K. L. F. Viola
R. A. Gomez, Jr.

CHARACTERISTICS AND IMPACTS OF ECOTOURISM IN THE MUNICIPALITIES OF BASCO AND MAHATAO, BATANES

ABSTRACT

This was conducted to document the extent of ecotourism activities based on the demand function and the correlation of tourist visits (or arrivals) with 'tourism-related' services and amenities. It also assessed the impacts of eco-tourism in terms of solid waste generation, water quality and water supply. The field work phase of the study was conducted in the months of May and June 2006.

Results showed that the level of ecoturism in Batanes was quite or relatively high.' Based on the tourist arrivals from 1995 to 2006, there was an increasing trend. With the number of visitors reaching past the two thousand plus mark. The demand curve values (R2 value of 0.4803 and R value of 0.69) showed a more or less definite pattern of visitation by tourists, and it also reflected that Batanes is generally well visited place by tourists. The willingness to pay (WTP) of an individual in each zone Showed that the visitors from Zone 3 (Ireland) had a WTP of less than about PhP 450,000.00. This implies that people from other countries (e.g. Ireland) were willing to spend big amounts of money to enjoy the recreational value offered by the eco-tourism sites in Basco and Mahatao.

There was no significant correlation among the number of tourists with the number of restaurants, lodging houses, and souvenir shops, .However, the number of tourists and the number of public transport units showed a significant correlation.

In 2005 the estimated volume of solid waste produced by the two communities together with the tourists has increased to 1,227,431.44 kilograms from 944,987.20 kilograms in 1995. Moreover, biodegradable wastes were "not frequently seen and in small amounts" (Rank 4) while non-biode-

garadable wastes were observed to be "frequently scattered in the sites but in small amount" (Rank 3). The impacts of these wastes might take many generations to be realized but it might still have impacts that would cause destruction to the environment.

The water quality utilized for drinking, washing and bathing purposes was still generally "very clean" (Rank 2) in the two municipalities in 2006, with a better perception towards "extremely clean" (Rank 1) in Mahatao. Generally, the water quality in the two municipalities is "very clean" and still safe for the needs of the public as perceived by the community respondents. There was a slight change in water quality in the two towns especially in the more urban town of Basco. Ecotourism activities may still have contributed to this change in water quality, as a consequence of the influx of more people into the place.

Majority of the respondents also perceived that the water supply in the two municipalities is not enough for their daily needs for the whole year. In general, the volume of water distributed is insufficient for both community and the tourists. The impacts of ecotourism activities on water supply could thus aggravate the problem on insufficiency in the coming years.

INTRODUCTION

Ecotourism usually refers to non-consumptive recreation activities that are closely linked to natural history and likewise related to wildlife, such as bird watching, wildlife watching, nature photography, botanical study, and wildlife treks and safaris (MacLellan, 2005). The main attraction is the quality and uniqueness of the natural environment. This is often linked with encountering equally important cultural and historical resources associated with the indigenous population.

There has been a long history of travel to natural areas around the world. Over the past years, tourism has become the fastest growing industry in the world. Mass tourism has developed in a way that has caused undesirable consequences to the environment, thus, in a way, giving rise to its alternative, which is ecotourism. It is said that ideally, ecotourism is the first-ever true application of sustainable development concept. This concept

is generally viewed as a wise resource management activity because of its economic, ecological and socio-cultural advantages. Ecotourism came to the Philippines in 1992 as the country joined the fourth Pacific Asia Travel Association (PATA) adventure travel and ecotourism conference held in Malaysia (Libosada, 1995). The Philippine government had been interested in ecotourism because of its economic benefits and role in protecting and conserving the environment, the reason why the government steadfastly supports such.

Like other countries, the Philippines has rich biodiversity very ideal for ecotourism and one site that is frequently visited by tourists is the Batanes group of islands. This is the country's smallest province with the least population found in the northern most end of the Philippine archipelago. These islands are surrounded by sea, the Pacific Ocean to the East and China Sea to the West while to the North and the South, it is surrounded by the Bashi and Balintang Channels (Hornedo, 2000a). Batanes lies within the meridians of 20° 29' North, 124° 01' East of Northern Luzon. The province has six municipalities, two of which are Basco and Mahatao. Basco is both the provincial capital and the most productive municipality, generating more than half of Batanes output in goods and services. It is also the most accessible to human activities that is why it has the most disturbed marine and terrestrial ecosystem in the province. On the other hand, the town of Mahatao is rich in natural tourist attractions and it also has the best port in all of Batanes Islands. Mahatao is six kilometers away from Basco by land.

