CHAPTER 6
CONCLUSION

6.1 Major Findings of the Study

Within this section, I examine three key areas. The first is how environmental degradation has impacted upon the Inle Lake area, while the second describes the environmental entitlements of the local people - the Intha, and the final part describes the livelihood diversification patterns of the Intha within an environment on which they depend for their livelihoods.

6.1.1 Environmental Degradation in the Inle Lake Area

Concerning environmental degradation, different factors have had a negative impact on Inle Lake's environment, from different perspectives. In the watershed area, improper agricultural practices have exerted pressure on the lake. The ploughing system used there has proved unsustainable in terms of maintaining soil cover over the long term, meaning that sedimentation in the lake has become a long running problem. The inhabitants of this area understand their agricultural practices are not going well, because their yields are low; however, they do not have enough capital in terms of money or labor to make terraces and prevent this problem. In addition to terracing, they need to be trained in agro-forestry techniques, as well as given incentives to farm in a more environmentally favorable way.

Deforestation (for firewood) is one of the pressures exerted on the lake. As already mentioned, although Inle Lake is a major water supply area for a local hydroelectric dam, most villages around the lake area still do not have access to this electricity, and this means firewood consumption has led to deforestation of the watershed forest; one of several factors contributing to environmental degradation in the lake.

In the study area, floating agriculture causes pollution in the lake itself, for the floating gardeners use insecticides, pesticides and chemical fertilizers in order to attain higher yields. They use much more of these products than is required, then throw the excess waste into the lake, overloading its capacity. Moreover, human waste from the latrine systems used in most household on the lake, and untreated waste water, adds further pollution to the lake. Added to this, garbage from the local people's daily activities, such as plastic bags, detergents and creams also add to the water pollution levels, as does waste from the weaving and tourist industries.

6.1.2 Environmental Entitlements of the *Intha* within a Wildlife Sanctuary

Almost the whole of Nyaung Shwe Township lies within a wildlife sanctuary and reserved forest area. According to the law, the whole region around Inle Lake falls under the jurisdiction of the Forest Department; however, different people exercise resource use rights based on their community and location. In the watershed area, people cultivate for their livelihoods based on local rights, although the area is within the reserved forest. For firewood, people can collect it legally if just for household use.

The government grants fishing licenses to individuals, who then use this to pass on their rights to local people, for a fee. In this way, the fishers can catch fish for their livelihoods. Within the floating agriculture sector, people do not have ownership rights, but they do have customary rights, and they inherit and transfer the rights to use their gardens to others, through a customary rights process.

Through customary rights, local people can enjoy access to resources of different types in support of their livelihoods. In this way they can benefit from environmental services such as transportation routes and the pollution sink. The lake serves as a pollution sink for local people and the visitors who come to Inle Lake. People can also extract resources in the form of commodities such as fish, and also water for household use and irrigation, via both formal and informal rights.

Nevertheless, though formal and informal rights support their entitlements, these forms of access have led to environmental degradation of the lake, and the environmental condition of this resource is more important than the bundle of rights they have, as it is essential for supporting their livelihoods.

6.1.3 Livelihood Diversification of the Intha People

As Chamber and Cowney (1991) have stated, a livelihood is the combination of capabilities, activities and resources needed to organize and maintain a living, and various factors influence the creation of a sustainable livelihood. In the Inle Lake area, the natural environment is important for people's livelihoods, but because the environment is not as stable as it once was, the availability of assets or resources plays a more important role than it did previously in allowing the local people to cope.

As a result of a decline in the water level of the lake in both 2010 and 2011, some of the floating gardeners in Lwe Nyeint have abandoned their gardens and looked for other jobs. Some have entered the local tourism market as motor boat owners, while the poorer members have become motor boat drivers. Some people who have owned a motor boat for a while but had not joined the tourism sector prior to 2010, have since joined – in order to sustain their livelihoods after 2010. People who are better-off or who have a good network have been able to adapt better to the conditions than the poor. Other livelihood options have included running small-scale fishing operations, trading, and carrying out home and seasonal gardening, all based on the capital assets needed to generate a livelihood.

6.2 Theoretical Debates

As Ostrom et al. (2003) describe, a common pool resource is a valued or human-made resource or facility that is available to more than one person and is subject to degradation if overused. Common-pool resources are those for which exclusion from the resource is costly and one person's use subtracts from what is available to others. In this sense, Inle Lake can be seen as a common pool resource, as the people around it mainly rely on the lake's ecosystem in terms of extraction activities, such as fishing and environmental services, for their livelihoods, including running floating gardens, working in the tourism sector, and fishing.

