= Attend sec 4=MSCE 5=Techn. College 7=University* **Number of years in school:**	
Are you a committee member? *1= yes; 0= No .* **If yes what is your position?**_____	
Name of Enumerator:	**Date:…/……/2012,** **Start time:……..:** **Finish time:……:…….**

A2: What are the major livelihood activities and sources for the household?

Kodi ndi ntchito/zinthu ziti zomwe banja lanuli limagwira/limachita kuti muzipeza zofunika pa moyo wanu wa tsiku ndi tsiku?

1. *Salaried employment;*
2. *Wage labour,*
3. *Trade;*
4. *Farming*
5. *Forest related business*
6. *Family support;*
7. *Others*

A3 (i): What is your major source of labour?

Kodi mumadalira ndani pogwira ntchito zanu?

Hired; 2. Family

A3(ii). What is the source of hired labour?

Aganyuwo/Antchitowo mumawapeza kuti?

1= local; 2= other villages; 3= both

A4. Do you own land?

Muli ndi munda?

1= yes, 0=No, if yes what is the estimated size?

A5 (i): Do you own a house?

Kodi muli ndi nyumba yanuyanu?

1= yes, 0=No,

A5(ii): Quality of house;

Nyumbayo ndiyomangidwa/ mawonekedwe bwanji?

1)Walls: *1= Poles and mud; 2= Sundried walls; 3= compacted earth ; 4=burnt bricks walls; 5= plastered and painted walls*

2) Roof: *1=Grass Thatched; 2=Iron sheets; 3=Tiled; 4=cement sheets*

3) Floor: *1=cement; 2=mud*

4) Window: *1=wooden; 2=glass; 3=grass; 4=without windows; 5= opening*

A6: What kind of assets do you own?

Kodi muli ndi katundu wanji?

No.	Assets name

B. Impact of Comanagement on forest condition and livelihood *(Community perception before and after the programme)*

B1. How would you describe the state or extent of the forest and trees over these time periods or changes in forest?

Kodi mungatiwuzeko, mene nkhalangoyi yiyalili makamaka kachulukidwe kamitengo mudzaka izi?

2000 to 2005 (before the programme started)	2005 to 2010(start of programme)	2010 to current

B2. What factors do you think have led to the current state of the forest?

Ndizifukwa dzaji zomwe zapangitsa kuti nkhalangoyi ndi miteengo ya munkhalangoyi yikhale chomwechi kapena yikhale mene yiririmu tsiku la lerori muchaka chino?

No.	*Response*

B3(i). Do you think co-management programme has had any impact or influence on the current state of the forest?

Kodi Polejekiti Yoti anthu a mudzi azi thandiza kutetedza nkhalango, yikukhudzana bwanji ndi mawonekede a Nkhlangoyi, and mitengoya munkhalangomu, tsiku lalerori ndi chaka chino?

1= yes; 0=no

B3 (ii). If yes, how?

Ngati yikukhuzadzako, ndi munjira yanji?

1= Improved or increased the state or extent of forest,

0= decrease the state or extent of forest (degraded)

B3(iii). What are the indicators, i.e what can see that shows if improved or not depending on response to question B3(ii)?

Ndidzizindikiro dziti zomwe tinga wone, zosoyenyeza kasithidwe komwe mwatchula kapena mwangomaliza kulongosolazi?

code	*Indicators*

B4(i). What activities is the community (and its parteners)carrying out under co-management that you were not doing before, that have contributed to the current state of the forest?

Ndizi zintchito ziti, zomwe zikuchitika ndi polejekitiyi zomwe zapangitsa kuti nkhalangoyi yikhale mmene mwalongosoleramu?

Act.code	Activity name	How many times

B4(ii). Do you participate in any of these activities? (If yes please indicate which ones, if no please explain why?)

Nanga inuyo mumatengako mbali pa zintchito ziti?

1= yes; 0=no

Please explain

_____

C. Livelihood impact

C1. Is the forest important to you and your household and livelihoods?

Kodi Nkhalangoyi ndi yo funikira pamoyo wanu ndi wa amubanja lanu pastiku ndi tsiku?

1=yes, 0=No

Please explain.

C2. Has the introduction of co-management programme brought new income sources for you and your household?

Kodi Pulojekitiyi yabweretsako kapena kuthandiza kubweretsa njira zina zopezera ndalama ndi kuthandizikira pakhomo ndi moyo wanu watsiku ndi tsiku?

1=Yes; 0= No

C3. Which/ What livelihood sources do you have NOW, that you have attained because of the co-management programme that you did not have before?

Panjira zomwe mwantchulazi, ndinjira yiti yomwe mungatiwuze,kuti yayamba chifukwa cha Pulojekitiyi?

Act.code	Activity

1= Sale of forest products; 2= Sale of firewood and charcoal; 3= Employed (salaried); 4= Wage labour; 5= Agriculture-crops; 6=Livestock; 7= Business (none forest related); 8= family support; 9=Others

C4. What impact do you think co-management programme has had on your income levels?

Ndinjira yiti yomwe pulojekitiyi yakudzana ndi kapezedwe ndiponso kachulukidwe ka ndalama zomwe inuyo ndi apabanja lanu mumapeza?

1= increased/ improved 2= none; 3= decreased

Please explain.

C5. Estimated average annual/ monthly income before and after the programme (If possible)?

Mungathe kutiwuza kuti mumapeza ndalama zochuluka bwanji pamwezi kapena pachaka, muzaka zambuyomu, yisanakwane 2005 kapena pulojekitiyi yisanayambe?

Nanga, Mungathe kutiwuza kuti mumapeza ndalama zochuluka bwanji pamwezi kapena pachaka, chiyambireni pulojekitiyi?

Income source if possible	A. (2000-2005) Before programme		2005 to present Current or after programme started	
	Monthly	Annual	Monthly	Annual

C6. How co-management programme, affected your level of depenadance on Forest and forest products for your livelihood (for income and substentence)?

Chiyambireni pulojekitiyi, kadaliridwe kanu pa nkhalango ndi mitengo yamukhalangoyi pamuyowanu wa tsiku ndi tsiku kwasitha bwanji?

1= decreased; 2: no change ; 3: increased; 4= Don't knon

Any comment:

C7 (i). Have you acquired any assests since the co-management programme started that you say are a direct result or benefit from the programme?

Chiyambireni pulojekitiyi, mwapezako nzinthu kapena kugula kumene, zomwe munganene kuti mwapeza kapena mwagula chifukwa cha ntchito za pulojekitiyi mu mudzi muno?

1=yes; 0=no

C7 (ii). If yes, which ones did you acquire because of the co-management programme and how? (*please indicated the estiametd value, if possible*)

Ndizinthu ziti, munazigula kapena kupeza muchaka chanji, ndi ndalama zingati ngati mungakumbukire?

Asset code	Estimated value	Year of acquisition	Remarks as on how and why?
1= Land; 2= House; 3= Car; 4=Ox cart; 5= Bicycle; 6=Wheelbarrow; 7= Agriculture machinery-Hand sprayer; 8=Treadle pump; 9=Engine pump; 10= Ridger; 11= Bed; 12=chair-sofa; 13=Table; 14= Sewing machine; 15= Radio; 16=Television, 17=Cell phone			

C8 (i). Have you been able to access loans or credit from the programme?

Mumatengako ngongole ku pulojekitiyi?

