



Norwegian University of  
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# Effects of Ecotourism Benefits on Local Support for Conservation

A Case Study of Local Perceptions of Inlay  
Lake, Myanmar

**Phyo Thuzar Win**

Natural Resources Management

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Supervisor: Eivin Røskaft, IBI

Norwegian University of Science and Technology  
Department of Biology



## **Abstract**

Conservation efforts by the local people are increasingly seemed as important with respect to the protected area management of developing countries. Such practices often involve ecotourism through income generating activities. It is worthy for the inclusion of ecotourism in protected area management if it generates funding for PA conservation, enhances benefit-sharing for the community, reduces resource-intense practices and encourages their positive perceptions towards conservation. In this study, the effects of ecotourism benefits on PA have been tested in terms of perceiving ecotourism as beneficial, conservation involvement and perceptions towards ecotourism and conservation by the local people. Local people are meaningful stakeholders as they depend on Inlay Lake in Myanmar for their primary livelihood. Subsequent to this, demographic factors that influence the local receipt of ecotourism benefits, conservation involvement and perceptions were also identified. Among them, locality and occupation were found to be significant factors that influence local perceptions towards ecotourism and conservation. Using a questionnaire survey, 250 farmers, fishers, ecotourism-related people and other residents living in the vicinity of the lake, lowlands and highlands were sampled. Other significant variables included age, gender, education, household size, land-holding size and local knowledge. The results revealed that 45% of the respondents perceived ecotourism as beneficial, while 55% had never or seldom participated in conservation activities related to wetland and biodiversity. Furthermore, local people are optimistic about ecotourism but their conservation perceptions are only marginally positive. In addition, lake dwellers are more likely to perceive ecotourism as beneficial and are also more inclined to support conservation. The results also indicated that farmers participate in conservation activities more frequently than do fishers and ecotourism-related people. Livelihood change neither affected involvement in ecotourism nor reduced the existing traditional use of wetland. Accordingly, the effects of ecotourism benefits on conservation are discussed in the context of protected areas ensuring benefits from ecotourism as a result of local support.

**Key words:** Ecotourism benefit, conservation, perception, local support, wetland, Inlay Lake

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## Abbreviations

ASEAN	Association Southeast Asian Nations
FD	Forest Department of Myanmar
GIS	Geographic Information System
ha	hectare
IUCN	International Union for Conservation of Nature
kg	kilogram
km <sup>2</sup>	Square kilometre
m	Metre
MAB	Man and Biosphere Reserve
MIID	Myanmar Institute for Integrated Development
mm	Millimetre
MOHT	Ministry of Hotels and Tourism of Myanmar
NBSAP	National Biodiversity Strategy and Action Plan
NTNU	Norwegian University of Science and Technology
PA	Protected Area
SDGs	Sustainable Development Goals
SPSS	Statistical Package for the Social Sciences
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNWTO	United Nations World Tourism Organization
USD	United States Dollar



# 1 Introduction

Due to the importance of wetlands for the livelihoods of the local populations, wetland protected areas (PAs) in low-income countries seem to be increasingly constrained with respect to livelihood opportunities (Aung et al. 2015). An abundance of wetland biodiversity provides various ecosystem services for the human well-being (MEA 2005). Considering the exponential population growth, increasing human activities in the wetland areas can degrade the functions of the wetlands and decrease the biodiversity because of habitat loss (IUCN 2018). Therefore, the less consumptive use of wetlands has been advocated for socio-economic development in tandem with biodiversity conservation in PA categories greater than III (Naughton-Treves et al. 2005, Dudley 2008). Such intervention of PA management, which can ensure the local support of conservation, commonly addresses ecotourism practices given that ecotourism has a dual function of development and conservation (Mondino 2017). Basically, “protected areas need ecotourism and ecotourism needs protected areas” (Boley and Green 2016). Local perception is used as a parameter to assess whether local support towards conservation is positively influenced by the benefits of ecotourism. The reason is that local perceptions can be modified by the direct or indirect benefits yielded by the PAs (Kideghesho et al. 2007). In addition, the local perceptions who are receiving economic benefits from ecotourism express more positive than those who are not benefiting from ecotourism (Walpole and Goodwin 2001).

Positive perceptions should provoke a reduced consumptive land-use if protection of wetlands can be afforded by the communities (Krüger 2005). Otherwise, the over-exploitation of natural resources in these areas can occur because different groups have different uses of wetland resources (Somarriba-Chang and Gunnarsdotter 2012). This consequently links with the ‘tragedy of the commons’, which is the misuse of the common property pool by an organization or individuals for their own self-interest that in turn leads to the depletion of the resources by their collective actions (Hardin 2009). Thus, local support is considerably important to ensure the protection of highly populated wetlands (Walpole and Goodwin 2001) and reduce human impacts, assuming that humans are a component of the ecosystem (Potschin et al. 2016). However, the cost of protection incurred by communities from ‘fortress conservation’ undoubtedly breeds resentment and then leads to less local support of the PA management actions (Amoah and Wiafe 2012, Thant 2017). Wetland PA conservation, including restricting human encroachment, controlling siltation, reducing invasive species and combating waterfowl hunting, requires local support. Hunting, deforestation, intensive agricultural practices and

cultural tourism are trade-offs of wetland biodiversity decline and habitat alteration (Rao et al. 2002, Htwe 2015). The degradation of significant wetland functions, which are biological productivity, water storage and wildlife habitat protection, inextricably relates to anthropogenic pressure (Wondie 2018). Hence, the success of conservation in protected areas is absolutely dependent on local support, particularly in such reserves where there is in-park residence and consumptive local use (Sekhar 2003). Such conservation requires understanding local people's interests and perceptions to align with conservation goals of the wetland and biodiversity, such as environmental awareness and local involvement. The conservation of wetland PAs without creating less-consumptive land use or alternative livelihood options can hinder its ecological integrity. Thus, ecotourism development becomes dealt with part of community-based natural resource management or decentralization (Kimengsi 2014).

From the aspect of PA policy intervention, ecotourism provides protected areas with direct benefits by way of park entrance fees. However, when such revenues are relatively small for conservation needs in developing countries, it must be understood that protected areas can be supported by community through indirect benefits of ecotourism, especially when considering that ecotourism also benefits the local community. That said, whether ecotourism benefits actually generate local support towards PAs remains controversial (Walpole and Goodwin 2001, Waylen et al. 2009).

Ecotourism, by its nature, is highly dependent on natural capital and hence PA managers question whether ecotourism protects the environment. In fact, there is evidence which suggests that ecotourism is not a universal solution for PAs (Krüger 2005). Nevertheless, ecotourism is generally advocated as a source of revenue and as a connector between conservation and local income for protected areas (Waylen et al. 2009). Interestingly, protected areas and poverty level of a country are related by cost of conservation and the greater the area under protection, the poorer the country (Brockington and Wilkie 2015). From the context of associating conservation with development, to prove that ecotourism is worthy of inclusion in PAs depends on whether ecotourism improves the livelihoods and local perceptions towards PA conservation.

This study focuses on Inlay Lake in Myanmar, which is a highly biological diverse area within the Indo-Burma biodiversity hotspot (Myers et al. 2000). While protected areas currently cover 8.7% of the total land area, that was expected to reach 10% in 2017 (FD 2015, UNEP-WCMC

2018). Additionally, 21 out of 39 PAs have been designed as ecotourism sites (MOECAF and MOHT 2015, Oo 2016). PAs have been increasingly viewed as tourism destinations in the broader policy context of biodiversity conservation and direct contribution to poverty alleviation and other SDGs. Accordingly, the aim of this thesis is therefore to examine whether ecotourism as a livelihood strategy influences local support and their perceptions towards the wetland PA conservation.

## **1.1 Problem statement and justification**

Although Inlay Lake is rich in biodiversity, its ecological integrity is threatened by eutrophication (Lwin and Sharma 2012). It is one of the wetlands which is most highly modified by humans in the country (Khurtsia 2015). This is not unexpected because Inlay Lake is an integral part of livelihood (Su and Jassby 2000). There is a permanent human settlement of an enclave community called ‘Intha’ and their traditional livelihoods have revolved around fishing and farming. The local populations in the vicinity of the lake exceeds 168,000 (Sett and Liu 2014, MOECAF 2015). Such livelihood impacts are therefore directly related to the wetland functions. However, limited research has been conducted to understand how local livelihood opportunities and the wetland are related (Lamsal et al. 2015). Knowledge on how the primary livelihood strategies are mingling with each other is important for natural resource management, especially in such degraded wetland (Soe 2012). As an alternative livelihood strategy, ecotourism not only generates income but also encourage individuals to participate in conservation measures. Furthermore, when there are both in-park residence and traditional uses of park resources, park-people relationship also influences the local perception towards conservation (Zube and Busch 1990). Thus, a better understanding of the interaction effect of knowledge and the park-people relationship on perception is necessary. Accordingly, this study addresses the likelihood that the local community will effectively contribute to the wetland management based on their perceptions. Hence, the status of the lake will be reviewed through three main linkages; livelihood impact, perceptions, and the potential of ecotourism for PA conservation.

### **1.1.1 Livelihood strategies in the wetland**

Wetland biodiversity plays an important role in the wellbeing of the residents (Haines-Young and Potschin 2010). Wetlands are recognized as the most diverse and productive ecosystems

on the planet as they usually include aquatic, agricultural and forest ecosystems (Lamsal et al. 2015). More specifically, wetland biodiversity includes all types of taxa or groups of organisms, such as insects, birds, fish, amphibians, reptiles, mammals and plants that directly depend on wetland ecosystems according to the National Geographic website. The wetlands associated with the lake provide fish for proteins, cultivable land for agriculture and aesthetic scenery for ecotourism, which is meant to be the main source of income for the neighboring communities. According to Chambers and Conway (1992), the concept of livelihood incorporates “the capabilities, assets (including both material and social resources) and activities required for means of living”. Activities that meet the livelihood needs manifest as conservation threats because they degrade the wetland functions due to land use changes caused by overexploitation and exponential population growth (Sakataka and Namisiko 2014).

#### **1.1.1.1 Livelihood strategies in Inlay Lake**

When local people respond to changes in wetland functions and its ecosystem services, taking climate change into account, over time, their livelihood strategies become intensified or extended. Farmers living close to the lake often utilize the wetland for their agricultural products. Several studies highlighted that this extensive hydroponic monoculture of exotic tomato species of 32km<sup>2</sup> in Inlay Lake, which is the highest cash crop (Htwe 2015), was practiced by the overuse of inorganic fertilizers and pesticides that considerably exceeded than the recommended ratios (Butkus and Myint 2001, Rerkasem 2004, Michalon 2017a). Difficulties in market accessibility still hinder tomato farmers to use good agricultural practices, introduced in 2017 by the Department of Agriculture (Myanmar-Times 2017). In a similar vein, against declining fish stocks (Okamoto 2012), fishermen increased their efforts by spending more time fishing with more intensive equipment such as fishing gears and electrification. However, it rarely yielded the desired returns. Moreover, due to the lack of a land use map, growth of ecotourism industry and other related industries has been so massive that it has driven dramatic land use changes, such as the displacement of villages, which resulted an empty hotel zone of 2.5 km<sup>2</sup> along the southeastern fringes of Inlay lake (Michalon 2017b). As motorboat trips across the lake are a major tourist activity, goldsmiths, silversmiths, blacksmith, weavers and other handicraft cottage industries were found along the lakesides (Akaishi et al. 2006). Such accumulated and unsustainable human activities are threatening the long-term survival of the wetland ecosystem (RCSE-ILEC 2014). Hence, it is hypothesized that those who are engaged in traditional uses of wetland resources, particularly resource-intensive practices by

farming and fishing, neither receive ecotourism benefits nor do they support conservation efforts.

### **1.1.2 Why local perception matters in wetland conservation**

Considering the population pressure in the lake vicinity and the overlapping or closeness of wildlife habitats and human settlements, the human impact on wildlife conservation is significant. The aforementioned livelihoods are heavily relying on the wetland; meanwhile, the nearby communities are still incurring greater opportunity cost of conservation as a result of the prescribed laws and regulations and restrictions on wetland use, such as overfishing, extending floating gardens, waterfowl hunting and algae extraction (Cobbinah et al. 2015). Cost of PA can be substantial but affordable only if the local people agree. Otherwise, it can beleaguer PA management due to the conflicts that arise when the conservation interest and local interest contradict each other. The past history also indicated that bureaucratic conservation could never ensure PA survival for generations, without raising issues of illegal activities, land-use conflict and environmental degradation. Negative perceptions and poor knowledge could cause unforeseen obstacles in biodiversity conservation. Then, the perceptions of the local people can justify the success of conservation (Allendorf et al. 2006). This is because perceptions are influenced by pre-existing values and processes that are concealed from outsiders (Allendorf et al. 2006, Waylen et al. 2009). The concept of perception refers to “people’s beliefs that derive from experiences and interactions with a program or activity” (Htun et al. 2012). Similarly, local perceptions are important for park-people relationship which is an indicator for long-term protected area existence. Therefore, examining the local perceptions with respect to biodiversity conservation based on their various kinds of adapting livelihood strategies (Okamoto 2012) plays an important role in determining the optimum level of local engagement in PA management. It requires a collective performance of key stakeholders (Le Saout et al. 2013). Statements related to awareness and local knowledge about the wetland were used to determine whether they influence perceptions towards conservation.

### **1.1.3 Ensuring local support in wetland conservation**

In the face of institutional and socio-economic changes, livelihood strategies to adaptively use biological resources are related to diverse arrays of the individual’s own knowledge and value of these resources (Htun et al. 2012). Without a basic understanding of the local people’s

priorities and perspectives, the resource uses are most likely misinterpreted (Reo 2011). Accordingly, many social and economic conflicts in PAs stem from the exclusion of local people in the use and management of wetland resources (Somarriba-Chang and Gunnarsdotter 2012). Such conflicts then trigger weak collaboration in any participatory approach, which is the most common fund ensuring management tool in conservation activities of PAs (Pimbert and Pretty 1997).

Local communities are meaningful key stakeholders to implement actions related to the control of overexploitation of natural resources throughout the lake's watershed (Andereck and Nyaupane 2011). National policy has stressed to achieve local engagement not only in the implementation of business models of ecotourism (MOECAF and MOHT 2015) but also in the rehabilitation and management of Inlay Lake and its watershed areas (MOECAF 2015). However, a bottom-up approach in planning and decision making can often be complicated given that high level of initial investment and management knowledge in ecotourism or wetland rehabilitation is beyond local capacity (Krüger 2005). Moreover, the issue of benefit sharing likely impedes collaboration due to the fact highlighted by Buijtendijk and Tschunkert (2016) that “actors purposely produce and maintain strategic situations to benefit some at the cost of many others by liquidating natural resources,” in the case of a weak governance setting. It is also asserted that PAs can benefit from ecotourism only if it is on a small-scale<sup>1</sup> and it is locally driven (Weaver 1991). Statements regarding conservation experience were used to verify which factors influence conservation support.

