Conservation principle: A Normative Imperative in Addressing Illegal Fishing in Lake Malawi

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Abstract Illegal fishing presents a significant threat to aquatic resources and environments around the world. In this paper, we address illegal fishing through an exploration into the normative principle aspect of a governance perspective. Specifically, we examine the prevalence of the 'responsibility to conserve' principle (or conservation principle, in short) and how it relates to illegal fishing practices. Using the Southeast Arm fishery of Lake Malawi as a case study, two components conceptualized to represent the conservation principle – awareness and inclination – were assessed using a questionnaire survey based on the damage schedule approach. This study provides empirical evidence supporting the view that focusing on the normative dimension of fisheries governance could play a meaningful role in reducing the extent of illegal fishing and therefore increasing penchant and responsibility for fisheries conservation among stakeholders.

Introduction

Illegal fishing and non-compliance of regulations poses a serious problem to fisheries around the world. It is a governance issue that has a wide implication to all scales of fishery, from an inland artisanal fishery in a developing country to a large industrial-scale one in the high seas. Manifested in various ways such as poaching, use of destructive fishing methods and zoning violation, the overall effect of illegal fishing and non-compliance behaviours threatens the integrity and the health of the ecosystem as well as the socio-economic basis of those who depend on the resources. Over the years, a range of fisheries management practices and studies have reported its widespread nature and deliberated on ways to improve the situation (see for instance, Agnew *et al.* 2009; Crawford *et al.* 2004; Flewwelling *et al.* 2002; Hauck and Kroese 2006; Sumaila *et al.* 2006). The Food and Agriculture Organization of the United Nations (FAO)'s initiative in combating illegal, unreported and unregulated (IUU) fishing is another good example (FAO 2001).

The overarching policy response to this issue has been the promotion of deterrence by heightening enforcement and posing threats of severe sanctions or expensive fines (Hatcher *et al.* 2000). This measure assumes that fishers are utility maximizing individuals driven by self-interest whose decision to whether

or not engage in illegal fishing is primarily determined by expected payoffs and penalties (confer Furlong 1991; Sutinen *et al*. 1990; Sutinen and Gauvin 1989). However, such deterrent policy has severe limits, given that it is costly and difficult to implement (Hatcher *et al*. 2000). It is also coercive in nature, which can engender bitterness or hostility towards government authority (Sutinen and Kuperan 1999).

Like many fisheries around the world, illegal fishing is widespread in the southeast end of Lake Malawi called the Southeast Arm (SEA) and is considered one of the main reasons for the decline of fisheries resources in the area (Banda *et al*. 2005; Bulirani 2005). Decades of policy responses focusing on the enforcement of regulations produced little but 'enforcement agitations' (Hara 2006a), and the implementation of a co-management initiative, promoted to help encourage compliance since the 1990s, also showed only marginal success (Hara 2008; Njaya 2007; Scholtz *et al*. 1998). An alternative measure that has a different focus and that recognizes the limited availability of financial and human resources in management is required to address the illegal fishing problem in SEA and the growing need for the conservation of the lake ecosystem.

This study finds inspiration in the emerging fisheries governance literature, in particular interactive governance theory because of its emphasis on 'meta-governance', such as values, norms and principles that guide every practical governing action (Kooiman *et al*. 2005; Kooiman and Jentoft 2009). The explicit attention on meta-governance stems from the acknowledgement that while governing and governance may be seen largely as an analytical concept, what *governs the governing* is a highly normative one, implying that one cannot escape or ignore the normative aspect involved in governance (Kooiman 2003). Hence, for both governors and those being governed, values, norms and principles lay the foundation for conscious decision-making and subsequent behaviour. Following this stipulation, illegal fishing would have its own set of normative underpinnings, which are likely incompatible with conservation efforts. Conversely, principles on conservation can also be hypothesized to discourage illegal fishing practice once they are properly understood and made explicit. Taking this as the angle of departure, the study explores the principle aspect relating to fisheries conservation in order to generate alternate policy prescriptions for the SEA fishery on the issue of illegal fishing and non-compliance.

To the best of our knowledge, no established quantitative methodology for examining one's principle is readily available.[1] In this study, we use the damage schedule approach (Chuenpagdee *et al*. 2001), which has been shown to reliably elicit stakeholders' judgments on environmentally damaging activities and resource losses, to provide an indication of the conservation principle held by various stakeholders. Two components conceptualized to represent the conservation principle – awareness and inclination – were assessed using a questionnaire survey based on the damage schedule approach.

In the following, we first describe the SEA fishery and provide a brief history of its governance structure. Next, the theoretical basis for studying principles in the context of fisheries governance is presented. The conceptualization of the 'conservation principle' is then outlined which sets the stage for the design of

study methods. Writing on methods include a description of the damage schedule approach and the questionnaire survey as well as a categorization scheme devised in this study to deepen the understanding of the linkage between the conservation principle and illegal fishing. The results of the study follow next under the headings of conservation awareness, conservation inclination and conservation potential. The findings are discussed leading to policy inferences.

Study Site

Characteristics of the SEA Fishery

The SEA of Lake Malawi is a semi-opened water body located in the southern end of Lake Malawi with the estimated surface area of about 2,000 square kilometres (Figure 1). In contrast to the rest of the lake which mostly features steep slope with rocky surface formed by the Great Rift Valley, the SEA is characterized by shallower water depth of less than 100 metres and prevalence of muddy and sandy bottom (Crul 1997). In addition, it experiences seasonal upwelling and mixing of nutrients and oxygen throughout the entire water column due to the marked pattern of prevailing winds and rain. These climatic and limnological characteristics help to create a favourable condition for biological productivity in this area. Lake Malawi features one of the highest freshwater fish biodiversity in the world (Ngatunga 2001), containing fishes of eleven families, dominated by *Cichlidae* with an estimated number of 450-700 species (Konings 1990; Turner *et al*. 2001). Of these, *Oreochromis* spp. of tilapiine kind (local name: *chambo*), *Copadichromis* spp. (*utaka*) and *Lethrinops* spp. (*kambuzi*) are the key species of high commercial importance. Two other major kinds of fish that support the fishery are catfishes (Family *Bagridae* and *Clariidae*) and anchovy-like *usipa* (*Engraulicypris sardella*).

