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Attitudes of Local Communities towards the Conservation of a Wetland Protected Area: a Case Study from the Moeyungyi Wetland Wildlife Sanctuary in Myanmar

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Natural Resources Management
Submission date: June 2018
Supervisor: Eivin Røskaft, IBI

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List of Abbreviations

BANCA	Biodiversity and Nature Conservation Association
FD	Forest Department
IBA	Important Bird and Biodiversity Area
km^2	Square kilometer
MWWS	Moeyungyi Wetland Wildlife Sanctuary
NTNU	Norwegian University of Science and Technology
PA	Protected Area
spp.	Species
SPSS	Statistical Package for the Social Science
USD	United States Dollar

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Abstract

Attitudinal studies are globally being recognized as useful indicators for evaluating the efficiency of conservation policy. An understanding of the attitudes of local communities towards nearby protected areas (PAs) helps to bridge the knowledge gap between public acceptance and conservation interventions. Many factors stimulate community attitudes to be positive or negative. This study aimed to explore linkages among conservation attitudes on PAs, interactions with PAs and how PAs are perceived. Based on geographic distance, 216 randomly selected households were interviewed from 12 villages around the Moeyungyi Wetland Wildlife Sanctuary in Myanmar. I assessed the general attitudes through a sampling population with 5 dependent variables: feelings towards PAs, relationship with PA management, trust in PA staff, perception that PAs are necessary for the long-term existence of biodiversity, and active participation in PA conservation. The most important variables that explained respondents' attitudes regarded dependency on PA resources, perceived benefits of PAs, experience of losses (i.e., direct or opportunity costs), and village distance to the PA boundary. The results showed that individual perceptions were more dominant in shaping attitudes than were socio-demographic factors (gender, age, education, wealth). Despite the complex magnitude of the effects of resource dependency on attitudes, people with the least dependency had more positive attitudes. Overall, 78% of the respondents appreciated the wetland benefits of the PA landscape, but those who thought that they attain the benefits were more antagonistic. In general, those who faced conflicts with PA management, those who were dissatisfied with fence-and-fine conservation, and those living in the vicinity of PAs expressed more negative attitudes. The results indicate that negative attitudes will remain unchanged if the real costs of PAs are higher than their perceived benefits, which is an important factor to consider in PA conservation.

Keywords: Attitude, benefit, conflict, dependency, management, perception, protected area, wetland conservation

Introduction

Background

Overall Issues of Protected Areas and Biodiversity

Global loss of natural habitats and rapid decline in biodiversity are unstoppable events caused by anthropogenic impacts: deforestation, over-exploitation and destructive land conversion (Rao et al. 2002; Ambastha et al. 2007; Dimitrakopoulos et al. 2010). Protected areas (hereinafter, PAs) are presently the only surviving home to many remaining wildlife species and populations (De Pourcq et al. 2015). However, there are prolonged conflicts between PA authorities and local residents' attitudes and livelihoods across the world (Dimitrakopoulos et al. 2010). The reason is because PA management has been in favour of the top-down and exclusive "fortress-and-fine" practice as a typical strategy, in which restrictive regulations are enforced by local communities living in and around PAs (Baral & Heinen 2007; Kideghesho et al. 2007). Such law enforcement attempts intend to exclude them with the idea that human activities are incompatible with wildlife conservation (Wells & McShane 2004). At this point, biodiversity conservation aims and socio-economic development of local communities might be a source of such conflicts (Liu et al. 2010).

Costs of Conflicts (Negative Interactions between PA Authority and Community)

A fence-and-fine regime includes the bureaucracy (Kubo & Supriyanto 2010), by which PA establishment begins to alienate local residents. Afterwards, PA staffs monitor, prohibit and punish the illegal actions of resource users in terms of legislations (Allendorf et al. 2006), resulting in negative relationships between the PA and community (Sarker & Røskaft 2011). Loss of their customary rights, strict restrictions on their habituation (Baral & Heinen 2007) and no alternative sustenance, except PA-related livelihoods (Htun et al. 2012), are the sources of the increased conflicts in the periphery of PAs that are observed in most of the developing countries in both Asia and Africa (see examples in (Heinen 1993; Newmark et al. 1993; Shrestha & Alavalapati 2006; Liu et al. 2010; Sarker & Røskaft 2011)). Such socio-economic losses are responsible for their antagonism, which also builds up their ignorance of, as well as their lack of interests in, being part of PA conservation, management and planning (Baral & Heinen 2007; Liu et al. 2010).

Costs of Conflicts (Negative Interactions between Local Residents and Wildlife)

Several studies focusing on human-wildlife conflicts (Connell-Rodwel et al. 2000; Vijayan & Pati 2002; Zhang & Wang 2003) also reported that local communities near PAs very often negatively interact with protected species. For instance, farmland owners close to the Maputo Elephant Reserve in Mozambique have attitudinal oppositions, which are seen as linked with crop losses caused by African elephants (*Loxodonta africana*), hippos (*Hippopotamus amphibius*) or bush pigs (*Potamochoerus porcus*) (De Boer & Baquete 1998). Wildlife crop depredation in the Western Serengeti has also resulted in economic losses equivalent to approximately 0.5 million USD per year, for which warthogs (*Phacochoerus aethiopicus*), monkeys (*Cercopithecus aethiops*), African elephants and wildebeests (*Connochaetes taurinus*) are responsible (Emerton & Mfunda 1999). Conflicts between humans and Asian elephants (*Elephas maximus*) or tigers (*Panthera tigris*) usually take place in the edges of PAs in Sumatra in Indonesia (Nyhus & Tilson 2004). Likewise, wild elephants in Bangladesh attack residents and destroy their crops and settlements (Sarker 2011). The wildlife-inflicted costs fuel the negative attitudes that impact people to make PA conservation less efficient (Distefano 2005).

Co-management with Inclusion of Local Residents

Affected people who lack alternative livelihoods or are not dependent on PA resources tend to do more illegal extraction or revenge actions (e.g., retaliatory killing of wildlife) to show their negative attitudes (Badola 1998). Active involvement of local residents is essential to maintain the quality of PAs, since most imposed threats to PAs are related to actions of small-scale resource users in proximity areas (Allendorf et al. 2006). Along with democratization (Baral & Heinen 2007) and advocacy of scholars and conservation organizations, PA management in developing countries have realized that local residents' support plays an important role in the sustainable existence of PA resources (Wells & McShane 2004). For these reasons, PA authorities over the last decades have been considering the inclusive "co-management approach" (Sarker & Røskaft 2011), with inclusion of local residents in the planning and management of PAs (Dimitrakopoulos et al. 2010) in an attempt to reduce failures of fence-and-fine conservation (Sarker & Røskaft 2011). However, as discussed above, local residents are usually not supportive of the conservation strategies and have negative attitudes towards PAs due to the losses they have suffered (Baral & Heinen 2007; Sodhi et al. 2010).

Importance of Attitudes and its Concept

It is thus necessary to gain a better understanding of the local residents' attitudinal opposition towards PAs and why they have developed such attitudes (Adams et al. 2003; Røskaft et al. 2007). The concept of attitudes varies among disciplines (Røskaft et al. 2007). In this study, attitude refers to a human psychological behaviour expressed by evaluating the PA, with favour or disfavour, based on the "Theory of Reasoned Action" (Ajzen 1980). This theory embraces a set of three elements: 1) feeling (e.g., like or dislike of PA), 2) belief (i.e., cognition or thought about the PA and its conservation), and 3) action or behaviour (e.g., participation in PA conservation). Allendorf (2007) said that beliefs are associations people establish between PAs and various attributes. An individual's perception about PAs is his or her belief or recognition that derives from his or her personal experiences or interaction with PAs (Allendorf et al. 2006; Htun et al. 2012). Regardless of conceptual differences, attitudes and perceptions appear closely related to each other; perception is likely to be one of the emotional components that determines attitudes. This research seeks local residents' general attitudes comprising all three elements mentioned above.

Attitudes as an Indicator in Adaptive Co-management

Attitudes can be understood from human actions or words, although feelings and beliefs are internal reactions (Pickens 2005). Attitudes of local residents in the neighbourhood of PAs can be predicted from their verbal responses: feelings regarding PAs, perceived costs and benefits from PAs (Allendorf et al. 2006; Xu et al. 2006; Dimitrakopoulos et al. 2010), dependency on PA resources, perception of PA existence (Xu et al. 2006), relationship with PA management (Sarker & Røskaft 2011; Allendorf et al. 2012), trust in PA staff, involvement in PA conservation, and level of awareness of PAs (Dimitrakopoulos et al. 2010). Attitudes affect how a person acts in the nearby environment (e.g., resource harvest from a landscape near them), and physical and social factors affect the person's attitudes as well (Pickens 2005). By understanding the attitudes of local inhabitants, appropriate and adaptive co-management strategies can be designed for the reconciliation of crosscutting conflicts (Allendorf et al. 2006; Sarker & Røskaft 2011) to reduce problematic resource use actions. A good relationship between the PA and the community gradually creates mutual trust (Kubo & Supriyanto 2010), which could change negative attitudes.

Attitude Change due to Benefits gained

Residents within an accessible distance of a PA usually extract PA resources in an unsustainable behaviour; however, they are more likely to be active in PA conservation since their livelihoods rely on PA resources (Sarker & Røskaft 2011). These residents' perception of the benefits given by the PA contributes to their positive attitudes towards and willingness to participate in conservation (Sodhi et al. 2010). They usually recognize material benefits (Lan et al. 2015) and are expected to have better traditional ecological knowledge of resources (Liu et al. 2010) than the management staff are. Residents' long-lasting relationship with neighbouring PAs may cause them to contribute to biodiversity conservation (Trakolis 2001). Rural people in developing countries often recognize the non-material benefits of PAs (Sarker & Røskaft 2011) (i.e., sense of place, landscape identity, recreation) that symbolize their sentimental connectedness to it (Chan et al. 2011). The importance of particular PAs to individuals might vary upon interpersonal relationship and spatial scale (Mitsch & Gosselink 2000; Stobbelaar & Pedroli 2011). However, it is unclear if they perceive the benefits they gain as being a result of PA conservation and living near the PA landscape (e.g., wetlands). These individuals have generally positive attitudes towards the PA if they perceive that they obtain direct benefits (e.g., socio-economic incentives or legal rights) to their subsistence through management interventions (Allendorf et al. 2012). Therefore, it is important to clarify how residents view and value the PA itself or the PA conservation attached to management operations.

PA History & Wetland PAs in Myanmar

Historically, PA management in Myanmar has favoured the fence-and-fine policy that excludes people by force and prohibitions (Rao et al. 2002; Aung 2007). Due to limited financial and institutional support, law enforcement was, however, ineffective in preventing illegal resource extraction (Aung 2007; Rao et al. 2013). Biodiversity has been threatened by activities, such as over-exploitation, improper land use, illegal hunting and trade, of local communities near PAs (Forest-Department 2014). These activities worsen the adverse effects of habitat fragmentation or loss and decrease wildlife populations in PAs (Allendorf et al. 2006). At present, Myanmar has 39 designated PAs covering 38,906 km^2 (5.75%) of the total area of the country (Forest-Department 2015), of which a few inland water areas are PAs (Aung 2007). Of the surveyed 99 wetlands, 55 sites are important bird and biodiversity areas (IBAs), and 35 sites are qualified to be Ramsar sites (Davies et al. 2004). Wetlands are regarded as multiple-use areas for socio-economic development for various stakeholders and mitigate climate change across the country (Forest-Department 2015).

Being a member state of the Convention on Biological Diversity and the Ramsar Convention, Myanmar has been trying to explore participatory co-management systems in PAs, including all Ramsar sites. Designated buffer zones must be included as a tool in the system for supporting local residents' livelihoods, with an idea that they will actively participate in conservation. Designating buffer zones is in line with the "National Biodiversity Strategy and Action Plan," which is a political commitment to fulfil the 2020 Aichi Targets (Forest-Department 2015). Currently in progress is the drafting of the national wetland policy, which initiates community support for the sustainable conservation, restoration, and wise use of wetlands as national-level priorities (Forest-Department 2017). For balancing conservation and human needs, the Forest Department has started formulating community-based management strategies instead of using the fortress approach. However, it is difficult to develop adaptive management plans due to the scarcity of scientific knowledge regarding interactions of PAs and people (Rao et al. 2002; Allendorf et al. 2006). The nature of conflicts between the PA and community vary by site-specification and socio-economic status (Sarker & Røskaft 2011), and more problem-driven studies are necessary to assist in developing proper innovative management practices and addressing management issues.

