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Impacts on the biodiversity by living inside a protected area, Natma Taung National Park, Myanmar; A human perspective

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Table of Contents

List of figures

List of tables

List of abbreviations

No	Abbreviations	Definition
1.	ACB	ASEAN Center for Biodiversity
2.	AHP	ASEAN Heritage Park
3.	BANCA	Biodiversity and Nature Conservation Association
4.	IUCN	International Union for Conservation of Nature
5.	NTNP	Natma Taung National Park
6.	NTNU	Norwegian University of Science and Technology
7.	NWCD	Nature and Wildlife Conservation Division
8.	PAs	Protected Areas

Acknowledgement

Abstract

Protected areas (PAs) are aimed to maintain or restore the balance in nature. PAs are also an important indicator in measuring the biodiversity loss caused by humans. Global biodiversity is under the long term threats all over the world and we need to understand the behavior of human, ourselves which is challenging the conservation of biodiversity. PAs are usually located in the most remote regions of the countries where people living close to the PAs have poor social status. Local people in Myanmar are being prohibited from using resources inside PAs, which cause conflict in the management of such PAs. Biodiversity of Natma Taung National Park (NTNP) is threatened by people living inside and outside of the park. The study aims to learn more about human impacts on biodiversity in a PA in relation to their location and how perceptions of people living inside and outside of the PA vary in relation to their own impacts on the sustainable use of biodiversity inside the PA. A total of 203 participants from 11 villages (5 from inside and 6 from outside of NTNP) were conducted with personal face to face interview. The questionnaire was constructed with three main parts (1) demographic information, (2) benefits obtained from NTNP and (3) perceptions about NTNP. Logging, hunting, fuelwood collection and other impacts (disturbance and resource scarcity) are the impacts described by the participants. Both inside and outside people know that they have impacts on the biodiversity of NTNP. One third of the participants from outside of NTNP did not know that human have any impacts on the biodiversity. Fulfilling basic needs and cooperation with local people are suggested by participants for the effective conservation of NTNP. Park and people relationships need to be improved for the long term sustainability of NTNP.

Key words: Protected areas, perception, biodiversity, conservation attitudes, local people, Natma Taung National Park, conflict

Introduction

Background

Protected areas (PAs) are important for both biodiversity and humans. Safriel (1997) underlined that PAs are aimed to maintain or restore the balance in nature. PAs are also an important indicator in measuring the biodiversity loss caused by humans (Sinclair et al. 2002). Global biodiversity is under long term threats, and we need to understand the behaviour of humans, ourselves which is challenging the conservation of biodiversity (Saunders et al. 2006). All types of PAs are the best hope for conserving the world's remaining natural resources (Chape et al. 2005). In developing countries, PAs are threatened by poverty, increasing human populations and political instability (bad governance) (Naughton-Treves et al. 2005), leading to increasing conflicts and demand for natural resources (Vedeld et al. 2012). In the word of Newton et al. (2009) , human impacts such as fuelwood collection, logging and road constructions, are all causing biodiversity loss. In addition, excessive resource harvesting, conflicts with stakeholders, poor community participation and insufficient financial support are also threating the sustainability of PAs (Khan and Bhagwat 2010). Because of such threats, PAs have been managed to be conserved to prevent human activities inside them (fences and fines)(Wells and McShane 2004). PAs are usually located in the most remote regions of the countries where people living close to the PAs have poor social status (Wilkie et al. 2006). Conflicts arise when the needs of local people are ignored and restricted them from resource use (Silori 2007). Besides that, the sustainability of PAs is critically related to the welfare of local communities (Khan and Bhagwat 2010). From the side of local people, they also face costs by living close to PAs, such as conflicts and their safety issues with wildlife (Karanth and Nepal 2012). Vedeld et al. (2012) suggested that PAs are not a poverty trap and they should be situated in a way that sustainably allows people to use the resources. Understanding the perception of local people is vital in improving park-people relationships (Allendorf et al. 2006, Allendorf et al. 2012) and developing conservation awareness of local people (Vodouhê et al. 2010). Allendorf (2007) stated that for long-term sustainability of PAs, people's perceptions should be taken into consideration when developing conservation plans.

In Myanmar, PAs are under the management of Nature and Wildlife Conservation Division (NWCD) of the Ministry of Natural Resources and Environmental Conservation(Htun et al. 2012). More than 70 % of the country's population are living in rural areas depending on the biodiversity for their survival (FD 2016). Local people in Myanmar are being prohibited

from using resources inside PAs which cause conflicts in the management of such PAs; the same situation has been found in Nepal (Baral 2005). Increasing human population and demand for natural resources are challenging the sustainability of PAs in Myanmar (Htun et al. 2012).

Problem Statement

Chin state is situated in the western part of Myanmar which is one of the least development. It has mountainous geography with poor transportation and agriculture. The estimated population is around 500,000, and they are mainly living in rural areas. It is officially announced as the poorest state in Myanmar where 73% of total population is recorded as poor (MIID 2014). Chin villages are situated at high altitude levels and are difficult to access (Win 2005). They do not have enough water sources and are facing difficulties in their daily lives such as food shortage, poor education and health services (MIID 2014). Moreover, due to an increasing human population, Chin people are facing shorter fallow periods, land scarcity (Senavirathna et al. 2014) and reduction in land quality which has caused erosion and landslides (Instituto-Oikos and BANCA 2011). Local people living around the Natma Taung National Park (NTNP) are highly dependent on the forest resources from NTNP (Aung et al. 2015). Biodiversity of NTNP is threatened by people living inside and outside of the park. Impacts such as Illegal logging, hunting, overexploitation and forest fires are derived from human settlements (Instituto-Oikos and BANCA 2011). Apart from these impacts, the design of the park, the elongated shape, itself is also causing problems and conflicts with local people (Thingstad and Gjershaug 2014). Therefore, it is important to investigate impacts on the biodiversity of NTNP and to understand how local people perceive their own impacts. Exploring the perceptions of local people is considered as a critical part of conflict reduction and successful management of PAs, which supported to do this research.

Objectives

- ❖ To study human impacts on biodiversity in a PA in relation to where they are located

- ❖ To study how perceptions of people living inside and outside of the PA vary in relation to their own impacts on the sustainable use of biodiversity inside the PA.

Hypotheses

- ❖ Human living inside the NTNP do believe that they have only a minor impact on the biodiversity.

- ❖ Those who are living outside the park do however, believe that major impacts on the biodiversity are caused by people living inside the NTNP.

Materials and Methods

Study area description

Myanmar has a total land area of 676,553 km², situated in South-East Asia (Rao et al. 2010). Myanmar is rich in habitat diversity, and natural forests are covering about 47% of the country's land area. Natural resources in Myanmar have been protected and conserved with a sustainable basis. In Myanmar, the term PAs include national parks, marine parks, wildlife sanctuaries, nature reserves , zoos and are similar to IUCN categories IV which is habitat/ species management areas (Aung 2007). Myanmar has 39 protected areas (38915.35 km²) and 10 proposed protected areas (9117.86 km²), which cover 5.75% and 1.35% of the country's total land area. NatMa Taung National Park (NTNP) is one of the 36 protected areas in Myanmar which is located in Southern part of Chin state. It is also an ASEAN Heritage Park proclaimed by ASEAN Center for Biodiversity (ACB) in 2013 (FD 2016). NTNP was proposed as National Park in 1997. NTNP is a totally protected area and included in IUCN category II, National Park (Instituto-Oikos and BANCA 2011). It preserves endemic species including mammals (35 species) , birds (345 species), reptiles (106 species), butterflies (77 species), orchids (200 species) and medicinal plants (71 species) (NTNP 2016). NTNP is bordered by three townships, Matupi, Mindat and Kanpalet (Fig. 1). It is also an important watershed area of two big rivers on which three million people depend for their survival. NTNP comprise different forest types such as hill forests, evergreen forests and pine forests. There is one mountain inside NTNP, which is known as Natma Taung or Mt. Victoria or Khaw-Num-Cung (local name). This mountain peak is 3200m high, the highest elevation of NTNP. The management of NTNP is structured as a core zone and a buffer zone (Instituto-Oikos and BANCA 2011) with four patrol zone . The main objectives of NTNP was to conserve biodiversity and watershed areas of two rivers, and its specific objectives are to conserve the habitats of endemic species such as birds and orchids. The other aims are to improve ecotourism and to educate local people for NTNP conservation (Thingstad and Gjershaug

2014). There are 55 Chin villages in and around NTNP (NTNP 2016). Chin people were living in the study area before NTNP was established as a national park. They make their living by shifting cultivation, hunting and livestock rearing (Thingstad and Gjershaug 2014).