Human beings use common-pool resources by harvesting or extracting some of the finite flow of valued goods produced by them, or by putting in unwanted byproducts, thus treating the resource as a sink. In general, humans using resources of this type face at least two underlying incentive problems (Burger et al., 2001; Ostrom et al., 1994). In this case, the inhabitants of Inle Lake region not only extract

resources from the lake's ecosystem in the case of fishing, but also add unwanted materials or by-products to the lake in the cases of floating agriculture and tourism. They enjoy the environmental services offered by the lake, but at the same time they are harming the environmental condition of the lake, albeit unintentionally.

Unfortunately, the practices (both on- and off-farm) of the upland people and people living around the lake are causing environmental deterioration, such as deforestation, sedimentation, eutrophication, water pollution, water level decline and a reduction of the surface area. In this situation, it can be seen that users do not (or cannot) communicate with each other. Around Inle Lake, then in terms of the development of institutions needed to manage this situation, it has been a failure, and this institutional failure has brought losses to the local users. In terms of its physical condition, the Inle Lake environment is facing serious deterioration, meaning that "the Tragedy of the Commons", as described by Hardin (1968), has become a reality, due to a form of institutional failure.

Ostrom et al. (2002) point out that Hardin's tragedy of the commons does not always occur, and in some case the outcome is as McCay (1987) describes - more of a "comedy", one with a happy ending. They also emphasize that human motivations are complex. Paul et al. (2002) argue that "the tragedy of the commons" is only fitting under very special conditions. He adds that under typical resource use circumstances, users *can* and do communicate and have a way of developing trust. Ostrom et al. (2002) argue that if the institutional form is strong, common pool resources can be managed in sustainable ways. In the Inle Lake region, although local people, and especially the Intha, have their traditional ways and customs in term of religious and daily life, they have no traditional institution for dealing with environmental conservation. They have good connections with each other within villages, but rarely connect with those from other villages. And, as there are more than 400 villages in the lake area, it may prove difficult to unite them with regard to the lake's usage. One more important thing is that they use the lake ecosystem in different kinds of ways and for different reasons. If one person uses the lake environment for transportation purposes, another may use it to cultivate paddy fields. This diverse set of livelihood activities also creates a barrier to communication among groups and villages.

Even within the floating gardening community, the resource users do not have a close connection with their environment. Sam Myint of Lin Kin Village told me that now people know that the use of agro-chemicals causes water pollution in the lake, so some people have started to use natural fertilizers like vermin-compost. They want to try organic farming, but it is easier to use chemicals than natural fertilizer. In terms of profit, if a farmer uses agro-chemicals, he or she can produce more than when using natural fertilizers, plus growing with natural fertilizers requires more effort and does not generate as much of a profit. In terms of effort and profit, using agro-chemicals is more profitable, and though everyone would like to use natural fertilizers for the sake of the environment, most will continue to use agro-chemicals. As a result, it is a form of institutional failure that has led to a deterioration of the lake environment.

If we look at common pool resources, it is not enough to focus only on natural resources; one most also consider the property regime. Resources that do not have institutions governing their use are called open-access regimes, and the institutions that govern use can be broken down into three broad classes: private property, common property and government property (Thomas et al., 2002). Inle Lake can be seen as government property, as it has been a wildlife sanctuary since 1985 and is under the jurisdiction of the Forest Department. However, in reality, various government organizations have jurisdiction over the area in different sectors. For example, for fishing activities, the Fisheries Department manages the area, and in fact, there are several different government organizations who manage the lake, and in the local context, different kinds of users also rely on the lake while playing different roles. For the fishers, their aim is to catch as many fish as they can by using a variety of methods and many types of gear. Those who practice floating agriculture try to earn as much profit as possible by adding chemicals to the lake, but there are no rules in place or enforcement agencies in the guise of government or local institutions present to limit or manage such usage. As a result, local people should not be blamed, since they are merely struggling to survive. The point here is that policymakers should think about how to govern the common pool resource that is Inle Lake more successfully, and with the cooperation of the users, including the Inthas. They should also think of alternative livelihoods for the local people and set up a local institution to take care of the environment in the area.