Problems and Justifications

Loss due to PA Establishment

The Moeyungyi Wetland Wildlife Sanctuary (hereinafter MWWS), one of the three Ramsar sites in Myanmar (Forest-Department 2012), was chosen as a case study for various problematic reasons. Looking back at the history of the Moeyungyi wetland, local residents as well as people living farther away had open access to it as a common pool resource. In 1988, when the PA gazettement came about without prior consensus, seizure of lands without proper compensation and eviction of settlements (fishing camps, duck farms) initiated the resistance of villagers to the government, which was minimal. Conservation efforts came into force afterwards, with patrol staff forcing the distribution and timing of local residents' resource harvest to comply with strict regulations, resulting in negative interactions between the PA and the community.

Wetland-related Livelihoods

Overall, 77% of villagers around MWWS rely on wetland-related livelihoods, and the majority of those villagers are engaged in several types of fishing as a key livelihood (BANCA 2014). Fish is source of meat protein in the study area (Prasad et al. 2017) and is the most frequently

extracted resource for both of subsistence and commercial uses (BANCA 2014). There are no clearly designated fishing zones for local residents in the MWWS, although fishing with traditional gear is allowed except in bird breeding zones and during fish spawning season. In Myanmar, most fishermen usually prefer monsoon season to dry season, as it is a favourable time of year with increased water level and fish populations in lakes (Davies et al. 2004). However, fishing pressure with diminished gear has substantially increased in the edges of the MWWS due to shallow waters, especially during the dry season (Peh et al. 2015). This outcome suggests that the weather preference of fishermen in the study area may be associated with what type of fishing gear they use and their economic needs.

Loss of Customary Landownership Rights

When rain ceases, the wetland decreases, leaving flat areas of mud, marsh, and grassland and permanent open water bodies at a maximum depth of 2 metres in some areas (Peh et al. 2015). Soil fertility in wetlands induces residents to alter wetland vegetation as arable land and, consequently, they want to use the area as permanent farmland (Davies et al. 2004). Before PA declaration, there was a village-used land area of 626 hectares within the wetland. To reduce PA-community conflicts, local residents were allowed informally to grow wetland rice paddies within the PA during summer but were not granted legal rights to own land in the PA. A paddy field of 535 hectares encroached into the PA in 2015, expanded to 609 hectares in 2016, and contracted to 530 hectares by 2017 (unpublished data from MWWS office). As said by Ambastha et al. (2007), economic benefits and poverty dictate local residents to claim legal landownership within the PA and water subtraction from the wetland. In this study, such lands are described as customary land property within the PA.

Resource Dependency with Population Growth leading to Threats

Myanmar's annual population growth rate exists at 0.88%. In the Bago region, where the study area is located, there is a total population of 4,867,000. Of those people, 78% live in rural areas where PAs exist. On average, 124 people live within 1 km^2 of the rural areas (Central-Statistical-Organization 2016). Population pressure may be correlated with a high rate of resource dependency. There is a range of human impacts to the biodiversity of the MWWS, along with a gradual increase of poverty levels (BANCA 2014). Among human-inflicted threats, intensive fishing that makes fish stock considerably reduced tops the ranking, followed by bird hunting, wildlife trade (herpetofauna, edible insects), encroachment of paddy fields and grazing pressure (BANCA 2014).

Variation in Water Level controlled by Negotiation of Departments

The MWWS is under the tri-lateral jurisdiction of three government agencies: The MWWS management office under the Forest Department is in charge of PA conservation, the Fishery Department manages the fisheries, and the Irrigation Department controls the sluice gates (AIT 2014; Bhandari et al. 2014). During the summer, the Forest Department aims to maintain a minimum water level of 7 metres for water bird habitats, whereas the Irrigation Department is forced by water demands to supply water to downstream farmlands of 12,400 hectares through the Bago-Sittaung canal. These activities have resulted in the water level being reduced to less than 6.4 metres (Prasad et al. 2017), and conflicts of interest among the different departments regarding the variation in water level usually occur during very hot months (March and April) (Bhandari et al. 2014).

Variation in Water Level driven by Climate Change

Above all, local livelihood practices and resource-use patterns are strongly linked with temporal changes in water level that are handled by unpredictable seasonality (Prasad et al. 2017) and negotiations between the government agencies. The intensity and frequency of the resource harvest is increased, particularly during the dry season. Prasad et al. (2017) estimated that water inflow will decrease by 18% during the dry season by 2020, and it is likely to worsen the flooding that occurs during the monsoon season. This scenario would result in an increase in unsustainable resource use along with declining water levels, which could lead to rising conflicts between the local communities and PA staff. For the purpose of sustainable conservation, the Forest Department is now developing a co-management plan for the MWWS, but it requires scientific knowledge of the attitudes, interests and needs of the local communities. Although it has been nearly 20 years since PA notification, there is not a clear understanding of the local attitudes of people living in the periphery of the MWWS.

Structure of Thesis

As an attempt to fill up the knowledge gap, this study is organized as follows: First, research interests, the general hypothesis and predictions regarding attitudes are outlined. Second, methodologies are mentioned, including a description of the study area, data collection methods and research designs to test the predictions. Third, the data analysis results are described. Then, limitations of the research and interpretation of the key findings based on each prediction are discussed. Finally, the paper concludes possible conservation implications for the present management of MWWS.

Research Objective

The overall objective is concerned with understanding the linkages among the conservation attitudes of local residents living along and adjacent to the MWWS, interactions between the PA and the community, and how the individual perspectives of PA are held by the local residents. Specific objectives of this research are as follows:

1) To evaluate what types of factors govern the attitudes of local residents
2) To examine how the attitudes of local residents are determined by a dependency on PA resources
3) To explore how the attitudes of local residents are affected by
    a. Perception of benefits gained from the PA
    b. Loss through interactions with the PA

Hypothesis

Attitudes of the local communities towards PA conservation are influenced, more or less, by 1) socio-demographic characteristics, 2) how much they depend on PA resources, 3) which positive benefits they see in having a PA in their vicinity, 4) which negative costs they have due to the PA, and 5) how far they live from the PA boundary.

Predictions

P_1: Socio-demographic factors (gender, age, education, wealth) affect the attitudes of local residents regarding PA conservation.

P_2: People who are less dependent on PA resources and live farther away from the PA will display less negative attitudes (or more positive attitudes) on PA conservation.

P_3: People who perceive that they gain benefits from the PA will express more positive attitudes towards PA conservation.

P_4: People who experience direct or opportunity costs (i.e., financial loss, harassment, loss of customary rights) and live in the periphery of the PA will have more negative attitudes.

Methods

Description of Study Area

The Moeyungyi wetland is a shallow rectangular floodplain and unnatural reservoir bordered on three sides (north, east and south) by water-retention embankments that were constructed in the years (1873–1878) by the British Colonial Government with the aims of flood relief and irrigation to the Bago-Sittaung canal for downstream crop lands during the dry season (Prasad et al. 2017), as well as log transportation (BANCA 2014; Peh et al. 2015). Within one century, the man-made reservoir had slowly changed into a natural wetland ecosystem and waterfowl habitat (Aung 2015). The total area of 103.59 km^2 (10,359 hectares) covering the wetland and its vicinity was declared as a wildlife sanctuary in 1988, for the purpose of conservation of wild birds (both resident and migratory) and their habitats. The MWWS exists along the boundaries of three townships (Bago, Waw and Daik-U) in the Bago Region of Southern Central Myanmar between latitudes 17° 30' and 17° 36' N and longitudes 96° 33' and 96° 39' E (Figure 1).

Amongst the 99 wetlands found in Myanmar, this site was recognized not only as an IBA but also as the very first Ramsar site with a high tourism value (Davies et al. 2004), where the Ramsar site boundary and the MWWS are the same (Bhandari et al. 2014). The area has a tropical monsoon climate with average rainfall of 3543.05 mm per year. It has palustrine vegetation with herbaceous plants, such as grasses, reeds and rushes (Aung 2015). During the open season (late October to March), more than 20,000 migratory water birds coming from the Arctic region winter in the area, including IBA trigger species such as the globally threatened Baer's pochard (*Aythya baeri*), sarus crane (*Grus Antigone*) and greater spotted eagle (*Clanga clanga*), as well as >1% of the regional population of northern pintail (*Anas acuta*) (Aung, 2015). A total population of 18,364 birds of 133 bird species (water birds, 48 spp.; terrestrial birds, 85 spp.) was observed in 2014 (BANCA 2014). MWWS straddles the East Asian-Australian Flyway, an essential flying route for migratory birds (Forest-Department 2012). In addition, this area hosts many other wetland-dependent species: mammals (12 spp.), herpetofauna (24 spp. including the vulnerable Burmese eyed turtle (*Morenia ocellata*), which is endemic to Myanmar, fish (37 spp.), butterflies (41 spp.), beetles (14 spp.), and plants (74 spp.) (BANCA 2014).

Seventeen villages exist around the MWWS, with a local population of more than 65,000 individuals in approximately 12,000 households. The livelihoods of most of the people are directly associated with the wetland; year-round fishing, cultivation, wetland rice farming,

water draining, raising livestock, rearing ducks, harvesting stalks of lotus for making textiles are regular subsistence activities, while insect or leech collection is seasonal livelihood practices (BANCA 2014). Despite having an ecotourism facility, the MWWS can provide jobs to a few villagers (30–40), and alternative livelihoods are limited. In Myanmar, tourism entrance fees go into the pockets of a handful of Tour Companies that pay tax directly to the Union Government; there is no direct benefit of sharing from tourism to the conservation sector and surrounding communities. Many youth from the MWWS move and seek employment in overseas countries (esp. Thailand, Malaysia, Singapore or Korea) due to the limited alternative livelihoods and an insufficiency of resources in MWWS to meet their basic needs.

The major source of water to the wetland originates from the Bago river, while local rainfall and small creeks are minor water supplies (Prasad et al. 2017). Flooding occurs annually during the rainy season (May–October). When the wet season ends, water body size shrinks due to the declined water level, which is recharged by upstream dams at that period (Peh et al. 2015).

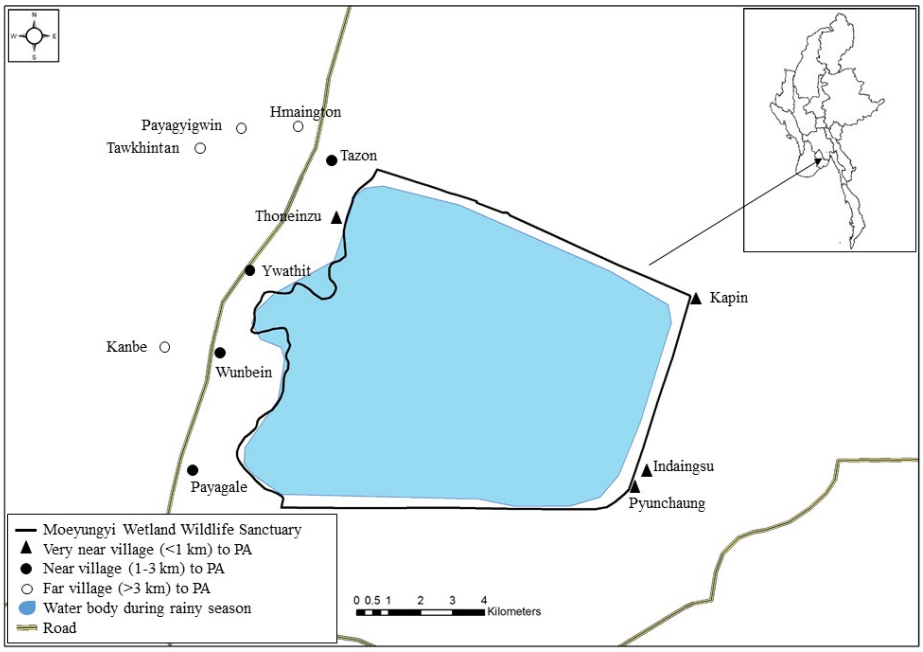

Figure 1: Map of surveyed villages near and adjacent to Moeyungyi Wetland Wildlife Sanctuary, shown at the top right corner of the map of Myanmar

Field Reconnaissance

Before the actual field work, a pilot study was carried out by interviewing a few local villagers using a draft questionnaire and meeting with PA staff. Field reconnaissance helped me to

become familiar with interviewing people, as well as to learn more about the study area (Ekpe 2012). Some modifications and changes to the questionnaire were made afterwards to be more in line with the local context (Wilson 2013). I aimed not to develop any misunderstandings with the respondents to questions during the interview. Therefore, I searched for accurate and reliable answers.