Map of the study area
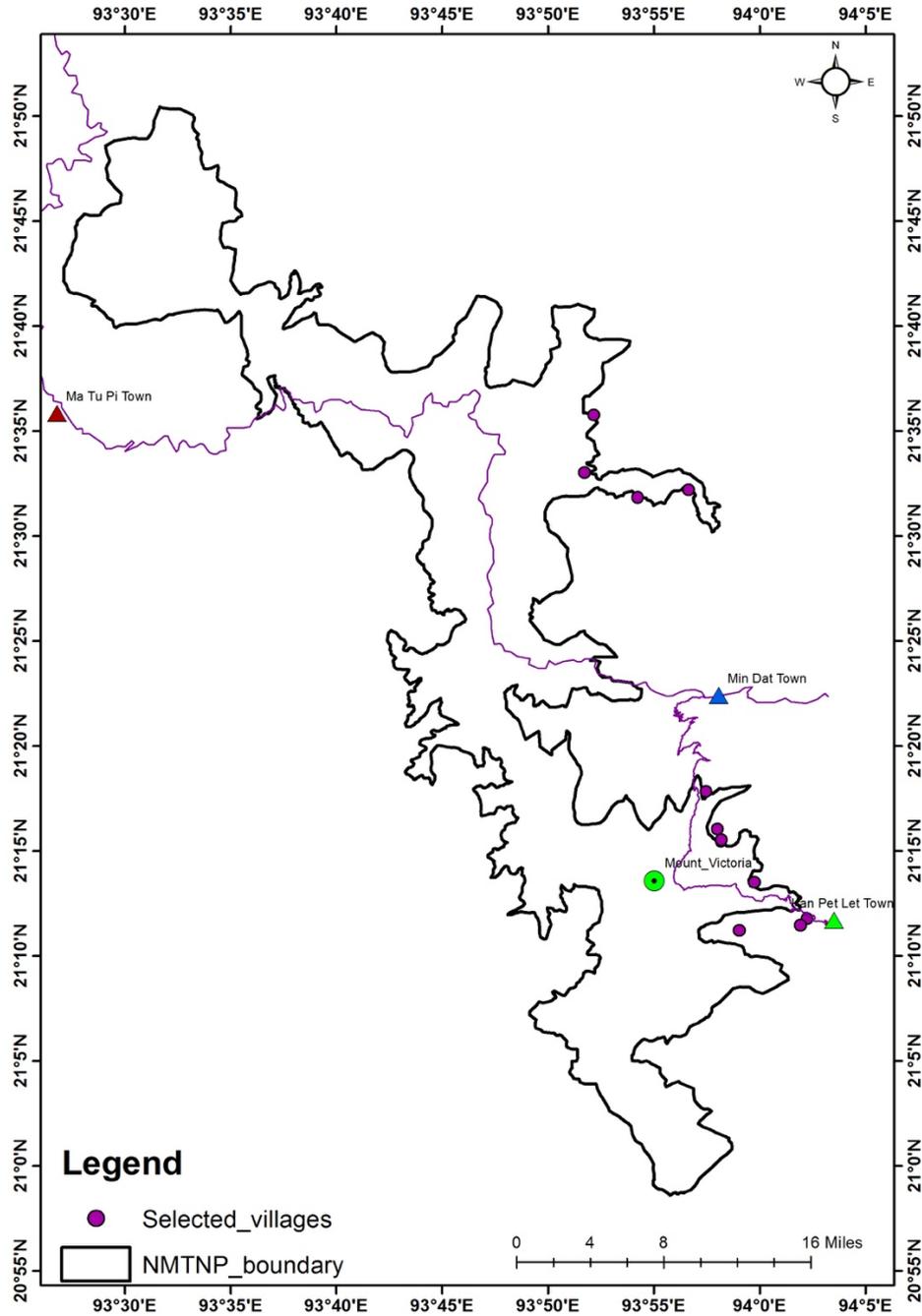
Figure 1: Map showing the location of study villages in NTNP

Data collection

The survey was conducted in NTNP, Chin State, Myanmar during the summer of 2016. A total of 203 participants were interviewed face to face. The purpose of the survey was to learn about the impacts and the perceptions on the biodiversity of people living inside/outside of NTNP. The villages were selected based on two factors, (1) location from NTNP (inside/outside/near) and (2) accessibility. Primary data for choosing the villages were obtained from discussions with the park warden and staff from NTNP. A total of 11 villages were selected from two townships, Kanpalet and Mindat. There are 5 villages from inside (Htet-Shwee, Hla-Hlaung-Pann, Chet, Palate-Htwee, Khwal-Lon-Thar) and 6 villages from outside (Oat-Pho, Ma-Kyauk-Arr, Kyat-Chann, Ma-Thue, Khwee-Yein, Khauk-Htuu) of NTNP were selected. From each village, 20 participants were randomly selected from the village register and interviewed with structured questionnaires. The rationale for selecting the participants was (1) person who is the head of the family, (2) person who is related to NTNP, (3) a person above18 years of age and (4) a person who agreed to be involved in the survey. Only one person from each household was selected. All of the participant selected from village register were agreed to involve in the survey and completely answered the questionnaire.

The questionnaires were written in English but all the participants were asked by the use of Myanmar or Chin languages. All participants were able to understand and speak Myanmar language but some of them preferred to answer with Chin language. A local high school graduate field assistant was also included in the survey and translated questions during the interview. Before starting the interview, each participant was explained about the objective of the research and that their identity would be unknown. Interviews were conducted mostly during the morning and evening depending on the availability of participants. The questionnaires were pre-tested with random villagers near the town. After that, some questions were added or changed to improve and clarify the survey. Informal focus group discussions were also included in every village to access general information about the village.

Questionnaire design

The questionnaire was constructed with three main parts including both open ended and close-ended question types, (1) demographic information, (2) benefits obtained from NTNP and (3) perceptions about NTNP. Demographic information such as age, religion, ethnicity, marital status, education, occupation, household size, daily protein source, landownership, agricultural status and time of settlement in the village were collected with close-ended

questions. Benefits obtained from NTNP was measured by type of products they got from NTNP (hunting, forest products, tourism) and travelling time to NTNP. Perception questions were mixed with open and close-ended questions. Open-ended questions were used to investigate the perceptions on human impacts, biodiversity conservation, situation of NTNP in the past/now, and park management. Conservation knowledge of the participants was collected through close-ended questions. Informal discussions with park staff were made to learn about their relationship with the villagers and difficulties occur in managing NTNP.

Data analysis

Data were collected and analyzed with qualitative methods. Field data were firstly organized by using Microsoft Excel and then analyzed by using IBM SPSS (Statistical Package for Social Science) version 24. Descriptive statistics were used for analyzing data. All perception questions (dependent variables) were tested with seven independent variables (location, gender, age, religion, marital status, education, occupation and household size) using Chi-square tests. Only significant variables will be described in details.

Results

Demographic information

A total of 203 participants were interviewed, of which 85 were from the inside and 118 from the outside of NTNP. Gender of participants was balanced and age was normally distributed in both locations (gender $\chi^2 = 0.461$, df = 1, P = 0.569; age $\chi^2 = 0.334$, df = 2, P = 0.846; Table 1). More than half of the participants from outside of NTNP were Christians whereas participants from inside performed a nearly equal ratio between Christians and Buddhists ($\chi^2 = 14.599$, df = 2, P = 0.001; Table 1). Most of the participants were married ($\chi^2 = 1.206$, df = 2, P = 0.547; Table 1). In addition, educational level did not significantly differ between outside and inside the park ($\chi^2 = 2.857$, df = 2, P = 0.240; Table 1). Furthermore, the majority of participants from both inside and outside of NTNP were farmers ($\chi^2 = 0.216$, df = 1, P = 0.689; Table 1). The majority of participant's household size lied between 1 to 5 and 6 to 10 people. However, household sizes were significantly higher among participants from outside of NTNP ($\chi^2 = 7.535$, df = 2, P = 0.023; Table 1).

Table 1: Demographic data of participants

No.	Category		Inside N (%)		Outside N (%)		Total N (%)	
1.	Gender	Male	42	(49.4)	64	(54.2)	106	(52.2)
		Female	43	(50.6)	54	(45.8)	97	(47.8)
2.	Age	18-30	28	(32.9)	37	(31.4)	65	(32)
		31-45	37	(43.5)	49	(41.5)	86	(42.4)
		46<	20	(23.5)	32	(27.1)	52	(25.6)
3	Religion	Christianity	40	(47.1)	74	(62.7)	114	(56.2)
		Buddhism	45	(52.9)	44	(37.3)	89	(43.8)
4.	Marital Status	Single	13	(15.3)	12	(10.2)	25	(12.3)
		Married	65	(76.5)	96	(81.4)	161	(79.3)
		Widow	7	(8.2)	10	(8.5)	17	(8.4)
5	Education	None	26	(30.6)	38	(32.2)	64	(31.5)
		Primary	35	(41.2)	36	(30.5)	71	(35)
		Secondary And above	24	(28.2)	44	(37.3)	68	(33.5)
6	Occupation	Farmer	74	(87.1)	100	(84.7)	174	(85.7)
		Other	11	(12.9)	18	(15.3)	29	(14.3)
7	Household size	1-5	48	(56.5)	45	(38.1)	93	(45.8)
		6-10	33	(38.8)	60	(50.8)	93	(45.8)
		11<	4	(4.7)	13	(11)	17	(8.4)
Total			85	(41.9)	118	(58.1)	203	(100)

Perceptions

Among nine perceptions, two perception questions differed statistically significant with all independent variables described in Table 2. Gender was statistically significant in almost all (7 out of 9) of the perception statements. Age, education and location were also statistically significant in some perceptions (Table 2). Other independent variables such as religion, marital status, occupation and household size of the participants were not significantly different in any perception questions, they will therefore not be included in the further tests.