1=Yes; 0= No (if no go to C9)

C8 (ii). If yes how much?

Mwatengako zochuluka bwanji?

_____

C9(i). Were you able to access any loans, before the comanagement programme?

Pulojekitiyi yisanayambe, munatengako ngongole ku bungwe lilironse?

1= yes, 0=No (if no go C10)

C9(ii). If yes from who? And estimated who much so far (estimated)?

Mabungwe anji ndipo zochuluka bwanji?

1._____
2._____

C10(i). Since the programme started have you been able to make any savings, in bank, or village saving ?

Chiyambire pulojekitiyi, mwasungako ndalama, potsegula book lanu painu nonkha ku Banki kapena, mabigwe ena osungutsa ndalama?

1= yes, 0=No (if no go C11)

C10(ii). If yes, how much ?

Zochuluka bwanji?_____

C11(i). Were you able to make any savings before the programme started?

Pulojekitiyi yisanayambe, munkasungako ndalama, potsegula book lanu painu nonkha ku Banki kapena, mabigwe ena osungutsa ndalama?

1= yes, 0=No(if no go C12)

C11(ii). If yes, on estimate how much annually?

Zochuluka bwanji pachaka?

_____

C12(i). Have you benefited in any form of employment from the programme?

Chiyambireni Pulojekitiyi, munayamba mwapezako ntchito ku pulojekitiyi?

1= yes, 0=No*(if no go C13)*

C12(ii). If yes in what capacity or what form?

Ntchito yanji, ndipo kwanthawi yayitali bwanji?

1= wage labour; 2= salaried; 3= food for work

C12(iii). How much have you earned (estimate) so far?

Munapezako ndalama zochuluka bwanji?

_____

C13. How would you compare the following before and after the programme?

Poyerekeza, pulejekiti yisanayambe, ndi panopo, kapena chiyambire pulojekitiyi, mukuwona kusintha kwanji pazinthu izi? *1= better off; -1= worse off; 0= no change*

	Assest/capital	Before	After
i	Natural assest		
a	Availability and accessibility Timber(Forest reserve) **Kapezekedwe ka matambwa ku chokera mukhalangoyi**		
b	Availability and accessibility of other forest resources (poles, fire wood and NTFP) **Kapezekedwe ka nkhuni, migula..ndi zokolora zina monga zipatso bowa, ku chokera mukhalangoyi**		
ii	**Human and social assest**		
a	Participartion in training and skill development **Anthu aphunzitsidwa ntchito zamanja zosiyana siyana**		
c	Participartion in village meetings **Anthu ankhala nawo pa zokumana ndi zochitika zamudzi**		

D. Willingness to Pay for Co-management programme

D1. Overall what impact do you think the programme has on your household?

Mukalingalira Mungatiwuze chani pazomwe pulojekitiyi yankhuzako ku moyo wanu ndi pabanja panu mwatsiku ndi tsiku?

1= benefiting, 0= not benefiting

D2. Hypothetical question

> *'Imagine that Government and its partners will no longer be in a position to fund some of the activities of the programme, thus they would like to ask community member to contribute in form of membership fee, so as to ensure that the activities of the programme continue in the community…*
>
> (***PONGOGANIZIRA, litati Boma langaniza kuti, silitha kupitiliza kupereka ndalama zothandizila ntchito zapulojekitiyi, ndipo likupempha anthu ammudzi azipeleka kangachepe, ngati yawumembala, kuti muzinthandizikira pantchito za Pulojekitiyi)***

(i).Would you are, willing to pay membership fee for the programme to keep going?

Muthakukhala womasuka kupereka ndalama yawu membala, kuti yithandizire kupititsa patsogolo ntchito ya pulojekitiyi?

1= yes 0= No

Please explain.

(Note: if no, let them explain the reason and interview ends here, only continue if response is yes)

If yes, how much would you be willing to pay?

Ngati aliwomasuka, mumemne mukuyiwonera pulojekitiyi, munga khale womasuka kupereka ndalama zochuluka bwanji?

_____

Thank you for your time and responses.

Appendix 3: Variance Inflation factor (VIF) and correlation matrices for explanatory variable used in regression models

Appendix 3.1: VIF for explanatory variables in the logit model (chapter 3)

Variable	VIF	1/VIF
Age of respondent	1.50	0.664776
Number of years in school	1.44	0.695362
Land size	1.31	0.765286
District	1.17	0.853622
Gender of respondent	1.17	0.854262
Wealth indicator	1.13	0.888550
Forest based livelihoods	1.01	0.987928
Mean VIF	1.25	

Appendix 3.2a: VIF for explanatory variables in the probability model for perceived overall programme impact current (Chapter 6)

Variable	VIF	1/VIF
Better access and availability to timber	1.43	0.699614
Gender of household head	1.37	0.729140
District	1.35	0.738008
Land size	1.34	0.744564
Better access and availability firewood	1.31	0.761249
Better participation in communal activity	1.27	0.787766
Marital status	1.26	0.790988
Age of household head	1.26	0.793237
Accessed new income sources	1.25	0.801361
Household size	1.21	0.825512
Acquired asset	1.18	0.844012
Wealth indicator	1.16	0.865103
Better training and skill development since co-management	1.14	0.879892
Committee member	1.11	0.897031
Savings	1.11	0.902678
Accessed loans	1.07	0.938807
Mean VIF	1.24	

Appendix 3.2b: VIF for explanatory variables in the probability model for perceived overall programme impact current (Chapter 6; Table 6.6; 6.7)

Variable	VIF	1/VIF
Age of household head	1.55	0.644171
Years in formal education	1.50	0.664493
Gender of household head	1.49	0.672160
Land size	1.46	0.684502
District	1.30	0.766954
Marital status	1.24	0.809152
Wealth indicator	1.22	0.821403
Household size	1.18	0.848025
Perceived overall impact	1.08	0.922831
Committee member	1.05	0.951246
Mean VIF	1.31	

Appendix 3.3: Correlations between perceived livelihood impacts as ill as between perceived impacts and household characterises (e.g. wealth, district and leadership) (Chapter 6)

	WI	CM	DI	BT	BF	TD	PC	NI	AS	AL	SV
WI	1.00										
CM	0.06	1.00									
DI	-0.13***	-0.05	1.00								
BT	0.02	-0.05	-0.04	1.00							
BF	-0.03	0.10**	0.05	0.48***	1.00						
TD	0.10**	0.01	0.01	0.06	0.12**	1.00					
PC	0.22***	-0.13**	0.01	0.13**	0.03	0.27***	1.00				
NI	-0.01	0.23***	0.01	0.11	0.02	0.00	0.11	1.00			
AS	-0.03	0.01	-0.05	0.02	0.01	-0.06	0.03	0.021	1.00		
AL	-0.01	0.09	-0.03	-0.04	0.02	0.02	0.01	0.15**	0.05	1.00	
SV	0.09	-0.06	-0.07	-0.04	-0.05	0.05	0.05	-0.06	-0.02	-0.01	1.00

Notes: Rounded to two decimal places

- Significance levels (*=10% ; **=5%; * =1%),*

WI - *wealth indicator*
CM - *Committee member*
DI - *District*
BT - *better access to Timber trees since co-management*
BF - *better access to firewood since co-management*
TD - *better training and skill development since co-management*
PC - *Better participation in communal activity*
NI - *Access to new income sources initiated by co-management programme*
AS - *Have acquired assets*
AL - *Accessing loans*
SV - *Saving*

Appendix 4: Example of co-management resource plans, rules and regulations and permit fees for various forest products accessed by communities

Appendix 4.1: An example of forest resource management plan (thatching grass)

MANAGEMENT PLAN FOR GRASS

Name of Forest Product: Grass

Key Species: Tsekera , tsenjere, and Nyambi .