In the local setting, it is critical that local people are motivated to conserve the environment. The environmental degradation of Inle lake can be described as a "Tragedy of the Commons" (Hardin, 1958), as the lake itself is a common-pool resource. Ostrom (2003) states that a common-pool resource is a valued or human-made resource or facility that is available to more than one person and subject to degradation as a result if overuse. Inle Lake is a natural resource that, in theory, should be able to support the various livelihood activities of the Intha.

Human beings use common-pool resources by harvesting or extracting some of the finite flow of valued goods produced by them, or by putting in unwanted by-products, thus treating the resource as a sink (Ostrom, 2003). On this point, people catch fish and put unwanted by-products into the lake in different forms and amounts. As a result, Inle Lake is pollution sink for both the people living in the area and also for visitors, as people produce for their livelihoods.

Ostrom et al. (2003) point out the formation of institutions is one way to overcome the "Tragedy of the Commons". They state that self-interest is the only motivator in such cases, and that social mechanisms such as communications, trust, and the ability to make binding agreements can control self-interest, and can be used to prevent tragedy (Ostrom et al., 2003). Around Inle Lake, people enjoy environmental services and extract commodities from the lake, but unfortunately, there is no local traditional institution aimed at protecting its long-term viability. The users use Inle Lake in different ways, and do not communicate with each other or respect the same rules, representing an institutional failure to sustain the lake's environment. However, if they can set up the appropriate local institutions, the environment around the lake may be restored. Government organization and NGOs should facilitate the Intha to develop such an organization and set up the rules needed to protect their environment.

Leach, et al. (1999) define environment entitlements as alternative sets of utilities derived from environmental goods and services over which social actors have legitimate and effective command. As Gore (1993) states, there are many ways of gaining access to and control over resources beyond the market, such as through kin networks, and many ways of legitimating such access and control outside the formal legal system, such as through customary laws, social conventions and norms. Around

Inle Lake, people do not have ownership rights, but they do have use rights, and these entitlements are derived from their society, as they can be inherit or transfer these according to their local customs. For fuel wood, they can collect according to the formal, legal system, but they still have their village boundaries, set according to their customs and in the local context. Legally, they can collect firewood for their household use in any area of the forest according to the law, but in their local context they cannot collect around other villages. Also, when practicing shifting cultivation, they have their own village forest boundaries.

In some cases, resource claims depend on the existing power relations between certain actors, and their claims are likely to prevail over those of others (Leach et al., 1999). In the case of fishing, a person who can get a license from the Fisheries Department has the right to decide who can catch fish in the licensed area, by re-granting rights to individual fishers through the sale of an entrance ticket. Without his permission or a ticket, the fishers may be fined if caught. This right can be seen as an exclusive right, due to the license holder's power, as granted from the Fisheries Department.

However, when environmental degradation occurs, the local people's customary rights and also the formal, legal rights in place, seem useless. When the water level declined in 2010 and 2011, floating gardening could not be practiced, not because of the user's rights, but because of the environmental conditions. To have sustainable environmental entitlements, environmental stability is more important than the bundle of rights held.

The Intha have diversified their livelihoods, as their main livelihood activity has suffered due to environmental degradation. The different coping strategies they have used vary according to their local setting. According to Agrawal (2008), people can use five analytical types of livelihood adaptation: mobility, storage, diversification, communal pooling and market exchange, in order to cope within the context of livelihood risk. The Intha have chosen diversification rather than the other strategies to adapt. The reason they have not chosen the first strategy, mobility, is that they are greatly attached to their homes, because the nature of their home villages is unique. Moreover, although they face environmental instability, it is not a disaster, as they have some alternative job opportunities. If they cannot practice floating

gardening, they can go fishing and obtain their daily food requirements, although the fish catch is declining. Another point is their education level, because about 90% of the household heads have only a primary-level education. Out of a total village population of 608, only three people have migrated - all well educated; one is working as a waiter in a restaurant and the other two are graduates - one works as a teacher and the other is a company employee.

The second strategy, storage, has some limits. The local people grow seasonal crops, mainly tomatoes, in their floating gardens, and these cannot be stored for long periods. One option is to make value-added products such as tomato juice, tomato jam and tomato powder, but the techniques and financial inputs required are still lacking in the area.

Ostrom (1990) points out that there are three problems when trying to develop collective action in the sustainable management of common pool resources, these being: (i) the problem of supplying a new set of institutions, (ii) the problem of making a credible commitment, and (iii) the problem of mutual monitoring.

