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Fragmentation of Resource Management on the South East Arm of Lake Malawi

Dynamics around Fisheries

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9 Discussion and recommendations for defragmentation of resource management on the Southeast Arm of Lake Malawi

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Introduction

The use of common-pool resources (CPRs) worldwide is drawing wide interest and debate as a result of multiple uses and interests by a wide range of stakeholders. Population growth, urbanisation, growing demands for food and natural resources, improvement in technology and changing living patterns continue to increase the impact by humans on natural resources. In most cases this has led to overexploitation of the resources. This process, often called "the tragedy of the commons", has been studied extensively since Hardin's (1968) seminal article (Ciriacy-Wantrup and Bishop 1975; Hardin and Baden 1977; McCay and Acheson 1987; Feeny et al. 1990; Bromley 1992; Feeny et al. 1996; Ostrom 1999; Berge and Laerhoven 2011). Overexploitation of resources often creates divisions and conflicts among traditional user groups and other stakeholders (Steins and Edwards 1999). In some instances, people have been able to devise solutions to the problems of overexploitation (Ostrom 1990). When people are unable to find solutions it is usually because the problems cut across scales in terms of both geography and governance, or involve issues of diverse cultures and legal systems with no intrinsic tradition for cooperative behaviour. Historically comparative studies in social anthropology locate the problem in the undermining of local institutional solutions by colonial and post-colonial states. These crosscut local integrated governance of common-pool resources, transforming common property into state property and due to failure into privatization or open access (Haller ed 2010). Clearly the problems facing the fishers of the Southeast Arm of Lake Malawi cross scales spatially, temporary and administratively.[1]

The preceding eight chapters provide detailed background on fisheries of the Southeast Arm and their environs and offer a framework for evaluating and analysing governance of the area. The authors have described and examined the history of management regimes, policy and legal approaches, administrative, organisational and institutional arrangements, resource utilisation and exploitation

[1] On the problem of scale in the management of environmental resources see Holling (1995); Lemos and Agrawal (2006); Cash et al. (2006); Berkes (2007).

trends, and the ecological and environmental status of the area. The Lake Malawi ecosystem is fragile and if not governed effectively can lead to loss of its many beneficial uses. The reviews in the preceding chapters illustrate that resource management and governance in the Southeast Arm of Lake Malawi is fragmented. Although the interaction and interconnectedness among the various resource sector and components comprising the area and its catchment – i.e. land, beach, water, fish, wildlife, forests and birds – is recognised, in most cases these are managed as individual sector entities.

In Malawi, like most African countries, legislation and policy at various administrative levels (local, regional/district, national) are fragmented. Ministries and departments each have their own specific mandates and agendas to guide them in managing specific resources. The legislative acts and policies in Malawi most relevant to the Southeast Arm are listed in the text box below:

Statutes of Malawi and central government policy documents relevant for the management of resources around the Southeast Arm of Lake Malawi:

- The Fisheries Conservation and Management Act (GoM 1997a);
- The Forestry Act (GoM 1997b);
- The Malawi Parks and Wildlife Act (GoM 1992);
- The Water Resources Act (GoM 1969);
- The Agriculture Act (GoM 1987);
- The Tourism and Hotels Act (GoM 2003);
- The Town and Country Planning Act (GoM 1991);
- The Local Government Act (GoM 1998a);
- The Chiefs Act (GoM 1967);
- The Environment Management Act 1996 (GoM 1996);
- The National Fisheries and Aquaculture Policy (GoM 2000);
- The National Environmental Policy 1996, revised in 2004 (GoM 2004);
- The Malawi National Decentralisation Policy (GoM 1998c); and
- The Decentralized Environmental Management Guidelines (GoM 2012).

While different ministries and departments are responsible for administering and managing resources under these various Acts, what happens in one sector is related to and has an impact on other sectors. Thus, for example, the clearing of forests for agricultural activities and use of wood for fuel and fish processing etc. are of concern to forestry authorities. In addition, deforestation, for whatever purpose, results in erosion and siltation in the lake affecting fish productivity. The National Environmental Action Plan (NEAP) was developed to harmonise the interests and development and management agendas of various players. The

Plan promotes the sustainability and the health of the environment in Malawi, and considers the numerous challenges that exist between the objectives of economic growth and environmental management and conservation (GoM 2004). Despite the existence of an action plan, management of resources in Malawi continues to be fragmented. There is a lack of coordination in planning and management and a disjuncture among and within policies and legislation. Conflicts arise due to disjointed stipulations within policies and the lack of capacity to implement existing policies. For example, in the fisheries sector the implementation of co-management regimes was theoretically assumed to benefit the resources and their users, but recent empirical studies have highlighted the potential problems that may arise from such natural resource governance reforms. In an in-depth analysis of co-management arrangements in the fisheries sector of Malawi, Njaya et al. (2011) and Hara et al. (2002) show that problems arise particularly around power distribution, i.e. determining who is responsible for what among the different actors. Specifically, the roles of the assumed key partners like traditional leaders and the Department of Fisheries are imprecise or conflicting. Despite much publication on devolution of authority and decentralisation, the norms of centralised management remain deeply ingrained in the dominant mindset of officials at the Department of Fisheries (Chinsinga 2005)[2]. Others suggest that policy makers should adopt integrated management planning that considers the diverse interests in the fisheries resources, as well as the ecological, socio-economic and external factors threatening sustainability of lake ecosystems and livelihoods of dependent communities (Jamu et al. 2011).

One of the important questions that the DARMA project seeks to address with regard to the African commons is how to integrate natural and social science knowledge about exploitation of common pool resources so that policy makers involved with biodiversity conservation can manage and govern these resources sustainably.