#### **1.1.4 Ecotourism in Inlay Lake**

According to the UNWTO (2014), “sustainable tourism, including ecotourism, takes full account of its current and future economic, social and environmental impacts, addressing the needs of the visitors, the industry, the environment and the host communities”. Ideally, ecotourism is an open and strongly advocated practice of PA systems throughout the country (MOECAF and MOHT 2015) so that ecotourism can ensure economic benefits to the local people without causing any harm to the nature. In reality, the implementation of ecotourism has been riddled with uncertainties because the benefits sharing with the communities is not automatic (Magio et al. 2013).

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<sup>1</sup> Generally 5 to 10% of the PA for ecotourism



On the one hand, ecotourism is neither an end in itself nor it is a development tool for lake sustainability, as its impact may not fully align with the PA regulations. In this sense, the tourism industry continues to fuel the economy and act as the primary indirect driver of habitat change (Palomo et al. 2014). Ecotourism is based on nature and thus if the geographical feature of ecotourism site is mountainous, the fragility of ecosystem could be greater due to pollution and erosion (Krüger 2005). All in all, it is unlikely to create substantial revenues from protected areas by means of ecotourism in developing countries (Wells 1992).

On the other hand, it is argued that expanding tourism offers opportunities for better management of the conservation issues in Inlay Lake (Jensen 2014). During the financial year 2013-2014, 110,000 international tourists visited the lake (MOECAAF 2015). Ecotourists are generally well-educated individuals who have high incomes and exhibit a willingness to spend or donate money at the tourism destination. This consequently raises awareness among local people into support of conservation after ecotourism experience (Krüger, 2005; Wearing and Neil 1999). Furthermore, it has been argued that ecotourism has less environmental impact in comparison to any of the other adaptive livelihood strategies, including hydroponic farming and overfishing (Htwe 2015). Moreover, if economic benefits from ecotourism generate more positive local perceptions towards protected area, this could be the first building block for collaborative management. Nonetheless, the management plan must carefully consider the socio-cultural changes that may influence the cash flow within the local economy due to the greater demand for foreign products (Mbaiwa and Stronza 2010). Statements regarding perceiving ecotourism as beneficial and impact awareness were analysed to determine whether ecotourism benefit and awareness affect conservation support.

A summary of the literature review indicates that for protected areas to benefit from ecotourism in terms of local support, ecotourism must be locally-driven and implemented neither on too widespread nor on too narrow scale (Weaver 1991). Furthermore, livelihood strategies are adaptively changing into more intensive or extensive use of wetland resources, due to degraded wetland functions and climate change (Okamoto 2012). To reduce such human impacts, local involvement in conservation is necessary and perception surveys are necessary to reveal hidden issues of conservation from the outsiders (Waylen et al. 2009).

## **1.2 Research design**

The main objective of this thesis is to test whether the ecotourism benefits in Inlay Lake generate greater local people support for conservation and endorse their perceptions towards ecotourism and conservation to be more positive.

Accordingly, this study will determine whether the community really perceives ecotourism as beneficial, which socioeconomic factors contribute to local people employment in ecotourism and whether those who are employed in ecotourism earn higher incomes than those engaged in other occupations. Finally, the study will examine whether perceiving ecotourism benefits influences local natural resource extraction level, their support of conservation and perceptions towards ecotourism and conservation.

It is hypothesized that if the locals who perceive benefits from ecotourism, they are better-off economically and less dependent on natural resources. Thus, such benefits more positively influence local support and perceptions towards ecotourism and conservation. The supporting predictions are as follows;

1. People who have perceived ecotourism as beneficial or have been employed in ecotourism-related businesses will earn higher incomes than those engaged in any other livelihood strategies.
2. Those who have perceived ecotourism benefits extract fewer natural resources than those who have not perceived such benefits.
3. Those who have not perceived ecotourism benefits are more likely to use traditional methods to extract wetland resources.
4. Those who have perceived ecotourism benefits support conservation and have positive perceptions towards ecotourism and conservation.
5. Those who have 'supported' conservation exhibit more positive perceptions towards conservation.
6. Perceptions towards ecotourism align with perceptions towards conservation.

## **2 Materials and Methods**

### **2.1 Research overview**

Four common different user groups of Inlay Lake were interviewed, namely, farmers, fishermen, ecotourism-related people and other residents. The lake is the core zone of Inlay Lake Man and Biosphere reserve (MAB) of 534 km<sup>2</sup>. Although there is another MAB in northern Myanmar, its ecotourism infrastructure is not as well-developed as that of Inlay Lake. Moreover, Inlay Lake was chosen as a case study because this wetland is one the most environmental-critical PAs, which is extensively modified by humans more than any kind of ecosystems in the country (Khurtsia 2015). Therefore, a case study approach regarding local perceptions was applied in this research as to comprehend a particular phenomenon of ecotourism effect on local conservation support (Neuman 2013).

### **2.2 Study area**

The Inlay Lake is the country's second largest highland lake within a broad valley surrounded by two limestone ridges covered by a mixed hill forest. This natural lake encompasses an open water area of 62.2 km<sup>2</sup> at 884 m above sea level. It is located between coordinates N 20°18' to N 20°53' latitudes and E 96°50' to E 96°57' longitudes (Htwe 2015), and spans across the three townships of Nyaung Shwe, Pinlaung and Peh Kon of the Shan plateau in eastern Myanmar and the Thanlwin river basin. The lake is fed by 35/110 billion m<sup>3</sup> of water a year from four streams, namely, Kalaw Chaung and Indein (or Balu) Chaung from the west, Nanlet Chaung and Negya Chaung from the north. The Balu Chaung is the only outlet that flows south to the Samka lake and Mobyre reservoir, which produces hydropower that provides 15% of the nation's total electricity needs (Michalon 2014). The socio-cultural values of the 'Shan' added to the nature-based ecotourism of Inlay Lake.

Climatically, the monsoon rains prevail from June to October and are seasonally accompanied by rises and falls in the lake's water level such that it is 2 m higher in October than it is in May (May 2008, Michalon 2014). Daytime temperatures range from 12°C to 25°C in December and 20°C to 35°C in April. The recent ten-year average rainfall is 988 mm (Htwe 2015).

Depending on the proximity to the Inlay Lake, livelihood options are diversified. The lake is inhabited by more than 168,000 people (MOECAAF 2015) with a population density of 386

people per km<sup>2</sup> on the water and 89 people per km<sup>2</sup> in the vicinity of the lake (Mjelde et al. 2017). The occupations of these individuals include farmers, fishers and small-scale business owners. Within the lake, hydroponic agriculture of tomato, which is the main cash crop for mainstay (Htwe 2015), is practised by year-round floating gardens<sup>2</sup> on teak bedding<sup>3</sup>. Fishing vehicles are essentially local cylindrical boats<sup>4</sup> with modified ends or edges that serves as a platform to stand-up for leg rowing. The lakeside villages offers jobs related to ecotourism such as sight-seeing tours and numerous small-scale craft business specializing in silverware, ironware, woodcrafts and textiles. The lake is an important waterway as evidenced by at least 1860 motor boats that have been registered (oral information from Township Administration Office, July 2017). In the lowland area, the neighbouring town of ‘Nyaung Shwe’ is an ecotourism hub to Inlay Lake. It is the place where hotels and tourism services are mainly available (Instituto-Oikos and BANCA 2011). Similarly, the agencies and offices responsible for lake conservation have also been established there. Another common occupation in the lowland area is agriculture on plains in transition to mountain ranges and the lake (Htwe 2015). In the highland areas, the main cash crop of highland agriculture is sebesten<sup>5</sup> (*Cordia dichotoma* G. Forst), which is planted on sloping terrain by using shifting cultivation<sup>6</sup> (Htwe, 2015).

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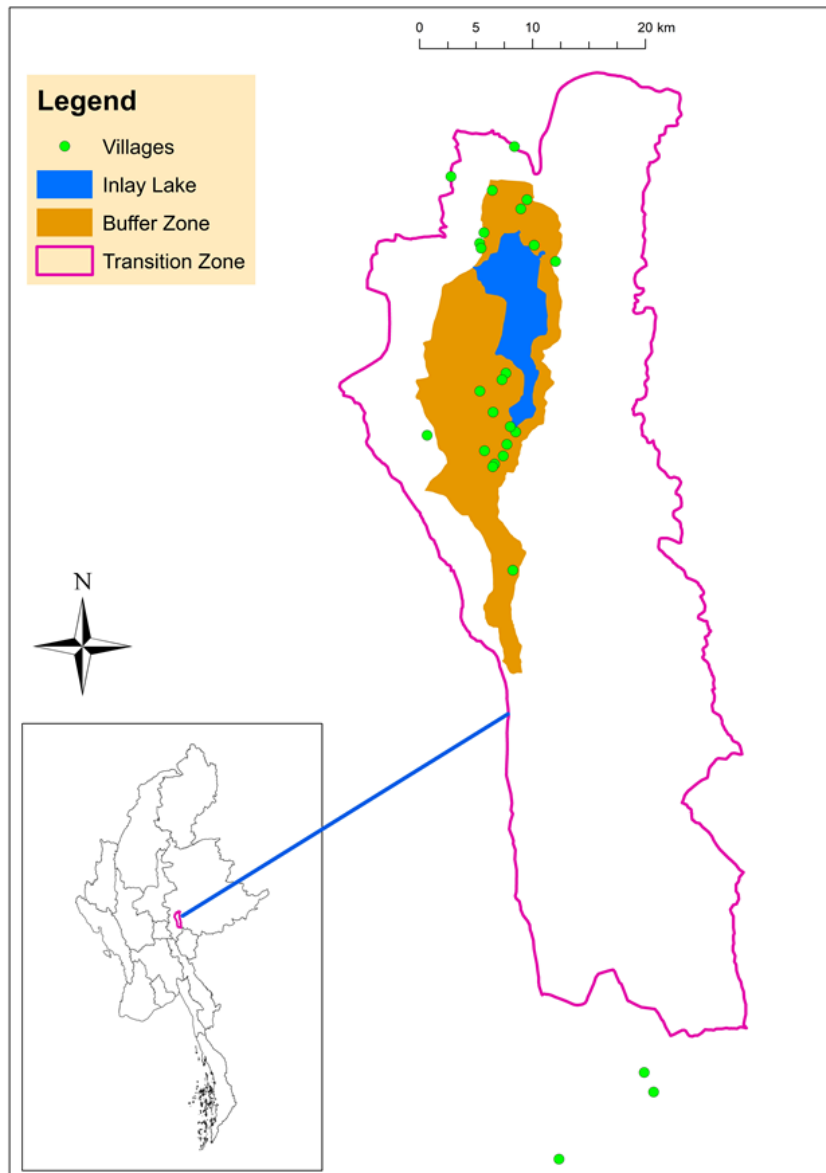
<sup>2</sup> floating garden = ye chan (local term)

<sup>3</sup> teak bedding = kyun myaw (local term)

<sup>4</sup> Cylindrical boats = saung (local term)

<sup>5</sup> Sebesten = tha net phet (local term)

<sup>6</sup> Shifting cultivation = taung ya (local term)



*Figure 2.1 Map of Inlay Lake Man and Biosphere Reserve with Selected study villages*

### **2.2.1 Biological diversity**

Endowed with endemic fish species and distinct biophysical characteristics (May 2008, Htwe 2015), Inlay Lake has been designated by the government of Myanmar as a wildlife sanctuary in 1985, by the ASEAN as an ASEAN heritage park in 2003 and by the UNESCO as a MAB in 2015 according to UNESCO website. It is one of the 21 ecotourism sites in Myanmar and a key biodiversity area at medium level (WCS Myanmar 2013). In addition to the native aquatic plants and freshwater fishes, the wetland wildlife sanctuary has been established over three decades to protect resident and migratory birds, particularly water birds migrating between Siberia and Australia (MOECAAF 2015). Also protected under IUCN category IV, there are

diverse fauna and flora species. For example, Inlay Lake is a nesting place for the globally endangered Sarus crane (*Grus antigone*) and also the habitat for an endemic fish species of Inlay Carp (*Cyprinus carpio intha*). Fauna species recorded include 9 mammal species, 351 bird species (including 92 water birds), 43 fish species (which is major protein food source and), 94 butterfly species, 23 amphibian species (including 10 reptiles) and 3 turtle species. Classified flora species are 86 species of trees, 11 species of bamboo, 184 species of orchids, 527 species of medicinal plants, 12 species of algae, 292 species of angiosperms (Monocot.) and 1320 species of angiosperms (Dicot.) in flora (FD 2017). Statements regarding species richness were included in the questionnaire to assess whether local knowledge affects conservation support.

### **2.3 Data collection by questionnaire**

Perception and knowledge surveys were administered to residents living on the lake, in lakeside villages and hillside communities to understand how to engage the local people in biodiversity conservation (Jensen 2014). Both quantitative and qualitative data collection was conducted during July and August 2017, by using semi-structured questionnaire-based face-to-face interviews among the four prominent user groups in the Inlay Lake (Appendix B). One prominent group is agriculture who do farming of crops, vegetables and livestock (n = 93 of 250). The mode of frequency among different kinds of primary crops was maize, followed by tomato, paddy, sugar cane and beans. 74% of farmers own less than 2 ha of land while 18% own from 2 to 4 ha, 3.1% own more than 4 ha and 1.5% are land-less. Fishermen (n = 32) do fishing either for subsistence or commercial gain, and their average daily fish catch is 1.67 kg  $\pm$  3.5 kg. People working in ecotourism-related jobs (n = 79) are classified into five groups: transportation, hotel and restaurant positions, tour guides and tour services, temple sales and cottage industries such as gold, silver, bronze, wood, textiles, etc. The mode of frequency with respect to the various types of ecotourism involvement is transportation by way of motor boat owner and drivers for boat trips, followed by textile workshops and temple sales. The sample size of other residents was 46. Majority of the respondents were contacted with the assistance of local authorities, specifically, the Myanmar Forest Department.