Questionnaire Design

During the interviews, a mixture of fixed-response questions and open-ended questionnaires were properly constructed and used to collect detailed information to test the predictions. In the survey form, the first part focused on demographic and socio-economic variables of the respondents; the second part was about their livelihoods and status of the wetland resources; and the last part aimed at assessing associations between the awareness level of the PA and the attitudes towards PA conservation. The questionnaire was prepared in English, but I used the Burmese language in simple and appropriate ways during the interviews and took great care to avoid using insensitive words.

Sample Selection and Fieldwork

As a starting attempt of the actual survey, a brief discussion with the local PA staff and some village heads was organized regarding type of major livelihoods, the present status of wetland resource extraction in the local villages, and how far each village is to the PA boundary (accessible to the resources). In favour of the stratified random sampling technique, 12 villages (Figure 1) were chosen through the discussion by dividing them into three strata each of 4 villages; i.e., very near the PA (<1 km), near the PA (1–3 km), and farther away from the PA (>3 km). The last stratum was regarded as the control site. First, I took screenshots of a Google Earth image of each targeted village and printed them out. Eighteen households per village were randomly selected by looking at the photos, ensuring that all the households were in a random distribution pattern to avoid observer biases. For easy analysis, an equal number of households in each village (18 respondents per village, 72 households per stratum) was chosen. Thus, a total of 216 questionnaires in 12 villages were conducted in this study.

Prior to the interviews in each village, I met with the village heads for their permission and asked for a local guide to accompany me. Then, we went to the selected households according to the Google Earth photos. The respondents were given a brief explanation of the research purposes and asked if they were able to participate in the survey. The respondents' identity was not recorded for ethical concerns, and I clarified that their answers would be kept

anonymous. Use of electronic devices such as cameras, mobile phones or voice recorders, were avoided, as they seemed too invasive to the participants. Locations of all settlements were roughly marked on the Google Earth map, with the help of local guides, and I later, checked and added the GPS coordinates to the survey sheets. The survey was performed during the months of June to August 2017.

Types of Data used

The primary data were obtained through interview surveys. The secondary data included grey literature (unpublished reports and documents) from the MWWS office and Nature and Wildlife Conservation Division, Forest Department Headquarter. Scientific publications as well as relevant papers from the NTNU library (Oria.no) and online databases (Google Scholar, Scopus, Research Gate, and PubMed), were also gathered and used for reference.

Characteristics of Respondents

At the individual level, socio-economic profiles, such as gender, age, education, occupation, ethnicity, religion and residency, of the respondents were recorded. Most of the respondents (66.2%) were males, while 33.8% were females. All respondents were adults over 18 years old and were classified into 4 age groups: 7.4% (below the age of 30 years), 19.4% (30–39 years), 26.9% (40–49 years) and 46.3% (50 years and above). Overall, 8.3% of the respondents were illiterate, 18.5% had no formal education but were able to read and write, 48.1% had a primary education, and 25% had finished secondary or higher education. Their primary source of income was from collecting and selling aquatic goods from the wetland (41.7%), followed by cultivation of crops (27.3%) self-owned business (13.4%), seasonal labour for daily wages (9.7%) and making tobacco cigarettes (7.9%).

Most of the respondents (95.8%) were Burmese while a low percentage were Karen-Burmese or Mon-Burmese. Only one respondent (0.5%) was Christian, while all the others were Buddhists. Therefore, ethnicity and religion were not considered. About one-fifth (22.2%) were immigrants to the study area, while 77.8% were native settlers. Non-native respondents (immigrants) were asked why they had moved to the area, their place of origin, how far they were born from the present settlement and their duration of residency. However, migration was also not significant in explaining any of the variation and was excluded from the further analyses.

At the household level, the size of household including number and age of children, spouse, parents and other relatives living in the same household, were recorded. The household

size was categorized into 3 groups; small (<4 members; 44.9%), medium (5–6 members; 34.7%) and large (>7 members; 20.4%). Household size was not considered in the analyses because of its non-significant contribution to the variation in the tested predictions. Most of the respondents (84.7%) owned livestock: buffalos (22.7%), ducks (16.2%), cows (8.8%), chickens (57.8%), pigs (30.1%), and one goat. Livestock were raised on a pasture within and near the PA by 24.5% of respondents all year round, near the PA by 12%, and far from the PA by 48.1%.

Ownership of agricultural farmland were recorded in acres, a unit of land widely used in Myanmar. Total farmland size of each household was later converted into SI units and categorized as three groups: 60.6% were landless, small (<2 hectares) farmland was owned by 4.6%, and large (>2 hectares) farmland was owned by 34.8%. However, the total farmland size could not be further considered, as it did not significantly contribute to a variation in tested results. In addition, I asked if total farmland acquisition was formally owned via legal documents to determine how much of the area was legal land property. This question intended to estimate the respondents' customary land property located within the PA boundary, since such lands appear after water shrinkage during the open dry season and local residents annually grow rice (*Oryza sativa L.*) paddies there. To learn more about customary land possession within the PA, I later subtracted legally owned area from the total farmland size belonging to those and converted the results into similar three categories: 78.7% of the participants being landless, but small (<2 hectares) and large (<2 hectares) belonging to 10.6% each.

To estimate accessible distance based on how far their houses were from the wetland, some of the respondents were uncertain due to the seasonal variation in water body. Thus, I used the village distance to the PA boundary in 3 categories: very near to MWWS (<1 km), near (1–3 km) and farther away (>3 km), instead of spatial distance of the respondents' house from the wetland. Approximately 33.3% of the respondents were involved in each category. Distances between boundary of study villages and MWWS were measured using the Euclidean distance tool in ArcMap 10 (ArcGIS developed by ESRI).

Consumption and Dependency of PA Resources

The resources directly utilized were zoological resources (1 to 9 resources) and plant resources (10 to 15 resources) (See Table 1 for all use of wetland resources). Zoological resources were consumed by 56% of the respondents, while plant resources were consumed by 58.3%. Subsequently, the state of all resources (zoological and plant resources) used was pooled into a

single variable of resource consumption that varied from 0 to 12. The variable was then categorized into two dichotomous responses (0 = not used, 1 to 12 = used).

Table 1: Fifteen types of extractive PA resources harvested by the respondents (n = 216)

Zoological resources *					
Fish	52.3	Eel	30.6	Prawn	25.9
Crab	23.6	Frog	16.2	Giant water bug (*Lethocerus indicus*)	12.5
Leech	10.6	Molluscs	4.2	Snake, rat, bird egg or turtle egg	2.3
Plant resources *					
Vegetable	46.8	Edible taro (*Colocasia esculenta*)	37.5	Lotus	32.9
Fodder	26.9	Shrub/reed used as fuel	26.4	Medicinal plant	5.6

* Value in column represents percentage of respondents used each type of resources

The income earning from last catch of each wetland resource was recorded, and I made a sum of all the incomes. The sum variable of the incomes, however, did not contribute to explain the variation in tested results and was not considered anymore. The ordinal rankings of households' livelihood activities of importance (fishing, cultivation, livestock herding, insect trapping, leech collection, and self-owned business) were combined into the sum of livelihood rankings, which were not considered because of statistical non-significance in the tested dependent variable.

To estimate the state of dependency on the wetland resources, responses of the interviewees were recorded by asking three questions: "Do you have access to wetland resources, and if so, how many times do you extract?" (1 = yes almost daily, 2 = yes mainly fodder, rarely other wetland resources, 3 = no), "How much does your daily expenditure rely on the wetland?" (1 = almost totally, 2 = a few, 3 = nothing), and "How long have you been using the wetland resources?" (1 = for generations, 2 = always, 3 = I do not use them). The

three dependency variables were highly significantly inter-correlated ($0.855 < r < 0.884$, $p < 0.001$). Thus, I pooled them into one dependency variable. The dependency variable varied from 3 (extremely dependent) to 9 (all over independent). Therefore, the lower the value was, the more dependent to the wetland resources.

Attitudes of Local Residents towards MWWS

The five-point *Likert-type* scales (strongly agree, agree, neither not, disagree, strongly disagree) were used during the interviews to understand attitudes towards the wetland conservation of local residents. For the following attitude-related questions, I later pooled those five options into three options: 1) "What is your relationship with the PA management?" (1 = positive, 2 = neutral, 3 = negative) and 2) "Do you trust the PA staff?" (1 = yes, 2 = neutral, 3 = no). Likewise, three different answers (yes, not aware and no) were used for the following questions: 3) "Do you think PA establishment is necessary for future survival of birds and fishes?", 4) "Do you willingly involve yourself in PA conservation?", and 5) "Do you like the existence of the PA in your locality?" These five attitudes were significantly inter-correlated ($0.304 < r < 0.632$, $p < 0.001$). Thus, I pooled them into one mean attitude variable. The mean attitude varied from 5 (overall positive) to 15 (overall negative), and it was assumed as follows: 5 to 8 = positive, 9 to 12 = neutral and 13 to 15 = negative. Hence, the higher the value was, the more negative attitudes of the respondents.

Data Analysis

The quantitative data collected from the field work were analysed using IBM SPSS statistical software version 24 with the aid of Microsoft Excel version 2011. At first, descriptive statistics were calculated to determine the frequencies of all the different variables. A one-way ANOVA (Scheffe post hoc tests) was used to identify statistically significant difference between the predictor variables in relation to the response variable, which is the mean attitude. Univariate analysis (the general linear model) was used for more clarification of effects of significant factors on attitudes. Then, relationships between dependent and independent variables using chi-square statistics were tested. A binary logistic regression model was applied to understand the variation of perceptions and knowledge, in which pseudo r^2 of Nagelkerke was a metric for the adequacy to evaluate the predictive capacity of the model to explain variation. The threshold level of significance for all tests was $p = 0.05$.

Results

P_1: Socio-demographic factors (gender, age, education, wealth) affect the attitudes of local people to PA conservation.

Effect of Socio-demographic Variables on Attitudes

In my research, gender and age were not the predictor variables of attitudes; however, education status and customary landownership within the PA had significant influences on attitudes. The mean attitude of the respondents differed significantly between different education levels (ANOVA, $F = 4.833$, df = 3 & 212, $p = 0.003$; Figure 2). However, the post hoc tests showed that only the difference between the illiterate group (most negative) and the most educated group (most positive) was statistically significant (Scheffe Test, $p = 0.005$; Figure 2). No statistically significant differences were found between any other groups.