Inter-sectoral interaction characterisation

Action research was undertaken at local and community level in the South East Arm area. It is at this local level that issues of fragmentation were discussed. This is the level at which communities and other stakeholders interact actively with the natural resources through use or through the effects of others' utilisation of natural resources elsewhere. The critical ecosystem interactions associated with the

[2] The particular problem of the power dynamics of established bureaucracies can be approached through the understanding provided by studies of policy making in domain specific sub-systems of the government. The idea of policy networks point to how the sub-systems interact and depend on each other. This may be exploited in a reform process; see e.g. Adam and Kriesi (2007); Carlsson and Sandström (2008).

Southeast Arm and its ecosystem were identified as cutting across seven key resource groups: fish, water, forest cover, land (upland), birds, beaches and wildlife. These resources are managed by a range of institutions to various degrees. A matrix of interactions was developed by looking at the interactions between the various common pool resource sectors and management regimes. Table 9.1 shows where there are sectoral interactions of activities that need management integration according to stakeholders' opinions elicited during action research. Evidently the management of a particular sector/resource is left chiefly to the parent Department/Ministry even though activities of or in that particular sector have effects or impacts (negative or positive) on other sectors/resources. According to the respondents, tourism, forestry, and agriculture activities interact with fisheries. Also the Southeast Arm water (level and quality) is important for fisheries, tourism and irrigated agriculture. The management of the particular sector/resource is based on scientific knowledge gathered by scientists and managers, and in some cases with assistance and collaboration rendered by community groups that create and enforce rules (by-laws or informal norms) developed for the sector. Largely though, each sector and parent department or ministry concentrates on management and issues in their sector without adequate consultation or even consideration of how/whether their decisions or activities affect and impact on other sectors. For example, the Ministry of Agriculture and Food Security has been developing plans for use of water from Lake Malawi for irrigation (the Green Belt Initiative) without much consultation with the Department of Fisheries about the effects this would have on fisheries or aquatic biodiversity. Furthermore upland agricultural activities do not take cognisance of the effects of erosion, chemical and organic pollution of the lake. Equally, the Department of Tourism and the Department of Physical Planning would do better to liaise and consult with other departments such as the Department of Fisheries when planning allocation of land for tourist and other developments on the beaches of the Southeast Arm.

In order to demonstrate in greater detail the type, levels (intensity) and possible effects of specific activities on a specific resource, an analysis of the effects of key activities on the key identified common pool resources on the Southeast Arm was undertaken (table 9.1). The intensity of the interactions is indicated by "x" for low; "xx" for moderate; and "xxx" for high. Thus the analysis is based on the following categories of interactions.

1. x = Low effects (impacts)
2. xx = Moderate effects (impacts)
3. xxx = High effects (impacts)

A summary of the results of the action research with stakeholders on the Southeast Arm is tabulated in Table 9.1.

Table 9-1: Level of interactions between resources and activities on the Southeast Arm of Lake Malawi

	Activity	Fishing	Water quality	Deforestation	Tourism	Agriculture
Resource						
Fish		xxx	xxx	xxx	xxx	xxx
Water level		x	x	xx	x	xx
Forest		xx	x	xxx	x	xxx
Land		x	x	xxx	x	xxx
Beach		xx	x	x	xxx	x
Birds		x	x	xx	x	xx
Wildlife		x	x	xxx	x	xxx

Action research with stakeholders illustrated the following findings:

- Fishing, deforestation, tourism, water quality and agricultural activities have high effects on fisheries.
- Deforestation and agricultural activities have high effects on forest cover.
- Deforestation and agriculture have high effects on land (soil cover/erosion).
- Tourism had high effects on contested use of beaches.
- Deforestation and agriculture had high effects on wildlife sustainability and biodiversity

The following activities were felt to have only moderate effects:

- Deforestation and agriculture on water levels;
- Fishing on forests (through firewood for processing);
- Fishing on use of beaches (crowding, human pollution, etc.); and
- Agriculture and deforestation on birds (especially through deforestation)

Regarding the need for management action, it can be assumed that those activities with high effects (xxx) need immediate action; those activities with moderate effects (xx) need to be monitored; activities with low effect (x) need only to be noted at present.

For the purposes of the present discussion, activities with high effects on fisheries were chosen for critical analysis. The rest of this chapter focuses on interactions between fish as a common pool resource and the key commons utilisation activities in the Southeast Arm that were judged to have high effects on fisheries. In addition to fishing, these activities were identified as deforestation, tourism, agriculture, and those affecting water quality.

Activities that interact with and have high effects on fisheries

Fishing: According to fishers and other stakeholders, fishing activities have had, without doubt, the biggest impact on fish populations on the Southeast Arm. Being the most productive area of Lake Malawi, the Southeast Arm attracts very high fishing effort, including commercial trawling (in fact Area A, the area south of Boadzulu Island, had to be closed to pair trawling in order to alleviate the situation). Given that small-scale fisheries are managed as open access and commercial trawling is managed only on the basis of limits on number of units that are allowed in Area B (the area north of Boadzulu Island) without limitations on output, this uncontrolled increase in fishing effort has had a great impact on fish resources. Even fishers agree and accept that there are too many fishers and too many gears. This can be seen in the decline of the Chambo, the most valuable species, to levels less than 10 % of its production at the height of its productivity in the 1980s (see Chapter 5).

The macro-economic policy that has always considered fisheries as a business sector and a source of livelihoods and subsistence that should be left open to entry for anyone with capital is thus seemingly at cross purposes with fisheries management policy that aims to achieve sustainable exploitation through MSY management strategy as stated in the National Fisheries and Aquaculture Policy (GoM 2000). It is strange therefore that the department has even implemented a project in the last decade that has promoted increasing the number of boats and engines through loans to potential new entrants and equipping existing fishers with more efficient boats and engines, at a time when it had already become clear that the small-scale sector was over-capitalised. Clearly the policy should actually have been towards reducing fishing effort. The promotion of increased fishing effort, while realising that the fishery was already over-capitalised, points to tensions between departmental policy and Malawi's macro-economic development policy.