Demand: High

Supply: High

Problems /Issues:

- Harmful fire destroying grass for thatching houses.
- Cutting of immature grass.

Management practice:

- Grass shall be cut in May –June after maturity.
- Thatch grass shall be collected before early burning and area for grass shall be protected.
- Firebreak maintenance shall be prepared as early as April-May.
- Grazing shall be prohibited in the grass area before harvesting.

Allowable quantity:

- 50 bundles /h h/y r for outsiders shall pay according to the agreed permits.

Who can permits be issued to?

- Permits shall be issued to grass collectors on the agreed fee by the committee through the treasurer.

Fees /Royalties:

- Commercial users shall pay K50.00/bundle and domestic use shall be free

Appendix 4.2: Example of resource use rules for the forest co-management

Resource Rules	Specification	Penalty
No setting of harmful bush fires	Early burning will be controlled by the block management committee	Anyone found guilty shall pay a fine of K5,000.00. Failure to pay this amount, the person shall screef a distance of 250 meters boundary
No harvesting of thatch grass in the block without permission	Thatch grass collection for domestic use is free. Permission shall be granted by the block committee	Anyone found guilty shall pay a fine of K500.00 and failure to pay shall lead to confiscation of thatch grass and tool used in the offence
No cutting, debarking and uprooting of trees for medicinal purposes without permission	Permission shall be monitored and supervised by block committee	Anyone found guilty shall pay a fine of K500.00 and failure to pay shall lead to confiscation of the product and tools used in the offence
No collection of mushroom without permission	Permission to collect mushroom shall be granted by the block committee	All illegal products and tools used in the offence will be confiscated
No collection of fruits without permission	Permission shall be granted by the block committee	Anyone found guilty shall pay a fine of K500.00 and fruits confiscated
No hunting without permission	Permission shall be granted by the block committee	Anyone found guilty shall pay a fine of K500.00. Failure to pay the person shall screef boundary distance of 20m
No charcoal burning, opening gardens, erecting a building in the block	Block committee and communities shall ensure that these malpractices do not occurs	Anyone found guilty shall pay a fine of K5000.00 and materials/tools confiscated. Failure to pay the amount, the person shall be taken to court
No collection of woody products	No permission shall be granted to allow growth of regenerants	If found guilty of an offence shall attract a fine of K500 per regenerant.
Chemicals not allowed in the forest	To protect water no one shall be allowed to use any chemicals in the block	If found guilty of an offence the matter shall be brought to the court of law.
No bee keeping in the block without permission	Bee keeping shall be regulated by the committee. The improved bee hives shall be allowed in the Block and fire shall not be allowed when harvesting honey.	If found guilty payment of **K1,000.00** shall be made per bee hive.

Appendix 4.3: Example of collection /harvesting permit fees for different forest product resource

Product Name	House hold	Domestic	Commercial
Bamboo	15 bundles	K50/bundle	K100/bundle
Mushroom	1 basin	free	K50/basin
Fruits	4 basins	free	K50/basin
Medicine	4 kg	free	K200/50jg bag
Thatch grass	52 bundles	free	K50?bundle

Appendix 5: Forest inventory data collection sheet

FORM 1(a): General information of forest

District :		Traditional Authority:		Forest Name:	Date:
Block Name :		Block Area:		Number of Coupes:	
Transect number:	GPS reading:	Transect level: 1= forest edge; 2= Mid forest; 3= Centre of forest		Plot number:	
Distance of plot from forest edge:		Accessibility to forest: 1= easy; 2= moderate; 3= difficult (???????)			
Accessibility to forest: *1= Road; 2= path; 3= track*		Distance from major road:		Distance from nearest village:	

	Management type:	*1= Government 2= Co-management*
	Vegetative type:	
	Relief forms present:	*1= valley, 2= upland plateau; 3= rivers permanent; 4= seasonal rivers; 5= others*
	Terrain	*1= flat; 2= gentle slope; 3=medium slope; 4= steep slope (measure of slope size)*
	Canopy cover	Thick, not thick??
	Perceived level of degradation	*1= low; 2= medium; 3= high or severe (how to estimate degradation)*
	Try to estimate changes (distance from original to the new boundary) from the old position:_____	

FORM 1(b): General information on forest management

	Block / forest edge	**Within the block**	**Remarks**
Block boundaries (1= constructed; 0= natural)			
Constructed fire breaks (1= present; 0= none)			
Planted trees (1= present; 0= none)			
Number of Village forest areas			
Number of tree nurseries			

FORM 2(a): Vegetative assessment form

2a1- Tree

Plot no	Tree counts (*bdh* >15cm)						
	Tree number	dbh	Specie/ name	debarked	lopped	Burnt marks	Notes and comments (e.g Use)

2a2- Regeneration assessment (Seedlings and Saplings)

	Seedling counts (*bdh* >15cm)			Sapling (*dbh* between 5cm -15)			
Plot no	Seedling number	Species name	Notes:	Plot no	Seedling number	Species name	Notes:

Notes: Seedlings and saplings are defined as woody plants with height ≤ 1.5 m, and > 1.5 m but less that 2m, respectively, with DBH< 10 cm (Kelbessa and Soromessa 2004 in Gobeze et al, 2009).

FORM 2(b): Vegetative assessment form- Tree felling

Plot no	Stump counts (*bdh* >15cm)						
	Number of stumps	dbh	Pole or Tree	Specie name/ name	Old or recent cut	Use	Notes

Notes: Poles are defined as all trees with straight stems at least 2m in length and with a DBH of 5-15cm, whilst, timber trees are defined as all trees with straight stems at least 3 m in length and exceeding 15cm DBH (Doody et al., 2001).[46]

T2 : cutting surface is still a fresh cream or green colour with no blackening or any other signs of decomposition

T3 : signs of decomposition are visible over 0–6 months, blackening

FORM 3: Presence of human activities assessment form

Plot no	Presence of human disturbance Q										
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**	**Notes**

Q1 Number cultivation plots or;
Q2 Number of settlement units
Q3 Number charcoal pits
Q4 Number pit sawing
Q5 Evidence of fire (yes=1 and no= 0)
Q6 Number of mining pits
Q7 Number of debarking
Q8 Number of lopped trees
Q9 Access paths (presence 1=yes, 0= no and number if yes)
Q10 Grazing-evidence(yes=1 and no=0)

Appendix 6: Tree species identified in Ntchisi and Zomba- Malosa Forest reserves

Appendix 6.1: Tree and regeneration species identified in state and co-managed blocks of Zomba- Malosa Forest reserve.