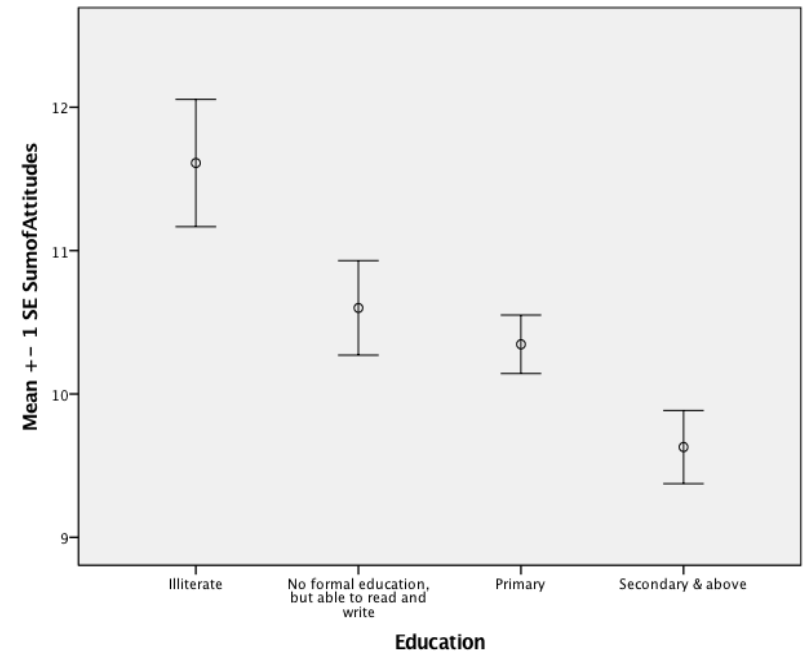

Figure 2: Mean attitude (±SE) of respondents in relation to education level

The mean attitude of the respondents varied with regard to the size of customary land property within the PA (ANOVA, $F = 3.790$, df = 2 & 213, $p = 0.024$; Figure 3). The post hoc analysis showed that the difference between the landless respondents (most positive) and those who owned land larger than 2 hectares (most negative) was statistically significant (Scheffe

Test, $p = 0.031$; Figure 3). The people with less than 2 hectares (negative) were not different significantly from the other two groups.

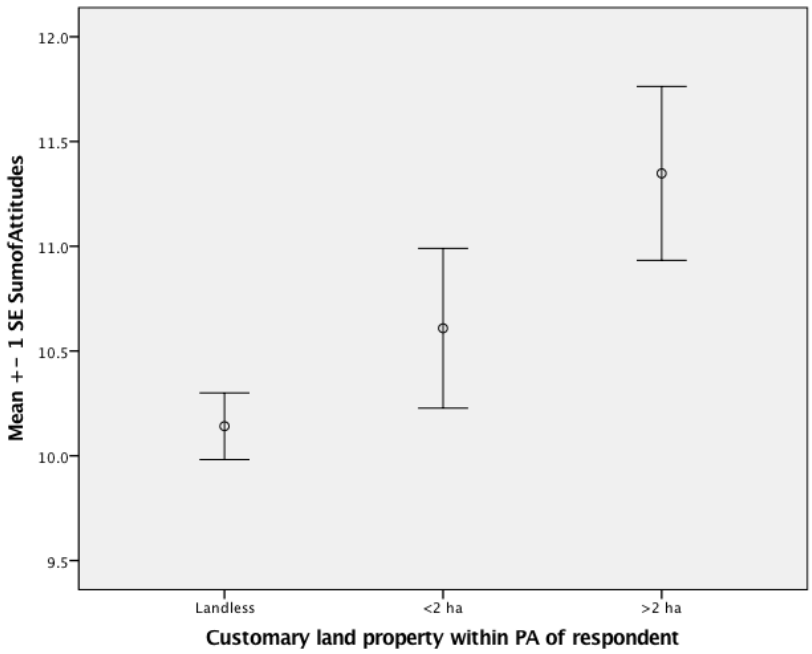

Figure 3: Mean attitude (±SE) of respondents in relation to customary land property within the PA

P_2: People who are less dependent on PA resources and live farther away from the PA will display less negative attitudes (or more positive attitudes) on PA conservation.

Effect of Resource Dependency on Attitudes

The mean attitude of respondents varied with regard to their dependency on the PA resources (ANOVA, $F = 7.180$, df = 6 & 209, $p < 0.001$; Figure 4). The post hoc tests showed that the respondents who did not rely on the PA (most positive) differed significantly from those with a total dependency (negative) (Scheffe Test, $p < 0.001$) and differed from those with a moderate dependency (most negative) (Scheffe Test, $p = 0.047$) (Figure 4). No statistically significant difference was found between any of the other groups.

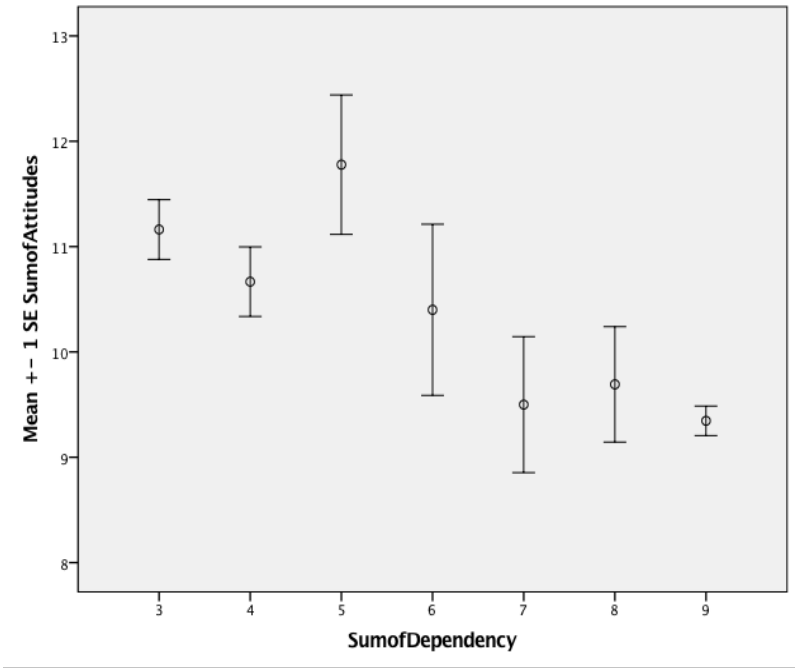

Figure 4: Mean attitude (±SE) of respondents in relation to dependency on the PA resources

Consumption of PA Resources

After pooling the utilization of fifteen types of resources into a single variable of resource utilization with dichotomous categories (0 = not used, 1 = used), 63% of the respondents were resource users. Of those, 53.3% arrived almost daily at the PA for resource extraction, while 9.7% rarely arrived at the PA, but the PA was pastureland for their livestock. The villagers very near to the PA boundary ($\chi^2 = 160.4$, df = 2, $p < 0.001$) and fishermen ($\chi^2 = 103.5$, df = 4, $p < 0.001$) were those who mostly consumed the resources. A binary logistic regression was conducted with resource use as a dependent variable and with village distance and occupation as independent variables. The model indicated that village distance and occupation both contributed significantly to explaining 77.6% of the variation in resource consumption (Nagelkerke $r^2 = 0.776$) (Table 2).

Table 2: A binary logistic regression of resource use as a dependent variable (yes/no) with village distance and occupation as independent variables

Factors	B	S.E.	Wald	df	$p \leq$
Village distance	-3.106	.470	43.73	1	.001
Occupation	-.797	.206	14.97	1	.001
Constant	9.373	1.202	60.79	1	.001

P_3: People who perceive that they gain benefits from the PA will express more positive attitudes towards PA conservation.

Effect of Perception of Benefits on Attitudes

A total of 21.3% of the respondents said they got nothing when they were asked "Do you know if any in your society gets benefits from the wetland?", while the remaining 78.7% said "yes". Of those who said yes, 54.6% received direct benefits (aquatic goods), while the remaining 24.1% appreciated direct as well as non-monetary benefits (i.e., physical landscape identity, tourism and flood control). The mean attitude of those answering yes or no differed significantly (ANOVA, $F = 5.418$, df = 1 & 214, $p = 0.021$; Figure 5).

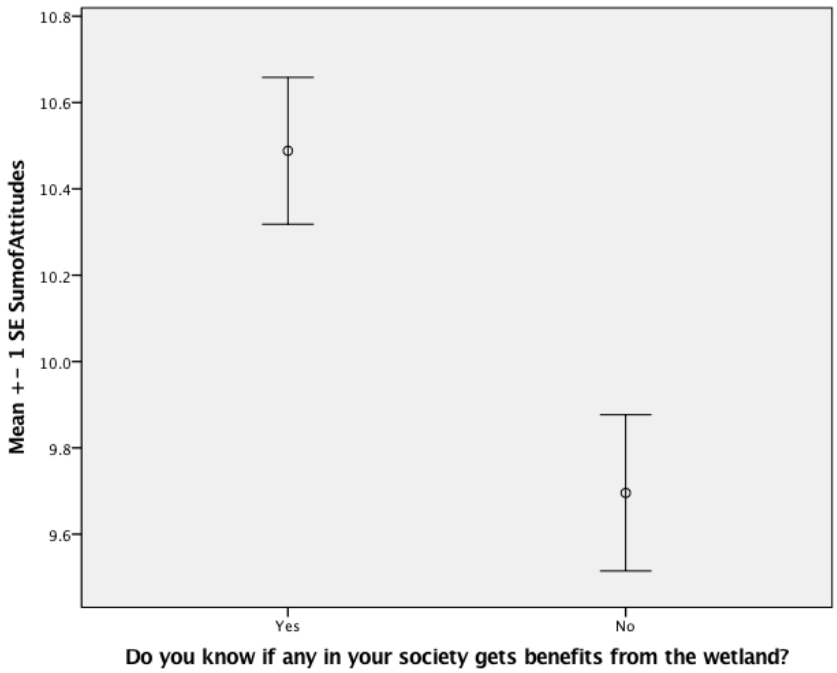

Figure 5: Mean attitude (±SE) of respondents answering yes or no in relation to the question "Do you know if any in your society gets benefits from the wetland?"

"Do you know if any in your society gets benefits from the wetland?"

All of the respondents living close to the PA answered yes to the question, "Do you know if any in your society gets benefits from the wetland?", while only 40% of those living far away answered yes (χ^2 = 95.52, df = 2, p < 0.001; Figure 6). Furthermore, males were also more likely than females to answer yes to the above question (χ^2 = 8.82, df = 1, p = 0.003; Figure 7). A binary logistic regression was carried out with the perception of benefits as a dependent variable (yes, no) and with village distance and gender as independent variables. The model showed that village distance and gender both contributed significantly to explaining 61.2% of the variation in this perception (Nagelkerke r^2 = 0.612) (Table 3).

Table 3: A binary logistic regression with the question "Do you know if any in your society gets benefits from the wetland?" as a dependent variable (yes/no) and with village distance and gender as independent variables

Factors	B	S.E.	Wald	df	$p \leq$
Village distance	3.707	.640	33.601	1	.001
Gender	1.238	.489	6.401	1	.011
Constant	-12.417	2.077	35.744	1	.001

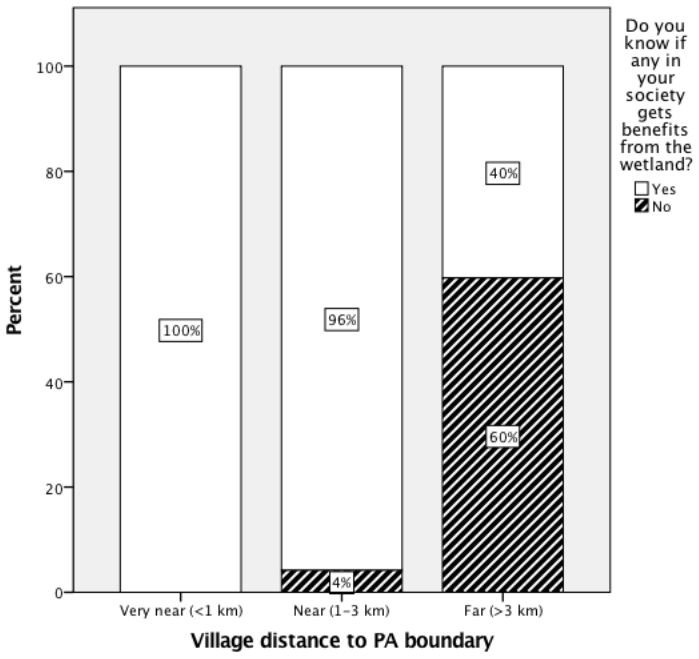

Figure 6: Percentage distribution of respondents' answers towards "Do you know if any in your society gets benefits from the wetland?" (yes/no) in relation to village distance to the PA boundary