It is becoming clear that the use of output regulations (quotas) in the commercial sector and also rights-based fishing in the small-scale fisheries might be the most probable options in future to avert the decline of fish species and promote the recovery of the Chambo. The fact that the Department of Fisheries cannot even enforce existing regulations due to inadequate resources and the structural organisation of the small-scale sector (whereby fishers can launch and land anywhere they chose) makes rights-based fishing and user involvement in management even more pertinent.

Deforestation: The magnitude of forests within the Southeast Arm catchment appears to be declining (see Chapter 6). According to GoM (2006a)[3] influx of Mozambican refugees into Malawi between 1986 and 1993 resulted in over-

[3] We have read the draft edition of 2006, but are aware of the final version of GoM (2009)

exploitation of forests at the expense of human settlements. Especially on the Southeast Arm east bank catchment since this area borders Mozambique in the Makanjira and Namwera area. The recent government initiative known as 'kudzigulira malo' where people relocated to Mangochi from the southern districts, such as Thyolo, Mulanje and Chiradzulu, is also contributing to the depletion of forests to open new farm lands and construct dwelling houses. Thus refugees from Mozambique and internal migration from other districts has been and is contributing to deforestation both in the Government Forest Reserves and the Customary Land Forests (see Chapter 6). The loss of forests and vegetation cover is leaving most of the soil exposed and vulnerable to soil erosion. Potential effects of increased sediment loads on aquatic communities include increased water turbidity, which results in the reduction of light penetration and suppresses photosynthetic rates (see Chapter 4). Turbidity also affects fish mate choice, the reduction of habitat complexity and destruction of spawning grounds for fish (Lévêque 1995). Experiments conducted to test for the immediate behavioural response to increased turbidity in territorial rock-dwelling cichlid fishes which use colourful visual cues to maintain territories near the substrate and attract mates in Lake Malawi found a significant movement of fish away from the substrate, with a concomitant shift from displaying territorial and courting behaviours to foraging behaviours (Gray et al. 2011). Rusuwa et al. (2006) also observed reduced food availability and shrinking habitat for fish due to deposition of silt in the lake.

Agriculture: Human population growth, as well as increased rates of habitation and agriculture in the Southeast Arm catchment, has augmented the demand for land. The increase in tobacco estates, especially in the Namwera and Makanjira areas, has also increased the rate of deforestation for establishing these estates and also curing tobacco (see Chapter 6). As a result, more land, including wetlands for dry season irrigated agriculture, is being cleared to create the additional space required. Vegetation along the shoreline, which offers several advantages to fish as breeding areas and spots of refuge for juvenile fish, have been and continue to be cleared, exposing young fish to predation. Removal of vegetation is reducing the catchment's filtering capacity for particulate matter and nutrients from agricultural runoff. Deforestation, biomass burning, destruction of wetlands in the catchments for agricultural purposes and the cultivation of marginal areas such as steep slopes of hills, is resulting in massive quantities of sediment being eroded from clear-cut watersheds discharging into the rivers and eventually into the lake (Bootsma and Hecky 1993). This results in the blanketing of benthic algae and disruption of the feeding patterns of the specialised aufwuchs eaters i.e. the rock-dwelling *Mbuna* that have limited mobility and migration capacity and whose food web is based on benthic algae growing on rocks (Ribbink (2001); see Chapter 4). The

government's Green Belt Initiative could be a source of new nutrient enrichment into the lake if not properly planned. Nutrients from fertilisers that will be used in the proposed farms around Mpondasi area (under the Green Belt Initiative) have the potential to enhance eutrophication of the Southeast Arm if buffer zones which filter particulates and retain dissolved nutrients are not constructed and maintained. Eutrophication could have a negative impact on the biodiversity of which the mbuna is the 'crown in the jewel'.

Tourism:

a) Beach – The opening of resorts along the shores of the lake is increasingly reducing fishermen's access to many launching and landing sites. The use of the lakeshore beaches in the Southeast Arm, especially on the western shores due to easy access by multiple stakeholders, is thus increasing contestation and conflict of interests in their usage. While fishers use the beaches for launching, landing and marketing of their catches, cottage and hotel owners use the beaches for recreational purposes. These two uses of the beach are not usually compatible and in most cases fishers are not allowed to land their catches in front of the cottages and hotels. In most instances, hotels and private cottages fence off their areas and extend the fences right into the lake, which is illegal even under existing law that requires fences to extend only up to 30 metres from the highest water mark.[4] Unfortunately, the Fisheries Department does not have control over these lakeshore developments since the allocation of land for these developments falls under the jurisdiction of the Physical Planning Department. In areas where beaches fall under customary land, chiefs and village headmen have been known to give away or sell land for development at the expense of their people. It is not clear as to whether even customary land should be under the jurisdiction of the Department of Physical Planning or local (Mangochi District) council in terms of decisions regarding its allocation for economic development. This is sometimes done on the premise that such establishments and developments will create employment for the local people. At the minimum, one would think that at least government should have some advisory role to chiefs in such matters. Whether such trade-offs for jobs are worth the loss of easy access to the beaches for both fishing and domestic use is a matter for debate. In any case, there is never any real guarantee for jobs for the local communities that lose their land/beaches, let alone that the communities that are directly impacted upon will be prioritised in

[4] This regulation, mandated by the Town and Country Planning Act (GoM 1991), was put in place in order to allow the public and local communities access to and use of beaches for fishing and domestic purposes.

terms of employment by the establishments that have taken over their land. What should be noted is the disjuncture between the basis for decisions over allocation of lakeshore land and beaches for development, what legal underpinnings are being used (including customary) and who makes such decisions.

b) Waste disposal – Another effect of tourist developments is both sewage and solid waste disposal. The Mangochi District Council does not have a sewage disposal system outside the town areas (Mangochi and Monkey Bay). Worse still, it does not have systems for solid waste disposal. Thus holiday resorts have to construct their own sewage and solid waste disposal systems. It is a matter for concern that these might end up in the lake, posing health hazards to humans and pollution of the lake. Given that the Mangochi District Council or local government do not have the capacity or the systems for certifying and monitoring these sewage and waste disposal systems, this is a source of real concern as these developments continue to flourish without environmental impact assessments and monitoring controls.

c) Birds – Boadzulu Island in the Southeast Arm is home to many types of birds, including the kingfisher, fish eagles and cormorants. While the main source of food for the birds is fish, the fish also benefit from bird droppings as a source of feed and nutrients for primary production. These birds are a tourist attraction for visitors who travel to the island. However, the use of speedboats within the area creates conflict with local fishers if the boats damage fishing nets or engine propellers are damaged when they get stuck in nets.

