

LAKE VICTORIA
FISHERIES RESEARCH PROJECT
PHASE II

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What is ...definitions and ideas in
co-management

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management

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1. Introduction: what is fisheries management?

- 1.1. Through effective regulation, resource management seeks to gain 'optimum' outputs from the resource base. In a few cases, management may recognise that a resource is under-utilised and seek to increase output. More normally, however, management recognises that many resources are often close to being over-utilised, and so seeks to limit exploitation.
- 1.2. Historically, fisheries management has been a 'command and control' system of resource management, typically based on very centralised systems of regulation and resource administration in which it is the state which commands sole responsibility for both monitoring and regulating the resource base. Briefly, contemporary fisheries management strategies espouse regulations that are, firstly, biologically-based and seek to protect fish stocks. Regulations will include net mesh-size controls, bans on fishing in certain areas or during certain times of the year or prohibiting the use of certain destructive kinds of fishing gear and/or techniques. The second set of regulations have economic origins and seek to control effort sizes. These may include fish quotas and licensing or registration systems that can be used to limit the number of fishing units in a fishery.
- 1.3. These kinds of regulatory systems have many problems. For our purposes, three main problems may be identified:
 - 1.3.1. they are expensive: the costs of monitoring a fishery for fish population dynamics and/or whether or not fishermen are breaking rules are prohibitive if such regulation is to be carried out by a single, central regulatory institution alone.
 - 1.3.2. they assume that the state is the sole source of regulation. This degree of centralisation is inefficient if the state is under-staffed, lacking in technology, under-funded and under-motivated.
 - 1.3.3. the rules assume *homogenous* fishing communities and homogenous applicability. The rules assume that all resource users will equally be able to obey the rules, and that the outcome of these regulations will be uniform irrespective of culture, location, history nor political systems. They cannot, in other words, capture human diversity and are too inflexible to cope with dynamic systems of resource use.
- 1.4. Considering alternative systems of resource management has many advantages. One of the foremost alternative suggestions for fisheries management is the inclusion of fishing communities in the regulation and monitoring of the resource. Here are some of the advantages:
 - 1.4.1. the costs of implementation, monitoring and enforcement are transferred from any outside institution to the community itself. Given that many external enforcement agencies in 'developing' nations are often unable to afford these costs, this factor is quite possibly the most important of the benefits to be derived from such a transfer

- 1.4.2. Because resource-using communities have a greater vested interest in the sustainability of their resources, the implementation of such regulatory systems can lead to the more effective monitoring of the resource and the more efficient punishment of offenders.
 - 1.4.3. Because resource-using communities have typically had considerable historical experience regulating the resources on which they rely, they are likely to not only perceive the benefits of creating them, but will, in all likelihood, choose such institutions that they are already familiar with, and which they can draw from their history. This means that the regulations that arise are more likely to capture the diversity within and between communities than any type of externally imposed regulation.
 - 1.4.4. The reasons why people obey or disobey regulations will nearly always have something to do with the benefits they perceive that they will gain. In other words, if disobeying a regulation is likely to yield greater benefits than obeying it, it is unlikely that people will obey the regulation. How benefits are viewed will vary from community to community, and from culture to culture. Internally generated community regulations are more likely to capture these benefits than those regulations imposed from the outside.
 - 1.4.5. Common property resources - in particular fisheries - are often fraught with problems of uncertainty. Management of any variety typically cannot account for such uncertainties, particularly because of difficulties in monitoring resource variations. However, because of their intimacy with the resource base, communities are better able to assess variations within the resource as they occur, and able to react to these more rapidly than any external institution overly-reliant on scientific assessment of resource change.
- 1.5. It is these and other factors that this paper will discuss. Its objective will be to attempt a change in how we view the resource. All too often, resource users are branded as 'ignorant' or 'uneducated' or even as 'criminals', when the reasons for over-exploitation or regulatory disobedience may in fact be very easily explained if we took the time to look a little further or to understand the effects of wider social, political and economic trends.