No.	Tree Species		Regeneration Species	
	State managed forest block	**Co-managed forest block**	**State managed forest block**	**Co-managed forest blocks**
1	*Brachystegia stipulate* De Wild.	*Acacia polyacantha* Willd.	*Acacia polyacantha* Willd.	*Annona senegalensis* Pers.
2	*Bridelia micrantha* (Hochst.) Baill.	*Annona senegalensis* Pers.	*Annona senegalensis* Pers.	*Azanza garkeana* (F.Hoffm.) Exell&Hillcoat
3	*Combretum zeyheri* Sonder	*Bauhinia petersiana* Bolle	*Bauhinia petersiana* Bolle	*Brachystegia boehmii* Taub.
4	*Parinari curatellifolia* Planch. Ex Benth	*Bauhinia thonningi* Schum.	*Brachystegia boehmii* Taub.	*Brachystegia floribunda* Benth
5	*Pseudolachnostylis maprouneifolia* Pax var. maprouneifolia	*Brachystagia longifolia* Benth	*Brachystegia floribunda* Benth	*Brachystegia stipulate* De Wild.
6	*Syzigium cordatum* Hochst. ex.Krauss	*Brachystegia stipulate* De Wild.	*BBrachystegia stipulata* De Wild.	*Bridelia micrantha* (Hochst.) Baill.
7	*Uapaca kirkiana* Mulli. Arg. var. kirkiana	*Bridelia micrantha* (Hochst.) Baill.	*Bridelia micrantha* (Hochst.) Baill.	*Burkea Africana* Hook
8		*Burkea Africana* Hook	*Burkea Africana* Hook	*Cassia singueana* Delile
9		*Catunaregum spinosa* (Thumb.) Tirveng.	*Catunaregum spinosa* (Thumb.) Tirveng.	*Combretum zeyheri* Sonder
10		*Combretum zeyheri* Sonder	*Cassia singueana* Delile	*Cussonia arborea* Hochst. ex A.Rich.
11		*Cussonia arborea* Hochst. ex A.Rich.	*Combretum zeyheri* Sonder	*Diplorrynchus condylocarpon* (Muell.Arg.) Pichon
12		*Diplorrynchus condylocarpon* (Muell.Arg.) Pichon	*Cussonia arborea* Hochst. ex A.Rich.	*Parinari curatellifolia* Planch. Ex Benth
13		*Ficus sycomorus* Linnaeus	*Desmodium velutinum* (Wild.) DC. 1825	*Pseudolachnostylis maprouneifolia* Pax var. maprouneifolia
14		*Fraxinifolius* Wight et.Arn.	*Diplorrynchus condylocarpon* (Muell.Arg.) Pichon	*Pterocarpus angolensis* D.C
15		*Lannea discolour* (Sond.) Engl.	*Kigelia africana*	*Syzigium cordatum* Hochst. ex.Krauss
16		*Lecaniodiscus fraxinifolius* Baker	*Lannea discolour* (Sond.) Engl.	*Terminalia sericea* Burch. Ex DC.
17		*Parinari curatellifolia* Planch. Ex Benth	*Lecaniodiscus fraxinifolius* Baker	*Uapaca kirkiana* Mulli. Arg. var. kirkiana
18		*Pterocarpus angolensis* D.C	*Parinari curatellifolia* Planch. Ex Benth	*Vangueria infausta* Burch.
19		*Strychnos spinosa* Lam.	*Pterocarpus angolensis* D.C	*Vitex mombassae* Vatke
20		*Syzigium cordatum* Hochst. ex.Krauss	*Steganotaenia araliacea* Hochst. var.araliace	
21		*Terminalia sericea* Burch. Ex DC.	*Stereospermum kunthianum* (Cham.) A.Rich.	
22		*Uapaca kirkiana* Mulli. Arg. var. kirkiana	*Strychnos spinosa* Lam.	
23		*Vitex mombassae* Vatke	*Syzigium cordatum* Hochst. ex.Krauss	
24		*Ximenia caffra* Sonder	*Terminalia sericea* Burch. Ex DC.	
25			*Toona ciliate* Roem.	
26			*Uapaca kirkiana* Mulli. Arg. var. kirkiana	
27			*Vitex mombassae* Vatke	
28			*Ximenia caffra* Sonder	

Appendix 6.2: Tree and Regeneration species identified in state and co-managed blocks of Ntchisi forest reserve.

No	Tree Species		Regeneration Species	
	State managed forest block	**Co-managed forest block**	**State managed forest block**	**Co-managed forest block**
1	*Acacia polyacantha* Willd.	*Acacia Tortilis* (Forssk.) Hayne	*Acacia Tortilis* (Forssk.) Hayne	*Annona senegalensis* Pers.
2	*Acacia Tortilis* (Forssk.) Hayne	*Brachystegia allenii* Burtt Davy & Hutch	*Brachystegia boehmii* Taub.	*Brachystegia boehmii* Taub.
3	*Annona senegalensis* Pers.	*Brachystagia longifolia* Benth	*Brachystegia speciformis* Harms.	*Brachystegia speciformis* Harms.
4	*Bauhinia thonningi* Schum.	*Burkea Africana* Hook	*Bridelia micrantha* (Hochst.) Baill.	*Bridelia micrantha* (Hochst.) Baill. *Bridelia micrantha* (Hochst.) Baill. *Bridelia micrantha* (Hochst.) Baill.
5	*Brachystegia allenii* Burtt Davy & Hutch	*Combretum molle* R.Br.ex G.Don	*Canthium crissum* Hiern	*Canthium crissum* Hiern
6	*Brachystagia longifolia* Benth	*Cussonia arborea* Hochst. ex A.Rich.	*Catunaregum spinosa* (Thumb.) Tirveng.	*Combretum molle* R.Br.ex G.Don
7	*Brachystegia speciformis* Harms.	*Dalbergia nitidula* Welw.ex. Baker	*Acacia Tortilis* (Forssk.) Hayne	*Cussonia arborea* Hochst.ex A.Rich.
8	*Bridelia micrantha* (Hochst.) Baill.	*Diplorrynchus condylocarpon* (Muell.Arg.) Pichon	*Colophospermum mapane* (Benth.) J.Leonard	*Dalbergia nitidula* Welw.ex. Baker
9	*Burkea Africana* Hook	*Faurea saligna* Harv.	*Combretum molle* R.Br.ex G.Don	*Diospyros kirkii* Hiern
10	*Cassia singueana* Delile	*Ficus capensis* Thunb.	*Crotalariab brevidens* (Benth.)	*Diplorrynchus condylocarpon* (Muell.Arg.) Pichon
11	*Acacia xanthophloea* Benth.	*Annona senegalensis* Pers.	*Cussonia arborea* Hochst.ex A.Rich.	*Acacia Tortilis* (Forssk.) Hayne
12	*Colophospermum mapane* (Benth.) J.Leonard	*Ficus varruculosa* Warburg 1894	*Dalbergia nitidula* Welw.ex. Baker	*Ectadiopsis oblongifolia* (Meisn.) Schltr.
13	*Combretum molle* R.Br.ex G.Don	*Julbernadia globiflora* (Benth.) Troupin	*Dichrostachys cinerea* (L.) Wight & Arn.	*Faurea saligna* Harv.
14	*Cussonia arborea* Hochst.ex A.Rich.	*Julbernardia paniculata* (Benth.) Troupin	*Diospyros kirkii* Hiern	*Ficus brachylepis* Welw. Ex Hiern
15	*Dalbergia nitidula* Welw.ex. Baker	*Lannea schimperi* (Hochst. ex A.Rich.) Engl.	*Diplorrynchus condylocarpon* (Muell.Arg.) Pichon	*Ficus varruculosa* Warburg 1894
16	*Diospyros kirkii* Hiern	*Parinari curatellifolia* Planch. Ex Benth	*Droogmansia pteropus* (Baker) De wild.	*Flacourtia indica* (Burm. f.) Merr.
17	*Diplorrynchus condylocarpon* (Muell.Arg.) Pichon	*Pterocarpus angolensis* DC.	*Faurea saligna* Harv.	*Julbernardia paniculata* (Benth.) Troupin
18	*Faurea saligna* Harv.	*Pseudolachnostylis maprouneifolia* Pax var. maprouneifolia	*Ficus capensis* Thunb.	*Lannea schimperi* (Hochst. ex A.Rich.) Engl.
19	*Ficus varruculosa* Warburg 1894	*Srychnos innocua* Delile	*Flacourtia indica* (Burm. f.) Merr.	*Monotes africunus* A.DC.
20	*Julbernadia globiflora* (Benth.) Troupin	*Stereospermum kunthianum* (Cham.) A.Rich.	*Julbernadia globiflora* (Benth.) Troupin	*Parinari curatellifolia* Planch. ex Benth