Table 2: Significance level of Chi-square tests from nine perceptions tested with gender, age, education and location of participants (significant values in bold)

Perceptions	1.Gender P =	2.Age P =	3.Education P =	4.Location P =
Human impacts on the biodiversity from the participant point of view	**0.003**	**0.008**	**0.017**	**0.012**
Possible changes of the overall effectiveness of NTNP conservation	**0.000**	**0.036**	**0.001**	**0.000**
Conservation knowledge	**0.040**	**0.019**	0.867	0.229
Effect of population growth on NTNP	0.108	**0.006**	**0.023**	0.481
Purpose of establishing the NTNP	**0.011**	0.576	0.074	0.104
Overall view of NTNP	**0.000**	0.937	0.080	0.151
Overall view of NTNP (satisfied / unsatisfied)	**0.000**	0.898	0.076	0.273
Impacts on the biodiversity of the NTNP	**0.004**	0.087	0.966	0.462
Current situation of NTNP (better/worse)	0.422	0.445	**0.045**	0.088

Human impacts on the biodiversity from the participant point of view

With regard to human impacts on the biodiversity of NTNP, there were four important impacts that came out of the answers; 1) logging, 2) hunting, 3) fuelwood collection and 4) other impacts. Logging was the most important impact, while hunting was the second most important impact described by the participants. In general, male participants described the impacts as more serious than females who frequently answered "I do not know" (χ^2 = 15.8, df = 4, P = 0.003; Fig 2A). Among the three age groups, the majority of the middle age group (age 31-45 years) mentioned hunting as the most serious impacts (χ^2 = 20.825, df = 8, P = 0.008; Fig 2B). Furthermore, Primary and Secondary (and above) educated people stated that hunting was the second most important impact while the majority of none educated people answered that they did not know what kind of impacts they have on NTNP (χ^2 = 18.546, df = 8, P = 0.017; Fig 2C). Although, participants from outside of NTNP claimed that logging was the major impact from humans, 1/3 of the participants from outside still did not know the impacts they were causing on the park. Participants from inside of NTNP mentioned logging and hunting as nearly equal impacts on the NTNP (χ^2 =12.8, df = 4, P = 0.012; Fig 2D).

(A) Gender
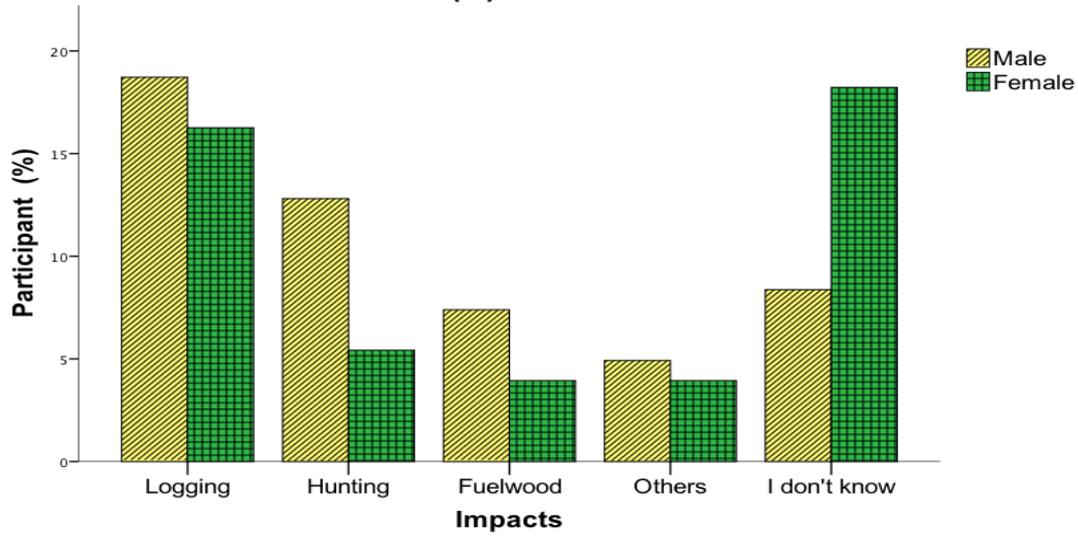
(B) Age
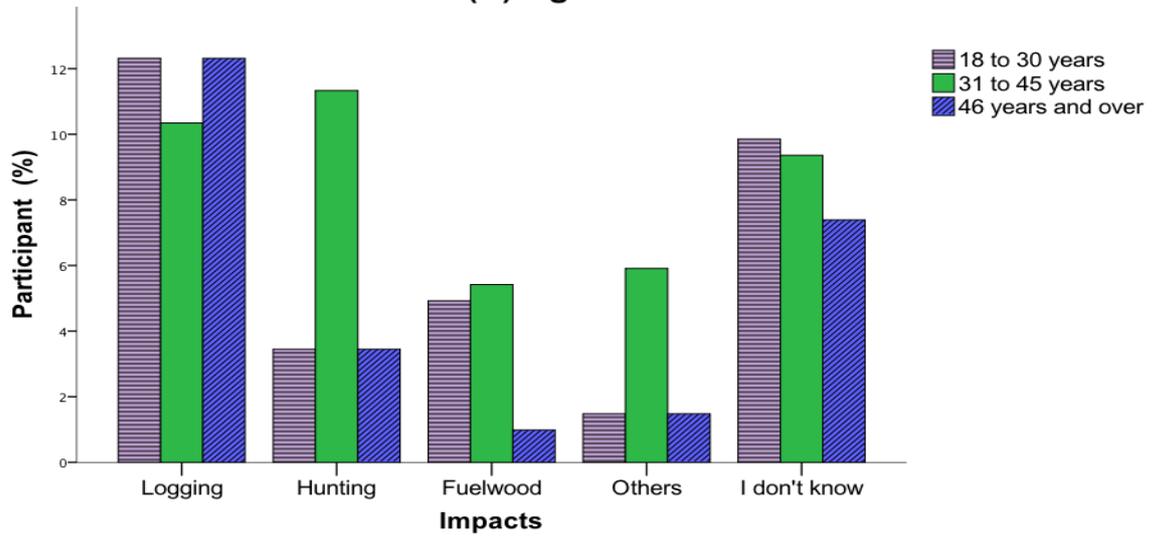
(C) Education
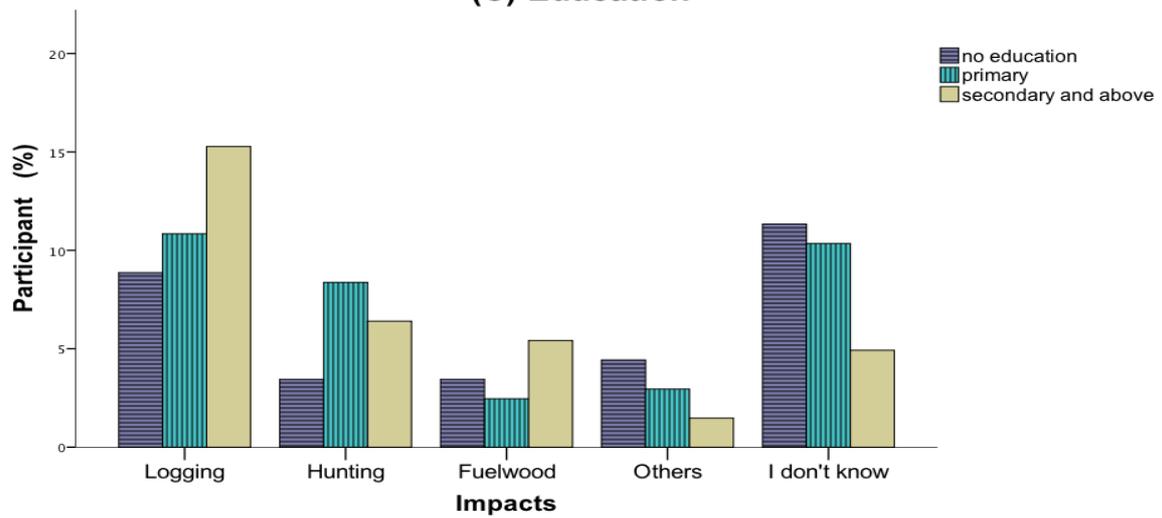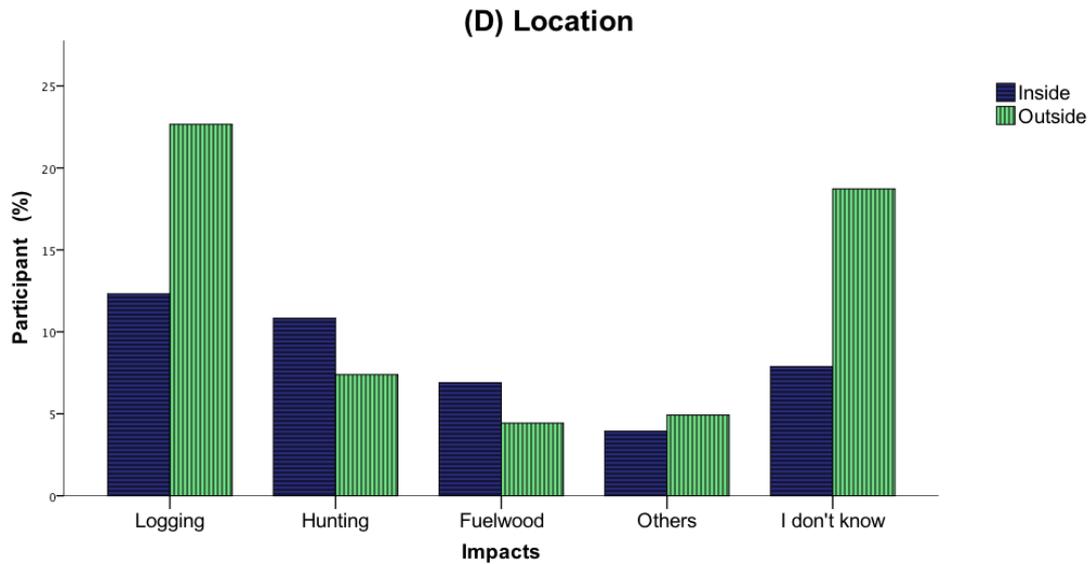
(D) Location

Figure 2: Perceived impacts from humans described by participants based on
A) gender, B) age, C) education and D) location from NTNP.