2. Why obey regulations?

- 2.1. Imagine a water tap. When turned all the way down, no water comes out of it, while lots of water comes out of it when it is turned all the way up. The amount of water coming out of the tap is *regulated* by how far we have turned it. *Rules*, on the other hand, are far more final. They would only allow lots of water or no water to come out of the tap. They allow for no amount in between these two extremes. Realistically, regulation can rarely achieve ultimate outcomes, but can often achieve a degree of the desired outcome of some action. As a result, resource users may not obey or disobey rules, but instead obey or disobey to a certain degree. The degree to which they choose either outcome is dependent on the *benefits* they perceive from doing so. Take a look at this example:

200 years ago, fishermen using hooks and lines were catching between 100,000 and 200,000 tons of cod a year from the Newfoundland fishery in Canada. In the 1870's, the cod trap was invented and soon introduced to the fishery. Catches rose to a fairly stable 200,000 tons of fish a year. Catches were fairly seasonal, and fishermen would have to wait for annual runs of fish called 'capelin' which the cod followed into the bay. In the 1960's, as demand for cod in Europe increased, distant water fleets arrived, and catches rose suddenly to 800,000 tons a year. Canada rapidly introduced a 200 mile economic exclusion zone, and started urging its own fishermen into the water, subsidising boat building, supporting the formation of large trawler fleets and building fish processing plants. New fishing technologies enabled trawler captains to locate areas where the cod mated and bred, so turning the fishery from a seasonal one to a year-round activity. The Canadian government was supposed to regulate fishing. However, trawler boat captains rarely took any notice, fishing wherever they liked and catching as much as they liked. In the fever of the boom years, no one paid attention to the rules. And then, in 1992, Newfoundland's cod fishery collapsed. As the cod catches declined, trawler boat operators invested in ever more sophisticated technologies to find what cod remained and so giving an artificial impression of what was happening. Fishing for cod off Newfoundland is now banned. The fish has not re-established itself and may not ever do so again (From Bill McKibben, 1998).

Box 1

- 2.3. In the latter example, the perceived benefit was cash. Cash is very often perceived as an important benefit in the resource exploitation process, and will almost certainly always be considered as such.

At the turn of the century, many of the problems affecting Kenya's Lake Victoria fishery arose with the establishment of a cash economy in Kenya. In 1900 and 1910, hut and poll taxes were introduced so as to try and obtain funds for the colonial government, as well as to force Kenyans to accept cash as a legitimate medium of exchange (Fearn 1961). Missionaries had already appeared in the west, where they persuaded the local population to clothe themselves, and so opened up a market for clothes (Fearn 1961; Ayot 1979). A governor persuaded Luo communities to build roads around the Winam Gulf on which they could then ride their newly-purchased bicycles (Goldsmith 1955). These developments helped to establish cash as a viable medium of exchange in western Kenya. Markets were a necessary accompaniment to this process. Demand for fish grew primarily amongst European consumers located in Nakuru, Naivasha and Nairobi. The most popular fish was tilapia, and in 1933 100,000 fish were sent down the railway line (Beverton 1959), increasing to 2,400,000 fish in 1953 (Beverton 1959). This rising production was facilitated by the introduction of nylon gill-nets, for which demand was so high a black market in the nets had developed by the 1930's (Fearn 1961) and by 1953 an estimated 2,000 km of nets were being set per night (Fryer and Iles 1972). But why did cash achieve such rapid popularity? Kenya's Lake Victoria fishermen are predominantly of Luo origin. For them, cattle was the highest form of wealth. Traditionally, access to cattle was mainly through inheritance. Cash changed this, for it became an acceptable medium of exchange for the purchase of cattle. As one fisherman put it "the new [fish] market gave people new opportunities for wealth. With money, we could buy more livestock and land, and the more cattle and land we had, the more say we had in the community...money made the drive for power easier" (quoted in Geheb 1997: 62).