21	Lannea schimperi (Hochst. ex A.Rich.) Engl.	*Trichilia emetica* Vahl	*Julbernardia paniculata* (Benth.) Troupin	*Pavetta crassipes* K.Schum
22	*Lannea schweinfurthii* (Engli.) Engl.	*Uapaca kirkiana* Mulli. Arg. var. kirkiana	*Lannea schweinfurthii* (Engli.) Engl.	*Pterocarpus angolensis* DC.
23	*Monotes africunus* A.DC.	*Uapaca nitida* Mulli. Arg. var. nitida	Lannea schimperi (Hochst. ex A.Rich.) Engl.	*Pseudolachnostylis maprouneifolia* Pax var. maprouneifolia
24	*Parinari curatellifolia* Planch. Ex Benth	*Vitex doniana* Thonn 1827	*Ozoroa insigns* (Baker F.) R .& A. Fern.	*Psorospermum febrifugum* Spach
25	*Pterocarpus angolensis* DC.		*Pavetta crassipes* K.Schum	*Stereospermum kunthianum* (Cham.) A.Rich.
26	*Pseudolachnostylis maprouneifolia* Pax var. maprouneifolia		*Srychnos innocua* Delile	*Strychnos spinosa* Lam.
27	*Srychnos innocua* Delile		*Pseudolachnostylis maprouneifolia* Pax var. maprouneifolia	*Trichilia emetica* Vahl
28	*Steganotaenia araliacea* Hochst. var.araliace		*Psorospermum febrifugum* Spach	*Uapaca kirkiana* Mulli. Arg. var. kirkiana
29	*Syzigium cordatum* Hochst. ex.Krauss		*Steganotaenia araliacea* Hochst. var.araliace	*Uapaca nitida* Mulli. Arg. var. nitida
30	*Uapaca kirkiana* Mulli. Arg. var. kirkiana		*Stereospermum kunthianum* (Cham.) A.Rich.	
31	*Uapaca nitida* Mulli. Arg. var. nitida		*Uapaca kirkiana* Mulli. Arg. var. kirkiana	
32	*Vangueria infausta* Burch.		*Uapaca nitida* Mulli. Arg. var. nitida	
33			*Vernonia amygdalina* Delile	

Appendix 7: Summary of Linear regression results showing the relationship between tree density and seedlings and saplings density in state managed and co-management blocks in Ntchisi and Zomba-Malosa forest reserves

Forest name	Management type	Co-efficient	Robust standard errors	Significance *(p-value)*
Ntchisi	State management	-1.04	1.44	0.36
	Co-management	-2.19	0.81	0.02
Zomba-Malosa	State management	-5.24	3.04	0.09
	Co-management	-1.135	1.21	0.35

Appendix 8: Pictures showing extent of the debarking in both Ntchisi and Zomba-Malosa forest reserves

Appendix 9

COMMUNITY FOREST MANAGEMENT IN MALAWI: A REVIEW OF CURRENT STUDIES

Introduction

Through the provision of food, fruits, timber, fuel wood, medicine, employment, and other environmental benefits, forest resources are an important part of the rural livelihoods, development and economy in Malawi. Though Kayambazinthu (2000) argues that local communities have always been involved in managing and using trees, for nearly eight decades forests resources in Malawi have been under state control with little or no recognition of customary property rights and no provision for community participation (Mwafongo *et al.,* 1996). In the pre-colonial era, access to and management of forest resources was governed by traditional leaders (village chiefs). However, in the mid-1920's forest area were gazetted as protected areas, to be managed by the central government through its structures e.g. district forest officers, field officers, and forest guards (Kayambazinthu, 2000). The centralized management systems were characterised by: limited and controlled access to forest resources by local communities who depended on the resources for livelihoods; increased conflict between government staff and local communities; low productivity; increased deforestation and environmental degradation (Chiumia, 2003).

Deforestation is one of the major environmental problems in Malawi and a challenge to the countries efforts to conserve forest resource and biodiversity. Key causes of forest degradation in Malawi are clearing for agricultural expansion and high demand for wood, in particular fuel wood (Malawi Government, 1998). In Malawi, as in most African countries, indigenous woodlands (miombo woodlands) still provide both urban and rural populations with by far the greatest proportion of their fuel requirements (Abbot and Lowore, 1999). Deforestation therefore threatens both the rich biodiversity of the miombo woodland ecosystem, and the livelihoods of a majority of the country's population, largely the poor and rural population (Zulu, 2008; Fisher, 2004; Malawi Government, 1998). It is estimated that, between the years 1972 and 1992 total forest cover declined from 4.4 million hectares to 1.9 million hectares representing an average loss of 2.3% per year, therefore prompting some

observers and researchers to ask if the problem of deforestation in Malawi ”could be solved or controlled” (Fisher, 2004).

Recently, following the United Nations Earth Summit in Rio de Janeiro, 1992 and in an effort to improve forest conservation and rural livelihoods, the centralised approach to managing forests resources started changing towards a community management approach. In 1996, the Malawi Government formulated the National Forestry Policy (1996) and the New Forestry Act (1997), which encourages local people's participation in the management of forests and more equal access to the benefits of management (Malawi Government, 1996). The Government also developed a programme and action plan (the National Forestry Program, 2001), to guide the sustainable natural resource management process, by providing a framework of priorities and actions for improving the management of forest goods and services to contribute to livelihoods and the rural economy of local users (Mayers *et al.*, 2001). By involving different actors (State, Communities, Donors and non-government organisations) to participate in the management of forest resources, community based forest management tries to re- establish some traditional management tools that colonial and central management control regimes severed (Mazur and Stakhanov, 2008).

The pilot projects for co-management in Malawi were launched in 1996 in Chimaliro and Liwonde forest reserves with support from World Bank and United Kingdom –DFID (Mayers *et al*, 2001). Chimaliro and Liwonde forest reserves are located in the central/Northern and Southern regions of Malawi, respectively. Another project was also launched in Blantrye, the Blantyre City Fuel wood Project (BCFP) with support from The Norwegian Agency for Development Cooperation (NORAD), from the years 1997 to 2003. Unlike Chimaliro and Liwonde forest reserves which are of natural miombo woodland, the Blantyre City Fuel wood Project (BCFP) comprises of both eucalyptus plantations and old miombo woodlands (Zulu, 2008). Since the launch of co management in Malawi in 1996, a number of programmes have been initiated and are being implemented.