Wildlife: To a certain extent, fishermen are at risk from hippos, crocodiles, and marine snakes. Hippos and crocodiles are protected under the Wildlife Act meaning that they cannot be killed without a permit from the Department of Wildlife. Thus fishers have to report where there are problem animals so that the Department of Wildlife can come and deal with them. In addition elephants (also protected) can eat and/or have been known to destroy crops belonging to fishing communities on the east banks and also Nkope area. Deaths and injuries from attacks by wild animals or destruction of crops are also known to occur in the area.

Water: The availability of abundant and good quality water is essential for fisheries production. Water level fluctuations in Lake Malawi that might pose a threat to fisheries production are minor at the moment. The total volume of Lake Malawi is approximately 8,000 km^3, while the amount of water leaving the lake though the Shire River and evaporation is less than 1 % (Bootsma and Hecky 1993). However, climate change could affect this balance. The quality of water in Lake Malawi

is still in relatively good condition, although effects from sedimentation/siltation and nutrient enrichment from farmlands could alter the current water quality status in future. Pollution of water can result from several factors, including mining, through both the introduction of chemicals as well as through increased suspended solids loading. The newly established cement manufacturing company at Makawa, Njereza Cement Company could be a new source of pollution if the operations are not properly planned. Other factors include agricultural activities – through the introduction of pesticides and chemical fertilisers, tourism and domestic waste – organic pollution from sewage effluent (e.g. increased nutrient loading and faecal coliforms); urbanisation – sewage effluent and industrial effluent; and aquaculture – the introduction of intensive cage culture. Other potential threats to water quality include: nutrient loading from inflowing rivers and atmospheric deposition and the introduction of organic waste; sediment loading; and faecal pollution from the catchment. Additionally, cage aquaculture, which serves as a new source of nutrients and organic pollution from unconsumed fish feed, may exacerbate the reduction in water quality and occurrence of nuisance algae through the introduction of pesticides.

Other potential threats to fisheries production

The majority of the fish in Lake Malawi belongs to the Cichlidae family and are mostly planktivorous, feeding on either phytoplankton or zooplankton. While the lake is dominated by diatoms, which are presumed to be very good food for fish, Cyanobacteria, dominated by *Oscillatoria sp*., *Microsystis aerugenosa* and the heterocystous *Anabaena flos-aquae,* are important during the stratified season; the potentially toxic *Cylindrospermopsis raciborski* has also been reported in the lake (Higgins et al. 2001). While our understanding of the effect of these changes on the lower food web structure in the lake is insufficient, the presence of Cyanobacteria could have negative ecological implications.

Institutional and governance fragmentation

An important aspect of fragmentation in the management of fisheries and other resources on the Southeast Arm relates to institutions and governance. Formal policies and legislation are not aligned; as noted above, tourism development is affecting access to the beaches for fishing and domestic uses by communities. Agricultural activities are having an impact on forest cover, soil erosion and siltation/turbidity of the lake.

In addition, formal government policies and regulations are not necessarily in line with informal and customary norms and practices. For example, traditional chiefs have powers over customary land, forests and fishing activities in their ar-

eas. While these powers are supposed to be exercised in support of their people, some chiefs give away or sell land and beaches, limiting their people's access to and use of such resources. Chiefs demand an honorarium from migrant fishers or emigrants settling in their areas, something which though a historical custom and tradition is viewed as bribery, especially if this is not in the interest of their people (Hara et al. 2002). With respect to the powers of traditional chiefs over natural resources, there is at times a grey area surrounding their powers and that of government (Chapter 5). This has become a real issue along the lake in terms of customary land for developments such as holiday and private resorts. Where does the limit for chiefs to give and sell such land and beaches stop and where does government's responsibility and role begin? This is also a concern with regard to public land along the lake. In this context there needs to be consideration of the interests of local communities and the public when such land is allocated, demarcated and fenced for development.

One of the issues that have become clear is the role of chiefs in co-management arrangements (see Chapters 5, 6 and 8). In most instances, there is contestation for power between local organisations that are supposed to be vehicles for user participation in co-management of natural resources – for example, Beach Village Committees (BVCs) and Forestry Natural Resource Management Committees (FNRMC) – and local chiefs. The question has become whether these organisations should be independent of or fall under local chiefs. To the extent that they are seen as separate power brokers, local chiefs see these structures as a threat to their authority and therefore would like to have control over their functioning. Meanwhile, local user representative management organisations regard themselves as being independent of their chiefs. This appears to be tacitly supported by government departments that are partners with the local committees in the co-management arrangements. Government departments view the need for strong independent committees as a necessary prerequisite for devolution of management authority and responsibility to local committees. But if local committees are eventually to assume management responsibilities, it is likely that they will require the use of traditional authority powers for the application of sanctions at local level, unless they will be required to become honorary government entities and apply the formal regulations with sanctions being applied through magistrate courts (Chapter 8). This dilemma and contestation for power between local management committees and their chiefs continues to hamper progress towards co-management.