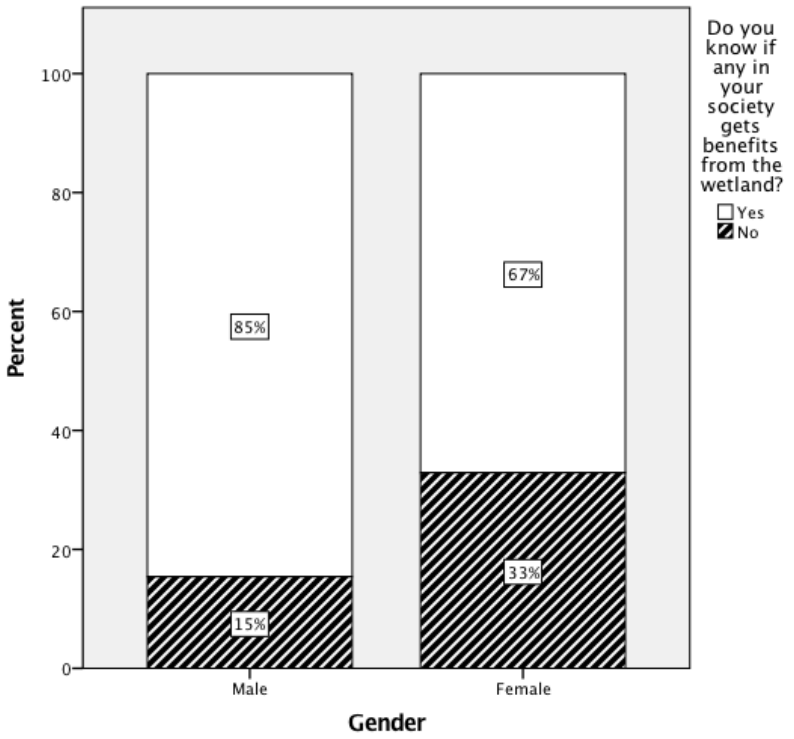

Figure 7: Percentage distribution of respondents' answers towards "Do you know if any in your society gets benefits from the wetland?" (yes/no) in relation to gender

"Are the benefits equally shared between all villagers?"

A total of 61.1% of the respondents answered yes in response to the question, "Are the benefits equally shared between all villagers?", and 38.9% responded no. Of those who said no, 17.6% claimed that the fishers who use illegal gear, the middlemen and people who can grow wetland rice on the customary land that appears after water shrinkage gained the maximum benefits, while the remaining 21.3% had no comments. People adjacent to the PA boundary were more aware of the sharing of perceived benefits than those living furthest away ($\chi^2 = 19.99$, df = 2, $p < 0.001$); similarly, customary landholders had better knowledge of it than landless people ($\chi^2 = 13.97$, df = 2, $p = 0.001$). Again, in a binary logistic regression, there was a statistically significant relation between the dependent variable and independent variables. The model indicated that village distance and customary land property both explained the 13.4% of the variation about this perception of benefit sharing (Nagelkerke $r^2 = 0.134$) (Table 4).

Table 4: A binary logistic regression with the question "Are the benefits equally shared between all villagers?" as a dependent variable (yes/no) with village distance and customary land property as independent variables

Factors	B	S.E.	Wald	df	$p \leq$
Village distance	.644	.185	12.177	1	.001
Customary land property	-.586	.274	4.583	1	.032
Constant	-1.614	.428	14.218	1	.001

P_4: People who experience direct or opportunity costs (i.e., financial loss, harassment, loss of customary rights) and live in the periphery of the PA will have more negative attitudes.

Effect of PA-induced Losses on Attitudes

A total of 54.6% of the respondents answered no when they were asked "Do you or your village incur losses due to conservation of the PA?", while 45.4% claimed they had losses. Of those who said no, 4.6% suffered from the forced eviction of settlements and confiscation of farmlands without proper compensation, and 32.5% faced restrictions on resource access, while the rest (8.3%) blamed the PA authority who controlled water storage unnecessarily during the open season; hence, their customary farmland did not appear within the wetland, and they could not cultivate wetland rice. The mean attitude of those answering yes or no differed significantly (ANOVA, $F = 72.4$, df = 1 & 214, $p < 0.001$; Figure 8).

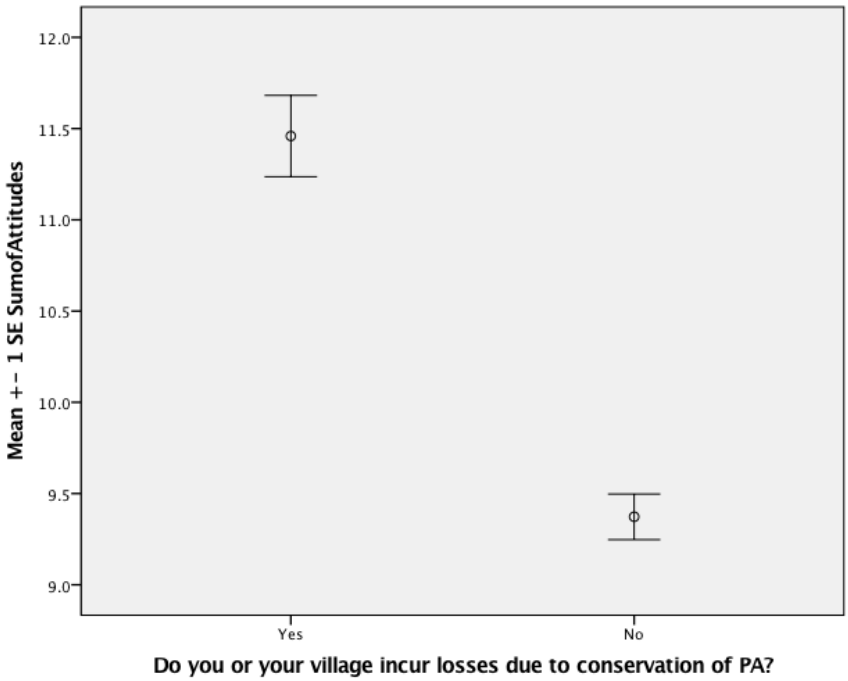

Figure 8: Mean attitude (±SE) of respondents answering yes or no in relation to the question "Do you or your village incur losses due to conservation of the PA?"

"Do you or your village incur losses due to conservation of the PA?"

Almost 70% of the respondents living close to the PA answered yes to the question "Do you or your village incur losses due to conservation of the PA?", while only 1% of those living furthest away answered yes (χ^2 = 84.3, df = 2, p < 0.001; Figure 9). Moreover, people who owned customary land within the PA were also more likely than landless people to answer yes to the above question (χ^2 = 16.5, df = 2, p < 0.001; Figure 10). A binary logistic regression was carried out with the experience of losses as a dependent variable (yes, no) and with village distance and customary land property as independent variables. The model indicated that village distance and customary land property both contributed significantly in explaining 39.1% of the variation in the matter of losses (Nagelkerke r^2 = 0.391) (Table 5).

Table 5: A binary logistic regression with the question "Do you or your village incur losses due to conservation of the PA?" as a dependent variable (yes/no), with village distance and customary land property within the PA as independent variables

Factors	B	S.E.	Wald	df	$p \leq$
Village distance	1.536	.229	45.138	1	.001
Customary land property	-.663	.256	6.718	1	.010
Constant	-2.570	.465	30.481	1	.001

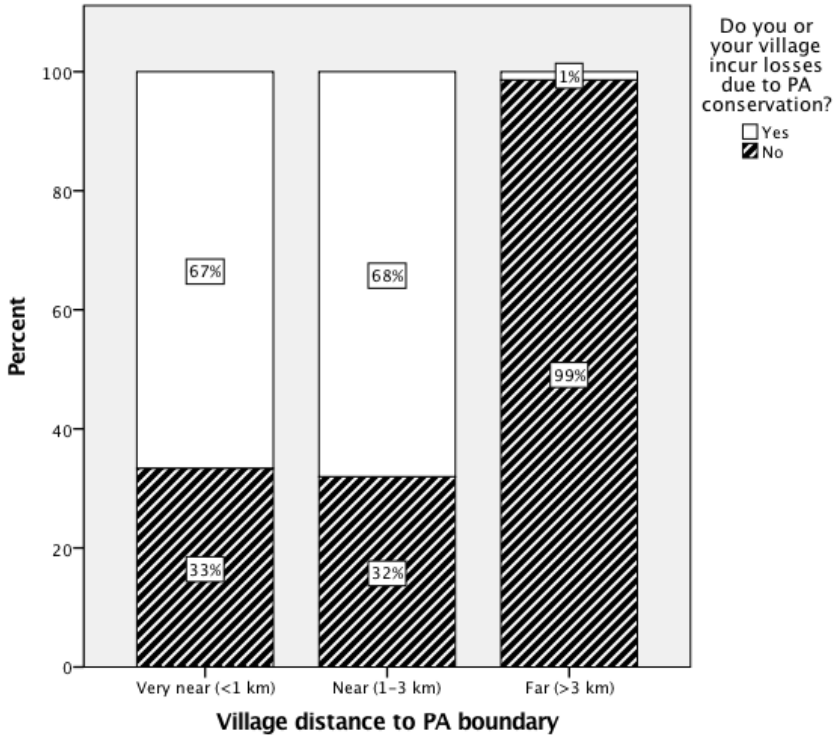

Figure 9: Percentage distribution of respondents' answers towards "Do you or your village incur losses due to conservation of the PA?" (yes/no) in relation to village distance to the PA boundary

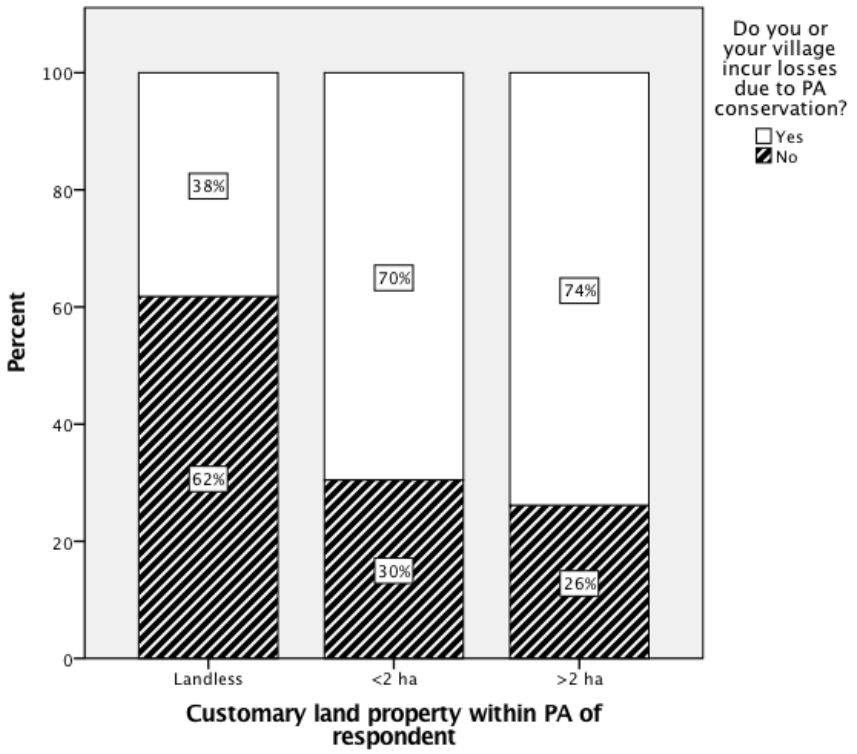

Figure 10: Percentage distribution of respondents' answers towards "Do you or your village incur losses due to conservation of the PA?" (yes/no) in relation to customary land property within the PA of the respondents

Effect of Village Distance on Attitudes

Village distance contributed significantly to explain the variation in the mean attitude of the respondents (ANOVA, $F = 15.91$, df = 2 & 213, $p < 0.001$; Figure 11). The post hoc tests indicated the respondents living more than 3 km away from the PA boundary (most positive) were significantly different from those closest to the boundary (most negative) (Scheffe Test, $p < 0.001$), as well as from those residing 1 to 3 km away (negative) (Scheffe Test, $p < 0.001$) (Figure 11). There was no statistically significant difference between those living 1 to 3 km away and those living less than 1 km away from the boundary.