Respondents were categorized by occupation and locality. As illustrated in Figure 2.1, 27 villages from different localities within Inlay Lake were selected using coordinates of a Geographic Information System GIS and the MAB zonation map (Appendix C). They are located on the water (nearby core zone of MAB), on the lowland (around the edges of the lake-buffer zone) and the highland (nearby areas - transition zone). This led to 250 individuals,

specifically, 127 respondents are on the water and 85 respondents on the lowland and 38 respondents from the highland. These respondents were selected by using stratified random sampling methods and based on the following three criteria: a) communities with different kinds of livelihood contributions from the wetland of ecotourism site, b) communities from different zonation of MAB zones, and c) communities with readiness to participate in the research.

### **2.3.1 Independent variables**

Regarding independent variables, the questionnaire consisted of two sections. The first section gathered personal data including gender, age, education level, household size, occupation, income, ethnicity, length of residence and benefits from ecotourism. The second section assessed their local knowledge to use and control wetland ecosystem services related to adapted livelihood strategies including ecotourism. To assess their local knowledge, they were asked five questions. How many fish species are there? How many bird species are there? How many amphibian species are there? Can you name any invasive species near or in the lake? Do you know that Inlay Lake is also referred to as MAB? The variable of perceiving ecotourism as beneficial was derived from the dichotomous question (Yes, No).

### **2.3.2 Dependent variables**

The variable of conservation support was also derived from the dichotomous question, '*Have you ever supported conservation efforts?*' (Yes, No). The other two dependent variables, which focused on perceptions towards ecotourism and conservation, were obtained from the following statements as shown in Table 2.1. The evaluation of the statements included Yes/No binary responses and 3-point Likert scale responses. When agreeing with the statement, positive answers for each question were scored 1; and 0 otherwise. Score of local knowledge of wetland species richness was marked as 1 if their answer is close to the official record. Then, score of awareness question, shown in bold, was reversed to indicate positive perception. The sum of the answers for knowledge, perception towards ecotourism and perception towards conservation ranged from 0 to 9 scores, 0 to 4 and 0 to 7, respectively. The overall perceptions were assumed to be positive or negative depending on the mean value and were used as dependent variables for regression models.

*Table 2.1 Combining independent variables for dependent variables*

<b>Statement</b>		<b>Right answer/ Agree with statement</b>	
<b>Knowledge</b>			<b>Mean Value</b>
i)	How many fish species are there?	0-1	0 - 9
ii)	Did you catch more fish this year?	0-1	
iii)	How many bird species are there?	0-1	
iv)	Did you see more birds this year?	0-1	
v)	How many amphibian species are there?	0-1	
vi)	Do you think water level was higher this year?	0-1	
vii)	Can you name any invasive species?	0-1	
viii)	Do you know that Inlay lake is also referred to as Inlay Lake MAB?	0-1	
ix)	Do you traditionally use wetland for your interest?	0-1	
<b>Ecotourism Benefits</b>		<b>Agree with statement</b>	<b>Mean Value</b>
i)	Ecotourism is beneficial to my family income.	0-1	0 - 1
<b>Perception towards ecotourism</b>			<b>Mean Value</b>
ii)	Ecotourism activities may have negative impacts on the wetland area.	0-1	0 - 3
iii)	I would be happy if any family members became involved in ecotourism services.	0-1	
iv)	The area should be reserved for traditional uses only, by stopping ecotourism.	0-1	
<b>Conservation Support</b>			<b>Mean Value</b>
i)	I participated in conservation activities of lake and biodiversity, e.g., de-weeding, siltation control and planting trees, etc.	0-1	0-1
<b>Perception towards conservation</b>			<b>Mean Value</b>
ii)	<b>The local people's use of the wetland is not detrimental to the sustainability of aquatic life.</b>	<b>0-1</b>	0 - 6
iii)	The future of the wetland could be better.	0-1	
iv)	It is easy to access the biological resources, such as algae and fish from the wetland.	0-1	
v)	It is good that this lake is protected by the government.	0-1	
vi)	The prescribed rules and regulations are easy to follow.	0-1	
vi))	The park staff are making the sufficient amount of effort to conserve wildlife.	0-1	



## **2.4 Data analysis**

Descriptive statistics was used to summarize the collected field data. Pearson's chi-square and Spearman's rank-order correlation analyses were performed to test the relationship between dependent and independent variables. Logistic and linear regression analyses were carried out to identify significant factors that influenced the independent variable. The interpretation of the results was complicated when the categorical data were not binary and consisted of more than two components. Therefore, the components of the statements were reduced to binary categories, i.e., agree, disagree, even though responses were recorded on a 5-point Likert scale. SPSS software (IBM Corp. Released 2017. IBM SPSS Statistics for Macintosh, Version 25.0. Armonk, NY: IBM Corp) was applied to test all statistical analyses. The significant level for statistics on the questionnaire was set at  $p \leq 0.05$ .

## **2.5 Socio-economic Characteristics of sample**

Data were collected from altogether 250 respondents. The ratio of males to females was approximately 2:1. Nearly two-fifths of respondents (39.3%) were 50 years of age or more, 22.8% and 23.7% respectively were middle-aged (30 to 39 years and 40 to 49 years), while 14.2% were young (18 to 29 years). With respect to education level, 45.1% of the respondents had secondary or higher education, 42.9% had completed elementary school level and 12.1% had never attended school. Half of the respondents were lake dweller, while 34% were from the lowland and 15.2% were from the highland. Agriculture, ecotourism and fishing were the main livelihoods of the respondents. The population of Inlay lake, is dominated by a single ethnic group called Intha (88.2%). The average household size was five persons. Of lake dwellers, 89% were locally born. Furthermore, there was no significant difference in age or household size with respect to locality. The above data are presented in Appendix A.

### 3 Results

#### 3.1 Involvement in ecotourism-related occupations

##### 3.1.1 Distribution of different occupation types

In this study, respondents were engaged in one of the four different occupations; including farmers, fishermen, ecotourism-related businesses or other businesses. Farming and ecotourism-related businesses were the most common types of occupations in each of the three localities, i.e., within lake, lowland and highland areas, although occupations were diversified depending on locality (Figure 3.1;  $\chi^2= 31.34$ ,  $df = 6$ ,  $p < 0.001$ ). Most respondents on the lake were engaged in the ecotourism industry, while the majority of the respondents in the lowland and highland areas were also farmers.

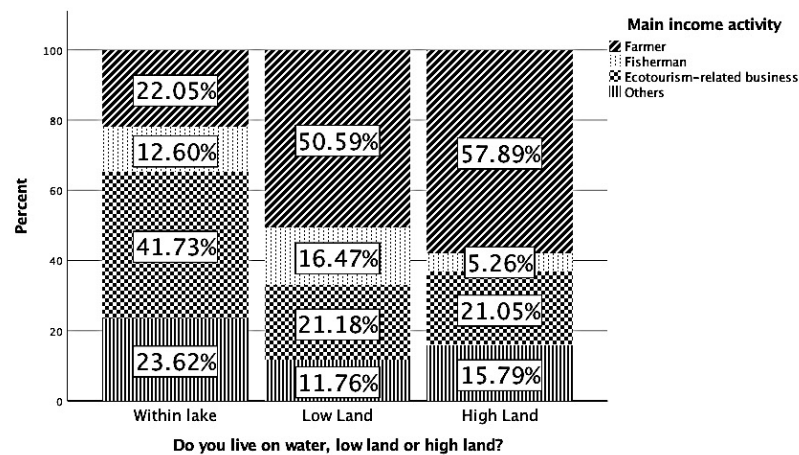


Figure 3.1 Distribution of occupation types in each locality

##### 3.1.2 Ecotourism involvement and household income

The level of household income differed based on whether the respondents were involved in ecotourism services. Specifically, those involved in ecotourism-related businesses often received higher income level than their counterparts in one of the three occupations ( $\chi^2 = 17.03$ ,  $df = 2$ ,  $p < 0.001$ ; Figure 3.2).

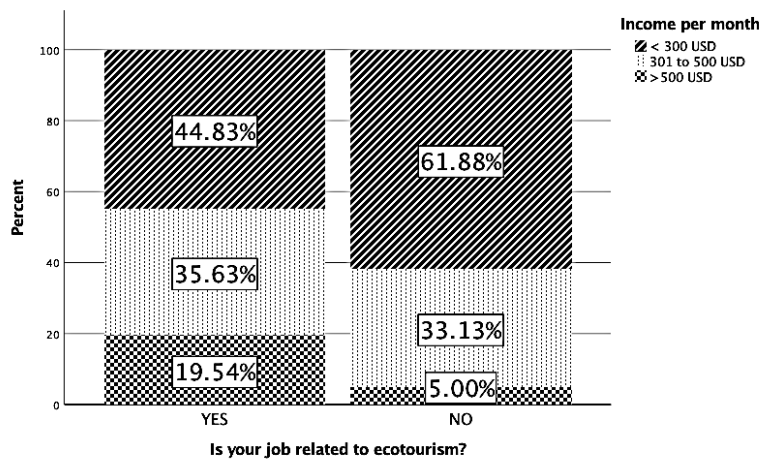


Figure 3.2 Relationship between involvement in ecotourism and household income

### 3.1.3 Perceiving ecotourism benefits with respect to demographic variables (Locality, Occupation and Length of Stay)

Significantly, respondents from villages within the lake answered “yes” to the question “Is ecotourism beneficial to your family income?” than did those from villages in the low and high lands ( $F_{(2,240)} = 11.12, p < 0.001$ ; Figure 3.3a). Furthermore, those perceiving ecotourism as beneficial differed statistically significantly depending on their different occupational statuses ( $F_{(3,239)} = 35.62, p < 0.001$ ; Figure 3.3b). Those involved in ecotourism related businesses received more benefits from ecotourism. Finally, people with lengths of stay of less than 10 years were more likely to perceive ecotourism benefits than were locally born residents ( $F_{(3,237)} = 2.77, p = 0.042$ ; Figure 3.3c).

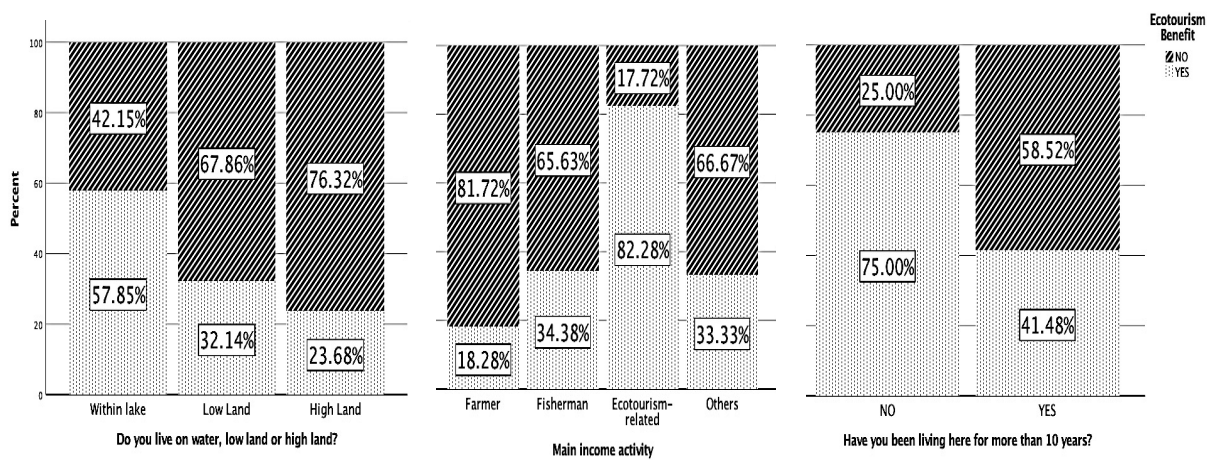


Figure 3.3 Responses of local people towards the question “Is ecotourism beneficial to your family income? (YES, NO)” in relation to a) locality, b) occupation type and c) length of stay

**Table 3.1** Logistic regression analysis regarding the question “Is ecotourism beneficial to your family income? (Yes, No)” as a dependent variable and with different independent socioeconomic variables (n = 250) (Nagelkerke  $r^2 = 0.445$ ).

	<b>B</b>	<b>Std. Error</b>	<b>Wald</b>	<b>df</b>	<b>p</b>
Locality (within lake)	1.324	0.523	6.406	1	0.011
Occupation (ecotourism)	2.447	0.483	25.716	1	<0.001
Household size (larger)	0.204	0.082	6.206	1	0.013
Residency (longer)	1.552	0.796	3.815	1	0.051
Constant	-2.943	0.779	14.278	1	<0.001

A logistic regression analysis (Table 3.1) with dependency of ecotourism (Yes, No) as a dependent variable revealed that there was a significant difference for perceiving benefits depending on locality, occupation, household size and length of residency. The lake dwellers, people with ecotourism-related occupations, families larger than the average household size of 5 and people with longer lengths of stay in the area (2-10 years) were more likely to perceive ecotourism benefits. These four variables explained 44.5% of the variance in perceived benefits.

### 3.2 Demographic factors influencing statements of perceptions towards ecotourism and conservation

#### 3.2.1 Gender, age and education

**Table 3.2** Difference in statements of perception towards ecotourism and conservation in relation to age, gender and education

Statement	Gender		Age		Education Level	
	$\chi^2$ (1)	p	$\chi^2$ (3)	p	$\chi^2$ (2)	p
<b>Ecotourism</b>						
Ecotourism is beneficial to my family income.	3.65	0.056	4.03	0.259	6.79	<b>0.034</b>
I would be happy if more family member became involved in ecotourism services.	32.78	< <b>0.001</b>	6.67	0.083	1.5	0.473
The area should be reserved for traditional uses only, by stopping ecotourism.	26.87	< <b>0.001</b>	11.5	<b>0.009</b>	1.46	0.483
<b>Conservation</b>						
The future of the wetland could be better.	13.19	< <b>0.001</b>	5.75	0.124	0.88	0.062
It is easy to extract the biological resources (fish and algae) from the wetland.	12.9	< <b>0.001</b>	0.18	0.981	4.62	0.491
I have participated in conservation activities.	0.84	0.359	6.36	0.095	18.96	< <b>0.001</b>

Respondents' perceptions differed depending on gender, age and education, as presented in Table 2. Only education level influenced the statement that "Ecotourism is beneficial to my family income". The more educated people were benefitted the most (Figure 3.4). In response to the statement "I would be happy if a family member became involved in ecotourism services", respondents only differed significantly based on gender (Figure 3.4). Not only gender but also age were related with the statement "The area should be reserved for traditional use only, by stopping ecotourism". The responses to the two statements "The future of wetland could be better" and "It is easy to extract the biological resources (fish and algae) from the wetland" differed by gender, while the responses to the statement "I have participated in conservation activities" differed according to education level (Figure 3.5).