Although the Intha are aware of the environmental deterioration taking place in and around the lake, they have not set up an institution in response, because the interests of the villagers are diverse. Some are floating gardeners, while others are both fishers and floating gardeners at the same time. Some are motor service providers and at the same time, may be fish traders. As a result, their interests are not similar, though they could still set up institutions according to their interest group.

Within the floating gardening sector, local people should have their own institution, such as a floating gardeners' association, as then they could set up their own rules on the use of pesticides and fertilizers and provide education on how to use these chemical inputs more effectively and safely. Moreover, in the case of the crop price, they could negotiate with other stakeholders, such as the middlemen and traders. In the future, they could set up organic agriculture and an organic market, after setting certain standards for product quality. In terms of financial capital and inputs for their floating gardening activities, they could ask the government or a private bank to set up a microcredit program, as exists in the paddy farming sector. In the long term, they could produce value-added products such as ketchup and jam, and

if they had a strong institution, could make a credible commitment to monitor whether people are following the rules and commitments of their institution.

The fifth strategy, market exchange, is not really an option for the Intha, as they still do not have a strong local institution in place – as highlighted above.

For the above reasons, the Intha have chosen diversification as their way of coping with natural shocks such as the decline in the lake's water level in 2010 and 2011. Among the various factors shaping the sustainability of their livelihoods, their livelihood capitals or assets play a fundamental role. Capitals link with one another to produce a livelihood, and most of the local people have similar physical and natural capital, and most of them are weak in terms of social relations with outsiders. When they join the local tourism market as part of their diversification, the livelihood situation that results is very much linked to the social capital or social relations they have. Those who have good social relations with outsiders can make a good profit.

Most of the villagers are at the same level in terms of financial capital, although a few are better-off in the village. All in all, their livelihoods are dependent upon the quality and quantity of human capital they have access to, because their jobs are labor intensive. In the case of fishing, a household which has more fishers can catch more fish, though the skills of the labor are also important.

6.3 Policy Implications

This study makes an empirical contribution to the local process of interaction between the Inle Lake's environment and the local inhabitants - the Intha, and especially in terms of their livelihoods. While environmental degradation has drawn the attention of environmentalists, I have shown here how the livelihoods of local people have intensified in the Inle Lake area due to environmental uncertainty, and how the Intha have tried to cope with their changing environment, according to their livelihood assets. This study will help policymakers, INGOs, NGOs and civil society groups to understand the local, social context of Inle Lake, so as to take account of the current livelihood situation among the local people, as well as the environmental degradation of the lake.

The findings of this study reveal that policymakers and the local authorities should clearly identify the current risks facing the local people and their livelihoods,

and what their needs are, if they wish to create sustainable livelihoods in line with local development measures.

In addition, I have identified the root causes and impacts of the environmental deterioration around Inle Lake, so that policymakers and civil society players can decide upon what measures should be taken account of within environmental restoration programs. As environmental degradation is not just a technical and scientific issue, but also a social and political concern, any rehabilitation program around Inle Lake should be accompanied by social security measures.My study supports some data on livelihood interaction of the Intha and their changing environment to those who wish to work as volunteers or NGO staffs in Inle Lake area.

Currently, there is an urgent need to create environmentally-friendly ways of life around Inle Lake, and this should be taken account of by all stakeholders, including policymakers, local people as well as government and NGO staff.

6.4 Constraints and Recommendations for Further Study

Limited time and resources have led to the following shortcomings with my study. Transportation was somewhat difficult because it was not possible to travel between villages without a boat, meaning I could not capture detailed information for the whole lake area, though I was able to explore and visit around 30 villages.

The legal rights to access natural resource are somewhat complicated and not clear, and in the case of the floating gardening sector, some problems existed in terms of accessing the area.

Some people did not want to be interviewed, and some thought I may be a spy, so were afraid they would get into trouble if their answers were misunderstood by me, although I showed them my forms of identification and tried to become familiar with all of them.

In future studies of this area, the researchers should take longer, so as to fully cover the situation that exists around Inle Lake. As already stated, the lake is 22 km long and eleven kilometers wide, so time should be taken to investigate the context of the lake thoroughly.

More importantly, to know the current situation and its environmental impacts, any future researchers or investigators should talk with local people from different

locations and different levels. To interview just a few people will not provide enough information for a proper investigation to take place. The more researchers talk with local people, the better the level of understanding they will develop about the situation, because there are 36 village-tracts around the lake. Even on the lake itself, the situation among the villages varies, as they often have different backgrounds.