Box 2

- 2.4. Instead of working to conserve fisheries, management may try to *develop* it. It may try to regulate a fishery in such a way as to maximise its profits, which are then ploughed back into the fishery. To Western developers these sorts of ideas may seem both plausible and rational but may not do so to resource exploiters:

In 1976 a Swedish SIDA mission in Guinea-Bissau sought to develop a fishery to be exploited by Bijagos, a peoples living on the Bijagos Archipelago, some 60 km off the Guinea-Bissau shore. The Swedes anticipated providing initial financial and technical inputs, followed by a small-scale fishery developing, profits, reinvestment into the fishery and so on. The Bijagos, however, saw little reason to harvest resources over and above their needs, because current production levels provided as many benefits as required. The Swedes also felt that an exchange economy supported by rice might be of benefit to the islanders, and attempted to establish a system whereby fish would be exchanged for rice in an effort to 'force' the Bijagos to fish. This too failed, and the final recommendation of the Swedes was that "...the condition for the development of the fisheries in the Bijagos society is a 'destruction' of the social and economic organization of the same society and its cultural institutions" (Baekgaard and Overballe, 1992).

Box 3

- 2.5. Benefits, therefore, may be different to different groups of people. We may even find that how benefits are perceived can also change over time. Hence, a Canadian fisherman may initially have thought several thousand dollars to be a benefit at the start of the 'boom' described in Box 1 above. After the cod collapse, however, merely finding a job may have been seen to be a great benefit. There are additional factors that can influence how people perceive benefits and what determines whether or not they obey rules, and these may have a great deal to do with *access*.

3. What's access?

- 3.1. Imagine a door. The degree to which it is open represents the degree to which you have access to the goods on the other side. Access to something is normally a matter of degrees. Thus, for example, a fisherman with a 6" net has access to those fish of 6" girth and above, but not to those below. This is not to say he has no access to fish, but that he has a degree of access to fish. Similarly, a poor fisherman with a single net has less access to fish than a wealthy fisherman with 150 nets. The factors that determine access to resources are many. One of these is *vulnerability*.
- 3.2. People with plenty of *access* to resources (or the ability to buy them) are not vulnerable. When resources are few, they can switch between resources or diversify. Impoverished, resource constrained, people have fewer options. *Vulnerability is a factor of the number of resource options one has, and the fewer resource options one has, the greater one's vulnerability.*
- 3.3. Vulnerable resource exploiters may have no recourse but to over-exploit a resource irrespective of what they may think is right or wrong or, for that matter, what the rules say. Comparatively speaking, the resource-poor face very risky conditions. Just a little too much rain may cause far more and far greater problems to the resource poor than it would to a relatively affluent urban inhabitant. Because the resource poor cannot switch between resources, and have difficulties diversifying their nutritional base, their lives may in large measure be defined by attempts to limit the risks that they perceive. In this context, *risk aversion* is seen as a benefit.
- 3.4. The objective, then, becomes one of trying to avoid these risks by clothing oneself in securities of one form or another, most often classifiable as 'coping mechanisms'. Risk aversion, then, is normally a broad-based *survival strategy*, while coping mechanisms are the practical tools used to achieve security.
- 3.5. For example, a fisherman with two wives and seven children to feed, faces the knowledge that he is unable to feed them all with his limited access to land. He has no cattle, and his agricultural activities are severely limited by climatic constraints. He therefore needs cash in order to purchase the food with which to feed his family. Competition on the lake is stiff, which increases the level of uncertainty that he faces. His coping mechanisms will, therefore, aim to limit the degree to which he is affected by this uncertainty. Hence, he invests in a very small meshed net. Although it is not a complete guarantee of successful catches, it is a better guarantee against a

zero catch than if he were to use a larger mesh-size. He will also have improved the degree of access he has to the resource.