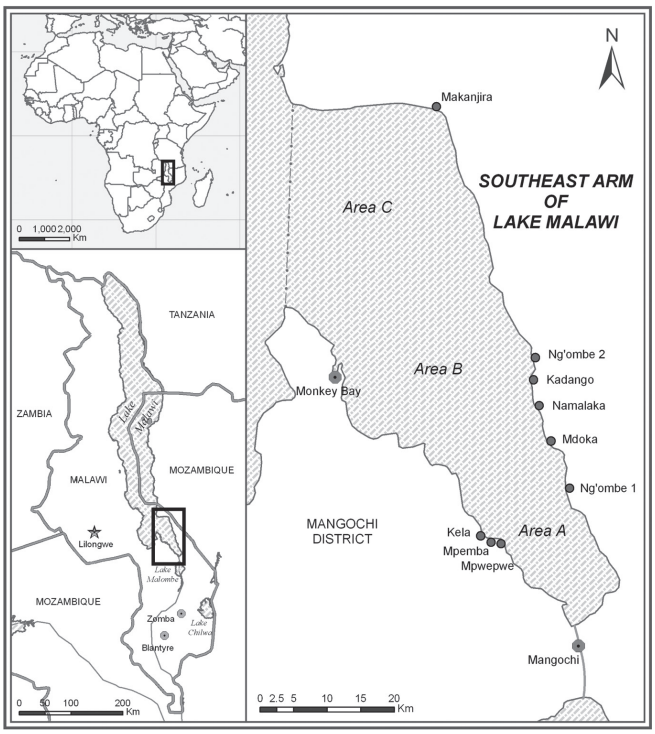
The SEA, with its boundaries completely falling within Mangochi district, has historically been one of the most important fishing grounds in the country (Chirwa 1996; McCracken 1987). It once held a major *chambo* fishery and also has accommodated an active large-scale commercial fishing operation over the years. Proximity to major town centres such as Zomba and Blantyre has helped the fish trading and marketing activities to blossom. It is estimated that, from 1976 to 2000, the SEA's contribution to the total fisheries production from Lake Malawi varied between twenty per cent and forty per cent, while making up approximately ten per cent to twenty five per cent of the national production (Hara 2001; Weyl 2005). In 2000, approximately 18,000 metric tons of fish from the SEA were landed.

Small-scale fishery, involving multi-species and multi-gear, is the main form of fishing activities in the SEA (Ngochera 2001; Smith 1998). It typically uses small vessels such as planked boats and dug-out canoes to operate gillnets, longlines and open-water seine nets called *chilimira* but fishing can also be done from land as in the case of beach seining. Much of the catch is being sold for cash income, signifying the commercial importance of the fishery. According to the 2005 Annual Frame Survey, there are approximately 1,300 gear owners and 8,000 crew members involved in fishing in the SEA (Banda *et al*. 2006). A gear owner commonly refers to as a fisher who owns fishing gear but may not necessarily

participate in fishing, while crew members are those who provide manpower and technical know-how in the actual fishing operation.

The SEA fishery is an open-access system with anyone wanting to fish being able to access the lake and its resources with relative ease. Fishing in this water is shared not only by the gear owners and crew members who are originally from the villages nearby SEA, but also by a large number of migrant fishers from other parts of the country such as Lake Malombe, northern parts of Lake Malawi and inland areas. The large presence of outside fishers is a reflection of the high geographical mobility characterizing the fishery, which is fostered by the existing fishing culture that accepts the influx of outsiders as a norm rather than a problem (Allison *et al*. 2001). In a similar vein, fluid occupational mobility among fishers (and non-fishers) is also a well-noted phenomenon in the region as a means of diversifying one's livelihood in the face of resource fluctuation (Allison *et al*. 2001; Jul-Larsen *et al*. 2003). A combination of fishing, fish trade, farming, small-scale business and money earned from labour migration abroad have been an enduring strategy for the members of the fishing community for many decades going back to the colonial era (McCracken 1987). In this regard, events occurring outside of the immediate fishing sector, such as a boom in tea plantation in the Shire Highlands in the 1940s, have been a significant factor affecting fishing effort (Jul-Larsen *et al*. 2003).

Figure 1: Map of the Southeast Arm of Lake Malawi (Survey Sites are Shown as Dark Circles; Circles with a Black Dot Inside Indicate Town Centres)



A Brief History of Fisheries Governance and Management Arrangements

The 1930s was a period of increasing British colonial concern with the lake's ecology and fish conservation, which was largely a response to the rapid commercialization and expansion of the traditional fishery. Traditional fishing methods, such as weirs and traps, were indignantly viewed as destructive and primitive by the colonial conservationists (Chirwa 1996). Hence, a series of early fishing regulations were introduced in the 1930s and the concept of illegal fishing subsequently became a topic of importance. Through the establishment of the Department of Fisheries (DOF) in 1946, deterrence through enforcement of regulations and threat of sanctions continued to be the main form of policy responses dealing with illegal fishing for decades that followed, persisting beyond independence from the colonial government in 1964. However, ineffectiveness of this approach was becoming evident as the process was often treated with mistrust and disdain, and the ensuing violent confrontations with the resource users not only prove to be dangerous but also demoralizing for the government enforcement personnel (Hara 2006a). With the rising eminence of co-management regime as a democratic and cost-effective way of achieving compliance, the participatory management initiative was put into practice in the mid-1990s in the SEA.[2] Unfortunately, as Njaya (2007, 2008) and Hara (2006b) point out, several challenges have been observed in the implementation and the program has shown marginal success in raising the support of the fishing communities needed to resolve the illegal fishing situation.