In these two municipalities, activities of ecotourism have already started its operation since the 1990s. Tourism activities however, might have degraded the quality of the tourist sites and might have lessened the number of visitors who would ultimately abandon the sites. Hornedo (2000b) noted that in the last quarter of the 20th century, the rate of change in traditional Ivatan (as natives of Batanes call themselves) ways has been fast and accelerating so that a large number of traditional ways vanished or began vanishing. As social and livelihood ways changed, it led to some conspicuous quantitative and qualitative developments in Ivatan life.

Ecotourism has become a part of everyday activities in the municipalities of Basco and Mahatao. The result of the continuous activities had led to some environmental degradation. Soil erosion has been observed be-

cause of the footpaths and roads being paved in accessing the sites. Increasing volume of solid waste had also contributed to the degradation of the environment as well as its aesthetic value. Raw materials for souvenirs had decreased because of over-harvesting. Similarly, animal resources such as coconut crabs have decreased greatly in number because of its high economic value and high demand. Summer months are the peak months of ecotourism in the area. In the case of Basco, there is limited water supply for the whole municipality so they have to get water from the municipality of Mahatao to be able to supply the demand. Caves in Mahatao were also being damaged because of visitors. Damage to limestone formations and vandalisms were observed in the area.

Due to a growing recognition of the environmental impacts being brought about by the confluence of various forces of change, albeit also due in part by the movement of people to and from the Island Province as well as tourism, there was a need to have a more definitive view, based on empirical evidences, of the level and extent of eco-tourism activities in the province as well as a clearer vantage point of their supposed impacts to the natural as well as the socio-cultural-economic components of the environment, which could provide important lessons by serving as inputs to and considerations for provincial, regional and even national planning for development goals. It was in this context, then, that the study was undertaken. It aimed at documenting the extent of ecotourism activities in two of the six towns of Batanes. Specifically, it sought to undertake the following:

1. To describe the level of eco-tourism activities in Basco and Mahatao based on the different 'tourism-related' services and amenities, and on the demand function; and,

2. To assess the impacts of ecotourism activities in the two identified sites in terms of solid waste generation, water quality and water supply.

METHODOLOGY

Four of frequented places in Basco and Mahatao, in Batanes were chosen as sampling zones. These sites are four of the most beautiful ecotourism sites in these towns. Naidi Hill and Tukon which is also known as "radar" are both located in Basco (Figure 1). In the municipality of Ma-

hatao, the sampling zones were Payaman Aru and Diura (Figure 2).

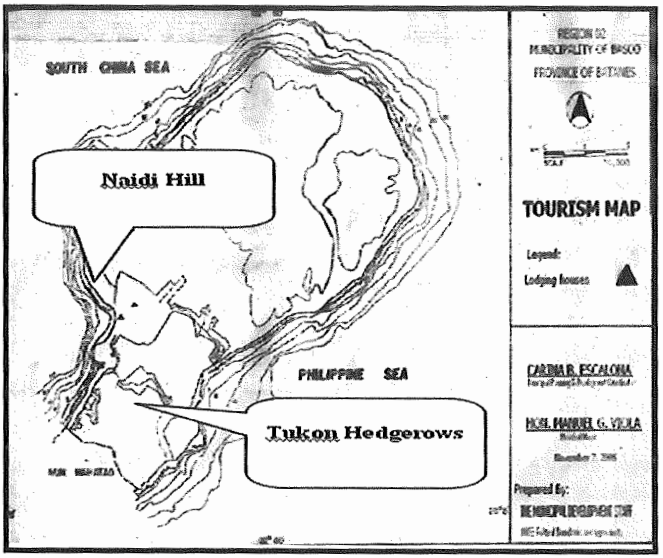

Fig. 1. *Tourism map of Basco, Batanes*

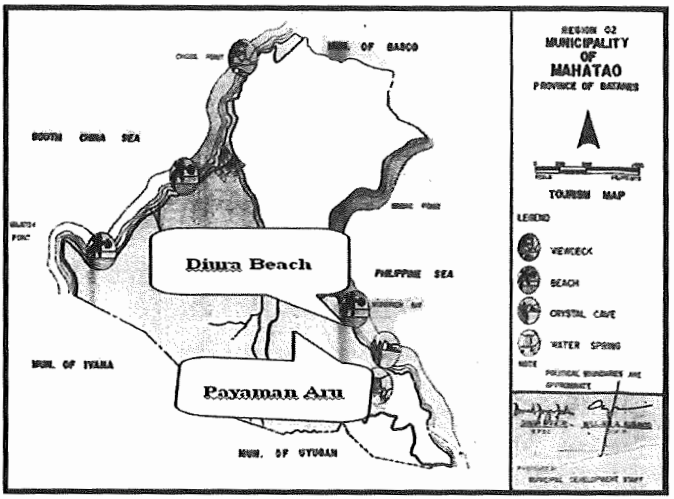

Fig. 2. *Tourism map of Mahatao, Batanes*

The aspects dealing with the level and impacts of ecotourism activities were determined through survey questionnaires and examination of

secondary data from the records of the different local government offices and agencies concerned. Key informant and in-depth interviews were used to reinforce the data gathered from the secondary data and the survey.