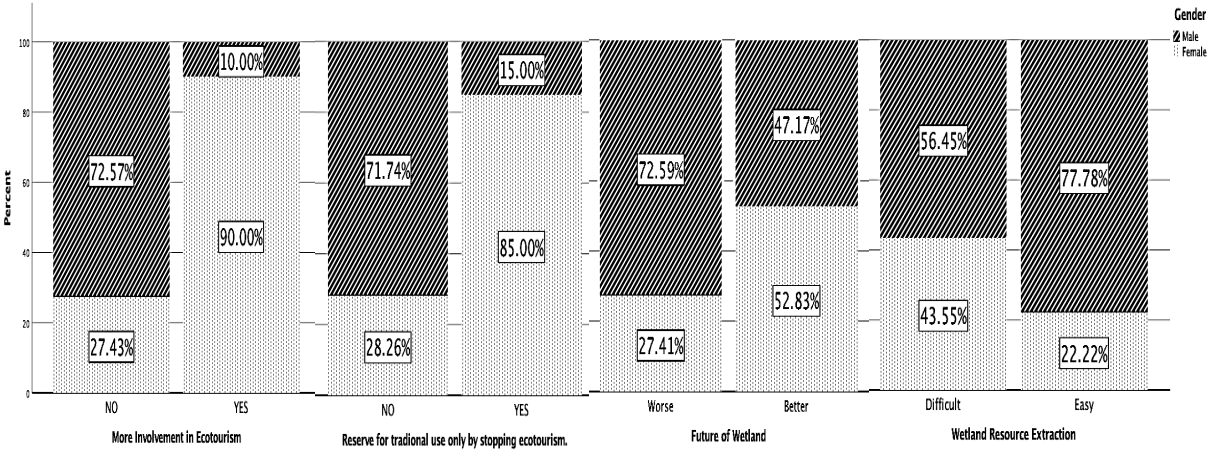


Figure 3.4 Local perceptions towards ecotourism and conservation in relation to gender

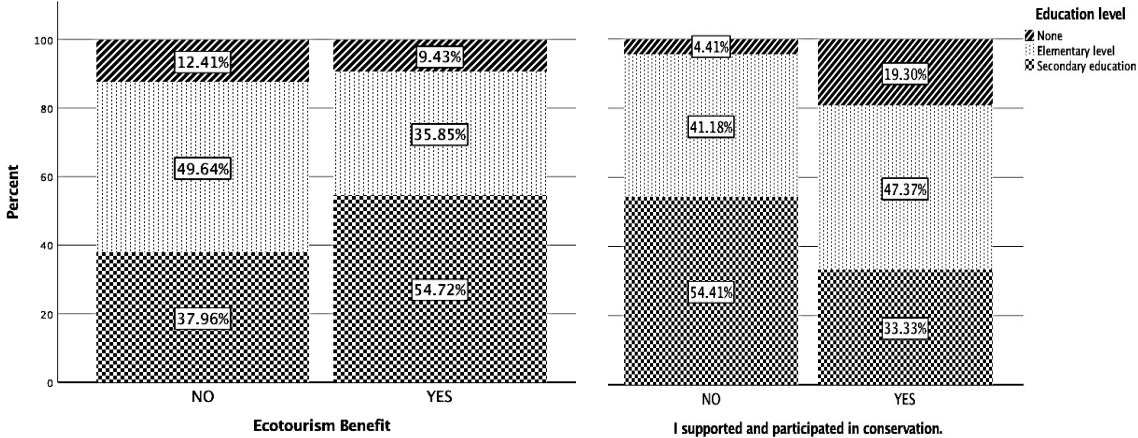


Figure 3.5 Local perceptions towards ecotourism and conservation in relation to education level

### 3.2.2 Locality and occupation

Table 3.3 Responses to statements of ecotourism and conservation of Inlay Lake in relation to locality and occupation status

Statement	Locality		Occupation	
	$\chi^2$ (2)	p	$\chi^2$ (3)	p
<b>Ecotourism</b>				
Ecotourism is beneficial to my family income.	20.61	< <b>0.001</b>	75.08	< <b>0.001</b>
The area should be reserved for traditional use only, by stopping ecotourism.	21.77	< <b>0.001</b>	67.18	<b>0.004</b>
I would be happy if more family members became involved in ecotourism.	21.05	< <b>0.001</b>	31.34	< <b>0.001</b>
<b>Conservation</b>				
It is easy to extract algae and fish from the lake.	5.65	0.059	18.36	< <b>0.001</b>
It is good that the lake is protected by the government.	13.83	<b>0.001</b>	16.72	<b>0.001</b>
The prescribed PA rules and regulations do not prohibit any kind of wetland use.	27.62	< <b>0.001</b>	4.86	0.182
I participated in conservation.	25.56	< <b>0.001</b>	10.02	<b>0.018</b>
The park staff are making the sufficient amount of effort to conserve forest and wildlife.	16.01	0.857	7.68	<b>0.053</b>

Firstly, respondents' perceptions towards ecotourism differed depending on not only locality but also occupations as evidenced by the results in Table 3.3. Specifically, occupation type was a more significant predictor of perceiving ecotourism benefits in the regression model (Table 3.1). Both locality and occupation differed in response to the three statements that "Ecotourism is beneficial to my family income", "I would be happy if any family member is involved in ecotourism services" and "The area should be reserved for traditional uses by stopping ecotourism". Lake dwellers perceived more benefits from ecotourism (Figure 3.6). They were more highly motivated to be employed in ecotourism but express an interest in reserving the area for traditional use only. Then, those who were not engaged in farming, fishing or ecotourism were more motivated to be involved in ecotourism and less likely to prefer reserving the area solely for traditional use.

Secondly, local perceptions towards conservation also differed depending on locality and occupation (Table 3.3). In response to the statement "It is easy to extract the biological resources (fish and algae) from the wetland", only occupation type differed. Ecotourism-related

people more frequently stated that the availability of wetland biological resources, such as algae and fish, was ‘difficult’ whereas farmers more frequently claimed that it was ‘easy’ for extraction. The statement “It is good for the lake to be protected by the Government” differed depending on both locality and occupation. Lowland people were not aware of the government’s role in protecting the lake and were twice to respond negatively to this statement than were those from other localities (Figure 3.7). Additionally, farmers were most likely to be positive while fishers expressed most negative by disagreeing with it more frequently (Figure 3.8). Next, only locality was found to influence the statement that “The wildlife Law does not prohibit any kind of wetland use”. Lowland people more frequently disagreed with it than did those from other localities (Figure 3.7). Then, the statement “I have participated in conservation activities” differed depending on locality and occupation (Table 3.3) but the regression model (Table 3.4) indicated that only locality differed statistically significantly. Lake dwellers and farmers tended to be more supportive of conservation (Figure 3.9). Specifically, farmers supported conservation more than ecotourism-related people. In response to the last statement “The park staff are making the sufficient amount of effort to conserve forest and wildlife”, only occupation status differed. It indicated that farmers were also most likely to hold positive perception in a kind of park-people relationship whereas fishers were far less likely to be positive (Figure 3.9).

Accordingly, people in the lake vicinity were more likely to perceive benefits from ecotourism and they were more positively supporting conservation. Besides, farmers also supported conservation though they were less likely to perceive ecotourism as beneficial.

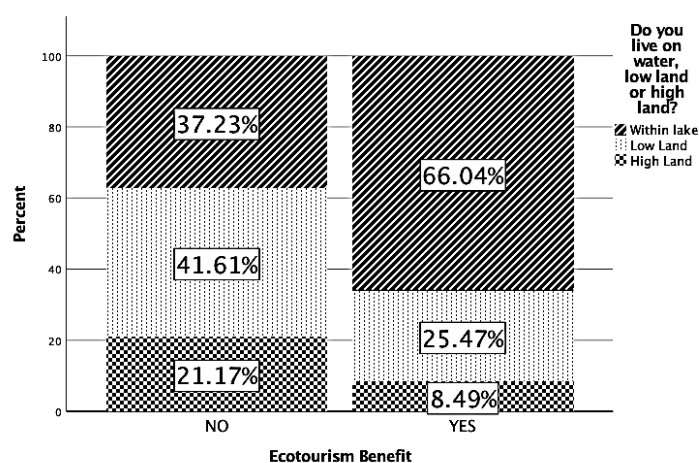


Figure 3.6 Local perceptions towards ecotourism in relation to locality

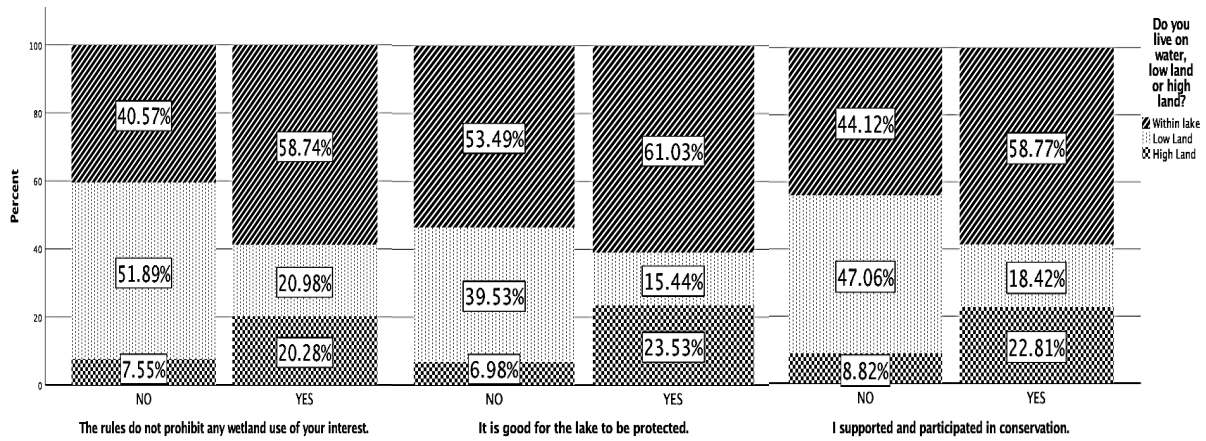


Figure 3.7 Local perceptions towards conservation in relation to locality

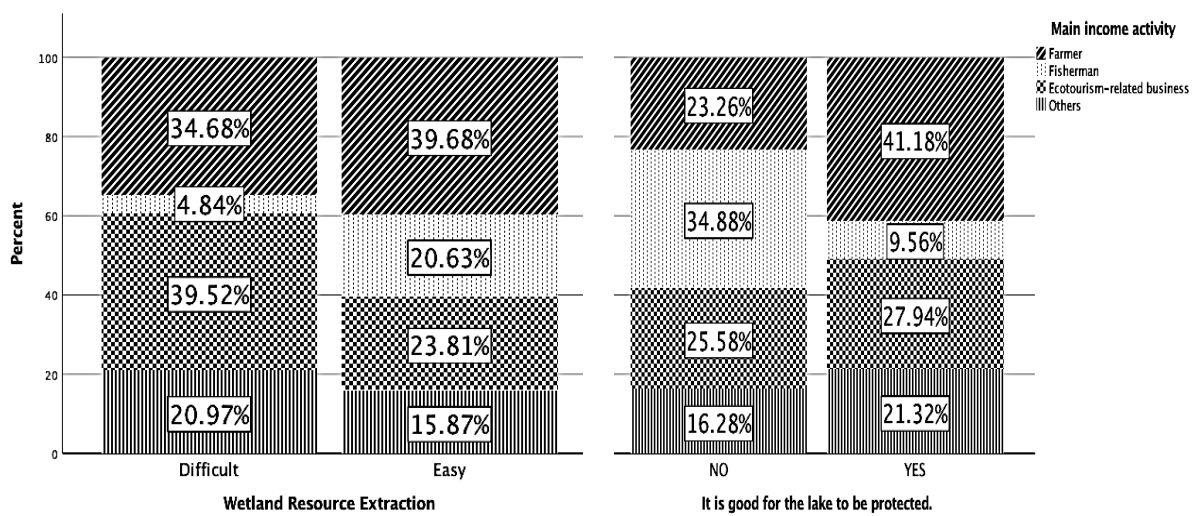


Figure 3.8 Local perceptions towards conservation in relation to occupation

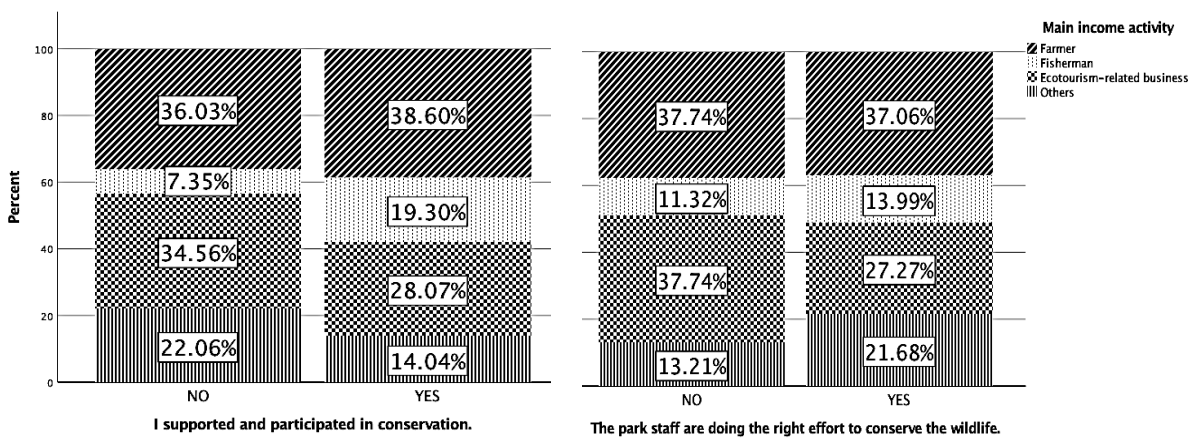


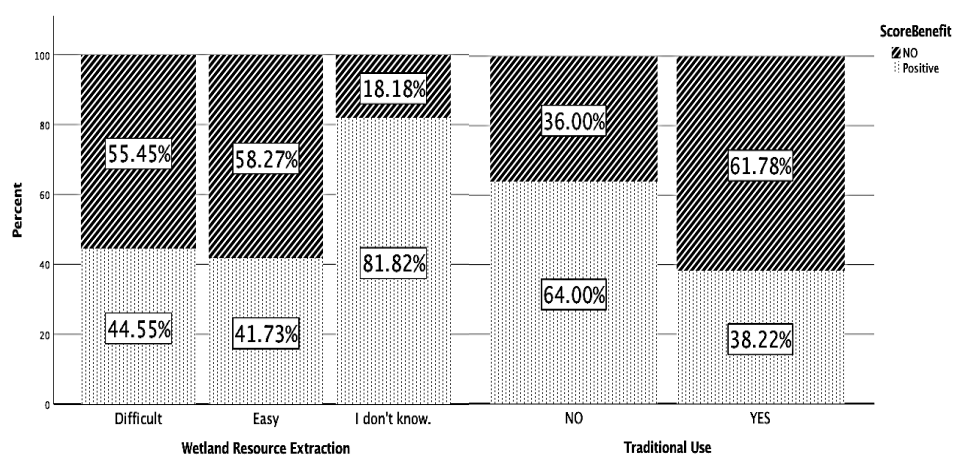
Figure 3.9 Local perceptions towards conservation in relation to occupation



### 3.3 Local involvement in conservation

#### 3.3.1 Local people's role in natural resource extraction

Lake dwellers with high local knowledge were more dependent on natural resources ( $\chi^2 = 11.51$ ,  $df=3$ ,  $p = < 0.009$ ) than those who live on land. Similarly, those who perceived benefits from ecotourism more frequently stated that they did not know when asked about the extraction of natural resources, that is they might extract fewer natural resources ( $\chi^2 = 6.58$ ,  $df = 2$ ,  $p = 0.037$ ; Figure 3.10), and they were also less likely to traditionally use the wetland for their interest ( $F_{(1,239)} = 11.12$ ,  $p = 0.001$ ; Figure 3.10).