Administrative decentralisation[5] (Chapters 6 and 8) regards Village Devel-

[5] Councilors have been elected only once, in 2000, since the legislation for decentralization was passed. As a result District Councils stopped functioning after the mandate for the councilors elected in 2000 expired in 2005 (Tambulasi 2011). It is hoped that the second elections for DCs

opment Committees (VDCs) as the lowest local organisations for participatory bottom-up planning and development implementation. Crucially, the Village Headperson are supposed to chair the VDCs for their villages. The question which remains unresolved is whether local management committees will and should continue to exist or whether their roles and responsibilities will be taken over by the VDCs. If they continue to exist, should they be independent or be under and subject to VDCs chaired by Village Heads? These are some of the issues that need to be resolved at a local level under decentralisation. At district level there is still lack of clarity in terms of lines of authority and trust. Some departments/ministries such as the Department of Fisheries are channelling funding for operations for their district offices to the District Commissioner's office (even then such funding is ring-fenced for the sole use of the Department of Fisheries). Meanwhile, other departments (for example Forestry, see Chapter 6) continue to retain the disbursement of funding, including that for operations, to their district offices within the department structures rather than channelling the funds to the District Commissioner. It is still not clear whether departmental and ministerial district offices should be reporting to the District Commissioner or their mother department/ministry. As demonstrated in Chapter 6, the District Forestry Officer reports both to the District Commissioner regarding management of customary forests while s/he reports to the Regional Forestry Office and Director of Forestry (in that order) with regard to management of Forest Reserves. In this context the Department of Forestry retains the management authority for Forest Reserves, which are viewed as public property, while it sees the management of customary forests as falling under the District Commissioner (as head of the District Assembly), with the role of the Department of Forestry limited to the provision of extension activities. In terms of management of fisheries, the Department of Fisheries retains authority and responsibility for management of all fish resources and gives no responsibility to the District Commissioner. In terms of responsibility for human resources, salaries and wages for staff for both departments remain under the respective departments rather than being delegated to the District Commissioner. Most government employees and the departments they belong to remain sceptical that the District Assembly (and therefore the District Commissioner) will have the capacity to deal with issues of human resources across all government departments and ministries including career paths and retirements (Hara 2006). Decentralisation proposes that the planning and management of development including natural resources should fall under and be the responsibility of District Assemblies (chaired by District Commissioners) with the requisite budget under its control. Clearly, there is still disagreement and ambiguity within government,

will take place together with the next general elections in 2014.

as can be seen in the context of both fisheries and forestry, regarding delegation of authority and responsibilities to the District Assemblies regarding their management mandates.

Another area of disjuncture is between macro-economic policy and sector policies. There is no disagreement on the need for poverty reduction and alleviation as Malawi's underlying national policy proponent (GoM 2006; 2011; 1998a; 2002). The policy also outlines the broad way in which each sector should contribute towards national development. For natural resources sectors such as fisheries and forestry, this has to be achieved without jeopardising the natural resource component. Generally, what has become disjointed is how each sector should be contributing towards the higher level national policies and economic goals without adversely affecting itself and also other sectors. For example, while agriculture forms the backbone of Malawi's economy and food security, agricultural activities have adverse effects on forests and increasingly on fisheries. Thus the agriculture sector might consider its needs as most important, and think that other sectors should be subservient to its requirements and activities. Equally, those in the tourism sector might feel that tourism is more important than fisheries as a source of foreign exchange and thus that the use of beaches for tourism should be prioritised over fisheries related and other uses. All in all, what is required is to acknowledge that various economic sectors and the related natural resources are linked to one another as a social ecological system and that there is therefore need for equitable trade-offs when taking economic and socio-economic utility decisions.

Weak institutional and legislative oversight is another factor resulting in fragmentation of management. Here, the inability of most departments and ministries to enforce even existing regulations is a source of real concern. For example, one of the reasons for over-exploitation of the Chambo fishery (Chapter 5) and the continuing devastation of both customary and public forests (Chapter 6) is the lack of resources for enforcing regulations by the departments responsible. This is one of the reasons for the move to devolve authority and responsibility to local levels through co-management and user participation. The argument is that by making user communities partners in the management of resources that they depend on for livelihoods, better management outcomes could be achieved.

Understanding the value of the natural resources

Before executing management options, knowledge about the quantity and value of the available resources is required. One of the issues needed for sustainable utilisation of natural resources to their full potential within the scheme of national development is correct/accurate valuation of the resources. For example, although the importance of fisheries to the economy, livelihoods, ecology and culture of the

Southeast Arm is widely recognised there is still inadequate understanding of its value, particularly in communities where fishing is the key means and source of meaningful livelihoods. There is therefore a need to place appropriate value on the resources in the Southeast Arm to raise the profile of various sectors in the area within the context of national development priorities. Particular attention should be provided to the following: (a) determining the quantity and value of natural resources such as biomass; (b) livelihoods benefit analysis; (c) social and cultural benefits; and (d) understanding of the extent of poverty and how this impacts or could impact on possibilities of reduced consumption of natural resources in the area. In this context, there is need for a better and more holistic understanding of how human activities actually represent a threat to livelihoods and concurrently the ecosystem of the Southeast Arm as a social ecological system.

Defragmenting resource management on the Southeast Arm

The preceding chapters have demonstrated the fragmented management of resources on the Southeast Arm as a result of a number of factors. These factors have an impact on other resources and sectors, and on local communities in terms of the quantity and quality of benefits that they can derive from the resources. This review volume has identified a number of the key factors causing fragmentation, using the fishery as a case in point. These are:

- Legislation and policies are still largely based and mandated towards sector-specific management.
- Policies and legislations are not aligned or compatible in their aims, objectives and strategies.
- In giving a mandate for poverty alleviation, economic development and improved livelihoods, national policy does not promote alignment of resource management objectives. In many instances, this actually results in contradictory objectives by the different resource sectors.
- Administrative and organisational structures/arrangements do not work or function collaboratively or cooperatively. In some instances there are power struggles and ambiguous lines of authority/responsibility.
- Most government departments lack capacity and resources for enforcing even the minimum existing legislation.