Figure 11: Mean attitude (±SE) of respondents in relation to village distance to the PA boundary

A univariate analysis (general linear model) was carried out with the mean attitude of respondents as a dependent variable and with village distance, education level and customary land ownership within the PA as independent variables. The model showed that customary land property was no longer significant, while village distance ($p = 0.005$) and education ($p = 0.004$) remained statistically significant (Table 6). However, the interaction effect between village distance and education was not statistically significant (Table 6).

Table 6: A univariate analysis (general linear model) with mean attitude of respondents as a dependent variable and with village distance as fixed factor, education as random factor, and customary land property as covariate

Source	Type III Sum of Squares	df	Mean Square	*F*	$p \leq$
Intercept	7820.233	1	7820.233	904.268	.001
Customary land property	10.103	1	10.103	2.707	.101
Education	22.883	3	7.628	7.132	.004
Village distance	21.903	2	10.951	5.662	.005
Education * Village distance	4.738	6	.790	.212	.973

Awareness of Local Communities about MWWS

"Do wild animals destroy agricultural crops in and around the wetland?"

For the question "Do wild animals destroy agricultural crops in and around the wetland?", 15.7% of the respondents said no, while 84.3% claimed that crop damage was caused by wild species. Those who said yes were requested to rank the level of severity, and 48.1% of those perceived the golden apple snail (*Pomacea canaliculata*) to be the root cause of the most extensive damage to crops, followed by insects, bugs or rats (30.6%) and birds (5.6%). Males (52.4%) had a better knowledge of the most destructive wildlife that destroy crops than females (39.7%) ($\chi^2 = 8.35$, df = 3, $p = 0.039$).

"Do you know present conditions of wetland resources?"

When asked "Do you know the present conditions of wetland resources?", 54.2% the respondents believed it was declining, 6% believed it was increasing, 11.1% replied it was stable, and the others were unaware of the conditions (28.7%). Males (59.4%) were almost statistically significantly more aware of the fact that wetland resources declined than females (43.8%) ($\chi^2 = 7.66$, df = 3, $p = 0.054$), while none of the other variables contributed significantly to this knowledge.

"Are you allowed to collect wetland resources?"

When asked "Are you allowed to collect wetland resources?", 57.9% of the respondents who replied yes said that resource collection was allowed except in the core conservation zones (i.e., bird breeding sites) and fish spawning seasons. A total of 27.3% of the respondents answered no and said the wetland was a bird sanctuary where no one is legally allowed to harvest resources, while the rest (14.8%) were not aware of this matter. The villagers who lived very near ($\chi^2 = 84.3$, df = 2, $p < 0.001$) and males ($\chi^2 = 12.01$, df = 2, $p = 0.002$) had a better knowledge of this concern. A total of 53.2% of the respondents admitted that they were fishing inside and near the PA upon the seasonal changes in water level.

"Do you know the rules, regulations and management activities of the PA?"

A total of 17.1% of the respondents responded no when asked "Do you know the rules, regulations and management activities of the PA?", while the majority (82.9%) knew them in some way. Of those who said yes, 36.6% knew that restriction efforts exist, such as the confiscation of illegal fishing gear, seizures and fines by the regular patrol, while 46.3% realized there were conservation operations, education, research and tourism. Villagers close to

the PA boundary (χ^2 = 16.9, df = 2, p < 0.001) and males (χ^2 = 4.40, df = 1, p = 0.036) were more aware of the rules and management efforts. A binary logistic regression was performed with knowledge of the legislation and management operations of the PA as a dependent variable (yes, no) and with village distance and gender as independent variables. The model showed that gender was no longer significant (p = 0.090), whereas village distance (Wald = 13.179, df = 1, p < 0.001) contributed significantly in explaining 14.4% of the variation of that knowledge (Nagelkerke r^2 = 0.144).

"Are you willing to report when you see illegal efforts in and around the PA?"

The respondents were asked "Are you willing to report when you see illegal efforts in and around the PA?"; only 3.7% said yes, 65.7% answered no, and 30.6% admitted they were not aware of which activity is illegal. Of those who said no, 15.3% admitted they had to use illegal fishing gear for subsistence needs, 37.5% were afraid of being attacked despite knowing who performed this illegal activity, and 12.9% claimed there was injustice and corruption of the PA staff. Males (χ^2 = 13.84, df = 2, p = 0.001) were more active than females in reporting and participating in patrolling and conservation.

"Do you know the wetland is a Ramsar site?"

The question "Do you know the wetland is a Ramsar site?" was asked to assess the respondents' knowledge of Ramsar. Only 9.7% of those who replied said they knew about it through the radio, television and newspapers; however, the others answered no. Males (14%) had better knowledge than females (1.4%) about the Ramsar designation of the wetland (χ^2 = 8.76, df = 1, p = 0.003), while none of the other socio-economic variables were statistically significant.

"Have you eaten bird meat?"

To understand the likelihood of illegal bird hunting and meat preference, the question, "Have you eaten bird meat?" was asked, and 24.1% of the respondents replied no, whereas 75.9% said yes. Of those who said yes, 65.7% admitted that bird meat was delicious and that it was one of their meat preferences. None of the other socio-economic variables were as significant as gender (χ^2 = 17.48, df = 1, p < 0.001); males (84.6%) admitted to have eaten bird meat more frequently than females (58.9%).

Discussion

Limitations of Study

In this study, I used the mean attitude, that is, the sum of five attitudinal factors with three options: the relationship with PA management, trust in the PA staff, willing participation in PA conservation, perception that the PA is necessary for the future survival of wildlife, and feelings regarding the existence of the PA. Attitudinal scores span from 5 to 15—the higher the scores, the more negative the attitudes of the respondents are. In case a respondent had a lack of awareness and no interaction with the PA, all of his or her answers may be neutral to all attitudinal questions, resulting in low attitudinal scores. It is thus possible for them not to have negative attitudes towards the PA; however, it does not mean they have positive attitudes, and their attitudes may possibly be neutral. Despite the inter-correlation among the five different attitudinal variables ($0.304 < r < 0.632$, $p < 0.001$), the strength of "r" is only at a substantial or moderate level and is not very strong.

Since these attitudinal questions are more or less sensitive, I could not measure respondents' attitudes objectively. Therefore, I deliberately used indirect questions during the interview and estimated possible scores of their character traits and aspirations depending on the nature of their responses. All their complaints about the PA conservation were recorded. Open-ended questions were also used to understand their perceived benefits from the wetland. They were encouraged to define their perceptions themselves regarding the importance of the wetland to them and what type of benefits they gain. To avoid biases, I tried to be consistent in the way of asking the questions and seeking their clarifications. No matter how much I carefully interviewed them, the respondents perhaps dared not to show their true expressions by any possible means, which is a significant challenge in this kind of self-reporting research (Wilson 2013).

The other limitation of the study concerns the under-representation of females in the sample (i.e., one-third of total respondents), which has been reported in previous studies as well (Dimitrakopoulos et al. 2010). The men were not interviewed on purpose, but the rest of the family members wanted the men, who are mostly the head of the household, to speak when they were available at home. This social scenario is common in Asian and African examples (Baral & Heinen 2007; Allendorf & Allendorf 2012; Sosiya 2016). Thus, gender did not contribute to significant differences in the attitudinal results, whereas several other scholars (Mehta & Heinen 2001; Røskaft et al. 2007; Allendorf & Allendorf 2012, 2013) proved that

gender is a strong predictor of attitudes. Despite having such limitations, this attitudinal research provides useful information for management decisions, as well as offering baseline data to evaluate the effectiveness of management approaches (Badola 1998) in the MWWS.

P_1: Socio-demographic factors (gender, age, education, wealth) affect the attitudes of local people to PA conservation.

Effect of Socio-demographic Variables on Attitudes

There are no relationships between gender, age and attitudes. However, people with a lower education display more negative attitudes towards the MWWS. This is a common finding in several studies (Infield 1988; Heinen 1993; Mehta & Heinen 2001; Kideghesho et al. 2007; Røskaft et al. 2007; Liu et al. 2010; Sodhi et al. 2010) that optimistic attitudes and support of local residents to PA conservation are governed by higher education. Perhaps it is because a higher level of education contributes to a better understanding of the importance of conservation, including the non-material contributions of PAs (Sodhi et al. 2010; Chambers et al. 2017). Mcclanahan et al. (2005) reinforced that even fishermen with secondary education hold positive perceptions of the marine park management in Kenya, as opposed to a conclusion of other researchers (De Boer & Baquete 1998; Baral & Heinen 2007) that showed no linkage between education and attitudes. Songorwa (1999) demonstrated an opposite case study, in which educated people near the Selous Game Reserve seemingly agitate against community-based conservation, as they do not trust the management of the weak governance. This suggests that the more educated the people in the periphery of the PA are, the more reasoning capacity they have to judge the PA staff's sincerity and conservation values.

People with more customary landownership exhibit more negative attitudes than landless people. They have been in favour of removing water during the open hot season for improving their income through wetland rice farming. In contrast, the PA authority maintains water levels for water bird habitats, and this competition of different interests causes the negative attitudes of the landholders. They believe they have opportunity costs by having a limited chance for growing wetland rice. Landholders are informally allowed to grow rice in water-shrinking areas in the summer but are not legally allowed to own it. Land rights within the PA have further complicated the situation; thus, negative attitudes are seen in the landowners living very close and near to the PAs. This finding is in line with Ambastha et al. (2007) in India, where fertile land availability is crucial to agriculturalists who demanded the

draining of the Kabartal wetland water. The ignorance of traditional ownership rights may also be a reason for increasing the conflicts between farmers and the PA management, as explained by Ambastha et al. (2007). Overall, it is possible to conclude that the results do not fully support P_1.

P_2: People, who are less dependent on PA resources and live farther away from the PA, will display less negative attitudes (or more positive attitudes) on PA conservation.

Effect of Resource Dependency on Attitudes

The results illustrate that people depending on the PA resources, either totally or moderately, hold a variety of negative attitudes. This is in line with the finding of Shrestha and Alavalapati (2006) in Nepal, where resource-dependent households revealed negative attitudes to the Koshi Tappu Wildlife Reserve, but families close to it have positive attitudes rendered by the conservation outreach programmes. A similar finding was observed by Kideghesho et al. (2007) at the Serengeti National Park border, where Nyatwali villagers with the minimum reliance of PA resources were less likely to have negative attitudes as they make a living by fishing in Lake Victoria and have no conflicts with the PA. This scenario is, however, argued by Baral and Heinen (2007) in Bardia National Park in Nepal, where high resource-dependent people have favourable attitudes that are associated with the participatory PA management in buffer zoning and socio-economic development. This finding suggests that developing alternative livelihoods or zoning benefits with environmental education may reduce their resource dependency, expecting their attitudes to be positive. These findings support my findings but do not directly support P_2.

Over 60% of the respondents obtain a variety of PA resources in several ways. Fish and eel are major zoological resources daily extracted for subsistence as well as commercial purposes, while plant resources have been used occasionally in households. Almost all respondent households from two village locations (very near, near) utilize the PA resources, whereas a few people in distant villages allow their buffalos to graze in the MWWS, particularly during the dry season. As found in the analysis, 27% of respondents are exposed to fodder, whereas it is known that ca. 4,000 buffalos graze in and around the PA (informal discussion with PA staff). Close distance and occupation are seen as strong predictors of high resource consumption, indicating that extraction may be opportunistic for those who live close to the PA

and fishermen with no alternative livelihoods and low incomes. A similar result has been reported by Ambastha et al. (2007) in India, where the distribution and frequency of the resource harvest by inhabitants are associated with a short distance to the source of resources and limited livelihoods. Likewise, Mackenzie et al. (2012) said that illegal fishing within Kibale National Park in Uganda is associated with the accessible distance and demand for fish. In general, people from farther away will have no negative interactions with the PA management as long as their livelihoods are not related to the PA. Thus, it can be concluded that the results support P_2.