In addition to DOF, day-to-day fishing matters at the village level are governed by the Traditional Authority, which is upheld by the three hierarchical levels of traditional leaders – the chief, the group village head and the village head. The land surrounding the SEA falls between five Traditional Authority areas, namely Mponda, Chowe, Nankumba, Namavi and Makanjira, each of which is governed by a hereditary chief. A pressing issue is the abuse of power by some traditional leaders who may permit illegal gears to operate in their villages in return for a weekly gift from fishers in the form of money or fish, a custom locally known as *mawe* (GOM 2005; Njaya 2007). With this practice, however, illegal fishing can be condoned, protected and even encouraged, consequently breaking down any conservation principle that fishers may have.

Principles as Meta-Governance

The articulation of meta-governance has been identified as the most distinguishing and innovative, yet also potentially controversial, facet about the interactive governance (Symes 2006; McGoodwin 2007). Principles, which in recent years have risen as a topic that deserves a closer attention, hold a position in the meta-governance order in which, together with values and norms, forms a fundamental underpinning that directs governing action (Bavinck *et al*. 2005; Kooiman *et al*. 2005). An elaboration by Kooiman and Jentoft (2009) stipulates that values give rise to principles, which in turn shape choices and therefore behaviours (Figure 2). In this scheme, values are the most fundamental notions, while choices/behaviours represent the most applied and specific. Principles are conceived as an

intermediate position that is still founded in the general notions of what is right or wrong, but applied in the sense that it has a direct association with the choices and behaviours that the governance actors make. Here, a relevant example would be seeing sustainability as a value, conservation as a principle and compliance of regulations as a choice/behaviour. Since principles have a major bearing on the actions taken, the main assertion is that principles involved in fisheries governance, often hidden in the background, should be made explicit so that they can be explained, discussed and evaluated as part of regular governing interaction (Kooiman *et al*. 2005).

Schwartz (1968a, 1968b, 1970), coming from sociological and psychological perspectives, posits that activation of moral principles in individuals to produce behaviour that is congruent with the given norm depends on the awareness of interpersonal consequences related to the welfare of others and ascription of responsibility for the actions and their consequences. First, being aware that particular actions have consequences for the welfare of others is the initial step leading to a moral decision-making. Schwartz argues that without recognition of such consequences, one would not perceive him/herself to be facing a moral choice at all (Schwartz 1970). Yet, after acknowledging responsibility for the actions and their consequences, one may ascribe it to the self or may evade responsibility by blaming it on others. He confirms in his studies that these two 'tendencies', when acted together, encourage individuals to produce behaviour that is in accordance with their subscribed principles.

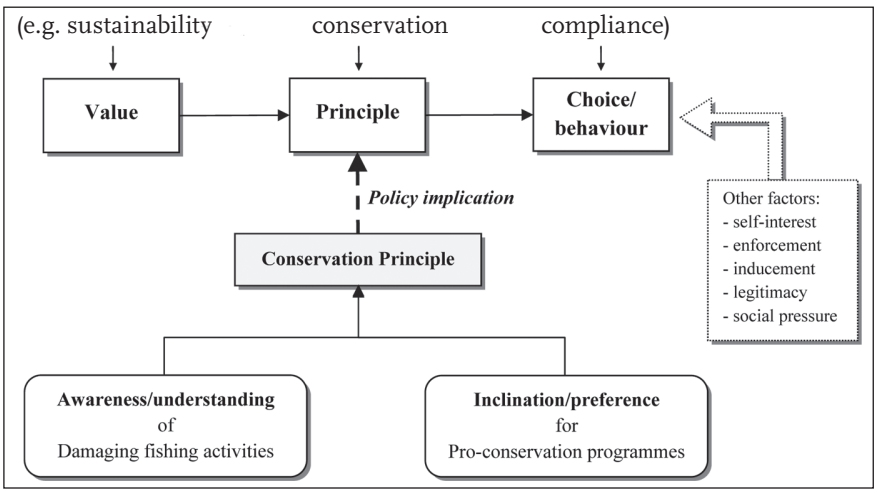
Although not adequately studied or practiced, progress has been made over the years in substantiating and codifying the principles involved in fishing and fishing-related activities. The best publicized product is the FAO's Code of Conduct for Responsible Fisheries, which states that 'The right to fish carries with it the *obligation* to do so in a *responsible* manner so as to ensure effective conservation and management of the living aquatic resources.' (FAO 1995:4, our italics for emphasis). Costanza *et al*. (1998), FAO (2005) and Mangel *et al*. (1996) all make a similar assertion on the users' responsibility to use the resources in a manner that protects and conserves the ecosystem. Hence, in this paper, the 'responsibility to conserve' is used to represent the principle that initiates and sustains conservation practices in fishing and is hereafter referred to as conservation principle.

In our conceptualization (Figure 2), two components are necessary in forming an individual's conservation principle.[3] Similar to Schwartz's model of moral decision-making, the first component refers to an adequate level of awareness or understanding about conservation. The assumption is that the internalization of the conservation principle can only take place if one has sufficient understanding of which activities promote conservation and which hinder it. Only after they are aware of the potential consequences of various fishing activities, can they then internally determine whether a certain activity is the right thing to do. Without sufficient understanding, a fishing choice or behaviour would come about in a haphazard fashion driven by instincts or other innate motives, not as *a matter of principle*. For this reason, fishery management everywhere often aims to enhance stakeholders', especially fishers', knowledge of conservation through education and awareness raising. A relevant set of knowledge would include information on

impacts of various fishing activities on the aquatic ecosystem. Therefore, in the first phase of the study, we assess the awareness level of stakeholders in regard to fisheries conservation by examining how they perceive the impacts of fishing activities on the SEA ecosystem.

The second component is about the inclination towards fisheries conservation. Even if the stakeholders hold sufficient understanding and awareness about damaging fishing activities, it is necessary to verify whether they do in fact value abstaining from damaging activities. For example, if the industrial polluters are asked whether they understand the ecological consequences of discharging toxic effluents into a coastal ecosystem, many would perhaps say yes. Hence, it is generally not the lack of understanding about facts and knowledge but the lack of genuine inclination towards conservation that influences the polluters' action. In this study, we assess stakeholders' preference towards hypothetical, but conceivable fisheries-related programmes that could be implemented in one's community in order to find out how much they attach importance to conservation. This component is similar to the second attribute of Schwartz's model, ascription of responsibility, in the sense that both represent the next step in the internal processing of moral norms after one holds sufficient awareness of consequences of potential actions. The conservation inclination is, however, specifically about how much individuals see the responsibility to conserve as something that is fulfilled out of anticipatory virtue, pride or personal satisfaction. In short, we posit that when an individual acts *knowingly* and *willingly* despite inconveniences or the opportunities to do otherwise, an individual is said to be acting out of his/her principle.