In order to defragment management and shift towards more coherent, sustainable resource utilisation, a number of reforms need to be instituted and implemented.

Administrative decentralisation

There is a need for implementing administrative decentralisation whole-heartedly rather than in the current piecemeal fashion. Decentralisation is based on sound

principles, and if executed effectively, could introduce planning, development implementation and resource management approaches that would have positive impact. For example, the proposed decentralisation policy and legislation (GoM 1998b; 1998c) are based on principles of bottom-up planning whereby communities are supposed to decide and prioritise issues and aspects of development in their areas. Regarding resource management, each district is supposed to have the capacity to develop and pass locally relevant and applicable regulatory by-laws for its district and specific local areas provided that these are aligned to national legislation (GoM 2004; 1996). In this context, the revised Fisheries Act provides authority for the formulation and passing of by-laws to District Assemblies, in line with (i.e. not in conflict with) the main Fisheries Act (GoM 1997a). Such local and then district-level planning would also take cognisance of a district's strengths and opportunities while mitigating the threats and it's weaknesses (a form of SWOT – Strengths, Weaknesses, Opportunities, and Threats – based planning). Budget allocation decisions for both development and management of natural resources would also be taken at district level. Other positive aspects regarding decentralisation include coordination of development by the District Commissioner and coordination of environmental management by the District Environmental Officer. One would hope that each district could develop locally based reward and sanction systems combining both formal and informal systems (based on the powers of traditional authorities) for resource management as part of the capacity to develop and pass by-laws.

However, local elections have been held only once since decentralization policy and legislation were passed in 1998 (GoM 1998b; Tambulasi 2011; GoM 1998c). Resistance by government departments reluctant to give up authority and responsibility to District Assemblies has been noted (Hara 2008). But it should also be noted that there may be valid reasons for some caution in a decentralisation policy. Local "elite capture" may for example threaten to negate the intended positive developments. Thus a facile explanation often heard for the lack of government action in general is "lack of political will". The same explanation has also been heard about lack of decentralisation. But this explanation fails to ask why there is a lack of "political will". In democratic politics one often sees that political will comes with political and administrative ability to act. Maybe the context, including both culture and formal institutions, is not yet ready? More generally it has been found that consequences for the power base of the currently ruling factions will determine political will. There is no "will to act" in ways that will diminish the resources and incomes of the ruling groups even if the welfare of the general public is sacrificed. This leads to persistent paths of economic underachievement (North 1990; 2005).

Devolution of authority and responsibility: design principles

There is an important distinction between decentralisation and devolution. The former refers to the delegation of authority and responsibility from higher levels to lower levels of government while the latter refers to relinquishing power (authority and responsibility) from government to locally elected assemblies or users. In the case of the former, the central authority retains power while in the latter case the central authority gives up power. Generally government can tolerate delegation, but will often fight against any proposal for devolution of power. The design principles for well-functioning resource governance institutions (Ostrom 1990; 2005) suggest strongly that granting local bodies the power and right to change operational and collective choice rules at the local level (i.e. real devolution – principle 7) is the minimum condition for successful co-management or user-management of natural resources. The design principles (first proposed by Ostrom in 1990, and later reviewed in 2005), are summarised in Table 9.2.

Table 9-2: Design principles for sustainable management of resources in a social ecological system

1 **Clearly defined boundaries**
The boundaries of the resource system (e.g. the fishery, the forest, the irrigation system) and the individuals or households with rights to harvest resource units are clearly defined. This is to overcome free riding. Notably, externally imposed boundaries do not work well compared with locally legitimised boundaries. Also, boundaries need to be defendable by the users.

Principle rephrased:
"The resource itself and the users of the resources are clearly defined, and the appropriators are able to effectively defend the resource from outsiders" Morrow and Hull (1996, Table 1).

2 **Proportional equivalence between benefits and costs**
Rules specifying the amount of resource products that a user is allocated are related to local conditions and to rules requiring labour, materials, and/or money inputs. In general it is known that fairness requires participation and rule following among conditional co-operators.

3 **Collective choice arrangements**
Individuals affected by harvesting and protection rules are included in the group that can modify these rules. User designed rules work better than village elite designed rules that work better than central government designed rules.

4 **Monitoring**
Monitoring biophysical conditions is done by locals or on contract with locals. This works better than external monitoring. The system of monitoring may be the most important variable for successful management.

5 **Graduated sanctions**
Users who violate rules-in-use are likely to receive graduated sanctions (depending on the seriousness and context of offence) from other users, from officials accountable to these users, or from both. Most self-governed groups rely on quasi-voluntary cooperation[6] rather than voluntary cooperation or coercion.

6 **Conflict resolution mechanisms**
Users and their officials have rapid access to low-cost, local arenas to resolve conflicts among users or between users and officials. The conflict resolution mechanism may involve levels above the village to counteract (local) elite capture.

7 **Minimum recognition of rights to organise**
The rights of users to devise their own institutions are not challenged by external governmental authorities, and users have long-term tenure rights to the resource. Remember that making rules in the extra-legal sector is more difficult (it will usually require unanimity) than in the legal sector. Local rule makers can more efficiently take into account new knowledge about the status of the resource.

8 **For resources that are part of larger systems: Nested enterprises**
Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organised in multiple layers of nested enterprises. A principle of poly-centricity may be applied.

Source: (Ostrom 1990, 90; 2005, 259)

In thinking about the problems that need immediate attention (xxx-problems) we should be guided by these design principles. Adherence to the principles is not an all or nothing choice, but a question of degree. The basic rule: 'There are no panaceas' (Ostrom et al. 2007) must be kept in mind. In addition, Cleaver's arguments about the need for 'institutional bricolage'[7] would need to be considered seriously when formulating institutions for collective action on the Southeast

[6] Levi (1988) introduces the concept of quasi-voluntary compliance to explain how collective action problems can be solved. Elster (2000) refers to the myth of Ulysses and the Sirens to explain how people can come to bind themselves to follow agreed upon rules (the "Ulysses technique").