Background

Globally a number of research studies on community forest management (CFM) programmes have been carried out, therefore a rich body of knowledge exist on this topic. The studies have focused on different aspects of community forest approaches, such as; on the role of community based forest management in improving forest conditions (Shrestha and Mcmanus, 2008; Maharjan *et al.*, 2009); improvement in livelihoods and assets communities

participating in the programmes (Ali *et al.*, 2007); and also governance of the programmes (Amornsanguansin and Routray, 1998). Also a number of reviews from such studies focusing on the 'success' and 'lessons' from CFM practice worldwide (e.g. Pagdee *et al.*, 2006; Sunderlin *et al.*, 2005; Tole, 2010), have been compiled. In a recent systematic review on the effectiveness of Community Forest Management, showed that the geographical focus of the majority of the accepted studies is Asia (70%), followed by Central America (16%); and 14% in Africa (Bowler *et al.*, 2010). This could either be because the studies from Sub Saharan region (in particular Malawi) did not meet their inclusion criteria or few or no studies on community forest have been carried out in Malawi. Therefore, before carrying out any studies on community forest in Malawi it is important to identify and review some of the community forest management studies that have already been done, the focus and objectives of the studies (as in what kind of studies); methods of study and key findings and conclusions. The review will give an insight on the what kind of knowledge already exist, what assessment studies have already been done; what knowledge gaps still exist, and therefore what kind or type of research is needed in order to contribute to the existing knowledge and provide necessary information for improved planning and implementation of current and future community forest management programmes.

This review is based on 10 studies both from peer reviewed articles and reports from the grey literature, focusing on CFM programmes and approaches in Malawi. The literature was accessed in November 2010 using *web of knowledge*, science direct and Google scholar as sources. Of the 10 studies reviewed, 6 studies or reviews were based on primary research and only 2 of which, focused on the outcomes of the programmes.The review is structured to first provide the overview of the nature of studies and their objectives. Secondly the study methodologies and parameters measured are also discussed and finally key findings and further research needs are also assessed.

Studies and Objectives

As co management approaches are gaining ground both in Malawi and globally, as an acceptable means of managing natural resources sustainably to achieve conservation and improved livelihoods, a number of questions have also been raised in the academic and policy sectors. Therefore, since 1996, a number of CFM programmes have been initiated in a number of communities surrounding forest reserves in Malawi. As in any programme, assessment and evaluation studies have been carried out in the different projects sites.

Different studies have focused on different issues and aspects of the community forest programmes, including, the effectiveness of the approach in achieving economic and livelihood security (e.g Zulu, 2010; Jumbe and Angelsen, 2006); community participation in the programmes (e.g Kamoto, 2007; Shackleton *et al.*, 2002); impact of co-management programmes in conservation of forest resources (e.g Hecht, 2008; Zulu, 2008); factors influencing success or failure/ lessons and challenges (Blakie. 2005); and the functions of different institutions governing the implementation of programmes and how they affect the outcomes of CFM projects (Zulu, 2008; Kamoto, 2009; Kambani, 2005; Kayambazinthu and Lockie, 2002) as shown in Table 1 below. However, there also some studies that are not specifically on community based forest or natural resources management, but just forest resources and management in relation to local community livelihoods, in general e.g Kamanga *et al.*, (2009); Mwase *et al.*, (2006); Fisher (2004); and Abbot and Lowore (1999). However these studies were not discussed since the focus is on studies, but their findings on impacts and outcomes of CFM projects.

Table 1: Studies on CFM programmes in Malawi

Author	Are of focus or Objectives	Type of study
Blakie, 2005	Challenges and lessons	Review Paper
Jumbe and Angelsen, 2006	Community dependence on forests and participation.	Journal paper
Hecht, 2008	Conservation of forest resources	Project evaluation report
Kamoto, 2009	Governance of Community Forest Resources	Unpublished paper based on Phd thesis
Kamoto, 2007	Community participation in resource monitoring	Book chapter
Kambani, 2005	Community participation and livelihoods	MSc thesis
Kayambazinthu and Lockie, 2002	Policies and institutions dynamics	Unpublished paper
Shackleton et al., 2002	Local participation and benefits	Review essay
Zulu, 2010	Community Forest management and fuel wood	Journal paper
Zulu, 2008	Impact on forest, livelihood and local institutions	Journal paper

Methods employed and parameters used

Performance of community based approaches may be assessed based on different factors and indicators, including: outcomes or impact on livelihood and forest conditions, and processes related to governance and implementation of the project and institutional changes at all levels (Blakie, 2005). Depending on what factors are to be studied or assessed, different variables or parameters that are measurable and verifiable and that best define the factors will be used. For the studies in Malawi, the factors studied include, improvement in forest quality, defined as the ability to reduce decline in basal area (e.g.Zulu, 2008); equitable benefit sharing, number of village development projects initiated, level of community participation in decision making, and ability to foster community unity, and enforce rules (e.g Jumbe and Angelsen, 2006; Kamoto, 2008a; Kambani, 2005 and Shackleton *et al.*, 2002). The methods used and parameters studied in some of the different research studies have been highlighted in Table 2 below. Few studies however measured what kind of forest products communities harvest from the forest, how they are used and which products are mostly harvested and of economic value to the communities.

Study techniques and data collection methods used, to assess the different issues related to community forest management programmes and its impact also varied for the different studies. Probably due to their objectives, or limitations of time and resources, most of the studies are based on case studies and data collected was qualitative in nature, collected using qualitative tools such as focus group discussions and key informants interviews (e.g Zulu, 2010; Kamoto, 2008a; Kambani, 2005; Shackleton *et al.*, 2002). Qualitative data from the interviews and group discussions is important as it gives information on communities' experience, opinions, perceptions and knowledge on issues related to social, economic and institutional aspects of the programme and also gives insights on the process measures of a programme (Patton, 2002; Chambers, 1994). However, they give limited information with regards to impact outcomes of a programme (Murali et al., 2002). Other studies collected both qualitative and quantitative data, (also known as mixed methods), to assess the implementation processes of programmes and their outcomes on household livelihoods and forest resources (e.g Zulu, 2008; Jumbe and Angelsen, 2006; Kamabani, 2005). The most common method used to collect quantitative data was household surveys using structured questionnaires. To ensure the validity of recall data from household questionnaires, supplementary information was collected from other informal interviews and literature reviews and secondary data sources. In addition to the impact of community forestry projects

on livelihoods and governance, a few studies assessed the impact on forest conservation and condition (e.g. Zulu, 2008). The data on forest conditions were collected by conducting forest inventories; however, these were not comprehensive as only tree counts were carried out.

All the studies did not have base line data, to describe the situation before the CFM project, hence enable them to quantify the impact of CFM on forest conditions and livelihoods, as well as the changes in forest management processes. All the studies only collected the data at one time; there was no repeat in the studies. However, the change in time, were assessed by asking communities in the CFM project sites to describe, their experiences, before the project started, and at the time of the project. Also none of the studies collected data for site or communities not participating in CFM, (state control or open access) to compare difference outcomes due different forest management approaches. Few of the studies collected data from different site to replicate their data; it was based on one location, therefore difficult to attribute the observed outcomes to CFM in general, or specific to particular characteristics of the study sites and communities.