Figure 2: Conceptual Diagram of How Conservation Principle is Positioned in Relation to Theory and Survey Design



Aside from the conservation principle, we acknowledge that there are likely other factors that also influence fishing choices and behaviours, as included in Figure 2.

Given that they are already well identified in the several past studies that address fisheries compliance (confer Hønneland 1999; Nielsen 2003; Sutinen and Kuperan 1999), we do not address these factors directly in this paper, but will include them into discussion whenever applicable.

Methods

Conservation Awareness and Inclination

The study was conducted in two main steps. The first step involves examining the two aspects of conservation principle, that is, awareness and inclination, using a method adapted from the damage schedule approach (confer Chuenpagdee 1998; Chuenpagdee *et al*. 2001). The basic premise of the approach lies in the establishment of an interval scale of relative importance, which then can be presented as a non-monetary indicator of the environmental and resource values determined by the community or other stakeholder groups. It involves an assessment of preferences and judgments with respect to severity of environmental damage, and it can be directed to provide guidance in developing an appropriate policy response as well as in understanding group consensus which may be uncovered in the process. The approach has been successfully applied to several fisheries and coastal related studies.[4]

Following the damage schedule approach, two sets of paired-comparison surveys were developed in this study.[5] The first set gauges the level of conservation awareness of the respondents based on their understanding of the degree of impact various fishing activities have on the fisheries resources, while the second set assesses the level of conservation inclination by seeing the preference of the respondents towards conservation-oriented fisheries programmes. There are seven scenarios included in each set, as listed in Table 1, selected based on existing literature (including fisheries regulations), direct observation during field visits and informal interviews with key informants. These scenarios represent site-specific fishing activities and the fisheries-related programmes that are relevant in the SEA. The lists were modified based on the results of several rounds of pre-tests and after verification with key fishery experts in Malawi to ensure that these activities and programmes indeed best capture the issues and concerns of the stakeholders in the region. One example of paired comparison used in the conservation awareness study is displayed in Figure 3, in which a survey respondent is asked to compare A and B in term of their damage to fisheries resources in SEA. In the same manner, all possible pair combinations of the seven scenarios are presented in the questionnaire booklet in a randomly generated sequence. The comparison result of the survey respondent is tallied according to each scenario, that is, counting the number of times s/he chooses each scenario over others.

Such individual response is then aggregated and normalized to a scale of 0 to 100 to produce a group response.

As shown in Table 1, the first set of fishing activity scenarios is void of any specific details. For example, there is no number indicating the degree of mechanization in 'fishing using mechanized gear', and no mention of a specific fishing gear. This was done to minimize strategic voting of the respondents through basing the comparisons on the concept – or the *image* – of the fishing gears and not on the specifics that may conjure up certain attachment to their own fishing activities. The second set is designed such that two community programmes that directly promote conservation are included. 'Programme to protect fish habitat and fish species' is a scenario that has a direct attachment to conservation, while 'programme to promote scientific research on lake fisheries ecosystem', which draws upon the well-known precautionary principle, also bears high relevance to conservation. Valuing these over the other community programmes, which may largely be driven by other interests and motivations that show little compatibility with the conservation objective, can be interpreted as a fair indication of their genuine inclination towards conservation. These programmes are presented to the respondents in a hypothetical sense as something that could be implemented but with no promise in order to deter short-sighted expectation from influencing their choices.

Table 1: Scenarios for Assessing Conservation Awareness (through Fishing Activities) and Conservation Inclination (through Fisheries-related Programmes)

Fishing activities
– Catching juvenile fish
– Fishing using mechanized gear
– Fishing using gears that disturb lake bottom
– Fishing in offshore deep water
– Fishing using non-selective gear
– Too many people fishing in one area
– Fishing in spawning area
Fisheries-related programmes
– Protect fish habitat and fish species
– Promote scientific research on lake fisheries ecosystem
– Provide micro-credit loans to expand fishing-related work
– Help reduce fish spoilage during catching and processing
– Promote small-scale community fish cage culture
– Ensure fishing access for local fishers and communities
– Provide ownership of resources to local communities

Figure 3: Sample Paired Comparison Question Drawn from the First Set

In your opinion, which of these two activities, A or B, do you consider
MORE DAMAGING
to the fisheries resources in the Southeast Arm of Lake Malawi?

Catching juvenile fish	Fishing in spawning area
A	**B**

Categorization Algorithm

After the results of the two sets of comparisons are considered separately, they can be viewed in relation to each other to indicate conservation potential using a simple categorization algorithm devised in this study. This second step allows observing the relationship between the understanding and inclination components, which is an important tenet of the conservation principle that we postulated earlier. The algorithm starts with an establishment of weighting factors for each component as listed in Table 2. In this study, the weighting factors for conservation awareness were developed based on the consensus revealed about the damaging fishing activities, such that the more damaging the fishing activity is judged to be, the higher is the weighting factor. For conservation inclination, the weighting factors were determined from the consultations with local fisheries experts who are familiar with the SEA fishery, in which a higher weighting factor denotes a higher degree of direct conservation benefit offered by a fisheries-related programme. Each individual's response is to be multiplied by the weighting factors and aggregated to produce a single value that represents his/her level of conservation awareness. After the values for all respondents are obtained, an average value is calculated. This average value is then used to categorize individuals, such that if the individual's value is higher than the average, he/she would be placed in the 'high' category (H). On the other hand, he/she would be categorized as 'low' (L) if his/her value is lower than the average. The same procedure can be applied to confer H or L to individuals regarding their conservation inclination.[6]

This scheme results in four different combinations into which an individual respondent could be categorized, that is, HH, HL, LH and LL. For example, HH would signify that a respondent has not only higher than the mean conservation awareness, but also relatively strong sense of inclination towards conservation. In other words, s/he is considered to have high conservation potential. On the contrary, LH would denote a case where despite having low conservation awareness, a respondent has relatively high penchant for conservation.