Possible changes for the overall effectiveness of NTNP conservation

The majority of the participants answered fulfilling the basic needs of local people is the key factor for an effective management of NTNP (Fig. 4). Male participants described the answer better than the female participants, as one third of the females did not know ($\chi^2 = 37.5$, df = 5, P < 0.000; Fig 3A). The middle age people (31-45 years of age) thought that cooperation with local people together with effective conservation programs (extension, patrolling, skillful staff and plantation) would be most beneficial for NTNP at a higher rate than other age groups ($\chi^2 = 19.310$, df = 10, P = 0.036; Fig 3B). Younger participants (18-30 years of age) said they do not know the answer more frequent than others. Secondary and above educated people said effective conservation programs for NTNP was the second most important factor for the sustainability of NTNP. A similar ratio of none and primary educated participants stated that people who loss the land should get compensation. Approximately, one third of the none educated people did not have any answer ($\chi^2 = 29.318$, df = 10, P < 0.001; Fig 3C). Participants from inside of NTNP answered that fulfilling the basic needs for the local people was more important than any other factor whereas participants from outside thought that fulfilling the basic needs and effective conservation programs were equally important for NTNP. The same ratios of participants from inside and outside of NTNP stated that cooperation with locals can be helpful for the conservation of NTNP. Participants from outside of NTNP also mentioned

10

that action against violation (taking effective actions on people who break the laws without biasing) would be more supportive for the NTNP than other factors ($\chi^2 = 25.2$, df = 5, P < 0.000; Fig 3D).

(A) Gender

(B) Age

(C) Education
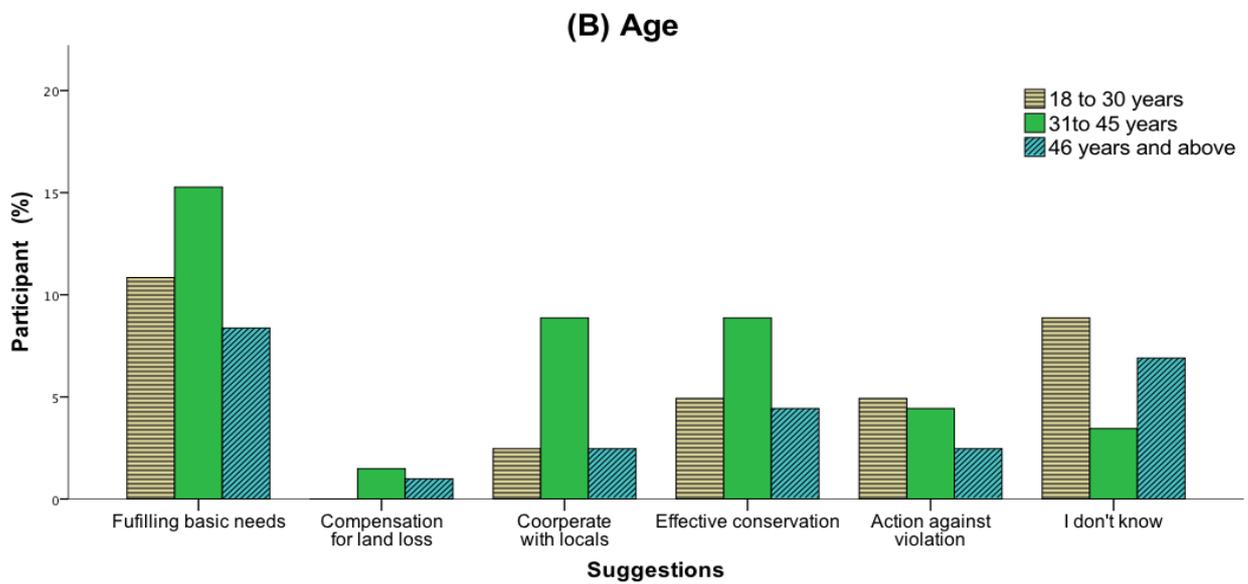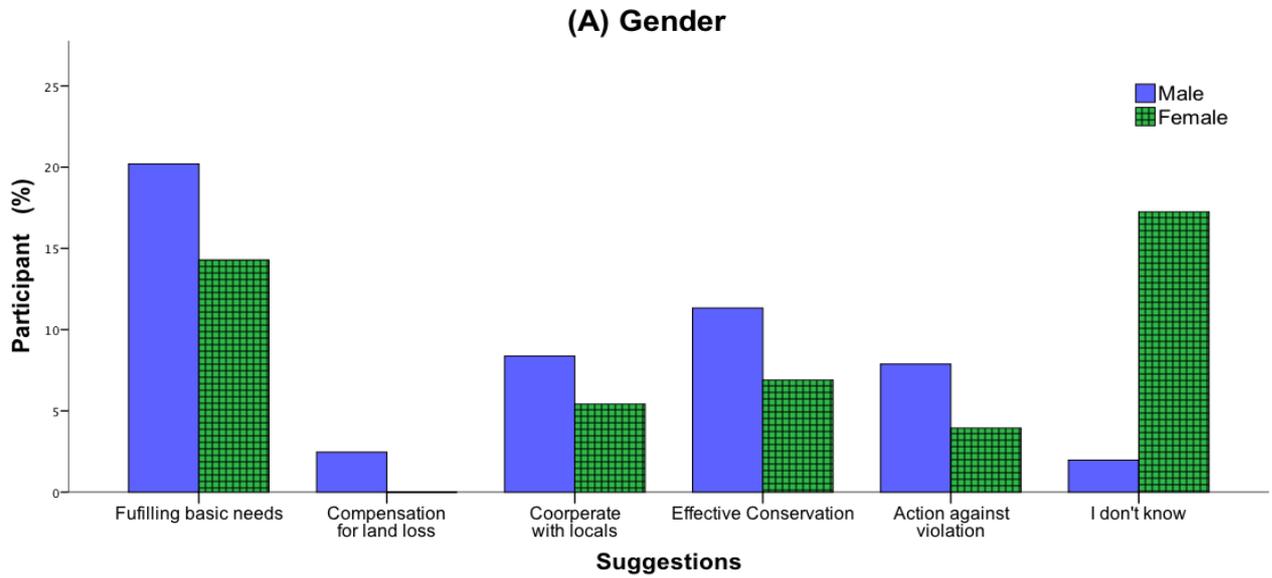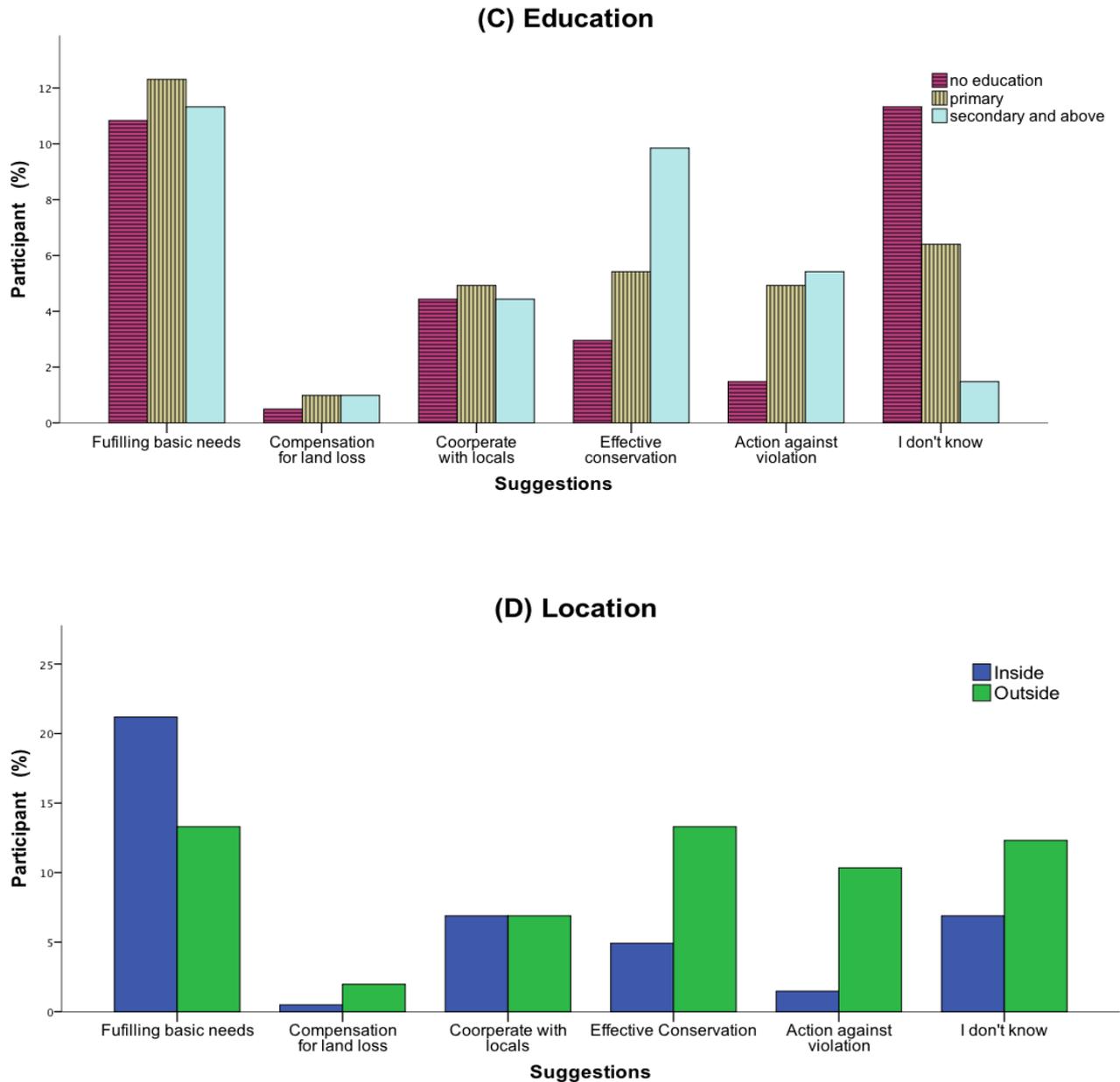
(D) Location

Figure 3: Local people's perceptions on the changes for the effective conservation based on their A) gender, B) age, C) education and D) location in relation to NTNP.