Two different sets of survey questionnaires were utilized in gathering data from visiting tourists and the Ivatan community. The first set of questionnaire was given to the tourists. It was used in the determination of the demand function based on the number of visits to the site from different distances and the cost of travel during the visit. Using purposive sampling method, 50 tourists were taken as respondents in the study. The determinants considered in the demand function were the travel time and costs per zone. Different points of origin were divided into zones where each zone was grouped according to defined range of distances from the site. This allowed the researcher to calculate the number of visits purchased at different prices. People's willingness to pay (WTP) to visit the site could be estimated based on the number of trips they make at different travel costs. It also comes up with a regression analysis between the travel cost and the number of visits in the given population level. This was used to estimate the level of tourism based on its present status and established patterns.

The secondary data that included the different 'tourism-related' services and amenities and attributes such as the number of souvenir shops, lodging houses, restaurants, and transportation facilities were correlated with the number of tourists who visited the sites in the past 10 years using Pearson correlation. The result served as an indicator of the level of ecotourism in the area.

Moreover, a second set of survey questionnaire was given to the Ivatan community members. A set of criteria was used in choosing the respondent. Each respondent must have been more than 20 years of age and a bonafide resident in the area and his livelihood should depend on tourism activities, or work within the vicinity of the sites. These community members were interviewed to get the impacts on solid waste generation, water quality and water supply in the province. Based on proportional sampling, 37 respondents came from Basco and 13 respondents came from Mahatao. This was based on the estimated population in Basco (7,500) and in Mahatao (2,400) with a total of 9,900 in 2005. The number of respondents was derived by dividing the respective population of each municipality by the total population and multiplied with the desired total number of respon-

dents.

In determining the status of solid waste generation, the volume of waste generation in the past years was obtained from the Municipal Planning and Development Office of the two municipalities. The observation of the respondents in the past years was also determined using the survey questionnaire. This includes observations on encounters of scattered solid wastes within the community and the tourist sites. In the survey, the local community described the impact of ecotourism by rating the observed waste in the sites. For the corresponding rating to be used, a value of 1 indicates that the observed waste was "frequent and plenty" or the wastes are usually seen in the area and they are in large amounts, for Rank 2 the wastes are not usually observed in the sites but when it is observed, they are in large quantities or they are "not frequent but plenty". For rank 3, these are usually seen in the ecotourism vicinity but the volume is small or they are "frequent but in small amount", a value of 4 when wastes are not regularly seen in the area or "not frequent and in small amount" and a value of 5 for "none" or when the respondents do not observe these wastes in the ecotourism sites.

Using the survey questionnaires, the local community also described the impact of ecotourism on water quality using a certain scale based on their perception. Basing it on the corresponding rank of 1-5, 1 indicates "extremely clean" and described as very clear, such as the steam or the watershed being uninhabited and can be considered as under class AA in the classification of water quality in the National Standards for Drinking Water. For this reason, the water was as safe and clean for general utilization. For rank 2, it was described to be "very clean" because it is clear but it may have very few sediments, although rarely. The water quality can still be considered to be clean and safe for cooking and other similar uses. For rank 3, the water is "fairly clean". This water can be described as very slightly turbid, though quite rarely, and it may have very few particles and sediments especially when the water is stirred up. This water may be used for laundry purposes. A value of 4 for "quite dirty" was described to be opaque and slightly muddy which can be used for flushing the toilet bowl, watering the plants and 5 for "polluted water" which is very turbid. The water may have high levels of pollutants like heavy metals, and with lots of sediments and the water is no longer suitable for any beneficial purpose.

Correlation between the number of tourists with the number of sou-

venir shops, lodging houses, restaurants, transportation facilities, waste generation and water supply was also applied using the Pearson Correlation (2-tailed). The chi-square test was employed to determine the association on the responses of the community respondents on the observed solid wastes, water quality and water supply. This was used as statistical bases of comparison on changes in the mentioned environmental quality attributes. Levene's test on the quality of variance was employed in the assessment of biodegradable and non biodegradable wastes in Basco and Mahatao. The same test was used in the analysis of variances in water for drinking, washing and bathing purposes 'some' (10 years ago) 2006, when the study was being undertaken). From the results of these statistical analysis, the values were analyzed as either significantly different based on the P-value or otherwise. Data analysis also included descriptive statistics like frequency counts, averages and percentages, and mean ratings.