Table 2: Methods adopted and Parameters used in the different Studies on CBFM in Malawi

Study	Methods	Parameters	Sample size	
			Hhs	*Forest plots*
Community dependence on forests and participation (Jumbe and Angelsen, 2006)	Household surveys, key informant interviews, and focus group interviews	Land and livestock holding size; participation in forest management or other village groups; Forest based business ownership; firewood prices; distance to forests; availability of markets, income sources, tribal cohesion, distance from forests, duration of residence and migration status.	404	
Conservation of forest (Hecht, 2008)	Satellite images, Secondary data (Government reports)	Current use and value of forest resources harvested(firewood, water use, Cedar poles, thatch grass, agriculture encroachment, tea irrigation, poles, beekeeping, tourism, crafts, aquaculture, forest fires and bauxite)		
Governance (Kamoto, 2009)	Focus group interviews and key informants interviews; literature review	Devolution of forest policies; perception of over management of resources by authorities; rules, bylaws and penalties; composition of natural resources committees and division of roles and responsibilities		
Resources monitoring (Kamoto, 2007)	Focus group interviews and key informants interviews; transect walks; secondary data	Frequency of patrolling; resource harvested; time for harvesting; market availability and income from marketing of products; committee roles and responsibilities; use of income generated for community development.		
Community participation and livelihoods (Kambani, 2005)	Household surveys, key informant interviews; focus group interviews; secondary data	Product harvested from forest; access to forest: roles, rules and regulations for participation; stakeholders involved in project	117	
Policies and institutions (Kayambazinthu and Lockie, 2002)	Secondary data from other case studies			
CFM and woodfuels (Zulu, 2010)	Secondary data from policies and law reports; Semi-structured interviews with key informants (e.g charcoal traders and government staff); vegetation survey	Wood volume, silviculture procedures; forest productivity; growth rate; access to forests, most harvested species; penalties;	381	15 (11 planted, 4 natural forests)
Impacts of CFM (Zulu, 2008)	Vegetation surveys(forest inventory); Household surveys (structured interview); Semi-structured interviews with key informants; focus group discussions	Trend in forest cover; access to forest resource, income and livelihoods, roles and level of participation; perceptions	381	15 (11 planted, 4 natural forests)

Key findings and conclusions

The results of the review studies on outcomes and impact of CFM programmes are mixed and at times unclear (Table 3). CFM projects are mainly positive with regard to governance of forest management and access to forest resources as compared to before CFM projects started or when the management of the forest was under state control. Therefore, negative impacts indicate that the outcomes or impacts of CFM project are worse off than before the project started, under state control. There are cases where it is clear that local people, including the politically marginalized, have benefited from the programmes especially when the state really has let go of professional and economic control, whilst there are also others which have produced ambiguous outcomes (Blakie, 2005). For example some studies have shown that Chimaliro Community Forest project is a model of success community based programmes (e.g Banda, 2001), whilst, Liwonde community forest management project, has not achieved its objectives (e.g Ngulube, 1999), in Jumbe and Angelsen, 2006).

The observed variations in the overall results and conclusions show that even at community and household level different members perceived the impacts or benefit from the programmes differently (Kayambazinthu and Lockie, 2002). These mixed outcomes are nevertheless significant because community forest programmes in Malawi, as in most other developing countries, were introduced as the solution to replace failed top-down, centralized management (Zulu, 2008; Chiuma, 2003). However, due to continued forest degradation (*i.e.* diminishing areas with significant forest resources) and failure of centralized approaches to forest management, none of the studied proposes any alternative to CFM approaches, though the evaluation results on performances and outcomes are mixed (Zulu, 2010; Lund and Treue, 2008, Kayambazinthu and Locke, 2002). In general, communities perceive a rather positive change in terms of livelihoods, access to forest resources, management procedures, and access to benefits since the start of the programmes (Kayambazinthu and Locke, 2002).

Table 3: Impact of Community Based Natural Resources Management (Forest) in Malawi

Study	Outcomes of CFM programmes		
	Forest condition	Rural livelihoods	Governance
Jumbe and Angelsen, (2006)	negative	-	positive
Hecht,(2008)	negative	-	-
Kamoto, (2009a)	positive	-	positive
Kamoto, (2007)	-	positive	positive
Kambani, (2005)	negative	-	negative
Kayambazinthu and Lockie, (2002)	-	positive	positive
Shackleton et al., (2002)	-	negative	negative
Zulu, (2010)	Not clear	Not clear	Not clear
Zulu, (2008)	negative	-	negative

While extensive consultation has taken place in the process of decentralization and the formation of co management approaches within a new Malawian forest policy, there is still very slow progress on the institution's effectiveness and functionality, hence CFM is prone to corruption (Blakie, 2005). These findings are supported by Zulu, (2008) and Shackleton *et al.*, (2002), who established that, the community management concept and implementation through committees (Village Natural Resources Management Committees-VNRMC), created new elites (committee members) whose operations are characterised with corruption and unaccountability. This results in the alienation of other community members from the forest resources and management; hence CFM is not seen as an activity or project to benefit the community as a whole but rather as a project to benefit VNRM committee members only and as problem for the whole community Zulu, (2008 and 2010). Therefore, when management powers are with the elite in a community, the project tends to deny the intended beneficiaries access to the benefits (Kamoto, 2009). Thus, the success of community based approaches in Malawi may not necessarily depend on local institutions and leadership, but on empowerment so that members can demand accountability from local leaders and committee members.

Village heads are custodians of natural resources on customary land, and uphold the law and order in their villages (Lunduka, 2009). However, implementation of community forest management projects is being done through the committees (VNRMC), which act as a point of contact between the forest extension workers or other government and non-

governmental officials and the communities. These committees take the lead role in forest planning, management, administration and enforcement of the forest bylaws (Malawi Government, 2001). Committee members are elected by the village members and may not always belong to the village heads' kinship. Therefore, in some areas, introduction of community forest management programmes may have also resulted in conflicts among villagers, as it upsets the established relations of power as the control that the hereditary village heads had over the resource including forests, appear to shift to elected committee members (Zulu, 2008; 2010). This resulted in altered relations between village heads and forest committees which negatively affect management and utilization, hence undermining forest resource conservation.

Findings based on locally defined criteria and performance ratings, observations, and reports reveal widespread institutional and conservation failure as a result of overharvesting of wood, weakening or collapse of rules and forest committees, in the case of Blantyre City Fuel wood project in Southern Malawi (Zulu, 2008). Similar increase demand of fuelwood from forest areas, has been observed as the major challenge in achieving forest conservation through community management approaches in Mulanje, also in Southern Malawi (Hecht, 2008). This is because, (1) the quantity of wood currently harvested is higher than the quantity that could be sustainably harvested from the protected area; (2) the villagers will not be able to manage their own village forest areas sustainably in the absence of another viable source of fuelwood and (3) Villagers surrounding the forest and participating in community forest programmes, are at most times unable to exclude their neighbouring communities who do not have village forest area and are not participating in the programmes (Hecht, 2008). This implies that communities are dependent on forest resources not as 'safety net' or 'gap filling', only, but as a daily livelihood source, therefore, sustaining and fostering the existing norms of and procedures for implementing CFM programmes become ineffective (Jumbe and Angelsen, 2006). Hence, link participation in CFM programmes to other complementary livelihood interventions, thus reducing pressure on the forest reserves especially among forest-dependent communities, could result in achieving a significant level of forest conservation as well as improved community livelihood.