- 3.6. This is a coping mechanism, which forms a part of a wider strategy aimed at reducing the risks he faces not only in the fishery, but in farming, or in the economy as a whole. An additional (and common) response within this strategy is to stop planning for the long-term. The resource rich can plan well into the future, because they have the resources at present with which to do so. However, the resource poor typically have too few resources at present and therefore no ability to consider the long-term
- 3.7. It is these kinds of factors that will determine how individuals perceive benefits and make decisions over whether or not they should obey rules. For the resource poor fisherman described above, pleas to avoid catching under-sized fish from the Fisheries Department are not likely to yield any results. An additional factor which will affect access to a resource is its *property status*.

4. Property? Whose property?

- 4.1. Property is that which is owned. To most of us, property constitutes private property. However, within resource management, there are several types of property:

Private property:	a resource owned by a single individual or corporation which has total control over who has access to it.
State property:	a resource owned by the state which determines who may have access to it.
Open-access resources	a resource for which there is no ownership claim. Lack of ownership is signified by 'free-for-all' exploitation carried out with no consideration for the sustainability of the resource. Truly open-access property is rare because there is very little exploitation that is not, in some way, regulated. Open-access resources will normally collapse.
Common property resources	these are characterised by, firstly, the difficulties of 'packaging' the resource. i.e. it is difficult to fence off the resource to protect it from would-be exploiters. Secondly, it is a 'subtractable' resource in that whatever one leaves behind will only be taken by someone else. Because of these two characteristics, the best way of managing such a resource is to ensure that it is managed by those who exploit it, and what each exploiter has in common with other exploiters is the resource itself.

(Adapted from Berkes and Taghi Farvar 1989).

- 4.2. It is commonly believed that open-access property is synonymous with common property. This is not the case, and the distinction made above must be maintained.
- 4.3. Fisheries are one of the best examples of a Common Property Resource (CPR). Those fisheries that fall under the contemporary forms of fisheries management mentioned earlier are nearly always managed as state property. Under this system, it is the state who is responsible for determining not only who may exploit the resource, but also to ensure that only those who are qualified to exploit the resource may do so. This is not to say that other forms of property-related fisheries management do not exist.
- 4.4. In fisheries, the closest thing to private 'property' that we may find are Territorial Users Rights in Fisheries (TURFS). Here, a community (usually) will claim an area of water as their own, and normally manage it as a shared resource. What is of interest to fisheries managers is that the community will protect this resource by excluding outsiders from exploiting it. Thus, the fish caught are not owned by the community, but rather, the water in which they swim. In the examples that follow, you are provided with, firstly, a lake example of TURFs in operation, and secondly, with two riverine examples:

Lake Titicata is an 8,100 km² lake lying across the Peruvian-Bolivian border in South America. Most fishing is carried out with gill-nets and some two-thirds of the catch is sold for cash, a sixth used for barter and the remainder used for subsistence. In the early 1980's there were 151 communities along the Peruvian shore of the lake, and each one of these had a 'parcel' of water that it claimed as its own. All members of each community were allowed to fish in that particular 'parcel'. The inner edge of the parcel is formed by the shore-line; the sides of the parcel are defined by neighbouring parcels, while the outer edge is defined by beds of reeds that extend into the lake and which are also an important resource to the communities. On the whole, each territory tends to be fairly small, and is, as a result, fairly easy to defend. In addition, communities tend not to comprise more than 20 inhabitants, so that each inhabitant knows all the others. This latter point is important because much CPR literature suggests that the greater the number of people who have access to the resource, the more open-access conditions are likely to arise. Members of neighbouring communities are not tolerated within communal territory and those wishing access need to offer some form of payment as well as to have a reason - such as visiting a relative - if they are to enter into a neighbouring water territory. The water beyond the territory on the open lake is open and anyone from any community can fish it (Levieil and Orlove 1990)

The River Niger traverses the Republic of Niger completely. Traditionally, access to the river has been regulated by the Sorko peoples whose origins lie in the eastern bend of the river. Between 1983 and 1987 an FAO project sought to re-establish the territorial rights of the Sorko as a means to managing the river which was, increasingly, showing signs of over-fishing. The main regulatory focus of the project were the 'guntu', religious spots along the river where the river Gods lived, and from where fishing was banned. 11 of these spots were identified along the course of the river and subjected to the management objectives of the project (Price 1995).