Conservation knowledge of participants

More than half of the participants answered that they know the conservation activities from NTNP. A much higher frequency of female participants answered that they do not know any of the conservation activities than male participants ($\chi^2 = 3.749$, df = 1, P = 0.040; Fig 4A). Conservation knowledges also significantly differed between different age groups whereas middle age people had more knowledge than other age groups ($\chi^2 = 7.9$, df = 2, P = 0.019; Fig 4B).
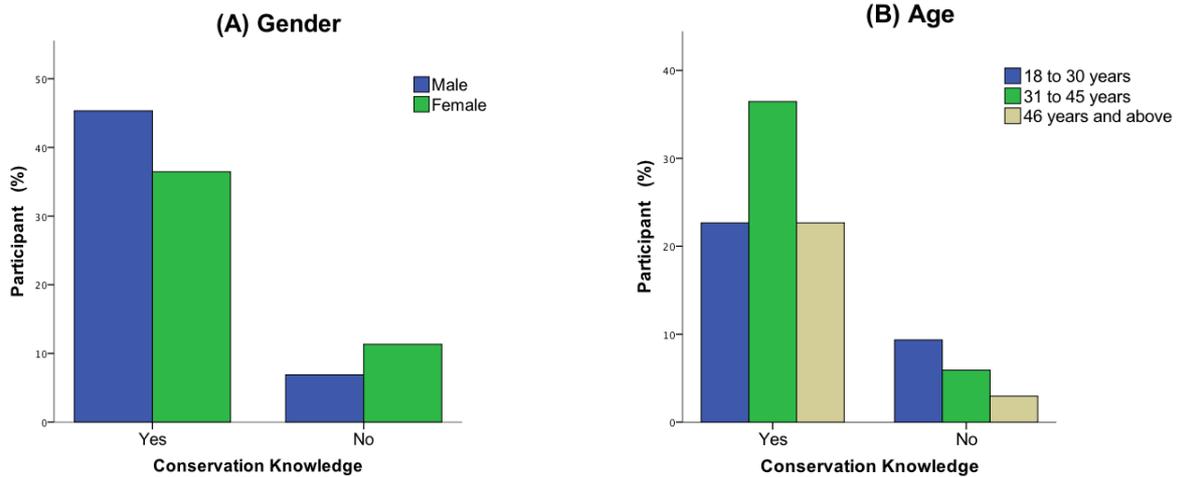
Figure 4: Differences in conservation knowledge in relation to A) gender and B) age.

Effects of population growth on NTNP

The majority of participants knew that the increasing human population has a high impact on the biodiversity. The youngest age group (18 to 30 years) answered that the population growth has a low impact more frequent than other age groups ($\chi^2 = 10.264$, df = 2, P = 0.006; Fig 5A). When comparing the educational level, secondary and above educated people (25%) described that an increasing human population will have low impacts on the biodiversity more than other education groups ($\chi^2 = 7.567$, df = 2, P = 0.023; Fig 5B).
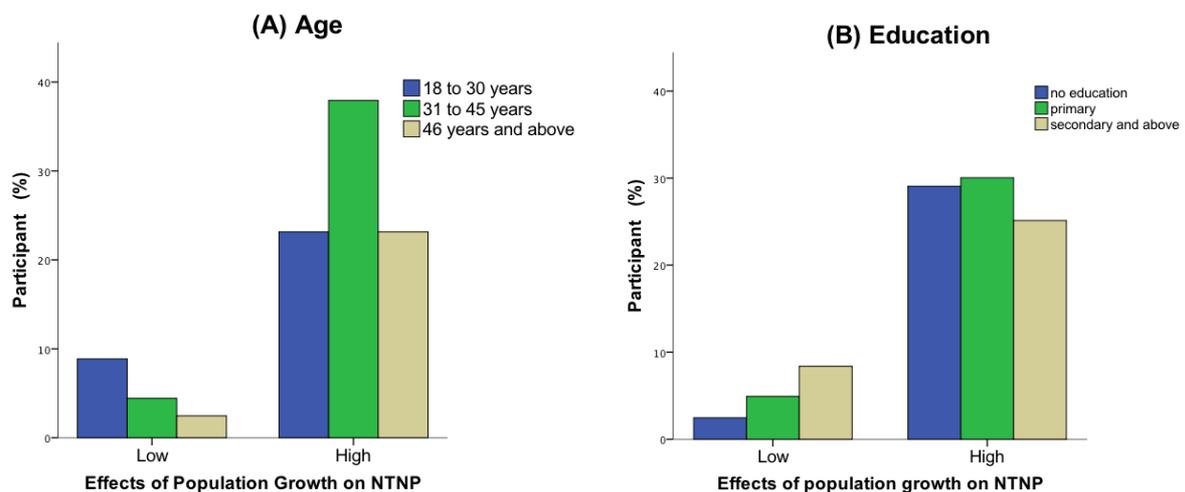
Figure 5: Perceptions of population growth effect on biodiversity with regard to A) age and B) education.

13

Purpose of establishing NTNP

Most of the participants answered that NTNP was established to conserve nature and biodiversity. Few people answered that it was established for other reasons. Significant differences were only found between the males and females. More than half of the female participants did not know the purpose ($\chi^2 = 9.079$, df = 2, P = 0.011; Table 3).

Table 3: Participant's knowledge on conservation and purpose of establishing NTNP

Gender	Purpose of establishing NTNP			
	Nature/biodiversity (%) N	**Other (%) N**	**Don't know (%) N**	**Total (%) N**
Male	59.4 (63)	6.6 (7)	34 (36)	100 (106)
Female	44.3 (43)	2.1 (2)	53.6 (52)	100 (97)
Total	52.2 (106)	4.4 (9)	43.3 (88)	100 (203)

Overall view and the reasons for the situation of NTNP

Participants were asked if they were satisfied or unsatisfied with the situation of NTNP and the reason for that. There was a statistically significant difference between the two gender. Generally, more than half of the participants were satisfied with the overall situation of NTNP. Female participants had more positive feelings on the situation whereas male participants had nearly the same ratio of answer between satisfied and unsatisfied with NTNP ($\chi^2 = 21.8$, df = 4, P < 0.0001; Fig 6).
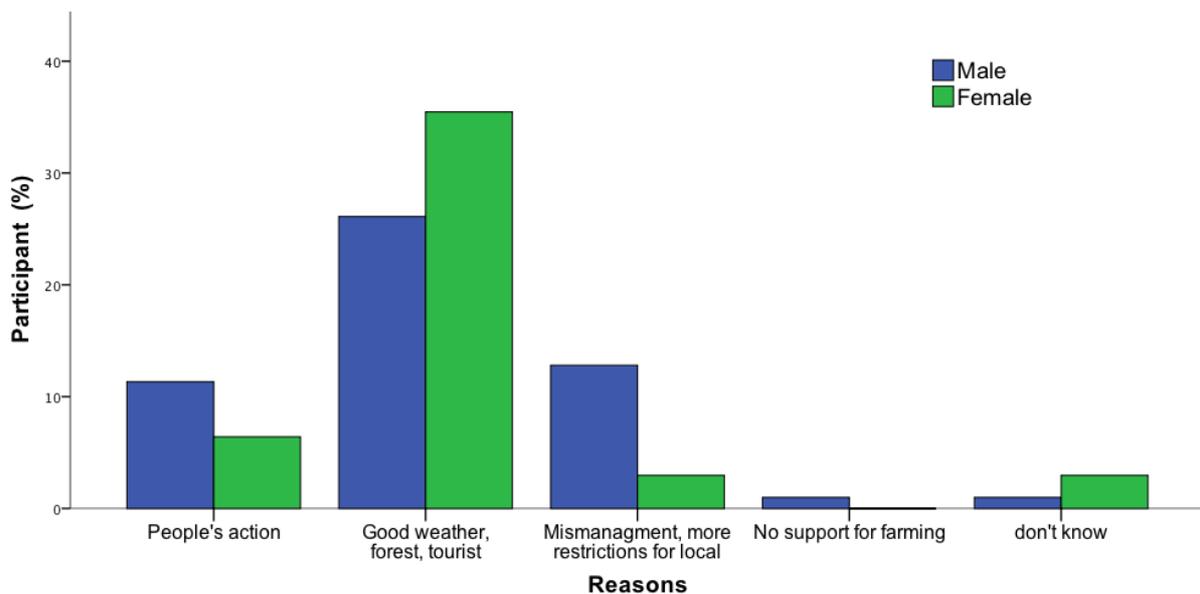
Figure 6: The reasons why participants satisfied/unsatisfied with the overall situation of NTNP

Impacts on the biodiversity in NTNP

Males answered at a much higher frequency than females that the human impact on biodiversity in the PA was high ($\chi^2 = 7.9$, df = 1, P = 0.004; Table 4).