**Figure 3.10** Responses of local people to the question ‘Is it easy for you to extract wetland resources from the lake?’ and ‘Do you traditionally use the wetland for your occupation?’ in relation to differently perceived ecotourism benefits

**Table 3.4** Logistic regression analysis with the question “Have you supported in conservation?” as a dependent variable and with different independent socioeconomic variables ( $n = 250$ ) (Nagelkerke  $r^2 = 0.392$ )

	<b>B</b>	<b>Std. Error</b>	<b>Wald</b>	<b>df</b>	<b>p</b>
Benefit (Yes)	0.890	0.350	6.490	1	0.011
Locality (Within Lake)	1.178	0.345	11.658	1	0.001
Education (None)	2.385	0.617	14.964	1	<0.001
Extraction of resources (Easy)	-1.759	0.330	28.356	1	<0.001
Land holding size (2 to 4 ha)	2.271	1.171	3.765	1	0.052
Traditional Use (Yes)	1.186	0.431	7.583	1	0.006
Constant	-3.350	1.241	7.292	1	0.007

A logistic regression analysis (Table 3.4) with “I have supported conservation (Yes, No)” as a dependent variable indicated that there was a significant effect on local support due to perceiving benefits, locality, education level, resource extraction, land holding size and traditional use. These six variables explained 39.2% of the variance in support of conservation. People who have benefitted from ecotourism, the lake dwellers, those with lower education, those who extract the wetland resources more often or those who consider resource extraction as difficult, those with larger land holding size and those who used the wetland for traditional purposes more supported conservation measures.

Land holding size positively and education level negatively were related to conservation support significantly. Bigger land holding size and lower education level were usually possessed by farmers ( $\chi^2 = 25.73$ ,  $df = 3$ ,  $p = 0.001$ ,  $\chi^2 = 11.25$ ,  $df = 2$ ,  $p = 0.004$ ) and this did not correspond with that farmers more likely supported conservation as shown in Figure 3.9. Concerning resource extraction, those, who thought resource extraction was difficult, more likely traditionally use the wetland ( $\chi^2 = 7.98$ ,  $df = 3$ ,  $p = 0.046$ ). Hence, those who traditionally use and extract the wetland more supported while conservation support did not express reduction in consumptive use or extraction of biological resources in the wetland.

### 3.4 Perceptions and knowledge

#### 3.4.1 Perception towards ecotourism

*Table 3.5 Responses to statements about perceptions towards ecotourism development*

Statement of perceptions	Percentages (%)	
	YES	NO
<b>Ecotourism</b>		
Ecotourism is beneficial to my family income.	45	55
Ecotourism activities may negatively impact for the wetland area.	19.9	82.1
I would be happy if more family members became involved in ecotourism.	80.6	19.4
The area should be reserved for traditional uses only, by stopping ecotourism.	17.6	82.4

As shown in Table 3.5, negative perception towards ecotourism that was revealed by responses from the questionnaire was receiving no benefit from ecotourism and positive one was their high motivation for involvement in ecotourism. Nearly half of the respondents (45%) stated

that ecotourism benefited their family or rose their income. The majority (82.1%) disagreed that ecotourism may have negative impacts. 80.6% wanted their family members to work in ecotourism and 82.4% also disagreed that the area should be reserved for traditional uses only by stopping ecotourism. Thus, as the dependent variable, the mean value of the perception score, which ranged from 0 to 4, was  $1.95 \pm 0.74$ , indicating an overall positive perception towards ecotourism.

**Table 3.6** A multiple regression analysis for perception towards ecotourism as the dependent variable, and locality, occupation, gender and age as independent variables

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	p
(Constant)	1.318	0.231		5.702	< 0.001
Locality	-0.422	0.081	-0.305	-5.207	< 0.001
Occupation	0.094	0.037	0.156	2.524	0.012
Gender	0.216	0.090	0.146	2.392	0.018
Age	-0.085	0.037	0.156	2.524	0.012

A multiple regression analysis (Table 3.6) indicated there was a significant difference in perception towards ecotourism depending on locality, occupation, gender and age ( $F_{(4,240)} = 17.68$ ,  $p < 0.001$ ). These four independent variables explained 22.8% ( $R^2 = 0.228$ ) of the variance in perception towards ecotourism. Lake dwellers perceived more benefits from ecotourism. If involved in ecotourism, it is more likely to perceive greater benefit from it. In addition, the females more likely perceived ecotourism as beneficial compared to males. Thus, removing gender bias appears to be an important factor for ecotourism employment. Finally, younger people benefitted more from ecotourism.

### 3.4.2 Perceptions towards conservation

Table 3.7 Responses to statements about perceptions towards conservation

Statement of perceptions	Percentages (%)	
	YES	NO
<b>Conservation</b>		
<b>The local people's use of the wetland is not detrimental to the sustainability of aquatic life.</b>	<b>64.8</b>	<b>35.2</b>
The future of the wetland could be better.	20.8	79.2
It is easy to access the biological resources from the wetland.	49.8	50.2
It is good that this lake is protected by the government.	75.5	24.5
The wildlife law do not prohibit the wetland use.	87.2	12.8
I participated in conservation activities of the lake.	45.5	54.5
The park staff are making the sufficient amount of effort to conserve forest and wildlife.	81.6	18.4

\*(n = 250; where awareness statements of conservation are in bold; if the respondents disagreed, the score was recorded as 1.)

As presented in Table 3.7, negative perceptions that were revealed by responses from the questionnaire were local people use, future wetland status, availability of wetland biological resources for extraction and participation in PA conservation activities. Positive perceptions were reported with respect to less prohibition of biological resource extraction and PA management activities. 64.8% of the respondents agreed that the local use of natural resources is sustainable while 20.8% predicted that the lake could have a better future. Furthermore, 49.8% perceived that it is easy to extract wetland resources. Nearly half of the respondents (45.5%) have ever participated in conservation activities. While 75.5% agreed that it is good that the lake is protected by the government, 12.8% claimed that the wildlife law prohibits the wetland use. Additionally, 81.6% felt that the efforts of park personnel to protect wildlife were adequate and 79.9% assumed that the prescribed rules and regulations were easy to follow. Similarly, as the dependent variable, the mean value of the perception score, which ranged from 0 to 7, was  $4.97 \pm 1.25$ , indicating an only marginal positive perception towards conservation.

**Table 3.8** A general linear model for perception towards conservation as the dependent variable, and gender and length of stay as independent variables and local knowledge as covariate

Source	Type III Sum of squares	df	Mean square	F	p
Correct Model	21.05	4	5.262	3.764	0.006
Intercept	689.82	1	689.822	493.410	< 0.001
Gender	6.14	1	6.139	4.391	0.038
Length of stay (Locally-born)	9.24	1	9.241	6.610	0.011
Local Knowledge	5.57	1	5.569	3.983	0.048
Gender * Length of stay	0.545	1	0.545	0.390	0.533
Error	178.95	128	1.398		
Total	3525.00	133			
Corrected total	200.00	132			

A general linear model (Table 3.8) indicated there was a significant difference in perceptions towards conservation depending on gender and length of stay and local knowledge, where the variables explained 10.5% ( $R^2 = 0.105$ ) of the variance in perceptions towards conservation.

### 3.4.3 Local knowledge in relation to locality, ethnicity & education

Local knowledge differed statistically significantly, in relation to locality ( $\chi^2 = 20.77$ ,  $df = 6$ ,  $p = 0.002$ ; Figure 3.11) and ethnicity ( $\chi^2 = 8.49$ ,  $df = 3$ ,  $p = 0.037$ ). It is important to note that 88% of the lake dwellers belong to the Intha ethnic people. This difference in local knowledge was probably a result of direct observational knowledge of wetland and its biodiversity. Lake dwellers or Intha people reported the least percentage of the lowest score and demonstrated greater awareness of the wetland status than lowland and highland people. While other socio-economic factors, such as occupation, gender and age, did not statistically significantly affect local knowledge, education did affect local knowledge ( $F_{(2,247)} = 6.22$ ,  $p = 0.002$ ; Figure 3.11). This is because highest scores of 4 and 5 are found among lake dwellers only with secondary education. Nonetheless, other people perceived more benefits from ecotourism than did the Intha ethnics ( $F_{(5,237)} = 3.29$ ,  $p < 0.001$ ; Figure 3.12).

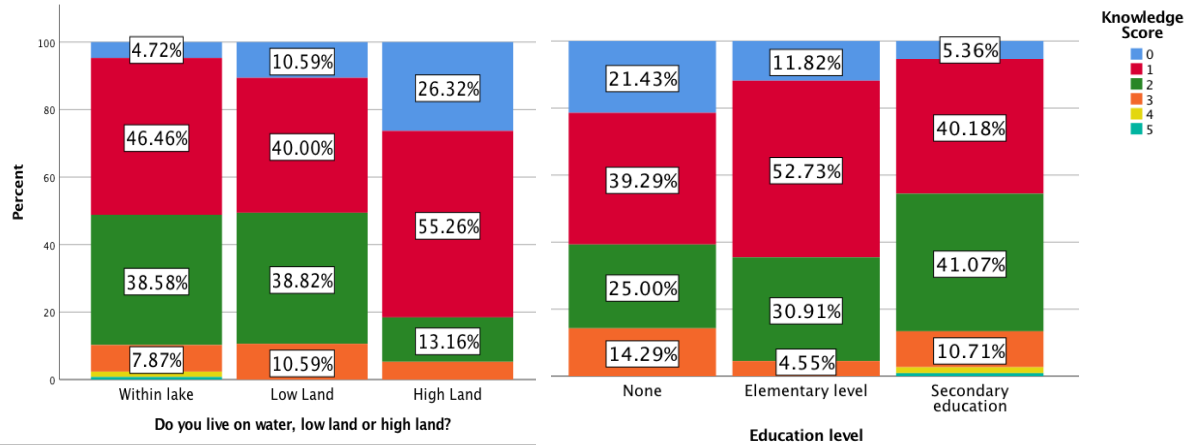


Figure 3.11 Responses of local people with different localities and education level in relation to score of local knowledge

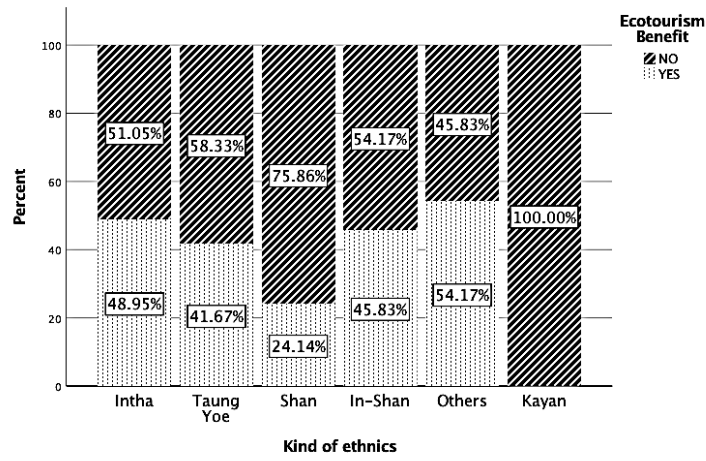
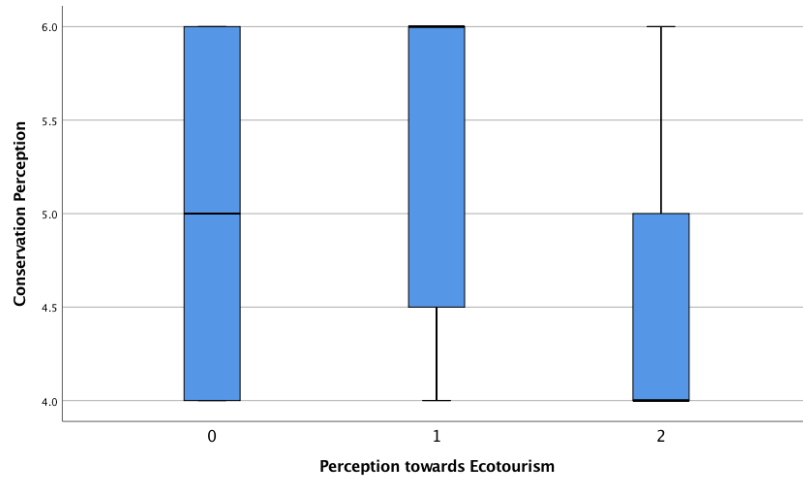


Figure 3.12 Answers to the question "Is ecotourism beneficial to your family income? (YES, NO)" in relation to ethnicity

### 3.4.4 Perceptions towards ecotourism and conservation

There was a weak but not significant correlation between perceptions towards ecotourism and conservation (Spearman rank correlation:  $\rho = -0.161$ ,  $N = 136$ ,  $P = 0.065$ , Figure 3.13).