On the flood plain where the River Hadejia meets the River Jama'are in Nigeria, a rather more elaborate system of TURFs are in use. When the river is in flood it is more or less open to anyone to fish more or less as they like. However, because most people are working on their farms at this time of the year, fishing is to some extent regulated. When the river recedes, it leaves behind pools of water called 'fadama', which are owned by the community nearest it. Access to *fadama* are entirely regulated by these communities, from whom permission must be sought before one can fish in it. Each fisherman must pay a third of his catch to the 'lawan', the village headman who then distributes the catch amongst the village elderly, or sells it and puts the money into a village fund. *Fadama* are also seasonally regulated, with evidence existing of community-enforced closures of the lakes for much of the time that the river is in recession (Thomas 1996).

Box 5

4.5. There is very little information on whether or not similar TURF systems existed in Lake Victoria. Here, however, are some examples gathered from Kenya (Geheb 1997):

Prior to the arrival of the British colonial administration, Kenya's Lake Victoria fishery was dominated by fishing 'sub-clans'. In this period, Luos could own land, and those who had land along the shore also 'owned' the water immediately off it. The TURF was referred to as '*podho*,' a term normally applied to owned land. The purpose of this ownership was to reserve an area for the owner to set his *kira* traps. As a result, the water was bounded to either side by neighbouring TURFs, and on the outside by a contour, being the deepest point at which a *kira* could be set.

Box 6

4.6. What is clear in all of the above examples is that it is not the government, but the community that is seen as the highest source of managerial order, including the Box 6 example where water resources are seen as part of a wider, community sanctioned, systems of territorial rights. Such water rights were facilitated by the fact that *kira* traps required only a single operator. However, in the event that a gear required several operatives, then there was a need for some kind of communal understanding of how water resources were to be used:

On Kenyan rivers in the pre-colonial period, a stockade trap called a '*kek*' was employed. It comprised a series of sturdy poles driven into the bed mud of the river to form a lattice into which *ohunga* basket traps could be set, facing in the direction that fish were known to be migrating. Rivers often marked the line between clans. As a result, a *kek* could only be built with the consent of the clan on the opposite shore. Once such consent was obtained, then the clan on the one shore would construct the lattice out to the median point of the river, and the clan on the opposite shore would complete the task. Each *ohunga* trap was owned by an individual who operated it (information from Cadwalldr 1965; Fearn 1961; van Someren 1959; Whitehead 1956, 1959)

Box 7

- 4.8. These patterns of ownership are extremely important and offer management a potential option to consider in the formulation of managerial policy. In the *kek* fishery of Western Kenya, then, some kind of collective decision-making was important. The results that arise from these kinds of decisions may often endure for long periods of time and may even come to comprise part of a society's structure, its understanding of what is right and wrong, its culture etc. It can be seen, therefore, as an *institution*.

5. What are institutions?

- 5.1. Institutions may be defined as regular patterns of behavior between individuals and groups in society, or groupings of things which can be considered as 'normal', rules and behaviors that serve, or can be used to serve, a collective purpose (Mearns, 1995; Leach *et al.* 1997). What should be noted, here, is that an institution is not solely an arrangement formalised by the state, such as a fisheries research institute. It is any association aimed towards a collective end. The end to which we are most interested here is the *collective management* of a fishery.
- 5.2. In the examples given above from the Kenyan and other fisheries, it was TURFs that represented part of an institution. It must be understood that it probably only formed a part of some wider institution. For example, the case from Niger of areas closed to fishing because these were where the river Gods lived, indicates that this particular fisheries regulation comprised part of a set of religious institutions. The Kenyan example of TURFs comprised part of Luo society's understanding of land ownership.
- 5.3. Institutions arise out of different cultures and may be constructed to achieve many ends, of which fisheries regulation may be just one. Indeed, regulation of the fishery may be a merely incidental outcome of some broader institutional objective. Why institutions occur is not clearly understood, but Wilson (1982) argues that local institutions will form when people in a community encounter a problem which is mutually shared. The problem (or 'dilemma' as he calls it) will result in an institution provided three conditions exist:

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|---|
| <p>[1] that the dilemma is encountered repeatedly under more or less similar circumstances which individualistic opportunistic behavior is seen to destroy the possibilities for collective gain (i.e. it must be seen that the benefits to be gained from acting alone will be less than the benefits to be gained from acting together).</p> <p>[2] an information network - arising from trading, competition and other interactions - exists which can form the basis for identifying and negotiating possible rules.</p> <p>[3] there exists a collective basis for the enforcement of these rules (i.e. the rules must not only be designed in such a way that they can be enforced collectively, but also that there is a collective available to do the enforcing).</p> |
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Box 8

- 5.4. An example of a repeatedly encountered dilemma could be one in which all fishermen from a single beach acknowledge that competing with outsiders is having an adverse affect on their own catches. They may therefore decide to try and limit access to their fishing grounds by, for example, imposing beach landing fees. Or they may decide that competition has become so severe that they do not want outsiders fishing in their waters at all. Or they may decide to limit the people fishing from their landing to only those that they themselves appoint.
- 5.5. These fishermen may arrive at the decision to carry out these regulations through talk at the end of the day while they sit and repair their nets. Because their community is fairly small, they know who is who and certainly know if outsiders are fishing their waters. As a result of their discussions, the fishermen decide that they all stand to benefit from a collective arrangement in which they ensure that each one of them will look out for outsiders, report it to the others, and then the whole group of them will seek to expel the outsiders.
- 5.6. So far, I have argued strongly in favour of community involvement in a fishery. What, then, is co-management?

6. What is co-management?

- 6.1. Co-management is system that employs two or more groups of stake holders in the management of a resource base, and in which all stake holders have equal power to make decisions. On Lake Victoria, one would anticipate that the stakeholders involved would be fishing communities and their constituent parts (fishers, fish traders, fish processors etc.), large-scale industrial fish processing factories and Fisheries Departments. In the discussion above I have more or less suggested that fishing communities ought to be able to carry out the task of managing a fisheries resource by themselves. What role should there then be for fisheries departments?

7. What role can Fisheries Departments play?

- 7.1. 'Adaptive management' is an innovative and fairly recent suggestion for future (external) resource management in-puts. What its advocates argue is that management should be designed in such a way that it deliberately changes *itself* through a process of experimentation. Management must open itself to the challenges of the resource system, and be both willing and capable of learning from this type of experimentation. In doing so, management aims to alter itself to meet certain managerial challenges typically arising as a result of managing the *human* benefactors of a resource base. Adaptive management is related to three key issues:

1. The extent to which management actions are reversible.
2. Whether or not the resource system can be understood by experimentation over small areas in little time.
3. Whether or not the rate of learning about the resource system is rapid enough to provide useful information about what decisions to make next.

(Hilborn, Walters and Ludwig 1995).