P_3: People who perceive that they gain benefits from the PA will express more positive attitudes towards PA conservation.

Effect of Perception of Benefits on Attitudes

As revealed in the results, almost 80% of the respondents perceive that they receive wetland benefits in some ways and the wetland is important to them. Of those people, most of them primarily know utilitarian benefits (provision of aquatic goods, water, etc.). Meanwhile, one-fourth of the total respondents appreciate it for its material benefits, as well as for non-monetary reasons that extend for a considerable distance. Many respondents living close to the PA believe the wetland to be their benefactor or shopping mall, indicating an existential landscape identity as a vital life support. However, some villagers in the far distance were proud of the PA as their regional image (i.e., spatial landscape identity) and for the aesthetics. A few elderly people in the downstream area recognize its role for flood control through their past experience in 1996–1997 when severe floods occurred. It is known that all three study villages in an eastern part of the PA (downstream) pump wetland water to be used as drinking water during dry season.

Only 40% of the respondents at a far distance presume they gain the benefits, while almost all those in the other spatial distances do. This finding indicates that people living close to the PA perceive that they gain benefits, in line with Mackenzie et al. (2012), while those living far away, who have never been to the MWWS, have a limited awareness of it. Men are more likely to think that they obtain benefits. Perhaps the perception is directly affected by individual experiences of their interactions with the wetland. Allendorf and Yang (2013) also observed that people's view of the PA benefits differs with gender, age, ethnicity, education, and type of crops grown. However, Sodhi et al. (2010) found that the people with higher education, longer residency, and experience of outreach activities realize the provisioning and

regulating values more, whereas poor people value the cultural benefits more. Kaplowitz and Kerr (2003) reported that 66% of Michigan respondents, who are younger, better educated and wealthy, find wetland benefits to be very important.

Approximately 60% of the respondents said that everyone could gain the benefits (material and non-material) of open access; the number of extractive resources they obtain vary upon individual diligence, hard-working efforts or frequency. Some respondents claimed that people using intense practices and the greedy middlemen receive excessive benefits. Selfishness and lack of interest to maintain the commons may lead to over-exploitation, as stated by previous researchers (Ostrom et al. 1999). Shrestha and Alavalapati (2006) reported that neighbouring people to the PA, in general, fail to prioritize conservation rather than their sustenance. However, Mcclanahan et al. (2005) argued that fishermen are likely to use proper fishing practices for the sake of long-term resource abundance when they have a clear understanding of the indirect benefits of aquatic PAs (i.e., the linkage between conservation benefits and resource system). This suggests that the MWWS would have an increase in over-use problems if effective awareness activities are not developed.

The results illustrate that local people who receive wetland benefits have more negative attitudes to the MWWS than those who gain nothing. In spite of the appreciation of the wetland benefits, they did not perceive that gaining such benefits are interlinked with the PA conservation management. They believe that conservation efforts cause the insufficiency of their subsistence needs, indicating their attitudes remain unfavourable. Inhabitants are positive towards the PAs when they realize tangible benefits from PA conservation over time (Mehta & Heinen 2001). Allendorf et al. (2012) said that attitude changes were seen in the Chatthin Wildlife Sanctuary after providing visible benefits through a well-defined buffer zone along with outreach programmes. This finding is in line with the results of Kideghesho et al. (2007) in Serengeti, where the benefit approach motivates villagers with a sense of ownership to actively get involved in the PA conservation. The inclusion of residents with a specific role in conservation efforts minimizes potential conflicts and develops a good relationship between the PA and local community, as suggested by Htun et al. (2012). Allendorf et al. (2006) reported that optimistic attitudes are strongly correlated with extractive benefits from the PA management (e.g., zone establishment, and clarifying their rights), which are able to change them from being resource users to conservation partners. However, the results demonstrate the opposite to P_3 and do not support it.

P_4: People who experience direct or opportunity costs (e.g., financial loss, harassment, loss of customary rights) and live in the periphery of the PA will have more negative attitudes.

Effect of PA-induced Losses on Attitudes

Pessimistic attitudes were found in approximately 50% of the respondents who experienced PA-induced losses. The observed disparity of attitudes is linked to the economic costs of conflicts in the present or the past. During PA designation, 4% of the respondents stated – with feelings of injustice – that the government evicted their settlements and confiscated wetland farmlands where there are productive agricultural and grazing lands. They claimed that their ancestors owned the lands even before the PA establishment. There were 32% who perceived that the PA staff even prohibits resource harvesting for their subsistence. Customary landowners claimed they lose the opportunity of growing wetland rice, since the PA authority stores much water during the wetland rice-farming season (January to May). This is a common finding in most conflict studies (Mcclanahan et al. 2005; Allendorf et al. 2006; Xu et al. 2006; Baral & Heinen 2007; Kideghesho 2008): the land use conflicts, loss of property and rights, and negative interactions with the PA staff increases the people's negative way of thinking, which opposes the conservation aims of the PA.

It was found that people who live very close and near to the PA and the customary landowners (with more negative attitudes) have economic impacts due to the PA. Similarly, Allendorf (2007) found that land confiscation occurred near the Lumbini PA in Nepal, and a lack of developing a government commitment subsequently led to conflicts between the PA and the affected people. Kideghesho et al. (2007) also reported that the Tanzanian colonial government attempted the displacement of Maasai pastoralists to the east of Serengeti National Park where there was no alternative grazing land. The negative relationship of the PA and the people, and the lack of consideration for their welfare, traditional rights and basic needs on the part of the PA management and planning, have cumulated in the people's negative attitudes and bitterness (Sarker 2011). Unless the PA-related problems are resolved in some way, local people's attitude to PAs may remain negative, as discussed above. This suggests that proper compensation, prior consensus and negotiation with local people in the vicinity of the PA, and the development of alternative livelihoods are possible tools to reduce strife and weaken the effects of their resistance. Referring to these studies and my empirical findings, it is concluded that the results support P_4.

Effect of Village Distance on Attitudes

Of the three categories of village distances from the wetland, the strongest negative attitudinal opposition was found in the very close and nearby villages. In these villages, there are conflicts and negative relationships between the PA management and villagers engaging in wetland-related livelihoods. With their daily interactions with the MWWS, villagers are usually victims of arrests or harassment by the PA staff. People living farther away have no experience of conflicts and earn their own living with other livelihoods that are not related to the MWWS—agriculture, sculpture and selling local products in bazaars or pilgrimage. This finding is consistent with (Heinen 1993; Shrestha & Alavalapati 2006) in Nepal and Sarker and Røskaft (2011) in Bangladesh, where people living in close proximity to the PAs have more negative attitudes than those who live farther away. However, Chambers et al. (2017) argues that people – especially landowners – in the vicinity of wetland PAs are more supportive of conservation, although individual's attitudes seem to be affected by how they value the perceived benefits from the nearby PAs. This finding suggests that conservation attitudes, which are affected by geographic distance, may also be attributed by the individual-level importance of the PAs, to some extent.

Univariate analysis explains that the effect of customary land ownership on attitudes decreased, as the far-away villagers lack such land ownership; therefore, their attitudes are more positive. It also demonstrates that the effects of village distance and education status on attitudes did not interact with each other, indicating that no matter how educated the people are who are close to PA, their attitudes may still not be positive. Thus, improving the education level of neighbouring people of PA may not change their negative attitudes. This finding makes sense in agreement with Allendorf et al. (2006), who stated that socio-demographic variables seem less powerful to govern attitudes than the perceived costs and benefits. It is similar to the idea of researchers (Allendorf et al. 2012; Allendorf & Yang 2013) that perceptions directly affect attitudes, while socio-demographic status indirectly affects attitudes through perceptions. As found by De Boer and Baquete (1998), attitudes are moderated by socio-demographic factors, but such factors cannot determine attitudes. Generally, the results indicate that the closer the people live to the MWWS, the more negative attitudes they have, thus supporting P_4.

Further Research

As this study is a problem-driven research rather than a theory-led one, the distance-based research design was formulated to understand attitudinal differences regarding the accessible distance to the source of resources. It focused on 12 villages around the MWWS, of which the western part (n = 9 villages) is upstream and the eastern part (n = 3 villages) is downstream. The boundary pillars have been delineated in the western border of the MWWS, while the other sides have artificial embankments as demarcations (see Figure 1). From the PA office on the western side, it is approximately a two-hour drive by boat to the eastern side; the PA staff reach the eastern part less frequently. Thus, people on the east side usually have easier access to the resources, as well as having less of a chance of being arrested. Several respondents in the western side claimed that their close proximity to the administrative structure (i.e., MWWS office) is a barrier to their livelihoods. My research, however, is not able to estimate the effect of the administrative barrier to local people's attitudes, in agreement with Shrestha and Alavalapati (2006). More research on attitudinal differences between the eastern and western communities of the MWWS may need to be carried out in the future.

Awareness of Local Communities about MWWS

Wildlife-inflicted Issues

Half of the respondents said there are considerable imposed crop damages that are caused by golden apple snails that cut off all the plants and hurt the local people, followed by insects, bugs or rats (30%), while wild birds are responsible for a few percent of the issues. During the interview, I found no serious complaints about the birds on the crops, denoting that the impact of invasive species (golden apple snails) on the crops is more severe than that of the birds. The snails rapidly spread on a huge scale (BANCA 2014; Bhandari et al. 2014); it is believed that migrant people brought in the snails to be used as fish bait more than ten years ago.

In addition, a male villager talked about infectious disease transmission to domestic ducks through the birds. Mon et al. (2012) reported that a severe disease outbreak (highly pathogenic avian influenza (HPAI) virus subtype H5N1) occurred in 2007, when H5N1 seemed to be spreading out through the interactions of poultry and migratory water birds originating from the Moeyungyi wetland, with a culling operation of 65,812 infected ducks from commercial as well as backyard farms along the Bago-Sittaung Canal.

Knowledge about PA Resources and PA Legislations

The majority of the respondents realize that the wetland is a bird sanctuary, but they perceive it as an open-access common. Approximately 60% said that the resource extraction from the PA is allowed in all other seasons rather than during the fish spawning season (May to July) and except in core conservation zones where wild birds breed, and pillars delineate the zones. The people close to the PA are the primary resource gatherers, and men usually go out to obtain the family sustenance, while most women usually stay at home and make cheroots as an alternative source of income. It is therefore not surprising that neighbouring people to the PA and men gain such knowledge through their interactions with different people. Over 50% said that the places where they fish are associated with the seasonal changes in the water body of the PA.

Most villagers reported unregulated fishing frequently occurs when the water level declines, and illegal fishermen in mobile groups are active at night to avoid the PA staff. People who are close to the PA know more about the PA legislations and its management operations, since they had to join village meetings about the dos and don'ts within the PA. Additionally, they said that insect trapping using nets are not allowed and that the trade of snakes, turtles or birds used to be common but are not anymore. It was known that there are middlemen who are buying snakes, turtles, rats, leeches and other aquatic products, indicating that market demand still exists in the MWWS.

Complaints about PA Staff

According to the PA staff, it is believed there are many people using illegal practices in and around the MWWS. There were 65% of the respondents, however, who did not want to report illegal activities. Most of those respondents feared that people doing illegal things would harm them, while some admitted they sympathize with them. There were 15% who said they do not earn sufficient income for family survival without doing illegal practices, and 12% claimed few PA staff are ill-disciplined for bribery in exchange for allowing such practices, as reported by Infield and Namara (2001) elsewhere in Lake Muburo National Park in Uganda. The villagers said the PA authority seldom makes inquiries about their interests, excuses or views regarding the management operations, similar to the finding of Htun et al. (2012). Most fishermen also revealed they start running or hiding as soon as they see the PA staff and hear the sound of the patrol boats. In contrast, the PA staff claimed that people who are being punished as revenge, in the absence of the patrol team and have often destroyed boundary pillars as their illegal equipment (e.g., electric shock devices, illegal nets) are confiscated. As stated by Allendorf

(2007), some residents said the patrol schedule could be known through biased rangers or lenient PA staffers who seldom take serious action against illegal activities. This suggests that illegal fishermen are rational people who consider the probability of prosecution compared with potential benefits, and they warn one another to escape from the risk of being arrested.