Table 2: Weighting Factors Developed for Conservation Principle

	Weighting factor	Description
Fishing activities		
Fishing in spawning area	4	Most damaging
Fishing using gears that disturb lake bottom	3	Generally accepted to be very damaging
Fishing using non-selective gear	3	
Catching juvenile fish	3	
Too many people fishing in one area	2	High potential to be damaging
Fishing using mechanized gear	2	
Fishing in offshore deep water	1	Least damaging
Fisheries-related programmes		
Protect fish habitat and fish species	3	Direct promotion of conservation
Promote scientific research on lake fisheries ecosystem	3	
Provide ownership of resources to local communities	2	Modest potential in advancing conservation
Promote small-scale community fish cage culture	2	
Ensure fishing access for local fishers and communities	1	Low or even potentially adverse effect on conservation
Help reduce fish spoilage during catching and processing	1	
Provide micro-credit loans to expand fishing-related work	1	

Survey Information

The survey was directed at seven groups of respondents involving multiple sites as shown in Figure 1. Active fishing villages on the eastern shore of the SEA were chosen to be the main location in surveying the resource-dependent groups, that is, gear owners, crew members, fish processors/traders and community members. This side of the water body is believed to yield better catch than the stock-depleted western shore (Njaya 2008). Also, due to its relative remoteness, coupled with the shortage of infrastructure and tourism development, fishing still remains a key economic activity supporting people's livelihoods. To investigate any potential disparity that may arise from the east-west geographical distinction, two more resource-dependent groups, gear owners and crew members on the western shore, were added to the survey. Thus, together with the managers/scientists group, seven respondent groups were formed. The survey with the resource-dependent groups was conducted with the assistance of a local person, who is native to the area with fluency in two of the most widely spoken local languages, Chichewa and Chiyao, as well as being proficient in English. Also, he was particularly well-versed in fishing matters as he held the position of a fisheries extension worker for over fifteen years in another part of Lake Malawi. The survey with the scientists/managers group, comprising of various government officials such as planners, researchers, statisticians, enforcement officers, lecturers, and also scientists from several nongovernmental organizations (NGOS) working in the field of fisheries, took place in various locations around the lake without the assistance of the local translator due to their English language proficiency.

A total number of 144 respondents were included in the survey using quota sampling (about twenty respondents in each group). As shown in the

demographic breakdown of the survey respondents (Table 3), there existed only modest differences in the number of respondents, the average age and the average years of fishery experience among the respondent groups. One may think that the small sample size of each group could reduce the reliability of the results of this study. However, as other studies of similar methodology and intent have shown (confer Bose and Crees-Morris 2009; Chuenpagdee *et al*. 2003; Quah *et al*. 2006), in-group consistency was quickly reached with the number of respondents obtained in the study (see Results). Thus, increasing the number of respondents would be of no pragmatic value from the view of both cost-effectiveness and time-efficiency (Bose and Crees-Morris 2009). When conducting the survey, one-on-one setting was preferred, whenever possible, to minimize strategic bias that may arise out of social pressure or fear of reprisal. Hence, most surveys were conducted in a quiet, sheltered environment in the absence of other community members. Each questionnaire survey took about twenty-five minutes on average to complete.

Table 3: Demographic Information of Survey Respondents

	Gear owners (East)	Crew members (East)	Processors/ Traders	Community members	Gear owners (West)	Crew members (West)	Managers/ Scientists	Total
Total number of respondents	**20**	**20**	**20**	**20**	**21**	**17**	**26**	**144**
Male	20	20	7	8	19	17	21	112
Female	0	0	13	12	2	0	5	32
Age[a]	38	30	37	34	38	34	40	–
Years of fishery experience[a]	10	9	9	–	6	9	13	–
Years in education[a]	1	5	6	3	3	3	130[b]	–

[a] denotes average value; [b] indicates tertiary education, which typically surpasses 13 years of schooling

Results

Conservation Awareness

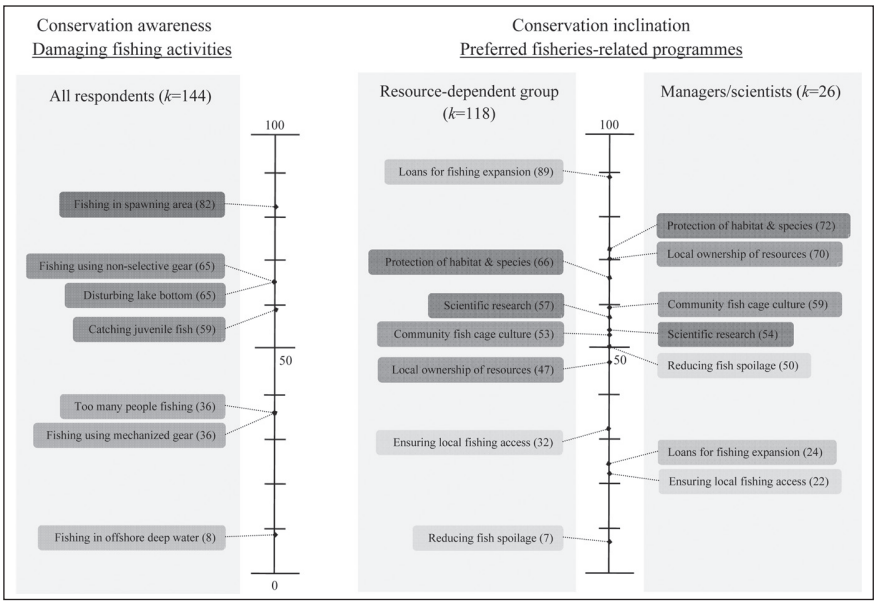
According to the Kendall's tau rank correlation analysis ($p = 0.05$), the survey results revealed no significant difference among the respondent groups as to which fishing activities are more or less damaging to the fisheries resources in the SEA. Hence, the judged responses of all seven groups were combined into a single scale as shown in Figure 4. Fishing in spawning area was unanimously identified to be the most damaging practice with the normalized score of 82 out of 100. This was followed by fishing using gears that disturb lake bottom and non-selective gear, which shared the identical score of 65. Catching juvenile fish was the next most damaging activity. As for activities with moderate damage, too many fishers in one area tied with fishing using mechanized gear. With the score of 8, fishing in offshore deep water was judged to be by far the least damaging form of fishing activity.