Box 9

- 7.2. The resource 'system' mentioned in Box 9 is not an ecosystem, but a resource characterised by the way in which it is exploited. In adaptive management, the following is suggested:

1. Human motivation and responses ought to be included in the study of a resource, because it is "[t]he short-sightedness and greed of humans underlie the difficulties in management of resources...".
2. Action should be taken before scientific consensus is reached. Waiting for such consensus is merely a delaying tactic because the kinds questions that resource managers typically ask of scientists (regarding resource status and potential yield) cannot be answered with any great degree of accuracy.
3. Scientists should be relied upon to identify problems but not to remedy them. Scientific judgement is typically influenced by training and may even be subject to political pressure. In any case, responses to resource problems should be sought from many disciplines and not just the sciences.
4. Because resource management has rarely, in the past, been sustainable, any reference to 'sustainability' as a policy measure should be treated with suspicion. Instead, inquiry should focus on how difficulties in past resource exploitation can be overcome.
5. Uncertainty should be confronted. Once we are freed from the belief that science and technology can provide solutions to resource exploitation problems, appropriate action becomes possible. Effective action can take place under conditions of uncertainty provided such action takes uncertainty into account: "Most principles of decision-making under uncertainty are simply common sense".

6. We must consider a variety of plausible hypotheses about the world; consider a variety of possible strategies; favour actions that are robust to uncertainties; hedge; favour actions that are informative; probe and experiment; monitor results; update assessments and modify policy accordingly; favour actions that are reversible.

(D. Ludwig, R. Hilborn and C. Walters. 1993 [quotations all from page 36]).

Box 10

- 7.3. What adaptive management advocates recommend is a system that is freed from the strictures of scientific methodology because the latter is too time consuming, too labourious and too expensive. It recommends a system that is able to adapt as quickly as possible to meet present challenges. You will note a considerable emphasis on time in boxes 9 and 10. You will also note the emphasis on 'fuzzy' data – i.e. data which may not be precise, but nonetheless accurate enough to plan and elicit an appropriate response. You will also note that adaptive management leans towards the management of people exploiting a resource as opposed to a managing a resource being exploited by people.
- 7.4. There is much to suggest that research that relies too heavily on exact data to provide precision responses is, at best, naive and at worst foolhardy. Chambers (1992) argues that the quality of data gathered from rural populations should be based on trade-offs between quality, relevance, accuracy and timeliness. These trade-offs should be based upon the principles of 'optimal ignorance': knowing what is not worth knowing; and 'appropriate imprecision': not measuring more precisely than is needed.
- 7.5. It is along these lines that new objectives for regional Fisheries Departments can be framed. Their first major step must be to step away from the belief that contemporary models of fisheries management are an adequate basis for the management of Lake Victoria's fisheries. It is not my objective to suggest that information on fish stocks and effort size are irrelevant to the management of the fishery, but rather, that they should not form the core around which all future managerial strategy should be formed.
- 7.6. The role of the Fisheries Departments can well be altered to be an information gathering and spreading network. The network will derive information concerning the fishery from fishing communities. This does not have to be information so precise that scientists are impressed, but nor need it be so imprecise that it cannot prompt action. At district, regional and national Fisheries Headquarters, the information is analysed, discussed, and possible actions decided upon, which are then, through the same network, disseminated to fishing communities. Ensuring that fishing communities are advised of trends elsewhere on the lake is extremely important. The state must also be seen to be playing a role in counseling fishing communities with advice on certain issues, but this must be *demand driven* – i.e.

information that fishing communities say they want as opposed to information that the Fisheries Department feel they need to know.

- 7.7. Perhaps the biggest change in a community-based management network is the transfer of the powers of rule enforcement away from the state and into the hands of the community. Most communities will have systems of justice in which they can find offenders guilty or not guilty, and in which they can decide on punishments. However, it is clear that these systems will only be able to cope with certain degrees of rule breaking. If offenders should disobey to such an extent that, for example, a prison term is considered, then the fishing communities can call upon the Fisheries Departments to take over the case at *their* request.
- 7.8. The above suggested roles for regional Fisheries Departments are not unusual – fisheries departments the world over face these kinds of issues. Nor are they supposed to point the direction towards some kind of concrete policy prescription. If there is one major implication to be derived from the adaptive management discussion, it is that management should be flexible and adaptive. Outside of this broad recommendation, the above ideas are meant only as points of departure for future discussion.

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