Complaints about NGOs

Several residents claimed that they feel fear when non-governmental organizations (NGOs) or foreigners visit and ask questions about local livelihoods and go back home. They perceived that the PA staff increases its restrictive attempts to please the conservation agencies that financially support the PA office and to upgrade the enforcement facilities; they blamed the status of the international importance for not being able to support their basic needs. This sentiment is in line with Brockington (2002) in the Mkomzai Game Reserve where Maasai pastoralists believed that increases of the PA harassment are encouraged by NGOs who reason that human habituation is not compatible with conservation. Aung et al. (2015) suggested that enforcement on resource access severely affects local people—who rely on the PA resources as a necessity for survival—to become poorer. The poor with no alternative livelihoods and marginalized people with no sense of ownership are more likely to be against the PA legislation, as concluded by Badola (1998). Instead of reducing illegal actions, forced conservation creates antagonistic attitudes of harassed people and negative effects on biodiversity loss (Coad et al. 2008).

Demand of Bird Meat

According to the respondents, the numbers of birds have been reduced in and around the MWWS during these years; however, bird meat could be very often available in local bazaars during the hot season. It is not difficult to shoot birds in and around human settlements, as stated by most people living in distant villages where there is weak protection level for birds. There were 65% of the respondents who admitted they prefer bird meat; men more frequently eat bird meat. Meat preference may also be associated with the illegal market demand that induces illegal bird hunting. BANCA (2014) reported that a minimum of 20 birds per day are killed, and illegal hunters use nets or potassium cyanide. Mist nets are usually set up to catch giant water bugs along the eastern part of the MWWS, where wild birds or bats are often caught.

Conclusion

In conclusion, local inhabitants who live a short distance from the PA extract more resources as a major livelihood, and bear most of the losses associated with conflicts with the PA management. Limited alternative livelihoods may increase the probability of their dependence on doing illegal practices, and negative attitudes are born from the costs of the conflicts. Higher educated villagers, who experience no conservation-induced costs, tend to be positive and aware of the importance of conservation. Households in accessible distances have more losses and perceptions of problems regarding the PA. Local residents near the PA and men are more likely to recognize the benefits gained from the PA landscape (i.e., Moeyungyi wetland) but do not view such benefits as generated by the PA conservation operations. They perceive that the efforts of the management restrict the resource access for their sustenance and reduce their incomes. Benefit sharing and allocation of wetland resource utilization are lacking in the MWWS. Despite having regular law enforcement, there are lack of specific studies that understand the carrying capacity of the resource system and the human impacts to it. My research illustrates the importance of local people's attitudes that can be used to predict how people see the present conservation of the PA and how much they know about the perceived benefits. Given the clear correlation between the negative attitudes and costs, the PA conservation will gain local support by adjusting the counterbalance of costs and visible benefits.

Recommendations

Understanding local attitudes and attempting to positively change them might not encompass sustainable biodiversity conservation in the PA due to the complex socio-ecological linkages and future uncertainty. However, understanding these attitudes can be helpful for a strategic PA management to make optimum trade-off decisions among multiple interest groups. The following measures are suggested for changing the local attitudes based upon the empirical findings:

1) Co-management with the participatory culture should be developed; visible management benefits (i.e., wetland zoning) will motivate them to look after the PA resources and reduce potential conflicts with the PA community. Forest Department may be able to clearly demarcate zones (buffer, transition, etc.) within the MWWS and officially allow appropriate customary rights and utilization benefits to local communities, in accordance with Chapter IV, Articles 13 (e, g) and 18 (e) of "Protection

of Wildlife and Conservation of Protected Areas Law (2018)". Free, prior and informed consensus and negotiations with the local community are required for zoning and clarifying the restrictions and rights in each zone. A local fishermen association was found in a study village downstream, which may be a cooperative to manage the resources. After determining the zones, the establishment of such community-based institutions may be useful for creating their sense of ownership.

2) Alternative sources of income should be generated to address resource dependency pressures (e.g., integrated farming with native fish aquaculture, pig breeding, cheroot manufacturing, etc.). Promoting ecotourism-related employments (e.g., local vendors, taxi driving, making value-added handicrafts) may be a good option, but the MWWS tourism industry is still not large enough to provide subsistence needs to all of the stakeholders. Effective law enforcement with local support is also required to mitigate over-exploitation issues. In addition, controlling golden apple snails is needed for local farmers to gain more agricultural yields.
3) There is a necessity to improve existing conservation education regarding the linkages between PA conservation, benefits received by the wetland landscape, and the local society. Extension activities should be targeted to poorly educated people and the villagers closest to the MWWS. The younger generation should also be included in the programmes to obtain a conservation mind-set, as they will become adults in the future.
4) Building good governance and positive interpersonal relationships (mutual trust) with local people will be necessary to induce their willing participation in conservation, which could regulate the efficiency of the management.

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Appendix (Questionnaire form used)

General Information

Questionnaire no. ……, House no. …… , Village category ……

Date of interview: ……..... /……. /…….

Name of village & township: …….

GPS coordinates: ……

Socio-demography

1. Age…….……

1. 18-29 ☐	2. 30-39 ☐	3. 40-49 ☐	4. 50 & over ☐

2. Gender & Family Head

1. Male ☐	2. Female ☐	1. Family Head ☐	2. Not Family Head ☐

3. Marital status

1. Single ☐	2. Married ☐	3. Divorced ☐	4. Widow ☐

4. Religion

1. Buddhism ☐	2. Christian ☐	3. Muslim ☐	4. Hinduism ☐	5. Others ☐

5. Ethnicity…….

6. Education

1. Never been to school ☐	2. Never been to school, but I can read and write ☐
3. Primary ☐	4. Secondary & above ☐

7. Occupation…….

8. How many family members in your household? …….

Relation	Age Group	No.	Relation	Age Group	No.
1. Children			2. Spouse		
3. Parents			4. Other relatives		

9. Were you born in this village? i) Yes ☐ ii) No ☐

a. If no, why? ……

b. Place of origin.…….

c. How far is it?

1. Very near (<1 mile) ☐	2. Near (1-3 miles) ☐	3. Far (>3 miles) ☐

d. How many years have you lived in this village? ……..

10. Do you own land where you can grow crops? i) Yes ☐ ii) No ☐

a. If yes, how big is your land in acres? …….

b. Do you own the whole land you mentioned in legal documents? i) Yes ☐ ii) No ☐

c. If no, please describe how many acres is legal land property? ……..

11. How far is your house to the PA?

1. 0 to 0.5 mile ☐	2. 0.5 to 1 mile ☐	3. 1 to 2 miles ☐	4. > 2 miles ☐

12. Do you own animals? i) Yes ☐ ii) No ☐

a. If yes, please specify below and number:

1. Buffalo		2. Cow		3. Duck		4. Chicken	
5. Pig		6. Goat		7. Others			

13. Where do you pasture for your livestock?

1. Within the PA ☐	2. Near the PA boundary ☐
3. Within and near the PA ☐	4. Far from the PA ☐

14. Standard of the house (type of building)……

15. Facilities and number

1. TV		2. Phone		3. Boat		4. Farm machine	
5. Motorbike		6. Bicycle		7. Car		8. Source of energy	
9. No. of battery		10. Others					

16. What is your sanitation status?

1. Open ☐	2. Simple ☐	3. Pan without septic tank ☐	4. Closed septic tank ☐

17. Where is your source of drinking water?

1. Local lake ☐	2. Underground water ☐	3. Drinking well ☐	4. Others ☐

Livelihoods and Resource Dependency

18. What are your household's livelihood activities? Please rank in the ordinal numbers, 1 being the highest % of dependency.

Activity	Rank	Activity	Rank
1. Fishing		2. Rice cultivation	
3. Livestock farming		4. Leech collection	
5. Insect trapping		6. Hunting bird/rat	
7. Self-owned business		8. Others (specify)	

19. Do you have access to wetland resources? i) Yes ☐ ii) No ☐

a. If yes, what kind of resources and how many times do you extract?

Resource	Use	Sell	Use & Sell	Describe what you do
1. Fish				
2. Eel				
3. Prawn				
4. Crab				
5. Frog				
6. Mollusc				
7. Leech				
8. Insect (water bug)				
9. Fodder				
10. Lotus				
11. Fuel (shrub/reed)				
12. Medicinal plant				
13. Edible taro				
14. Vegetable				
15. Bird egg/nestling				

16. Snake/rat				
17. Others (specify) ..				

20. Are there any resources that were used previously but no longer in access these days from the wetland? List in the order of importance.

1.		2.		3.		4.	

21. How much does you daily expenditure rely on the wetland?

1. Almost totally ☐	2. A few ☐	3. Nothing ☐

22. Is your income sufficient enough to cover your basic needs?

1. More than sufficient ☐	2. Sufficient ☐	3. Not sufficient ☐

23. How long have you been using the wetland resources?

1. For generations ☐	2. Always ☐	3. I do not use them ☐

24. Which parts of the wetland do you usually go for fishing?

i) Inside ☐ ii) Near ☐ iii) Both ☐

25. Are you allowed to collect wetland resources?

i) Yes ☐ ii) Do not know ☐ iii) No ☐

Crop damage by Wildlife

26. Do wild animals destroy agricultural crops in and around the wetland?

i) Yes ☐ ii) No ☐

27. If yes, which species are causes of problems to the crop? Please rank from the most serious to the least? ……

28. How do you respond when you see wild animals destroying the crops? ……

Attitudes and knowledge about PA

29. Are you or any member of your family employed by the PA office? i) Yes ☐ ii) No ☐

30. What is your relationship with the PA management?

1. Very good ☐	2. Good ☐	3. Neutral ☐	4. Bad ☐	5. Very bad ☐

31. Are you willing to report when you see illegal efforts in and around the PA?

i) Yes ☐ ii) No ☐

a. If yes or no, why? ……

b. If yes, where do you report about it?

1. Village leader ☐	2. PA Warden ☐	3. PA staff ☐	4. Others ☐

32. Do you think the wetland is important for you and your family? i) Yes ☐ ii) No ☐

If yes, why? …….

33. Do you know if any in your society gets benefits from the wetland? i) Yes ☐ ii) No ☐

34. Are the benefits equally shared between all villagers?

i) Yes ☐ ii) Do not know ☐ iii) No ☐

a. If no, who benefits more? ……

35. How should we conserve the wetland in future? …….

1. By Central/Local Government ☐	2. By PA staff ☐
3. By local people ☐	4. By combination of PA staff & local people ☐
5. By combination of all relevant sectors and villagers ☐	6. Others (specify)

36. In your opinion, what are constraints for future conservation of the wetland? ……

37. Do you know present conditions of resources in the wetland?

1. Declining ☐	2. Stable ☐	3. Increasing ☐	4. Do not know ☐

38. Do you think that PA establishment is necessary for future survival of birds and fishes?

i) Yes ☐ ii) Do not know ☐ iii) No ☐

39. Do you know rules, regulations and management activities of the PA?

i) Yes ☐ ii) Do not know ☐ iii) No ☐

a. If yes, please describe some activities you know……..

40. Do you willingly involve yourself in PA conservation? Please rate yourself -

1. Very good ☐	2. Good ☐	3. Neutral ☐	4. Poor ☐	5. Very poor ☐

41. Do you or your village incurs losses to conservation of PA? -

i) Yes ☐ ii) Do not know ☐ iii) No ☐

a. If yes – i) A little ☐ ii) A lot ☐

42. Do you trust the PA staff?

1. Very much ☐	2. A little ☐	3. Neither not ☐	4. Not ☐	5. Absolutely not ☐

43. Have you eaten bird meat? i) Yes ☐ ii) No ☐

a. If yes, do you like it? i) Yes ☐ ii) No ☐

44. Do you like the existence of the PA in your locality?

i) Yes ☐ ii) Do not know ☐ iii) No ☐

45. Do you know that the wetland is a Ramsar site? i) Yes ☐ ii) No ☐

46. Could you just mention species that are common today and that were not common ten years ago? i) Yes ☐ ii) No ☐

a. If yes, what are they? ……

47. Do you have anything to add as comment? ……..

Thank you very much!