Understanding the ecological impact of pertinent fishing activities forms an essential aspect of realizing fisheries conservation. Here, not only is the result agreed by all surveyed groups in the SEA fishery, it is also judged to be consistent with the commonly-held knowledge about fishing gears and their impacts in other fisheries worldwide. For instance, utmost attention on fishing in spawning area observed in the SEA corresponds with high emphasis put on the role of marine reserves in enhancing spawning stocks and protecting juvenile production (Manríquez and Castilla 2001; Murawski *et al*. 2000). Also, relatively severe damage from disturbing the lake bottom perceived by the respondents in the SEA is a contentious issue globally with special regard given to bottom-trawling (Chuenpagdee *et al*. 2003; Watling and Norse 1998). Hence, the general correspondence of the survey result with the prevailing ecological issues in global fisheries suggests that the stakeholder groups in the SEA hold a moderately high level of fisheries conservation understanding.

Most notably, managers and scientists' considerations of damaging fishing activities also significantly correlated with those of the resource-dependent groups. We infer that this shared understanding is largely attributed to the effective communication in transmitting knowledge from the managers/scientists group to fishing communities. Over the years, the top-down style of restricting and controlling harmful fishing activities has been the main form of conservation measures (Hara 2001). For instance, the Fisheries Conservation and Management Regulations of 2000, which currently provides the governing rules for the fishing matters in the SEA (GoM 2000), are featured with conservation provisions that predominantly attempt to control and manage the sort of fishing activities included in the survey. A previous study by Hara (2001) also reports fishers' strong acquaintance with the fisheries regulation. Therefore, it appears that fishing community has, for the most part, understood and accepted the conservation measures of the governing body.

In this light, popular claims in Malawi such as 'fishers must be taught conservation' as a way to promote conservation-oriented fishing practices does not fully hold truth. The findings above suggest that the resource-dependent groups, by and large, are cognizant of what is generally considered good or bad in terms of fisheries conservation. Instead, what becomes evident is that mere knowledge dissemination and routine awareness raising associated with the top-down mode of conservation promotion has produced little actual effect in curbing the extent of illegal fishing on the ground. This may indicate the limits of the blanket approach to the one-way knowledge transfer done in a typical top-down setting. Hence, this finding calls for a re-examination of 'teaching conservation' through engaging in frank two-way exchanges of ideas on other essential normative aspects such as conservation attitude, preferences and habits in order to foster conservation practices and encourage translation of conservation awareness into action.

Figure 4: Damage Schedule of Damaging Fishing Activities and Preferred Community Programmes



Conservation Inclination

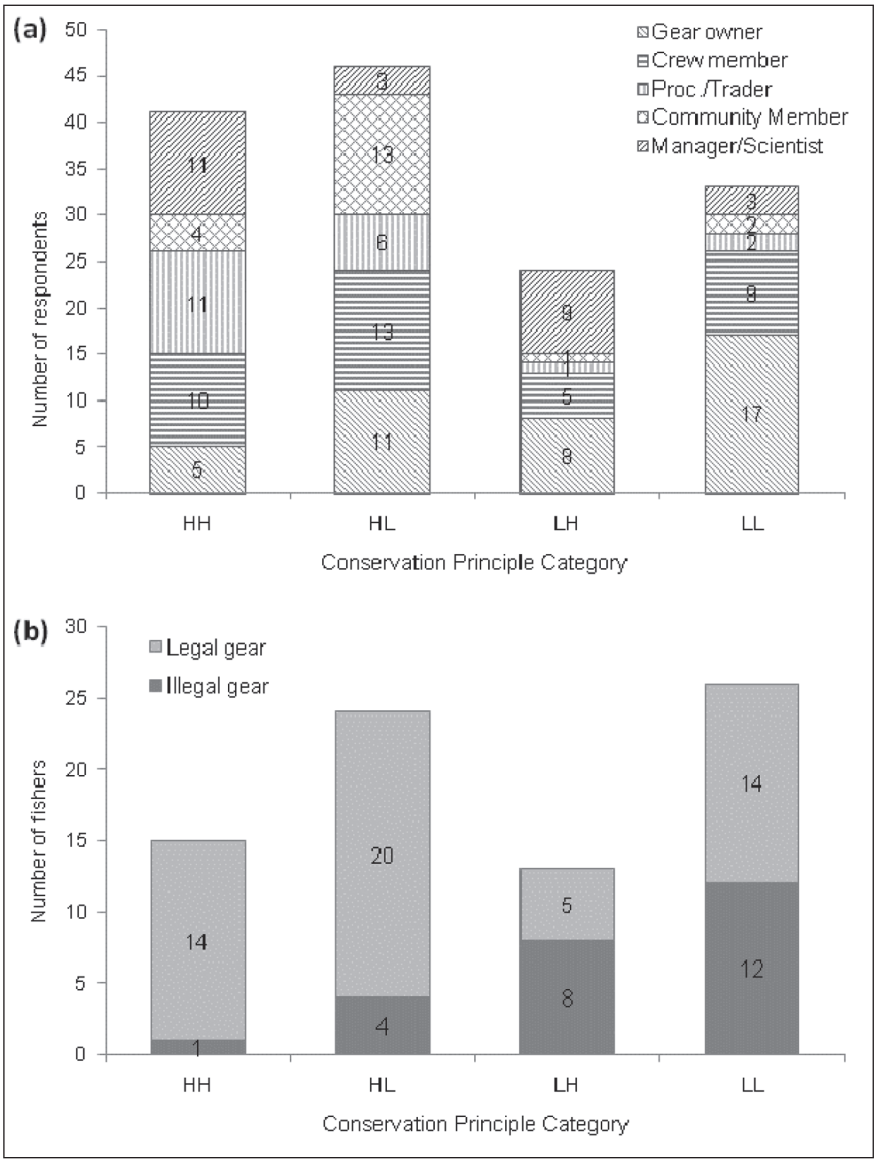
Unlike the awareness portion, the survey results showed that a significant divergence of opinion exists between the resource-dependent groups and the manager/scientists group when it comes to the preference of fisheries-related programmes (Figure 4). While the resource-dependent groups unequivocally preferred the programme to provide micro-credit loans for the expansion of their fishing-related work, the same inclination was not found within the managers/scientists who ranked the programme near the bottom. The second notable difference between the two groups lies in the preference ranking of the programme to provide ownership of resources to local communities, which was ranked relatively low for the resources-dependent groups compared to the high ranking given by the managers/scientists. The third disparity concerns the programme to help reduce fish spoilage during catching and processing. This was, by far the least preferred programme by the resource-dependent groups with the score of 7, and was of clear contrast to the score of 50 provided by the managers/scientists. Two programmes that have direct relevance to conservation, protecting fish habitat and species and promoting scientific research on the lake ecosystem, were both ranked comparatively high by both groupings. An agreement was also found in the mid-ranking of the promotion of small-scale community fish cage culture. Finally, the programme to ensure fishing access to local fishers and communities was generally the least preferred one by both groups compared to the other six hypothetical programmes.