Implementing community forestry management approaches is not a panacea for preventing further degradation of forest resources within different socioeconomic, cultural and institutional settings in Malawi (Jumbe and Angelsen, 2006; Zulu, 2010; Mwase, 2006), because few people participate in community forest management and access to forest resources does not necessarily depend on participation in management (Kambani, 2005). The

forest products participating communities have legitimate access to are only those that forest officials or government has agreed to such as fuelwood, thatch grass, poles, fodder, mushrooms, wild fruits and other non-timber forest products (NTFP) (Kayambazinthu, 2000). Therefore, in other cases, community members perceive participation in the programmes as restrictive and limiting to sustain their household substance and income need (Jumbe and Angelsen, 2006; Kambani, 2005). To achieve conservation and management of resources under community forest management approaches, the perceived benefit in management and conservation of forest resources and participation in such a programme, should be greater than the perceived cost. For example, forest ecology, in particular the distinction between miombo and eucalyptus, appeared to affect conservation outcomes, since the faster growth and robust coppicing ability of eucalyptus, and initial investment of effort, resulted in higher wood volumes and perceived cash value than for miombo (Zulu, 2008). This is also supported by findings by Jumbe and Angelsen, (2006), that showed that the proliferation of forest-based enterprises (selling of forest products) were seen as more rewarding by communities, hence weakening their willingness to participate in forest conservation and to control overexploitation of forest resources. Therefore, equity in sharing of benefits derived from participation in the community management programmes between communities and central government could enhance community participation and minimize individual misuse (e.g. Kamoto, 2009; Jumbe and Angelsen, 2006; Kambani, 2005).

Implications for further Studies

This review of studies on community forest management in Malawi has provided substantial information on gaps concerning the impact of CFM programmes on forest conditions, livelihood, and governance and the degree to which CFM projects have been implemented. Therefore a number of areas requiring further study or have been and identified as well as study methods that could be employed in order to contribute to the knowledge gaps that still exists in Malawi.

Methods may influence the results and consequently the conclusions drawn from the study**.** Studies on outcomes of and impact of community forestry management programmes in Malawi, have been done on one site, without a control (Non CFM sites), and also without temporal changes in the measured factors, therefore lacking the sufficient evidence that would enable one to conclude that the observed changes in forest condition or improvement of local communities livelihoods in the studied areas are as a result of implementing

community forestry management programmes. Considering that baseline data (before the project) are usually not available to indicate the temporal changes in the measured parameters, matched studies would be useful in assessing the changes brought about by an intervention (Shrestha and Mcmanus, 2008). Therefore there is a need for a comparison study, where communities or individuals participating in CFM will be regarded as treatment while those not participating as control (Baker, 2000; Shrestha and Mcmanus, 2008), so that the impacts of community forest management tools on forest conditions as well as livelihoods can be assessed and quantified. Apart from the comparison studies, the before and after data of the impacts of CFM on both livelihood and forest condition, could also be obtained by conducting a stated preference study, by asking communities to describe the situation before CFM project and the current status.

As in other developing countries, the three stated policy objectives for implementing community forest management approaches in Malawi are; (1) To conserve or improve forest resources through sustainable management; (2) improve rural livelihoods through improved access to forest resources for subsistence use as well as income generation and (3) improved governance of forest resources (which are considered as common pool resources), hence reducing conflict between state and communities (Blomley *et al.*, 2009; Agrawal and Chhatre, 2006; Bray *et al.*, 2003; Barrett et al., 2001; Klooster and Masera, 2000, Malawi Government, 1996). Unlike other countries where the impacts of community forest management on forest condition has been evaluated e.g. Tanzania (Blomley *et al.*, 2008) and Nepal (Webb and Gautam, 2001), studies on community based management programmes in Malawi are lacking. Most studies have concentrated on the impact of community programmes in achieving livelihood and governance goals and most of the studies have looked at households' socio-economic characteristics as determinants of success or failure of CFM programmes and on some aspects or characteristics of CFM, such as forest use and participation, leadership and community control over resources. However, there is limited information on the impacts of CFM on forest conservation and forest quality; therefore, there is still need to assess the impacts of implementing community based management approaches on the forest resources, livelihood and governance as the objectives of the programmes.

Community forest management programmes "should integrate outcomes of ecological sustainability (forest conditions), social equity, and economic efficiency" (Pagdee et al., 2006; Blakie, 2005). Mostly studies attempt to assess, only one or two of the stated objectives of CFM programmes. It is also important to study whether CFM programmes could be able to achieve all its three objectives at once (improved forest resources, community livelihood

and governance at local level; and under what conditions) (Blomley *et al.,* 2009), though, this is complex and may require more costly monitoring and evaluations (Blakie, 2005).

Extensive work on factors that influence success of co management of natural resources programmes have been carried out by different researchers (e.g., Agrawal, 2001) and a meta study on these factors has also been done (Pagdee *et al.,* 2006). However, these factors are dependent on certain relationships between the users and the resources (Pagdee *et al.,* 2006) and since different groups of people relate to their environment or value their resources differently (Pierce Colfer, 2005), the factors influencing success or failure of community forest management programmes may vary from one area to another and among different contexts and user groups. As in any programme or project, local conditions may influence and affect the direction of implementation and outcomes, therefore, as new programmes are still being initiated in Malawi, it is important to understand why other community forest management programmes are successful, what factors influence the success of such programmes and why. Identifying and understanding these factors would enable policy makers to create an enabling environment for implementers to design programmes that might succeed in a particular context. However such an assessment is yet to be done in Malawi.

Community forest programmes are aimed at improving the livelihoods of the poor community, which reside in and around forest areas. Kamanga *et al.,* 2009 suggest that a forest–led poverty reduction strategy can be achieved through higher-return forest activities. However, continued access to forest resources by the poor, to sustain subsistence and livelihood strategies conflicts with the interests of the wealthier and industry who are interested in forest products in order to exploit market opportunities (Arnold, 1995). Thus the poor have access to low productive forest resources (Leisher *et al.,* 2010). As the poor continuously engage in low return forest activities, they fail to generate capital and therefore their natural resource use strategies sometimes exacerbate their poverty (Leisher *et al.,* 2010; Fisher, 2004). Therefore, what innovative economic incentives and instruments may motivate poor communities to participate in sustainable forest management? There is a need to understand what factors could motivate the communities to continually participate in community management programmes for conserving the forest, even if they have low returns. Also there is a need to gain more insights on how devolution policies contribute to rural poverty reduction, and how the benefits (income) from the program are distributed among different user groups, and households with regards to different social classes (Jumbe and Angelsen, 2006). This will be vital for designing appropriate interventions to mitigate the

negative effects of future devolution programs by targeting the most vulnerable households (Jumbe and Angelsen, 2006).

The concept of community management connotes a collaborative institutional arrangement with diverse stakeholders managing or using a natural resource (Castro and Nielsen, 200). Although many publications on natural resource management champion the role of communities in bringing about decentralization, participation, and collective action, they give little consideration to the heterogeneity of actors within communities and to their diverse ways of perceiving and using natural resources (Shackleton *et al.*, 2002) and how this may affect the outcome of the programmes. Therefore there is a need to study the different roles of stakeholders in community forest management and how it affects outcomes; how the involvement of other stakeholders may influence the community's decisions in the management of a particular resource; and how does involvement of external stakeholders affect the overall management and outcomes.

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