[7] Cleaver (2002) uses the term 'bricolage' to refer to "how mechanisms for resource management and collective action are borrowed or constructed from existing institutions, styles of thinking

Arm. Arguments for decentralisation and devolution are often strong, but these approaches are no panacea either. There are tasks and functional requirements that only a central coordinator may perform. This is recognised by the ideas developed in the theories of co-management and adaptive co-management (Carlsson and Berkes 2005; Berkes 2009; Bown et al. 2013). The "fact is that co-management and adaptive co-management are laudable objectives, but very difficult to implement in practice." (Bown et al. 2013, 128). Reformers would do well to remember that "Rules are not self-formulating, not self-interpreting, and not self-enforcing". Real people are doing all these tasks and carry along their personal biases in doing so.

In a process of designing institutions one needs to be aware that the process of developing the rules is as important for the result as the rules themselves. The exact same rules will work as intended in one instance where the users of the rules have participated in their development and be quite ineffective in another where the rules have been promulgated top-down. The phenomenon has been labelled the "crowding out" effect (Cardenas et al. 2000; Ostrom 2005). Legitimacy of rules and moral commitment to following them are very important for the resulting exploitation of the resource. The problems experienced in institutionalising functional co-management arrangements in Lake Malawi and the Upper Shire River can be mainly attributed to a top-down approach in the introduction, facilitation and implementation by government (Njaya et al. 2011; Hara et al. 2002; Hara 2001). These lessons will need to be borne in mind when coming up with workable collective action arrangements on the Southeast Arm.

Looking beyond panaceas, Ostrom et al. (2007) advocate a diagnostic approach in selecting appropriate starting points for reforms of institutions for resource governance. This is what we have attempted here in surveying the SES of the Southeast Arm of Lake Malawi and focusing on the problems that need immediate attention. Empirically, the closer a system comes to following ideal design principles the more long-term sustainability can be observed until some external force (e.g. new markets; new technology; climate change, etc) creates a new dynamic. Then a new cycle of adaptation of the internal institutional structure follows or emerges. What we need to think about is how to speed up the cycle of adaptation based on knowledge of external forces, which local users seldom know much about (Berkes 2009). This might, for example, include long-term shifts in relative prices on the market for foods, large-scale relocations of populations or

and sanctioned social relationships" (p16). Also this concept argues existing arrangements are adapted for multiple purposes, are embedded in networks of social relations, norms and practices and in which maintaining social consensus and solidarity may be equally as important as optimum resource management outcomes (p17).

changes in the conditions for the swarming of the Lake Fly[8]. Thus the introduction of improved technologies such as nylon nets, motorised boats and improved linkages to expanding urban markets from the 1970s resulted in increased commoditisation of fisheries, without the requisite institutional arrangements for controlling and dealing with increasing fishing effort on a finite resource (Hara and Jul-Larsen 2003; Hara 2001).

The effective use of scientific knowledge (both natural and social) will in the long run depend heavily on how trustworthy the scientists involved are judged to be; if they are suspected of providing selective information or bias in favour of some definable sections of stakeholders, their advice will be of no actionable value to local decision makers regardless of the accuracy of their information. Concerns by fishers on the Southeast Arm regarding loss of access to beaches, equitable application of the closed season between them and commercial trawlers, destruction of their gears by trawlers or sport speed boats, and increased threats to loss of offshore fishing area as a result of introduction of cage culture practices therefore need to be taken very seriously also by scientists trying to assess their impact.

There is need to develop a mechanism that translates science into useful information that will eventually enhance and support conservation by the people. Community awareness and educational programmes link researchers and stakeholders, so that research findings are explained, presented and shared with the users. The final target audience of such programmes are subsistence farmers, woodcutters, or fishermen and their families. This is a two-way process: carrying science to communities and having scientists respond to communities is the essence of the team building work necessary for successful conservation of resources in the world today. Villagers often have insightful traditional knowledge and an intricate understanding of nature. Scientists are able to develop longer-term and larger-scale perspectives, predictive capacities, and the facility to monitor change. Blending the two to develop effective strategies is widely considered a necessary prerequisite for conservation.

The problem of institutional design for the exploitation of the SES of the Southeast Arm is complex (for example: how do we defragment?). The practical approach must be to acknowledge this complexity even as one uses the simplified models presented above (eg. Figure 1.1, Chapter 1). We need to list and describe relevant variables for understanding the resource system (RS), the resource units (RU), the governance system (GS), and the users of these systems (U). Even more importantly, we need to be specific about related ecosystems and social, political, and economic settings.

[8] See for example Darwall et al. (2010) or Irvine (2000).

To be realistic about what can be achieved we need to understand environmental parameters, including the power dynamics of established bureaucracies, opportunity structures created by existing markets and possible changes in market access, availability of new technology, and the presence of opportunistic strategies among all classes of stakeholders. The dynamics created by these parameters can be met and neutralised or enhanced by appropriately designed institutions.

An important part of any effective institution is monitoring and enforcement, but proposals for reform should include options for self-monitoring, giving local stakeholders both authority to act and sufficient information to understand when self-serving actors stray from the goals agreed upon. In practice this means a high degree of open access to information of all kinds.

Keeping to fisheries as the main topic, we need to be clear about the most important problem(s). While the core problems are interlinked, they cannot all be equally important and if we examine the links we may identify and address one problem with the potential to transform the others.