As Figure 4 highlights, the two conservation-oriented programmes are positioned mid-to-high in both groups' preference ranking scales. This can be loosely interpreted as the respondents having moderate inclination towards conservation (in other words, they care about conservation to some degree). Based on this, and together with the presence of shared understanding about the damaging fishing activities, which can help create a common vision for the fisheries, moderate potential in advancing conservation goals in the SEA fishery can be expected. An important challenge is noted, however, when looking at the top inclinations of the two groups. While the managers/scientists group preferred the programme to protect fish habitats and species, the resource-dependent group showed a clear liking for the provision of loans that would enable the expansion of one's fishing work. We believe that this difference must be duly recognized and reconciled in realizing the conservation potential. Certain compromises with each group making concessions will need to be attained, since governance is not so much about exercising authority from the top-down as about unilateral and unidirectional decisions and actions taken from a single party. Rather, it is a process of constant interaction and negotiation where operating goals and strategies are at best imperfect compromises (Chuenpagdee and Jentoft 2009).

Conservation Potential

Using the categorization method described earlier, the category with the highest number of respondents (46 out of 144) was HL (Figure 5a), implying relatively high conservation awareness, but low inclination towards conservation among them. This finding suggests that having a good understanding about conservation may not be necessarily accompanied by a keen interest in promoting it among the resource-dependent groups. Hence, the assumption that knowing about conservation guarantees the appropriate action does not hold true in the SEA and could lead to ineffectiveness in governance measures. Nevertheless, conservation awareness entails a certain level of conservation potential. Harnessing this potential to achieve sensible conservation would be the next important challenge in the SEA. This would likely require negotiating urgent livelihood concerns and poverty reduction goals (Adams *et al*. 2004) as well as creating effective internal and external leadership (Davis *et al*. 2006). Another important observation relates to the proportion of the occupations making up each category. The fisher group, composed of gear owners and crew members, formed the large majority of the LL category, which denotes both relatively low conservation awareness and inclination. This suggests fishers are the stakeholder group that requires the most urgent attention when promoting a conservation mindset in the SEA. However, given the open-access nature of the SEA fishery and the ease of entry, community members and other resource-dependent groups should also be included in the scope of such management interventions. Lastly, it can be noted that each of the four categories have all five groups represented, albeit with a varying degree of proportion. This suggests that occupational differences have not likely played a distinct role in producing the categorical patterns obtained here.

Figure 5: Results of Conservation Principle Categorization (A) By Occupation; (B) By Illegal Gear Use/Operation



Focusing on the fisher group to uncover any relationship between the use of illegal gear (a bona-fide form of illegal fishing) and the presence of low or high conservation awareness and inclination (Figure 5b), we observed that fishers who use illegal gear were most frequently found having LL, and that contrastingly, fishers who hold elevated conservation principle (HH) were mostly associated with owning or operating legal gears, with only a tiny fraction of illegal gear fishers

sharing the category. This logical, and even commonsensical, result implies that conservation principles are, in fact, consistent with the actual practice of fishing, such that robust conservation principle may deter illegal fishing while a weak one could allow it to proliferate. In other words, the conservation principle could form a normative imperative against illegal fishing. Thus, it provides empirical evidence supporting the view that the normative dimension of fisheries governance, such as one's underlying principle, is a relevant component in the governing of people's behaviour, and further clarification of the principle-behaviour linkages would be a beneficial line of research that could improve overall fisheries governance.

Policy Recommendations

Insights about the conservation principle point to several policy recommendations in dealing with illegal fishing. First, targeting the group of respondents with relatively high conservation understanding but relatively low inclination (HL), the policy response would logically focus on raising inclination towards conserving fisheries resources. Earlier, the resource-dependent groups' leading preference was shown to be the expansion of one's fishing work by acquiring a capital through loans. This is closely related to the short-term enhancement of standard-of-living, which is one of the main motivations that competes with, and often thwarts, a more resilient expression of the conservation principle. Therefore, conservation initiatives that align with the resource-dependent group's economic incentive are strongly recommended. Such initiatives could come in the form of a reward scheme or conservation subsidies (Milazzo 1998). Alternately, a more direct approach to compensate people for their role in looking after fisheries resources, such as 'conservation payments' (Ferraro 2001; Ferraro and Simpson 2002) or 'marine conservation agreements' (Nature Conservancy and Conservation International 2009), should also garner meaningful attention.