Table 4: Male and female opinions about their impacts on biodiversity of the PA

Perceptions	Impacts	Male% (N)	Female% (N)	Total% (N)
Human impacts on biodiversity	Low	32.1 (34)	51.5 (50)	41.4 (84)
	High	67.9 (72)	48.5 (47)	58.6 (119)
Total		**100 (106)**	**100 (97)**	**100 (203)**

Current situation of NTNP

Participants were also asked whether the situation of NTNP is presently better or worse than in the past. Majority of the participant said people actions (logging, hunting) makes NTNP to become worse. Significant differences were found between different education levels. Secondary and above educated people pointed out the ineffectiveness of management and construction of road inside the park is the second important factor making NTNP to be worse. Primary educated people described lack of support for local people as the second most important factor to cause a worse situation for NTNP ($\chi^2 = 21.411$, df = 12, P = 0.045; Fig 7).
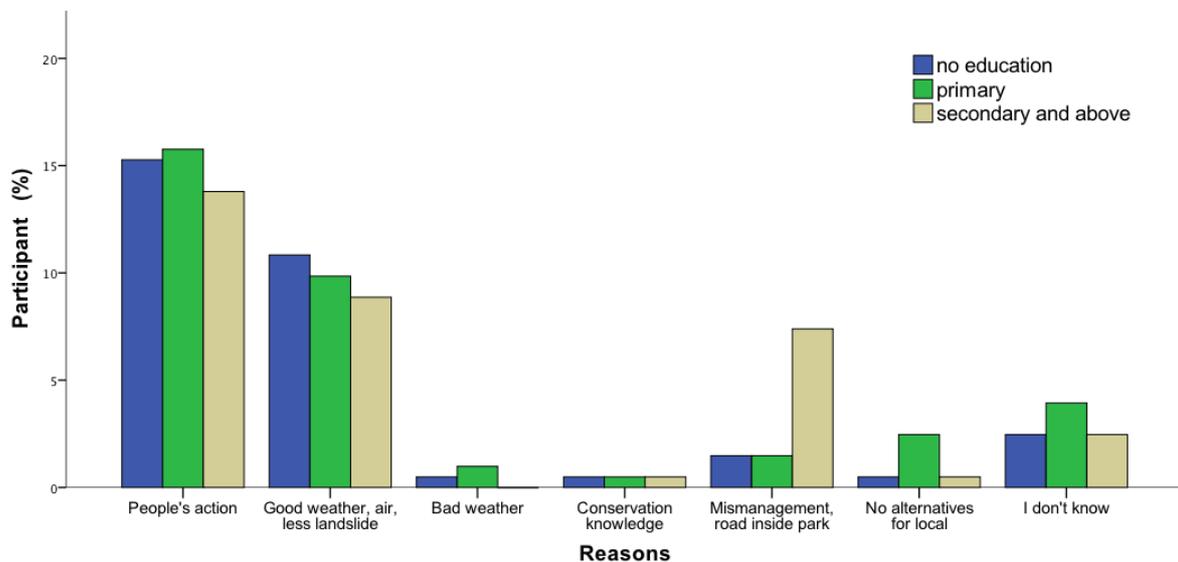
Figure 7: Participant's opinion on the current situation of NTNP, better/worse than in the past

Discussion

Demographic information

In general, participants from inside and outside of NTNP had a quite similar socioeconomic status such as age, gender, tribe, marital status, education, occupation and household activities. They were mostly farmers as also a study by Rao et al. (2010) did find. Most of the participants belonged to the Monn tribe. Most of the participants were married with many children. Also, Vedeld et al. (2012) found that people around national parks had very high child mortality rates and had lower education level. In the current study, 33.5% of my participants had secondary and above education, and 47.4% of the female participants were uneducated. Baral (2005), studies local people in Royal Suklaphanta Wildlife Reserve (RSWR), in Nepal also found that the educational status of women was lower than men.

Perceptions

Human impacts on the biodiversity from the participant point of view

In this part, results from three perceptions will be discuss together, which are human impacts on the biodiversity from the participant point of view, effects of population growth on NTNP and impacts on the biodiversity of NTNP. Overall, many participants knew that they had a lot of impacts on the biodiversity. This is quite similar to the study by Jalilova and Vacik (2012) in Kyrgyzstan. Very few people from inside of the park realized that they had no impacts. On the other hand, 1/3 of the participants from outside of NTNP did not know that human have impacts on the biodiversity. This might be influenced by the conservation knowledge they have and their involvement in the conservation activities. The majority of the participants thought that logging was the most common and serious human impacts on the biodiversity. The reason for that is participants feel that both legal and illegal logging can lead to the destruction of the upstream biodiversity which they depend on for their survival. This logging might also cause more landslides. In Chin state, houses were situated along the slope of the mountain and they suffer severely from landslides during the raining season. Hunting, fuelwood collection, nonwood forest products collection, disturbing and scarcity of resources are also important impacts mentioned by participants. Participants around 31-45 years of age mentioned hunting as the most serious impacts from humans. This finding is probably due to the greater involvement of male participants (probably local hunter) at this age class. They also notice the decreasing wildlife population and some participant mentioned that it become difficult to see wild animals.

Fuelwood collection is another important impact by humans as found by Newton et al. (2009), Jalilova and Vacik (2012). Many of the local people described fuelwood collection as one of the critical factors for biodiversity loss. According to findings from Senavirathna et al. (2014), local people in Chin state collect fuelwood and non-timber forest products (NTFP) from the forest for their survival, which is one serious human impact on natural forests. The current study found out that there is no electricity in the study area. Participants said that they have to collect fuelwood from NTNP for their daily use as found other places by Khan and Bhagwat (2010) in Chitral Go National Park in Pakistan. According to participants, some people collect fuelwood every day and some collect once per week. A collection of fuelwood is also depending on their location in relation to the forest. People who live far from the forest where they can find dried wood usually collect for the whole week. Before the rainy season, they have to collect fuelwood for the whole season. Most participants were agreed with the fact that they do not have alternatives to reduce their dependence on NTNP, which is caused by poverty. Jalilova and Vacik (2012), also found out that poverty is one of the most important reasons for human dependence on biodiversity. The current findings suggest that creating alternatives for the local livelihood would be benefit for NTNP and local people. Alternatives can be electricity, solar energy, providing less energy consuming stove for each household , increasing biofuel usage, support for agriculture and livestock in this area.

Other impacts from humans are disturbing the nature and scarcity of resources (water, medicinal plants, orchids). Participants noticed that the resources from NTNP are decreasing. Senavirathna et al. (2014) indicated that local people in Chin state agreed that forest resources are becoming reduced. Participants from outside of the park thought that other impacts were not as important as impacts from fuelwood collection this is because NTNP is the main water resource for them and they feel that scarcity of water is the serious impact from humans. Inside people directly obtain the water from NTNP and for them, daily fuel needs are more important than any others.

Almost all of the participants believed that NTNP will suffer from an increasing human population. Garekae et al. (2016) also found that all respondents thought that because of different agents and drivers, the close forest will change. Others have found that people think that human population growth and resource use will threaten protected areas (Htun et al. 2012, Garekae et al. 2016). Other findings (Khan and Bhagwat 2010, Senavirathna et al. 2014) indicate that Chin people from Midat believed that human population growth causes the shorter fallow years for shifting cultivation. Although most of the participants claimed that the increasing human population would have higher effect on the biodiversity of PA, some

participants did not agree. They argued that even the current human population is increasing, it will not have any effect if the cooperation between PA and local people is good.

Male participants knew the impacts better than females, probably due to the better education and knowledge about the conservation activities. Most of the female participants were uneducated. Also, they were very shy to talk, even to the interviewer myself as I am a woman. In most of the Chin households, male are the decision maker for the whole family and the role of female in their society is limited (MIID 2014). Allendorf and Allendorf (2013) also described that women in rural areas of Myanmar are less confident, and they do not want negative interactions with the guards. They are passively participating in conservation and their knowledge about forest management was obtained from their husbands. According to one female participant from outside village said there are some medicinal plants which has economic value to them and they usually go deep into the forest to find such medical plants. She also told that she knows that taking resources from NTNP is forbidden but she has to do it for her family survival. Aung et al. (2015) also found that females collected more food from the forest and gender of household should be considered in conservation activities. Women thought that they did not have any serious impact on the biodiversity. Kideghesho et al. (2007) also found that higher number of females in their study villages collected more resources (especially food) from the forest. It is important to learn more about the perceptions from females. Jalilova and Vacik (2012) also suggested that it is important to improve the women's awareness of the noneconomic benefit, sharing information from PAs and participation activities. The author also suggested that effective conservation can be obtained by understanding the role of gender in conservation. Garekae et al. (2016) also suggested that women were important for the conservation of protected areas and required special efforts to target women in conservation activities. It is strongly recommended for targeting women for the conservation activities together with well-trained women staff. Extension programs should also plan to listen from local people together with information sharing.