*Figure 3.13 Responses of perception towards conservation (4=low, 5 = medium and 6 = high) with different perceptions towards ecotourism (0=low, 1=medium and 3= high)*

### 3.5 Effect of ecotourism benefit on ecotourism and conservation

There was a statistically significant difference between ecotourism benefit and perception towards ecotourism ( $\chi^2 = 85.91$ ,  $df = 2$ ,  $p < 0.001$ ) and there was a positive linear correlation between ecotourism benefit and perception towards ecotourism ( $r = 0.539$ ,  $n = 250$ ,  $p < 0.001$ ). Furthermore, any positive effect of ecotourism benefit was not found on local support ( $r = -0.147$ ,  $n = 178$ ,  $p = 0.05$ ). However, there was a statistically significant difference between local support and perception towards conservation ( $\chi^2 = 13.39$ ,  $df = 6$ ,  $p = 0.037$ ), with local support positively influencing perception towards conservation ( $r = 0.272$ ,  $n = 178$ ,  $p < 0.001$ ). Then, there was no correlation between ecotourism benefit and perception towards local conservation ( $r = -0.013$ ,  $n = 248$ ,  $p = 0.883$ ), probably because perception towards conservation has already been high.

## **4 Discussion**

This study provides insight into which demographic variables influence wetland conservation and how ecotourism affects the local support for conservation. In addition, these findings offer details on the distribution patterns of perceptions from four different local user groups of the wetland, whereas previous studies have not addressed the relationship between ecotourism benefits and livelihood strategies.

### **4.1 Involvement in ecotourism-related occupations**

People who were involved in ecotourism had higher income than those in other occupations. This finding is supported by a previous study which indicates that ecotourism provides the local people with higher income (Hunt et al. 2015). It has also been reported that involvement in ecotourism reduces the constraint of subsistence needs due to its multiplier effect (Waylen et al. 2009). Therefore, these findings support the prediction P<sub>1</sub>, which states that people who are employed in ecotourism businesses earn higher income. Accordingly, it reinforces part of this study's hypothesis. Ecotourism has been a primarily developed industry in this area due to accessibility and stability of travel. Because of higher income from ecotourism employment within the impoverished communities, other residents, who are living in the lake vicinity, are more likely motivated to be involved in ecotourism instead of farmers and fishers, probably because they have already had good positions. In fact, such involvement occasionally demands related knowledge and financial capital because one respondent said, "I am willing to change my job from fish monger to motor boat driver, as there are many motor boats running in the surroundings but I don't have anything to invest." However, fishers do change into tomato growers as their primary livelihood according to one study of Michalon (2014) in Inlay Lake.

#### **4.1.1 Perceiving ecotourism benefits**

The results indicated that there was a strong relationship between those perceiving ecotourism benefits and locality, occupation type, household size and length of stay. However, Hunt et al. (2015) reported additional variables, such as marital status, gender and age were significant as well.

Lake dwellers were more likely to perceive the highest ecotourism benefits. Logically, receipt of ecotourism benefits mainly depended on individual occupation type. As discussed by Walpole and Goodwin (2001), traders were more dependent upon tourism. Similarly, small-scale business people related to ecotourism in this study were more likely to perceive



ecotourism benefits than farmers and fishers. This may suggest that the local people have not been convinced to change from traditional practices of fishing and farming to ecotourism development. Interestingly, although transportation is the common way of local involvement in ecotourism, the number of running motorboats are so abundant that it is adverse to conservation by decreasing water and air oxygen level, which causes fish and bird to move other places (Tun 2016).

Those who perceived ecotourism benefits belonged to households that exceeds the average size of 5. This result is contrary to a previous finding which suggested that ecotourism workers were generally from smaller families (Hunt et al. 2015). However, the finding corresponded with occupation in this study. The reason may be that even those who were not employed in ecotourism occasionally agreed with the statement that ‘Ecotourism is beneficial to the family income’. It is more possible that at least one person from the respondent’s larger household size was employed in ecotourism, when land is scarce. Considering respondents’ opinion that the land area is limited for a highly increasing growing population, the results also revealed that ecotourism-related people owned smaller piece of land than farmers.

People who have been living in the area for longer than 10 years were less likely to be involved in ecotourism. Moreover, those who came from more well-developed urban areas were more likely to be involved in ecotourism rather than the local ethnics. For the most part, locally born people or those living in the area for more than 10 years were farmers. Similarly, as reported by Hunt et al. (2015), non-ecotourism workers in Costa Rica had been living in the same area for slightly longer time than had ecotourism workers. Concerning benefit sharing mechanism, it is hard to expect conservation support from those who unlikely benefit from ecotourism.

#### **4.2 Local Involvement in conservation**

Despite that there is no fee to enter the park itself, a fee of US \$ 10 per international visitor was collected by MOHT to enter the Inlay zone and this revenue is not contributed into any PA management cost (Sett and Liu 2014, MOECAAF and MOHT 2015). Thus, the benefit for protected areas from ecotourism is mainly by way of local support for conservation. However, 55% of the respondents answered that they had never or had only seldom participated in conservation activities. This finding is similar to that of Sett and Liu (2014), who concluded that the participation level is passive. The results revealed that conservation support has been

influenced by six predictors; benefits, locality, education, extraction of wetland resources, land-holding size and traditional use.

Furthermore, there was a relation between benefits from ecotourism as perceived by local communities and their support for the protected area. It supports the idea that those who received benefits from ecotourism were more likely to support conservation and ecotourism encourages individuals to conserve the wetland and its biodiversity. Stem et al. (2003) also stated it had a positive impact on conservation. According to locality, lake dwellers were more likely to support conservation.

Non-educated people were more likely to favour conservation. This may be because they involved themselves in activities of conservation such as check-dam construction in watershed areas for erosion control and planting campaigns, often their employers are one of the conservation agencies. On the one hand, it stands in contrast to one finding that higher education levels tended to correspond with stronger conservation perspectives (Stem et al. 2003). On the other hand, it is similar to one's work that education is negatively associated with conservation involvement (Garekae et al. 2016).

Additionally, those who owned bigger land holding size were more likely to support conservation. The possible explanation is that few of them holding smaller land along the southeastern fringes of the lake, who have decreased their pieces of land because of land grabbing issue of over 250 ha, according to the Irrawaddy Local News Journal, March 2017, were far less likely to be positive. As land-holding size is an indicator of the social wealth status in the rural areas of Myanmar (Htun et al. 2012), land rights must be improved for supportive conservation, especially near such a regional heritage park. What Sah and Heinen (2001) stated is that although respondents with larger landholdings were more positive towards participatory wetland conservation, their participation in management activities, such as attending lake restoration meetings, lake cleaning or managing water for irrigation, was not related to landholding size.

Those who less frequently extract fish and algae were less supportive of conservation. Then, those who have perceived ecotourism benefits were more likely 'unaware' of the extraction status. Thus, this can be an opportunity for management bodies to target resource-intense user groups and to control the overexploitation and direct use of biological resources, which is one

of the greatest threats to conservation outcomes in Indo-Burma (Tordoff et al. 2012). Accordingly, engaging traditional communities in ecotourism employment directly or indirectly has been stressed (MOHT and MIID 2014). Therefore, the results partially supported P<sub>2</sub>, which states that those who have perceived ecotourism benefits extract less natural resources than those who do not receive ecotourism benefits.

The Myanmar Forest Policy (1994) permits the use of timber and non-timber forest products for subsistence from protected public forests. However, as argued by Rao et al. (2002) in a case study of PAs in Myanmar, it was difficult to differentiate subsistence from commercial scale and local from non-local use. Consequently, it could make conservation actions complicated. Due to high population density, resource-intense practices in or nearby the core zone for subsistence use by the local population could be addressed through providing alternative livelihood options, such as ecotourism, in buffer zone that can actually reduce the biological resources extraction from the core zone. Also in remote areas of highland, changes in slash and burn practices into permanent cultivation, which makes erosion worse (Michalon 2017a), needs to be regulated by proper land rights. PA staff can regulate the levels of resource extraction in the buffer zone as well (Rao et al. 2002).

People who traditionally used the wetland were more likely to engage in resource-intense practices, by farming and fishing. The park warden also claimed that the wise use of the wetland is hampered by the agricultural and fishing communities (Tun 2017). Although such traditional use has been found to be detrimental to the wetland functions, the results herein indicated that these people were more likely to support conservation. The probable reason for this is that they are more inclined to adapt the wetland services and disservices over time. Additionally, the result indicated that those who did not benefit from ecotourism were keen to use the wetland traditionally. Hence, this finding supports P<sub>3</sub>, which states that those who have not perceived ecotourism benefits will be more likely to use traditional methods to extract wetland resources.

### **4.3 Perceptions**

#### **4.3.1 Perception towards ecotourism**

Although ecotourism benefits depend on four variables, perception towards ecotourism is mainly determined by locality and age. Lake dwellers were more positive towards ecotourism than lowland and upland people. It suggests that respondents from villages closer to the

ecotourism zone had benefitted more from ecotourism and therefore were more positive towards ecotourism (Sekhar 2003). However, this may contradict with some studies from Europe and America where those living adjacent to more developed ecotourism industry tended to have a more negative view towards ecotourism (Walpole and Goodwin 2001).

Age was a significant predictor of one's perception towards ecotourism. Specifically, younger people were more positive towards ecotourism because they had grown up in a time when ecotourism and environmental conservation issues were at the forefront. However, older people tended to disagree more frequently towards the statement that the lake should be protected for traditional use only by stopping ecotourism and they appreciated the benefit of the ecotourism growth. This may be because they had more exposure to communicate with the visitors and the lake and they were dependent upon them for their own livelihood.

Perception towards ecotourism is overall positive and most of the respondents were totally optimistically about ecotourism and the visitor number as found by Sett and Liu (2014). However, MOHT and MIID (2014) reported oppositely that local people in the same area wanted to manage the visitor number sustainably. The finding of being positive towards ecotourism may be explained by one result of this study that those who are employed in ecotourism earn more income than those engaged in other occupations. In addition, another possible reason is limited environmental impact awareness and ecotourism knowledge of local people, as described in the FD report on ecotourism development (2016).

#### **4.3.2 Perception towards conservation**

Locality and local knowledge affected perceptions towards conservation. Regarding locality, lake dwellers were more positive towards conservation, probably because they have experienced project activities (UNDP-Myanmar 2015) and suffered from lake malfunctions, like undrinkable lake water and poor sanitation. In contrast, lowland people expressed more negative perceptions towards conservation, particularly with the statement of park existence "It is good for the lake to be protected by the Government" (Table 3). This can be related with restrictions in livelihood by the Wildlife Law which could make local people view the lake as threats. One respondent also replied for the answer of the dislike of the PA is "I don't know what's to protect here...but living within the PA makes our livelihoods difficult". This reason is congruent with one finding by Brockington and Wilkie (2015). Though Zube and Busch (1990) reported that in-park residence and traditional use influence park-people relationship,

my study analysis showed that only occupation affected in people-park relation regarding the statement “The park staff are making the sufficient amount of effort to conserve forest and wildlife”. A previous study concluded there exists a correlation between park-people relationship and local attitudes towards conservation (Sett and Liu 2014).

The next predictor, local knowledge, positively influences conservation perceptions. This result corroborated with the work of Htun et al. (2012) in Popa Mountain Park of Myanmar, which concluded that increases in knowledge positively impact perception towards the PA and management intervention. As previously mentioned, fishermen can have negative perceptions towards PA. However, the analysis herein suggests that if they increase their knowledge, then their negative perception towards conservation may be reduced to some extent. Moreover, In addition, increasing knowledge and conservation awareness is related to some changes in perceptions (Waylen et al. 2009). For instance, park staff can inform them that everything is connected to everything else. Illegal intensive fishing can be detrimental to sustainable fishery of the lake and small fish population has negative impact on bird species richness (Ringim and Harry 2017). Birds are important for them to predate wetland invasive species such as snail, which eats paddy fields and presence of birds is a symbol of healthy wetland and eco-tourist attraction as well (Environmental Science Website). Such information may cause them to be slightly more conscientious about their activities. In addition, community attitudes are more positive when the PA management implications are adaptively tailored to the specific community according to Dewu and Røskaft (2017). Similarly, it seems correspondingly important to be tailored with their knowledge level in regular dialogue among key stakeholders for raising awareness programs. Therefore, for improving local perceptions towards conservation, it needs to diminish some misconceptions like the lake disappearance and perceiving of PA as a threat.

#### **4.4 Other potential demographic variables influencing different statements of perceptions towards ecotourism and conservation**

Gender, education and occupation differed in analysis of respondents’ responses on statements of perceptions towards ecotourism and conservation. Although males usually lead in income generation in rural areas of Myanmar, females covered a small percentage of household expense by cheroot-making and sewing for wages. Interestingly, the results indicated that females are more highly motivated to be involved in ecotourism. Therefore, by easing certain regulations and promoting the legal practice of a home-stay culture in the stilt villages, women can benefit

from ecotourism by offering visitors suitable lodging, food and selling their crafts. Accordingly, women can generate income and become empowered in ecotourism, reduce their hardships of agriculture and fishing as well. It is one of the activities to implement by the lake authority (MOECAAF 2015). Next, females were less likely to express positive to reserve the area only for traditional use. Furthermore, males more frequently assessed the wetland biodiversity status as 'worse', whereas females were more inclined to assess it as 'better'. This is probably influenced by the misconception of lake disappearance (Michalon 2014) which remained after experiencing the lowest water level ever recorded. Access to wetland resources was thought of being 'difficult' more frequently by females, than 'easy'. Males indicated that they often engaged in conservation activities like de-weeding of water hyacinth and planting trees while females indicated that they regularly participated in such activities.

A strong relation between education and local support of conservation was found and was determined to be significantly associated with perceptions towards ecotourism. More highly educated people tended to receive more ecotourism benefits and be less supportive of conservation. In fact, as ecotourism involves expertise and language skills (San 2017) and another study also reported that educated people were more likely to be employed in ecotourism business and related services (Anup et al. 2015).

Although the farmers were far less likely to receive ecotourism benefits, they supported conservation. This is likely because of greater benefits from the wetland rather than from ecotourism. Fishers were more likely to hold negative perceptions towards the PA, mainly due to less fish catch and restrictions of fishing in specific zones and fish breeding seasons. This point is opposed to the finding of a study conducted in Bulgaria, which indicated that farmers were less likely to support wetland restoration than other residents and that fishers were more likely to support conservation (Scholte et al. 2016). Therefore, for improving local perceptions towards ecotourism and conservation, it needs to diminish some misconceptions like the lake disappearance (Michalon 2014) and perceiving of PA as a threat.