Secondly, sustained focus on education and awareness raising is still viewed necessary to increase the level of conservation understanding mainly of those who are categorized as LH and LL. The effort to elevate the conservation understanding could be implemented through various accessible means such as formal education, outreach and extension programmes, community-based projects and the work of fisheries field officers. As mentioned earlier, emphasis should be shifted from one-way knowledge dissemination to a more open form of dialogue that better allows a two-way exchange of conservation-related attitude and habits between various stakeholder groups. This shift is anticipated to positively affect the transition of an understanding into a genuine inclination.

At the same time, heightened promotion of direct conservation measures, such as protection of breeding sites and seasonal closures, should be fully considered given that fishers and other resource-dependent groups do have a moderate regard for conservation. When other motives such as the short-term enhancement of standard-of-living are firmly ingrained in people's lives, a persistent push towards implementing direct conservation measures could be a reminder that is needed to effectively uphold the existing care for conservation.

Aside from the fisheries-specific recommendations, policy options that have an implication to a wider society should also be continuously explored. Fisheries in the SEA have always been closely connected to the events happening in the outside sectors and distant geographic locations. Through an economic and social feedback loop, fisheries and conservation issues are affected by dynamical mechanisms such as an influx of fishers and a sudden rise of demand for fish. Seen in this light, the development of alternative livelihoods or income-generating options not directly related to fishing is a well-recognized strategy that could bring indirect benefits to fisheries conservation by potentially dissipating fishing effort into other sectors. Several initiatives that are currently underway in various stages of development include tourism operation and fish cage culture.

Conclusion

Illegal fishing is a multi-dimensioned, complex issue that greatly affects the efficacy of conservation efforts. Sources and determining factors of illegal fishing are numerous, and each explanation of the different aspects may provide a varied but valuable set of insights about why the issue comes about and how it can be addressed. This paper asked what can be learned about an illegal fishing situation in the SEA fishery in Lake Malawi by examining the normative aspect of fisheries governance.

The sense of *responsibility to conserve* (especially when given the right to fish) was framed as a governance principle and was put through a conceptualization process, in which two components, awareness and inclination, were identified as necessary conditions to enable conservation behaviour in an individual. An empirical survey was designed and conducted to gauge the level of conservation understanding and inclination among the various groups of stakeholders in the SEA fishery. Separately, the results of each component revealed 1) a shared understanding about the severity of fishing activities, and 2) an unequivocal tendency by the resource-dependent group to prefer expansion of fishing work for their short-term enhancement of standard-of-living. Analyzed in relation to each other, the respondents were most commonly found to possess high conservation awareness, but hold relatively low inclination. As a policy response, a direct provision of economic incentives to bring up the attractiveness of conserving ecosystem should be promoted to encourage more widespread conservation practice in fishing.

An alternate exploration of the illegal fishing situation is considered necessary in many fisheries worldwide due to a seeming inability to satisfactorily address the issue through the use of deterrence-based policy tools alone. A direct look at the individual principle in the SEA fishery has shown that fishers engaged in the use of illegal gear tend to be lacking conservation awareness and inclination, likely implying low conservation principle, while legal gear fishers amass at the opposite end with relatively higher conservation principle. Such insight, once translated into feasible and locally-sensitive management prescriptions, could contribute to improving the situation. Overall, relatively high conservation

awareness, shared understanding and certain care for conservation despite the dominance of an economic motive point to the conclusion that conservation potential exists among the resource-dependent fishing communities in the SEA. The potential could be carefully cultivated using appropriate policies to foster a more resilient expression of the conservation principle where people would willingly act upon their conservation awareness to engage in sustainable fishing practices as a normative imperative.

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Notes

1. Although the field of cognitive psychology has developed tests that measure the stages of moral development in an individual, labelled 'moral judgment', they have a different focus and a broader scope than what is intended here (cf. Colby and Kohlberg 1987; Rest 1979).
2. A donor-supported participatory fisheries management initiative created a local-level organization called Beach Village Committee (BVC) at each fishing village (Njaya 2008). The legally-mandated BVC's duties include management and monitoring of activities in the beach, control of illegal gears, managing migrating fishers, and involvement in other pertinent local fishing issues (GoM 2000). The executive members of the BVCs elected by the fishers and community members are normally influential or well-liked individuals in the village.
3. See Song (2009) for fuller details on the conceptualization of conservation principle.
4. Chuenpagdee *et al.* (2002) sought the opinions of community members in Mexico to reveal local judgments about the severity of damages to coastal habitats and the impact of activities that may cause the damages. A more elaborated set was developed to assess the relative severity of collateral impacts of the fishing gears commonly used in the U.S. (Chuenpagdee *et al.* 2003). Environmental damages in the urban coastal setting of Singapore were the subject of the study by Quah *et al.* (2006), who then used the resulting scale to derive willingness-to-accept compensation amounts for relinquishing top environmental concerns.
5. Paired comparison is a simple method being frequently used to attain a ranking scale (for detailed information, see David 1988). This method has proven useful in situations "where the objects to be compared can be judged only subjectively, such as in taste testing, colour comparison, or personnel evaluation" (David 1988). Moreover, its use in eliciting community preferences and judgments has been justified by a number of studies which employed this method with a similar intention (Chuenpagdee *et al.* 2001; Mardle *et al.* 2004; Peterson and Brown 1998; Quah *et al.* 2006; Rutherford *et al.* 1998).
6. The conservation principle categorization procedure can be expressed in an algorithm format.

$$(1)\ W_j = \sum_{i=1}^{N} a_i w_i \qquad (2)\ Avg = \frac{\sum_{j=1}^{k} W_j}{k} \qquad (3)\ \begin{cases} \text{If } W_j \geq Avg, & \text{assign } \mathbf{H} \\ \text{otherwise,} & \text{assign } \mathbf{L} \end{cases}$$

where a_i = individual respondent's preference score for i^{th} scenario; N = the number of scenarios; W_i = weighting factor for i^{th} scenario, $W_j = j^{th}$ respondent; and k = the total number of respondents.

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