- What are the core problems of the fisheries?
  - Too high effort (technology dependent)
  - Too many fishers (stipulating equality of technology)
  - Inequality of access to fishing
  - Inequality of outcome from the fishing effort
  - Agricultural activity
  - Tourism activity.
- We need to understand the scale at which any problem has to be solved; e.g. too high fishing effort must be addressed at the level of the Southeast Arm catchment area; tourism activity can be discussed as a zone regulation for the littoral; siltation from agriculture can be discussed as a zoning regulation of the riparian areas of the catchment with binding implications for the allocation of land.
- We need to understand the requirements for a solution:
  - If the solution requires changes in legislation, new legislation should be inspired by established design principles (see Table 2 above). The most important principles may be those relating to monitoring and sanctioning. But the stipulation of a rough equivalence between input in terms of effort at maintaining the resource, and output in the form of fishing opportunity or income is also central to maintain legitimacy of the rules and keep the cost of monitoring and sanctioning low.
  - If the solution requires changes in activities by many fishers with differing interests, it must include a low cost and legitimate way of monitoring and sanctioning (in general it is more effective to have some rules that are ade-

quately monitored and sanctioned rather than ideal rules that are ignored or circumvented).

- If the solution requires reform of the administrative apparatus, an understanding of inherent power dynamics of bureaucracies must be the point of departure for discussion.

In general a bureaucracy will work to maintain its resource base (budget allocation and legal mandate). Cooperation with other bureaucracies is easy only if both regard it as a win-win situation (likelihood for losing budget allocations or legal mandate is seen as very small). Devolution of power to the local level (e.g. District Commissioner for Mangochi and therefore for the Southeast Arm catchment area) encounters analogue problems between central ministries and the prospect of an amalgamated local administration. Ultimately this is a political question where many aspects will affect any outcome. But proposals should be evaluated dispassionately, partly with a view to improvements on the current situation, but mostly in terms of how the inherent dynamics may improve management in the long run.

The studies presented in this book raise one core problem – the inequality between an efficient fishing effort depending on motor boats and modern equipment and traditional fishing methods. One way to address this could be to develop quotas for each boat with a motor, and to register and monitor such boats. One sustainable low-cost way of achieving this would be to enlist traditional fishers in monitoring and possibly some low-level sanctioning. However, this requires that the fisher community has participated in the design of the rules, including the quotas, and accepts them as a reasonable way of securing fish for all. It also assumes that the motor boat community does not have sufficient lobbying power in Parliament to block the legislation.

Conclusion

The information gathered and analysed in this book indicates that decentralisation to the local level could help defragment management of natural resources in the Southeast Arm of Lake Malawi, especially if based on delegation – and then devolution – of authority and responsibility to the district level. The fact that all the sectoral extension agents at grassroots level target the same communities strengthens the argument that such an approach is needed. This would require bottom-up and transparent planning and coordination at community and district level by extension agents and administrators, thereby cutting down on management costs and improving service delivery to communities. However, the current scenario is that not all sectors are decentralised at district level. Table 9.3 summaries various ideal analytic options for resource management and governance of the Southeast Arm.

Table 9-3: Summary of defragmenting and natural resource management in Southeast Arm of Lake Malawi under decentralisation

	Fragmentation	Defragmentation
Centralisation	Fragmented Centralisation -	Defragmented Centralisation +
Decentralisation	Fragmented Decentralisation ++	Defragmented Decentralisation +++

(Source: developed by DARMA-team 2011)

Hypothetically, it is expected that sound governance resulting in sustainable utilisation of natural resources across generations would occur under defragmented decentralisation that extends to devolution of power to local users. In our arguments, this could be a situation whereby the proposed administrative decentralisation is implemented and is working perfectly and the District Assembly is able to formulate and pass by-laws appropriate for the Southeast Arm and conforming to design principles (Table 9.2). The extreme opposite is fragmented centralisation. One could say that this is the situation inherited by Malawi and most former colonies at independence, which continued after independence. Increasingly, this has become an untenable situation as this mode of governance is resulting in degradation of natural resources across all sectors.

Defragmented centralisation would be a situation whereby all government line agencies work together in managing resources holistically, but excluding user communities and other stakeholders. This undemocratic and non-transparent style of governance could work if government had access to necessary information (from both nature and society) as well as adequate capacity to enforce regulations, and user communities and other stakeholders accepted a passive role and were satisfied with the regulatory framework. But as practical experience and history has demonstrated, the Department of Fisheries (and other government departments) was unable to enforce existing regulations and fishers did not passively accept regulations that they did not like and had not participated in formulating (see Chapter 5 and Hara (2006)). In addition, international experience shows that it hardly matters how much policing and force government can muster – if users are dissatisfied with a regulatory framework, they will find ways to subvert it (Hersoug and Paulsen 1996; Flewwelling 1994; Jentoft 1993).

The hypothetical situation 'fragmented decentralisation' is the situation where management is decentralised but fragmented. This is the *de facto* situation currently on the Southeast Arm, largely due to a lack on the ground of *de jure* government line agency departments and ministries to enforce regulations, caused by budgetary constraints. Thus while fisheries management in the district is delegated

by the Director of Fisheries based in Lilongwe to the District Fisheries Officer, lack of resources has meant that the delegated office cannot fulfil its mandate adequately. Even if management was left to users alone (devolution of power), this might be problematic given the conflicts that contestation for dwindling resources might cause. Thus this mode of governance would probably not work either.

In conclusion it seems that the ideal mode of governance to ensure sustainable utilisation of the Southeast Arm as a social ecological system is 'defragmented decentralisation' based on the best available 'design principles' (Ostrom 1990; 2005), 'institutional bricolage' (Cleaver 2002) and a situation in which local actors are able to develop a sense of ownership in the institution building process despite power asymmetries (see by-law developing process in the Kafue Flats fisheries discussed as constitutionality (Chabwela and Haller 2010, Haller 2013). This could be achieved through a working and empowered District Assembly based on the proposed principles of administrative decentralisation and devolution of power to empowered BVCs designed appropriately for the area and embedded within the social, cultural and economic ethos and practices of stakeholders and their feeling of having crafted the institutions themselves.

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