#### **4.5 Effect of ecotourism benefit on ecotourism and conservation**

Respondents with positive perceptions towards ecotourism exhibited a greater likelihood of positively impacting the conservation of Inlay Lake. Despite generally positive perceptions towards ecotourism, 55.2% of the respondents did not believe that they benefitted from ecotourism. However, Walpole and Goodwin (2001) found that those who economically

benefitted from ecotourism expressed more positive perceptions towards ecotourism. Although farmers and fishers are gateway communities of the protected areas, they were less likely to perceive ecotourism as beneficial. Consequently, ecotourism benefits could neither decelerate the extraction of wetland resources nor engender greater conservation support. This finding contradicts with the findings of several other works (Nash 2001, Wong 2005, Mbaiwa et al. 2011, Sett and Liu 2014). For instance, two studies conversely reported that economic employment may promote to be more positive towards conservation activities (Mbaiwa et al. 2011) and that a willingness to participate in conservation is more positive when economic returns are ensured (Sett and Liu 2014). However, this finding is supported by a similar study which indicated that ecotourism benefits do not positively affect conservation behavior but awareness and perceptions towards conservation (Waylen et al. 2009).

The results of my study did not support P<sub>6</sub>, which states that perception towards ecotourism aligns with perception towards conservation, as the non-significant p-valued has resulted. Fundamentally, positive perception towards ecotourism hardly provokes the reduced consumptive use of biological resources in the wetland, presumably because economic return of benefit sharing from ecotourism could not cover the cost of conservation incurred to the community (Krüger 2005). Sett and Liu (2014) also highlighted that most of residents were not employed in ecotourism so that their living conditions were improved markedly. This might suggest that to obtain local support for the conservation of reserved area, benefit-sharing issues should be addressed.

Overall, this study finds an intricate relationship between ecotourism benefits by income and conservation perceptions but a clearly positive effect of ecotourism benefits on perceptions towards ecotourism and negative association between perceptions of ecotourism and conservation. Thus, P<sub>4</sub>, which states that those who perceived ecotourism benefits will support conservation and have positive perceptions towards ecotourism and conservation, is rejected. However, P<sub>5</sub>, which states that those who have 'supported' conservation will have more positive perception towards conservation, is supported. The study results did not completely follow or support the hypothesis that perceived ecotourism benefits result in less dependency on resource use and greater local support for conservation.

Eventually, regarding limitations of this study, focusing on one key stakeholder of local community, it viewed only from one side, which can lead to misinterpretation of the reality to tackle the conservation issues. With respect to ecotourism benefits, the study contends that income generated at the household level is an economic benefit that supersedes any other benefit. However, this is not probably sufficient to cover ecotourism benefits and infrastructure development and ideas or culture exchange are important factors indirectly derived from ecotourism. Moreover, the study attempted to determine whether resource extraction is 'easy' or difficult' but the results did not provide any solid answer for deduction of less or more extraction of wetland resources. Further research should deal with tangible and intangible ecotourism benefits, emphasize local knowledge for biodiversity conservation, like fish laying eggs site or bird sleeping site and take account of perceptions from different meaningful stakeholders, including those from policy, environmental impact assessment and market economy.



## 5 Conclusion

Ecotourism is increasingly practised in developing countries. Interestingly, the protected areas can benefit from ecotourism if it is locally driven on a small scale and if it reduces resource-intensive practices. However, these two factors are rarely fulfilled in the Inlay Lake. Proper land use zoning for ecotourism is needed to balance the conservation and development, while simultaneously receiving the support of the local people. The results revealed that ecotourism increased local income. That being said, the local ethnic group and people who have been living in the lake longer than 10 years less involved in ecotourism than other ethnics and those living for 2 to 10 years. Thus, local people unlikely benefitted much from ecotourism. Locality and occupation and household size are also significant factors for perceiving benefits. Those who did not benefit from ecotourism usually use the wetland for traditionally purposes. Resource-intensive user groups are still less likely to get employed in ecotourism while ecotourism unintentionally tended to reduce natural resource extraction. In this regard, ecotourism benefits do not generate markedly greater local support, which positively depends on the past experience of the respondents' from conservation activity and on the wages for conservation measures. Accordingly, people who are positive to ecotourism do not support conservation. In addition to occupation and locality, other variables, such as age, gender, education, land holding size and household size, also affect the conservation support and perception towards conservation. Finally, local knowledge influences conservation as well and this is the only factor that park staff can strive to improve the local perceptions towards PA conservation. Therefore, to enhance the local knowledge, these findings will be delivered to the park authority of Inlay Lake. To conclude, this research was an effort to grasp a realistic potential of ecotourism so that protected areas can achieve maximum benefit from ecotourism development by following means of; increasing local employment in ecotourism with gender responsive and youth-centered approach to reduce resource-intensive practices, raising local awareness of conservation through education and making regulations and dialogue to be tailored with local knowledge in the conservation of wetland habitat and biodiversity regarding Inlay Lake.

## 6 References

- Akaishi, F., M. Satake, M. Otaki, and N. Tominaga. 2006. Surface water quality and information about the environment surrounding Inle Lake in Myanmar. *Limnology* **7**:57-62.
- Allendorf, T., K. K. Swe, T. Oo, Y. Htut, M. Aung, K. Allendorf, L.-A. Hayek, P. Leimgruber, and C. Wemmer. 2006. Community attitudes toward three protected areas in Upper Myanmar (Burma). *Environmental conservation* **33**:344-352.
- Amoah, M., and E. Wiafe. 2012. Livelihoods of fringe communities and the impacts on the management of conservation area: the case of Kakum National Park in Ghana. *International Forestry Review* **14**:131-144.
- Andereck, K. L., and G. P. Nyaupane. 2011. Exploring the nature of tourism and quality of life perceptions among residents. *Journal of Travel Research* **50**:248-260.
- Anup, K. C., K. Rijal, and R. P. Sapkota. 2015. Role of ecotourism in environmental conservation and socioeconomic development in Annapurna conservation area, Nepal. *International Journal of Sustainable Development and World Ecology* **22**:251-258.
- Aung, P. S., Y. O. Adam, J. Pretzsch, and R. Peters. 2015. Distribution of forest income among rural households: a case study from Natma Taung national park, Myanmar. *Forests, Trees and Livelihoods* **24**:190-201.
- Boley, B. B., and G. T. Green. 2016. Ecotourism and natural resource conservation: the 'potential' for a sustainable symbiotic relationship. *Journal of Ecotourism* **15**:36-50.
- Brockington, D., and D. Wilkie. 2015. Protected areas and poverty. *Philosophical Transactions of the Royal Society of London B, Biological Sciences* **370**:20140271.
- Buijtendijk, H., and K. Tschunkert. 2016. Hotel industry expansion and sustainable development: A case study of Inle Lake, Myanmar. *Research in Hospitality Management* **6**:9-23.
- Butkus, S., and S. Myint. 2001. Pesticide use limits for protection of human health in Inle Lake (Myanmar) Watershed. Living Earth Institute, Olympia, Washington, USA). [www.living-earth.org/inle.html](http://www.living-earth.org/inle.html).
- Chambers, R., and G. Conway. 1992. Sustainable rural livelihoods: practical concepts for the 21st century. Institute of Development Studies (UK).
- Cobbinah, P. B., R. Black, and R. Thwaites. 2015. Biodiversity conservation and livelihoods in rural Ghana: Impacts and coping strategies. *Environmental Development* **15**:79-93.
- Dewu, S., and E. Røskaft. 2017. Community attitudes towards protected areas: insights from Ghana. *Oryx*:1-8.
- Dudley, N. 2008. Guidelines for applying protected area management categories. IUCN.
- FD. 2015. National Biodiversity Strategy and Action Plan (2015-2020). Ministry of Natural Resources and Environmental Conservation.
- FD. 2017. Conservation of Wetland and Water Birds is Everybody's Job. *in* I. L. W. S. Nature and Wildlife Conservation Division, Nyaung Shwe Township, Shan State, Myanmar, editor.
- Garekae, H., O. T. Thakadu, and J. Lepetu. 2016. Attitudes of local communities towards forest conservation in Botswana: a case study of Chobe forest reserve. *International Forestry Review* **18**:180-191.
- Haines-Young, R., and M. Potschin. 2010. The links between biodiversity, ecosystem services and human well-being. *Ecosystem Ecology: a new synthesis* **1**:110-139.
- Hardin, G. 2009. The tragedy of the commons. *Journal of Natural Resources Policy Research* **1**:243-253.
- Hill, J. Retrieved 12 May, 2018, <https://www.environmentalscience.org/birds-ecosystem-services>. Environmental Science Website.

- Htun, N. Z., N. Mizoue, and S. Yoshida. 2012. Determinants of local people's perceptions and attitudes toward a protected area and its management: A case study from Popa Mountain Park, Central Myanmar. *Society & Natural Resources* **25**:743-758.
- Htwe, T. N. 2015. Changes of traditional farming systems and their effects on land degradation and socio-economic conditions in the Inle Lake region, Myanmar.
- Hunt, C. A., W. H. Durham, L. Driscoll, and M. Honey. 2015. Can ecotourism deliver real economic, social, and environmental benefits? A study of the Osa Peninsula, Costa Rica. *Journal of Sustainable Tourism* **23**:339-357.
- Instituto-Oikos, and BANCA. 2011. Myanmar Protected Areas: Context, Current Status and Challenges. Ancori Libri, Milano, Italy.
- IUCN. 2018. Retrieved 15 March 2018 from <https://www.iucn.org/theme/protected-areas/wcpa/what-we-do/biodiversity-and-protected-areas>.
- Jensen, A. 2014. Destination Management Plan for the Inlay Lake Region - - Environmental Assessment. Myanmar Institute of Integrated Development, Yangon, Myanmar.
- Khurtsia, K. 2015. Inle Lake Conservation and Rehabilitation: Stories from Myanmar. UNDP Myanmar.
- Kideghesho, J. R., E. Røskoft, and B. P. Kaltenborn. 2007. Factors influencing conservation attitudes of local people in Western Serengeti, Tanzania. *Biodiversity and Conservation* **16**:2213-2230.
- Kimengsi, J. N. 2014. Threats to Ecotourism Development and Forest Conservation in the Lake Barombi Mbo Area (LBMA) of Cameroon. *Journal of International Wildlife Law & Policy* **17**:213-230.
- Krüger, O. 2005. The role of ecotourism in conservation: panacea or pandora's box? *Biodiversity & Conservation* **14**:579-600.
- Lamsal, P., K. P. Pant, L. Kumar, and K. Atreya. 2015. Sustainable livelihoods through conservation of wetland resources: a case of economic benefits from Ghodaghodi Lake, western Nepal. *Ecology and Society* **20**.
- Le Saout, S., M. Hoffmann, Y. Shi, A. Hughes, C. Bernard, T. M. Brooks, B. Bertzky, S. H. M. Butchart, S. N. Stuart, T. Badman, and A. S. L. Rodrigues. 2013. Protected Areas and Effective Biodiversity Conservation. *Science* **342**:803-805.
- Lwin, Z., and M. Sharma. 2012. Environmental management of the Inle lake in Myanmar. *Hydro Nepal: Journal of Water, Energy and Environment* **11**:57-60.
- Magio, K. O., M. V. Velarde, M. A. N. Santillán, and C. A. G. Ríos. 2013. Ecotourism in developing countries: a critical analysis of the promise, the reality and the future. *Journal of Emerging Trends in Economics and Management Sciences* **4**:481.
- May, S. 2008. Changes of water quality and water surface area in inle lake: facts and perceptions. Unpublished Ph. D. dissertation. Department of Geography, University of Yangon, Myanmar.
- Mbaiwa, J. E., A. Stronza, and U. Kreuter. 2011. From collaboration to conservation: insights from the Okavango Delta, Botswana. *Society and Natural Resources* **24**:400-411.
- Mbaiwa, J. E., and A. L. Stronza. 2010. The effects of tourism development on rural livelihoods in the Okavango Delta, Botswana. *Journal of Sustainable Tourism* **18**:635-656.
- MEA, M. E. A. 2005. Ecosystems and human well-being. Island Press Washington, DC.
- Michalon, M. 2014. The gardener and the fisherman in globalization: The Inle Lake (Myanmar), a region under transition. Université Jean Moulin Lyon 3.
- Michalon, M. 2017a. The Inlay Lake Region in the Mists of Tourism Governance. An Oxford Forum for New Perspectives on Burma/ Myanmar. <https://teacircleoxford.com/2017/03/09/the-inlay-lake-region-in-the-mists-of-tourism-governance/>, Oxford, UK.

- Michalon, M. 2017b. Tourism (s) and the way to Democracy in Myanmar. *Asian Journal of Tourism Research*.
- Mjelde, M., A. Ballot, T. Swe, T. E. Eriksen, I. Nesheim, and T. T. Aung. 2017. Integrated Water Resources Management in Myanmar. Water usage and introduction to water quality criteria for lakes and rivers in Myanmar. Preliminary report. NIVA-rapport.
- MOECAF. 2015. Inle Lake Conservation 5-year Action Plan (2015-2016 to 2019-2020).
- MOECAF, and MOHT. 2015. Myanmar Ecotourism Policy and Management Strategy for Protected Areas (2015-2025). Ministry of Environmental Conservation and Forestry & Ministry of Hotels and Tourism, Nay Pyi Taw, Myanmar.
- MOHT, and MIID. 2014. Destination Management Plan for the Inlay Lake Region 2014–2019. Ministry of Hotels and Tourism, Nay Pyi Taw.
- Mondino, E. 2017. Strengthening The Link Between Conservation and Sustainable Development: Can Ecotourism Be a Catalyst? The Case of Monviso Transboundary Biosphere Reserve, Italy.
- Myanmar-Times. 2017. Retrieved 20 March 2018, from <https://www.mmtimes.com/business/27228-ifc-agriculture-department-institute-gap-in-inle-lake.html>.
- Myers, N., R. A. Mittermeier, C. G. Mittermeier, G. A. Da Fonseca, and J. Kent. 2000. Biodiversity hotspots for conservation priorities. *Nature* **403**:853.
- Nash, J. 2001. *Eco-tourism: Encouraging Conservation or Adding to Exploitation?* Population Reference Bureau, Washington DC.
- Naughton-Treves, L., M. B. Holland, and K. Brandon. 2005. The role of protected areas in conserving biodiversity and sustaining local livelihoods. *Annual Review of Environment and Resources* **30**:219-252.
- Neuman, W. L. 2013. *Social research methods: Qualitative and quantitative approaches*. Pearson education.
- Okamoto, I. 2012. Coping and adaptation against decreasing fish resources: case study of fishermen in Lake Inle, Myanmar. Institute of Developing Economies, Japan External Trade Organization (JETRO).
- Oo, T. N. 2016. *Ecotourism Development in Myanmar*. Forest Department, Ministry of Natural Resources and Environmental Conservation.
- Palomo, I., C. Montes, B. Martín-López, J. A. González, M. García-Llorente, P. Alcorlo, and M. R. G. Mora. 2014. Incorporating the social–ecological approach in protected areas in the Anthropocene. *BioScience* **64**:181-191.
- Pimbert, M. P., and J. N. Pretty. 1997. Parks, people and professionals: putting ‘participation’ into protected area management. *Social change and conservation* **16**:297-330.
- Policy, M. F. 1994. Ministry of Natural Resources and Environmental Conservation. Forest Department.
- Potschin, M., R. Haines-Young, R. Fish, and R. K. Turner. 2016. *Routledge handbook of ecosystem services*. Routledge.
- Rao, M., A. Rabinowitz, and S. T. Khaing. 2002. Status Review of the Protected-Area System in Myanmar, with Recommendations for Conservation Planning. *Conservation Biology* **16**:360-368.
- RCSE-ILEC. 2014. *Development of ILBM Platform Process: Evolving Guidelines through Participatory Improvement*. 2nd Edition.
- Reo, N. J. 2011. The importance of belief systems in traditional ecological knowledge initiatives. *International Indigenous Policy Journal* **2**.
- Rerkasem, B. 2004. Asian Experiences in Intensification of Cropping Systems through Diversification. ERSEC Project Secretariat:102-121.