Possible changes for the overall effectiveness of NTNP conservation

The most common demand described by participants was to fulfill the daily basic needs. These basic requirements were most important for participants from inside the park. As mentioned earlier, there was no electricity in the study area, although some of the villages had access to electricity only two hours a day which was only for light and not for cooking. They do not have any alternatives for fuel and rely on fuelwood from NTNP for daily use. This

finding was supported by Badola (1998); Jalilova and Vacik (2012); Senavirathna et al. (2014); Aung et al. (2015) who found that local people's dependence on forest products is due to lacking alternatives. It is, therefore, important to understand the needs of local people which can be useful in persuading them to be more supportive for conservation (Ambastha et al. 2007, Jalilova and Vacik 2012, Karanth and Nepal 2012). But participants from outside the park think that effective extension programs and conservation activities (patrolling, skillful staff, establishing plantation) are equally important as fulfilling basic needs for local people.

Permanent agriculture, livestock, job opportunities are important human rights to consider for both local people and NTNP conservation. Education is also another important factor for conservation. Participants said it is very difficult to find a job with no education or lower education. Although they have primary schools in most villages, high schools are located only in townships. Studying in a township is costly and most of the parents can not afford it. Only children from villages which are close to townships can attend high school. Apart from that, universities and colleges are only located in big cities which is far from their place. This is the reason why most of the participant ended with primary school education only. Participants said that they have very few job opportunities. If the crop production is bad they have to find a loan or a part time job to survive for the remaining year. There are part-time jobs such as mower, builder, and concrete worker, however, these kind of jobs are rare, so they have to work part-time for illegal logging. Nowadays, people commonly use chainsaws for logging which has serious impacts on the biodiversity. Moreover, Pests and rats are also big problems for crop production. Therefore, the local people want technological and financial support from the government to improve their agriculture. One participant said that people hunt because of unsuccessful crop production. He also described that hunting is done for their family survival, not for their pleasure. Hunting, shifting cultivation, cutting trees and extracting resources from the NTNP is very tiresome for them. Others have found that all the participants from their study said that local people will be more support for conservation if their household income increase (Silori 2007, Tessema et al. 2010).

For the conservation of NTNP, local people also want the government to cooperate with them in a way that can create job opportunities. Both participants from inside and outside of NTNP had the same opinion on such a cooperation. It is fundamental to build trust between local people and the authorities to gain local people participation (Zamani-Farahani and Musa 2008). They also think patrolling should be planned for 24 hours, which will help in protecting NTNP. Moreover, they believe that using local young people in the NTNP conservation programs such us patrolling, training and inventory can help their families and the

sustainability of the NTNP. Iftekhar and Takama (2008) found that local people believed that cooperation with local people in forest management would end in better protection of the forest. Some participants said that they want the authorities to take action on people who break the law concerning the NTNP conservation. They also want equality in punishing the law breakers. Participation is one of the important factors to reduce conflicts in the management of protected areas (Allendorf 2007). Ambastha et al. (2007) also suggested that educational level of local people strongly influence the positive perceptions towards biodiversity conservation. Technology for shifting cultivation and educating local people is very important considerations for protection of the environment (Senavirathna et al. (2014). The finding by Garekae et al. (2016) was that conservation attitudes are related to education, the more the people educated, the more they support conservation. The current study found out that both none educated and educated people wants to cooperate for the conservation. In other studies, almost all the participants wanted to participate and being informed about protection of PAs (Silori 2007, Khan and Bhagwat 2010).

The important suggestion for the NTNP is improving the park-people relationship. There is a poor dialogue between park authorities and local people. Most of the participant did not know the exact boundaries of NTNP. They only know about patrolling and prohibition as a conservation activity. There is also lacking good relationship and transparency between park authorities and local people. Local people cannot be seen as lawbreakers. Local people feel that extension programs are only telling them that the forest and animals are important, and what about their lives? It is critically important to explaining them that they are equally important as NTNP and their participation is playing an important role in conserving nature. Similar suggestions have been found in other studies., Garekae et al. (2016) pointed out that good relationship with park staff is one of the factors influencing positive views of local people on PAs. The authors also found out that poor dialogue among local people and park authorities caused mistrust and dissatisfaction of local people towards PAs. Distrust between local people and park staff lead to low participation (Zamani-Farahani and Musa 2008). Local participation is, therefore, critical for the success of conservation (Karanth and Nepal 2012). The management of PAs is largely dependent on the relationship with the local people (Allendorf 2007). Park and people relationship is a critical factor for obtaining conservation success and support from local people (Karanth and Nepal 2012).

Conservation knowledge

Location of villages did not have any influence on the conservation knowledge, which is opposed to findings by Htun et al. (2012), who found that forest conservation attitudes were related to location. Gender and age did however, influence the conservation knowledge. However, Htun et al. (2012), found that gender did not have any influence where both males and females had similar conservation attitudes . Male participants said that they knew more conservation activities than females. This can be because most of the extension programs are focused on the male participants. The present study found that the middle male age group people (31-45 years of age) were the most targeted group for the extension programs. This can be because the middle age group people are mostly males and the leader of the family. Participants described that NTNP is protected not only for the nature, biodiversity, and tourism but also for their cultures and traditions. The conservation activities described by the participants include extension programs, patrolling, prohibition for logging, hunting, searching cane, orchids and forest fire which are similar to findings by Htun et al. (2012). Some participants described that they know local conservation groups formed by BANCA (Biodiversity and Nature Conservation Association). Participants also described that they did not know the exact boundary of NTNP, as did Htun et al. (2012). The finding from the current study suggests that conservation education programs should also include younger generation and women. For example, information tours and school field trips to NTNP. Moreover, Chin people have different dialect for different ethnic groups. Conservation education and awareness programs need to increase and discuss with local Chin languages if possible. This can be done with the help of the local translator in villages. Warning signs for prohibition and boundary demarcation should also be written in local Chin language.

Overall view and the reasons for the situation of NTNP

In general, participants were satisfied with NTNP. Female participants were more satisfied with the situation of NTNP than males. This is in contrast to Iftekhar and Takama (2008) who found that men had more positive attitudes toward the PAs. The reason for this satisfaction were better protection from the government, better condition of the forest, more tourists in the area and fresh air. Participants were not satisfied with the construction of road inside the NTNP. That road will be used by most villages and most people. It will be easier and they will use shorter time to go to other villages. For example, before the construction of the road, they had to walk 3 days to reach the township area but now it takes only two hours to

reach there. Although they like the fact that they can use this road for traveling, they still do not like that the deeper parts of the forest become accessible by people. They claimed that such people will destroy the resources for no reason. For example, forest fires by people who are smoking when they are passing by and people who are carrying guns (traditional weapon) will shoot animals if they see them. They also claimed that the best way to protect NTNP is to investigate the people who are entering NTNP

When asking what kind of advantages, the NTNP will give to the local people, one participant answered that I think local people get advantages from the existence of NTNP because of good weather. But on the other hand local people have lost their rights to collect cane and hunting (trap). He thought that the existence of NTNP caused trouble for the local people because some people report them to the government and put local people into jail. In the past, their ancestors divided the land between them and they conserved the water. They avoided destroying trees around the water stream up to one-mile distance. Now the quality of NTNP becomes reduced because the more they conserve the more the people want to destroy. Almost all participants agreed with the fact that they do not have any benefits because of tourism in NTNP. This can be due to poor transportation and poor knowledge concerning tourism. However, the respondents accepted that they received some benefits from the existence of NTNP. Garekae et al. (2016) also found that the majority of ethnic groups living around PAs appreciated the existence of PAs. They also claimed that PAs are necessary for the biodiversity conservation.

Current situation of NTNP

Most of the participant mentioned that NTNP is becoming worse nowadays than it used to be in the past. According to them, the major driver is human actions. Senavirathna et al. (2014) found that poaching, unsustainable forest harvesting, as well as lack of community participation are threatening the PAs. Participants from the current study believed that because of the increasing human population and fewer job opportunities, there are more hunting, shifting cultivation, and more logging (chainsaw) all of which are destroying the NTNP. No support from the government for their survival is a major concern by participants. Secondary and above educated people claimed that ineffective management for NTNP is a major concern. Garekae et al. (2016) and Allendorf and Allendorf (2013) also reported that biodiversity loss is related to lack of proper management. One participant said that he thinks that the condition of NTNP becoming worse because NTNP was conserved by their ancestors and presently

people cannot easily access or extract the resources from the land. NTNP was established and controlled by the government. Thus, why people don't care and extract the resources from the area which was not common in the past. is because people are not satisfied with the condition of NTNP. Moreover, he did not like the existence of the hotel upstream. According to him, conditions have become worse after NTNP was controlled by the government, and it is hard to stop hunting, logging. In the past, the land owner could say to them to not enter or do somethings inside their territory. He was also worried if people were not aware of the scarcity of animal species inside NTNP. An insufficient number of guards for NTNP is also a problem for conservation. Bruner et al. (2001) pointed out that density of guards in the park is strongly related to the effectiveness of park conservation. The current study suggested that it is important to assigned the sufficient number of guards and necessary to provide basic facilities for the park staff for successful conservation NTNP.