- Ringim, A., and H. J. Harry. 2017. Is the Bird Population in the Hadejia-Nguru Wetlands under Threat? *West African Journal of Applied Ecology* **25**:69-84.
- Sah, J. P., and J. T. Heinen. 2001. Wetland resource use and conservation attitudes among indigenous and migrant peoples in Ghodaghodi Lake area, Nepal. *Environmental conservation* **28**:345-356.
- Sakataka, W., and P. Namisiko. 2014. Livelihood activities that impact on sustainable wetland use in upper Nzoia river basin, Kenya. *Journal of Economics and Sustainable Devevelopment* **5**:70-83.
- San, K. N. 2017. Impacts on the biodiversity by living inside a protected area, Natma Taung National Park, Myanmar; A human perspective. NTNU.
- Scholte, S. S., M. Todorova, A. J. van Teeffelen, and P. H. Verburg. 2016. Public Support for Wetland Restoration: What is the Link With Ecosystem Service Values? *Wetlands* **36**:467-481.
- Sekhar, N. U. 2003. Local people's attitudes towards conservation and wildlife tourism around Sariska Tiger Reserve, India. *Journal of environmental Management* **69**:339-347.
- Sett, E., and Y. Liu. 2014. Assessment of the existing tourism-park-community relationships: a case study in the Inle Lake Wildlife Sanctuary, Myanmar.
- Soe, K. Z. A. 2012. Struggle with Uncertainties: Livelihood of the Intha in Inle Lake of Myanmar, ICIRD (Internatinal Conference on International Relations and Development).
- Somarriba-Chang, M. D., and Y. Gunnarsdotter. 2012. Local community participation in ecotourism and conservation issues in two nature reserves in Nicaragua. *Journal of Sustainable Tourism* **20**:1025-1043.
- Stem, C. J., J. P. Lassoie, D. R. Lee, D. D. Deshler, and J. W. Schelhas. 2003. Community participation in ecotourism benefits: The link to conservation practices and perspectives. *Society & Natural Resources* **16**:387-413.
- Su, M., and A. D. Jassby. 2000. Inle: a large Myanmar lake in transition. *Lakes & Reservoirs: Research & Management* **5**:49-54.
- Thant, Z. M. 2017. Costs and benefits associated with natural resource exploitation in Chatthin Wildlife Sanctuary in Myanmar, and its impact on thamin (*Rucervus eldii thamin*) conservation. NTNU.
- Thar, K. O. 2017. Retrieved 23 March 2018, from <https://www.irrawaddy.com/news/burma/farmers-fight-official-ownership-application-confiscated-lands-near-inle-lake.html> The Irrawaddy Local News Journal.
- Tordoff, A., M. Bezuijen, J. Duckworth, J. Fellowes, K. Koenig, E. Pollard, A. Royo, and P. ZUN. 2012. Ecosystem Profile Indo-Burma Biodiversity Hotspot 2011 Update. Arlington, VA: Critical Ecosystem Partnership Fund.
- Tun, S. 2016. Inle Lake draws steady stream of tourists. *Global New Light of Myanmar*. Myanmar news agency, Yangon, Myanmar.
- Tun, S. 2017. Wetlands and Biodiversity Conservation of Inlay Lake Biosphere Reserve. Country Report, Forest Department, Ministry of Natural Resources and Environmental Conservation, Myanmar.
- UNDP-Myanmar. 2015. Inle Lake Conservation and Rehabilitation Project - End of Project Evaluation. Yangon, Myanmar.
- UNEP-WCMC. 2018. Protected Area Country Profile for Myanmar from the World Database of Protected Areas, June 2018.
- UNESCO. 2016. Retrieved 2 December 2017, from [http://www.unesco.org/new/en/member-states/single-view/news/inlay\\_lake\\_biosphere\\_reserve\\_myanmar\\_a\\_model\\_for\\_sustainab/](http://www.unesco.org/new/en/member-states/single-view/news/inlay_lake_biosphere_reserve_myanmar_a_model_for_sustainab/).
- UNWTO. 2014. Retrieved 15 October 2017, from <http://sdt.unwto.org/content/about-us-5>.

- Walpole, M. J., and H. J. Goodwin. 2001. Local attitudes towards conservation and tourism around Komodo National Park, Indonesia. *Environmental conservation* **28**:160-166.
- Waylen, K. A., P. J. McGowan, E. Milner-Gulland, and P. S. Group. 2009. Ecotourism positively affects awareness and attitudes but not conservation behaviours: a case study at Grande Riviere, Trinidad. *Oryx* **43**:343-351.
- Weaver, D. B. 1991. Alternative to mass tourism in Dominica. *Annals of Tourism Research* **18**:414-432.
- Website, N. G. 2018. Retrieved 12 January 2018, from <https://www.nationalgeographic.org/activity/biodiversity-in-wetland-ecosystem/>
- Wells, M. 1992. Biodiversity conservation, affluence and poverty: mismatched costs and benefits and efforts to remedy them. *Ambio* (Sweden).
- Wondie, A. 2018. Ecological conditions and ecosystem services of wetlands in the Lake Tana Area, Ethiopia. *Ecohydrology & Hydrobiology*.
- Wong, C. N. 2005. Ecotourism helps local communities. *The Star Newspaper*, Malaysia.
- Zube, E. H., and M. L. Busch. 1990. Park-people relationships: an international review. *Landscape and Urban Planning* **19**:117-131.

## Appendix A: Socioeconomic characteristics of the respondents

<b>Socio-economic Variables</b>		<b>Respondents (n = 250)</b>
Grew up in the same village (%)	Yes	82.3
	No	17.7
Gender (%)	Male	67.2
	Female	32.8
Age (%)	18 to 29 years old	14.2
	30 to 39 years old	22.8
	40 to 49 years old	23.7
	≥ 50 years old	39.3
Education (%)	Never been to school	11.2
	Elementary school	44
	Secondary or higher education	44.8
Occupation (%)	Farmer	37.2
	Fisherman	12.8
	Ecotourism-related business	31.6
	Other	18.4
Locality (%)	Within lake	50.8
	On low land (900 – 1000 m)	34
	On high land	15.2
Monthly NET Household Income (%)	< 300 USD	55.9
	301 to 500 USD	34
	> 500 USD	10.1
Household Size (Mean, SD)	5 (2.8)	

# Appendix B: Questionnaire

**Thesis Title: Biodiversity conservation and socio-ecological linkages in the wetland ecotourism industry: A case study in Inlay Lake Wildlife Sanctuary, Myanmar**

## Introduction

My name is Phyto Thuzar Win. I am a master student in Natural Resources Management at NTNU – Norwegian University of Science and Technology, Trondheim, Norway. The aim of my study is to gain information on the dependency of households living near the protected area on ecosystem services, knowledge about their perception and traditional use of natural resources and to find their impact on biodiversity. This study is important for conservation and social well-being. It would be highly appreciated if you could give me some time to answer my questions. Please feel free because I just would like to know your own opinion and knowledge and your identity is hidden in public.

Questionnaire no.

Date

Name of village

GPS location

### I. Demographic information

1. Gender                    i)  Female                    ii)  Male
2. Household head i)  YES                    ii)  NO
3. Occupation
  - i) Farmer
    - a) Crops b) Tomatoes c) Livestock d) other
  - ii) Fisherman
  - iii) Ecotourism
    - a) Transportation
    - b) Having jobs in hotels
    - c) Restaurant
    - d) Tour guides/ service
    - e) Silvery
    - f) Sewing traditional clothes
    - g) Temple sales
    - h) Small business
    - i) Weaving
    - j) Others
  - iv) Others (to specify)

4. Age

Range	Real age	Range	Real Age
<input type="radio"/> 18-29 yr		<input type="radio"/> 30-39 yr	
<input type="radio"/> 40-49 yr		<input type="radio"/> ≥50 yr	

5. Ethnicity i)  Intha ii)  Pa-O iii)  Da-nu iv)  Taung-yoe iv)  Shan v)  Shan vi)  Inn-shan vii)  Others (to specify)
6. Marital status: i)  Single ii)  Married iii)  Widow iv)  divorced



7. Education i)  None ii)  Primary iii)  Secondary iv)  Diploma or graduate  
v)  others (to specify)

**HH Asset information**

No.	Relation	Age
	Children	
	Spouse	
	Parents	
	Relatives	
	Total number	

8. Farm/ Land size  
i)  landless  
ii)  Permanent house owner  
iii)  Temporary stay or House tenant
9. If you own land, the size of land is  
iv)  Small (< 5 acres)  
v)  Medium (5-10 acres)  
vi)  Large (>10 acres)
10. How long have you been lived here (in this village)?  
i) <1 yr ii) 2-10 yr iii) >10 yr but not here (iv) Since born here (in this village)

**II. Land use and Resource use activities**

HH activity and income

11. In which social class would you put your family?  
i)  poor ii)  moderate iii)  rich
12. Where is your house? Distance from the wetland  
i)  Within the wetland ii)  From 0 to 2 miles iii)  > 2 miles
- What is your main income sources for your family?

Activity	Income per month/ year
Crop farming	
Livestock farming	
Tourism	
Others (specify)	

13. On days when you or anyone of your family member does fishing, what was  
i)  the average catch of previous 7 days?  
ii)  Or last season?
14. If you or your family does agricultural farming,  
i)  What kind of crops do you mainly grow?  
ii)  What was the average production (kg) last season?
15. If you or your family does livestock farming, you have

Kind of animal	Number	Kind of animal	Number	Kind of animal	Number
i) Cow		ii) Chicken		iii) Pig	
iv) Buffalo		v) Goat		vi) Duck	
vii) Other					

**III. Benefit from the Protected area (PA) / ecosystem services**

16. Is ecotourism beneficial to your family income? i) YES ii) NO

**IV. Traditional Use in Livelihood**

17. Do you use any following indigenous knowledge in main income activity?

- i) Fishing (to specify)
- ii) Farming (to specify)
- iii) Food (to specify)
- iv) Others (to specify)

18. Is it too easy or too difficult to access the natural resources from the wetland?

- i) o Too easy ii) o Too difficult iii) o About right

**V. Perceptions**

19. Do you have any thought about trends of the fish stock and water volume of the Inlay lake?

	Fish	Birds	Water Level
i)Decline			
ii)Stable			
iii)Increase			
iv)Not aware			

20. If you agree that natural resources have been decreasing, why do you think so?

Natural	
Policy	
Human Impact	

21. Do you know this lake is called as 'Biosphere Reserve'? i) YES ii) NO

22. Are there any natural resources that were used previously but no longer in access these days from the lake?

- i) Space on land or water, ii) Plants, iii) Animals iv) others

**VI. Biodiversity Impact**

How many bird species are there in Inlay lake	How many fish species are there?	How many amphibians are there?
<100	<10	<10
100 – 200	10 – 30	10 – 20
200 – 300	30 – 50	20 – 30
> 300	> 50	> 30

23. Do you know any kind of alien species here?

- i) YES ii) NO

24.

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
<b>Ecotourism</b>					
Ecotourism is beneficial to my family income.					
Tourism activities may have negative impacts for the wetland area.					
I would be happy if more family members became involved in ecotourism services.					
Should the area be reserved for traditional uses by stopping ecotourism.					
<b>Natural resource dependency</b>					
It is easy to access the natural resources from the wetland.					
<b>Perception</b>					
Local people's use of the wetland is not detrimental to the sustainability to aquatic life.					
The future of wetland could be better.					
It is good that the lake is protected by the government.					
The prescribed rules and regulations do not prohibit the wetland use.					
I participated in conservation activities.					
The park staff are making the sufficient amount of effort to conserve forest and wildlife.					

25. Do you have any questions on my study?

Thank you very much.

## Appendix C: Selected villages

No.	Village name	GPS1 latitude	GPS2 longitude
1	Khaung Daing	20.6197	96.8848
2	Lwe Nyeint	20.6112	96.8814
3	Kay lar	20.5076	96.9023
4	Inn Chang	20.5024	96.8992
5	Heya Ywarma	20.4933	96.8815
6	Inn Paw Khone	20.4458	96.8852
7	Taung Poe Gyi (North)	20.6534	96.8914
8	Kyauk Taing	20.6073	96.8825
9	Samka	20.0934	96.5663
10	Maing Thauk	20.3505	96.9078
11	Nam Pan (inland)	20.4416	96.9001
12	Nant Thel	20.6460	96.9191
13	Kyar Twin	20.5967	96.9418
14	Inn Dein	20.4581	96.8395
15	Ye Oo	20.6883	96.9091
16	Thar lay	20.4765	96.8921
17	Lwe Pan Sone	19.9344	97.0200
18	Ho Tein	19.9500	97.0125
19	Khaung Maing	20.6097	96.9248
20	Taung Htin Shu	19.8809	96.9446
21	Sel Gaung	20.4508	96.9031
22	Si Thar	20.6386	96.9142
23	Ey Daunt Gyi	20.6097	96.9248
24	Let Maung Kway	20.6644	96.8585
25	Pauk Par	20.4608	96.9101
26	Kyar Taw	20.4650	96.9058
27	Ye Tan	20.4330	96.8918