Conclusion

The study revealed that participants living both inside and outside of NTNP knew their impacts on the biodiversity of NTNP. The findings indicate that people from inside of NTNP know their impacts better than people from outside the park. Outside people do, however, know that they also have impacts on the biodiversity of NTNP. The results are not supporting my hypothesis that inside people believe that they have minor impacts on the biodiversity and outside people do not consider that they have impacts on the biodiversity. The major limitation of the present study is however, the selection of the study villages. The villages were chosen in relation to their location from the PA and their accessibility because the survey period was during the raining season in Myanmar and most of the villages around NTNP were not accessed by motorbike. The roads were slippery (landslides occurred in some places) and the villages were located on steep slopes. Thus, the study only covers villages on Eastern and Northeastern parts of NTNP, which were more easily accessed. Future research should therefore also investigate more villages from other parts of NTNP. To solve the problem with accessibility, the study should be conducted during either the hot or the cool season (from September to April).

For a long-term effective conservation of NTNP, park and people relationship need to be prioritized. Supporting alternatives for local people's survival is the second highest priority for the conservation. Alternative means of basic needs such as food, water, shelter, clothing and job opportunities such as small scale business, handicraft etc. must be prioritized. The potential for local based tourism need furthermore, to be figured out. Conservation will not be

the first priority, if the local people do not have anything to eat. Although people from urban areas are shouting for the conservation only, it is really important to consider the local people who are depending on the forest for their own survival. Information concerning human impacts on the biodiversity of NTNP is still lacking and need future research for investigating the anthropogenic impacts on NTNP. The role of women should be seriously considered in conservation and their impacts on the biodiversity need to be studied. The finding from the current study is important for the effective management and local people participations for obtaining sustainable conservation objectives of NTNP, or for all PAs in Myanmar.

Recommendations

1. Park and people relationship needs to improved.
2. Alternatives for fuelwood usage should be developed
   (electricity, less energy consuming stove, biofuel, solar energy).
3. Job opportunities for local people should be created
   (tour guides, small scale businesses etc.).
4. Women targeted conservation programs need to be developed and implemented.

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Appendix-1. (Questionnaire use)

Household Questionnaires

Introduction

I am a master student, studying Natural Resource Management at the Norwegian University of Science and Technology, Trondheim, Norway. The aim of my study is to acquire knowledge about the perception of local people living near the protected areas, Natma Taung National Park (NTNP) . This study is important both for the conservation of biodiversity and the local people who is dependent on the protected areas. I hope you would like to give me some time to answer my questions. Feel free to answer my questions, I will not show your identity in my thesis. I just want to know your opinion and your knowledge for my study.

Thank you so much for your kind participation!

Date & Time………………………...........................
Village Name……………….…………………………….
GPS position…………………………………………
……………….…………………………………………

Demographic Information

1) How old are you ?_____years
2) Gender_____Female(   )   Male(   )
3) What is your religion ?_____
4) What is your ethinicity/ tribe? _____
5) Marital status -Single   (   )
   - Married (   )
   - Widow   (   )
   - Divorced (   )
6) Education - None   (   )
   - Primary   (   )
   - Secondary   (   )
   - Other(specify) (   )
7) What is your occupation? _____

8) How many people are living in your household? _____

Age	Sex	Occupation	Education	Relation

9) Household Activity and Income

Activity	Income in Year
Agriculture	
Fishing	
Hunting	
Employment	
Business	
Tour Guide (Bird Watching Tour)	
Other (specify)	

10) What is your main protein in your daily meal?_____

11) What kind of food do you usually eat?_____

12) What is your favourite meat? _____

13) Do you own land? Yes(   )   No (   )

14) If Yes, how big is your land? _____Ac/Ha

15) What kind of crops do you mainly grow?

_____

16) What was the average production (kg) last season? _____

17) How long have you been living in this village? _____ years

18) What happened to you when the NTNP was established?

_____

Benefit from the PAs

19) Do you ever go into the PA?   Yes (   )   No (   )

    (a) If Yes, could you tell me why do you go there?

        o   Hunting   (   )

        o   Fuelwood collections   (   )

        o   Collection of Non-wood forest products   (   )

        o   Grazing   (   )

        o   Water   (   )

        o   Others(specify)_____(   )

    (b) Which part of the PAs do you usually go?

        Inside (   ) Near (   )

    (c) How far is it?_____

20) How many times do you go per month? _____times

21) How long does it take to go into NTNP? _____ hours

22) Have you ever sleep in the NTNP ? Yes (   ) No (   )

23) Do you benefit from the tourism activities of this PAs?   Yes (   ) No (   )

    If, Yes…. Please specify in which way -   Selling Handicraft   (   )

                                    - Selling forest products   (   )

                                    - Tour guide/porter   (   )

                                    - Others (specify)   (   )_____

24) What is your income from this business per month? _____ kyats

Perceptions

25) Do you know what the main purpose of the protected areas is?

    - Nature protection/biodiversity conservation   (   )

    - Tourism   (   )

    - Watershed   (   )

    - Don't know   (   )

    - Other (specify)   (   )

26) Do you think that the protected area is necessary for the conservation of remaining natural resources?

    Yes (   )   No (   )   Don't know (   )

27) Do you think local people get any advantages from the existence of the protected areas?

    Yes (   )   No (   )   Don't know (   )

28) Do you rely to some extent on resources located within the park boundary?

Yes (   )   No (   )

   If Yes, please rate the following resources according to their value to you.

	Least Value				Most Value
Timber	1	2	3	4	5
Pasture	1	2	3	4	5
Wild Animals	1	2	3	4	5
Water	1	2	3	4	5
Other	1	2	3	4	5

29) Have you heard about the conservation activities within the protected areas?

Yes (   ) No (   )

If Yes, please describe some activities

_____

30) Are you involved in some way in conservation activities of the Natma Taung Nation Park?

Yes (   )   No (   )

If Yes, please describe in what way you involved in conservation activities?

_____

31) Do you have knowledge about the protected species in Natma Taung National Park?

Yes (   )   No (   )

If Yes, Can you tell me some rare species you know in Natma Taung National park?

Animals -

Birds -

Medicinal Plants-

Orchids –

Others(specify)-

32) Do you think that local people take full advantage of the area's economic potential related to tourism?

-   No, definitely not   (   )
-   No, not really   (   )
-   Do not know   (   )
-   Yes to some extent   (   )
-   Yes definitely   (   )

33) What is your overall view of the Natma Taung National Park?

- Not all satisfied   (   )
- Somewhat dissatisfied   (   )
- Neutral / Do not know   (   )
- Somewhat satisfied   (   )
- Very satisfied   (   )

34) How do you think of the situations of NTNP in the past and now?

Better (   ) Similar (   ) Worse (   ) Don't know (   )

Why ?

_____

35) Please indicate the level regarding your-

	Low	Relatively Low	Neutral/ Don't know	Relatively High	High
Awareness of the importance of PAs	1	2	3	4	5
Knowledge about the rare species	1	2	3	4	5
Observing the changing climate	1	2	3	4	5
Concern regarding environmental issues	1	2	3	4	5
Understanding the laws and regulations	1	2	3	4	5
Participation in conservation activities	1	2	3	4	5
Impacts on the biodiversity in the PAs	1	2	3	4	5
Other (specify)	1	2	3	4	5

36) Could you tell me what kind of impacts do local people have on the biodiversity in the PAs? _____

37) With the current population growth, more people will live here in 20 years. How do you think of this affect on the biodiversity in the PAs?

Low (   )   Relatively Low(   )   Don't know (   )   Relatively High (   )   High (   )

38) What possible changes could be made to improve the overall effectiveness of NTNP in nature conservation?

_____

39) Do you have any questions about my study?

Thank you !!!!!

Appendix-2 (Photos from survey)

Photo Plate 1: Local Chin kid collecting fuelwood for household use

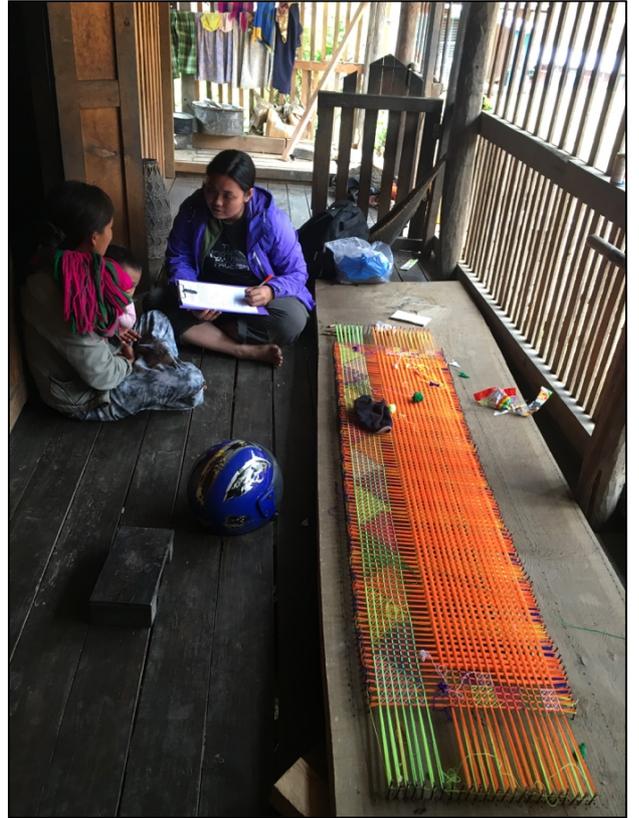Photo Plate 2: Face to face interview at each household

Photo Plate 3: Face to face interview at each household

Photo Plate 4: Group discussion before starting interview