RESULTS AND DISCUSSION

Level of Tourism

Ecotourism plays an important role in the economy of the province of Batanes. The municipalities of Basco and Mahatao are established ecotourism destinations in Batanes. According to Libosada (1998), the Department of Tourism classified the province of Batanes as one of the "off the beaten track" in the Philippines because of its inaccessibility which limits the number of visitors through airplanes. However, the island is still gaining tourists due to its continuous advertisements. There was a considerable increase in the number of tourists and as the number of tourist increased, the number of lodging houses, souvenir shops and transportation also increased.

Tourist arrival. Table 1 shows the tourist arrival in the municipalities of Basco and Mahatao for 11 years (1995 to 2006). According to the Provincial Tourism Officer, as of 2006 the total number of visitors in Basco and Mahato is 2,481. Tourism in Batanes is a potential industry but the number of tourist arrival has been basically unchanged in the late years of 1990s. On the same years, the total number of tourists arrival who stay in the island for an average of about four days was less than a thousand annually (Provincial Government of Batanes (2001). From late 1970's to early

1990's the development of ecotourism in the country has been impeded by natural disasters and political instability that led to a decline in the tourism industry. In the latter part of 1995, the number of tourist arrival grew and is still continuously growing to date. Several factors are contributing to tourism growth. Some of these are improved international image of the country and promotion of the country's tourists destinations (Libosada and Santiago, 1997).

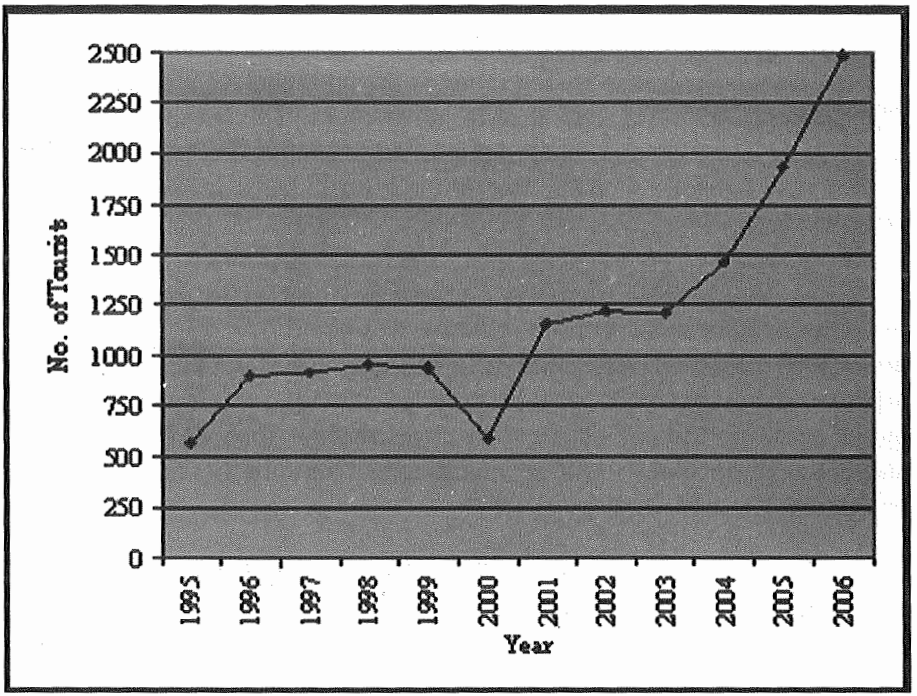

***Fig. 3**. Yearly tourist visits from 1995 to 2006*

It was observed that visitors in the two municipalities were at their highest during summer, from April to June. The warmer temperature during summer months may have encouraged many visitors to favor domestic tourism destinations over Mediterranean destinations (Agnew and Viner, 2001).

According to Singh (1997), the growth of tourism industry was motivated by increases in economic growth, extra income and leisure time, political stability, and aggressive tourism campaign among other factors. Figure 3 illustrates the trend of tourists visiting Batanes from the year 1995

to 2006. It was noticed that the number of travelers who visited Basco and Mahatao in 1999 decreased in 2000 by 36.72%, but generally the trend in the tourist arrival is increasing. This may be attributed to the changes in weather conditions in the area. This could also be due to the typhoons, earthquakes, and floods that occurred in the Philippines during year 2000 which resulted to the decrease in number of tourists (Bandillo Batanes, 2000). According to Cataluna (2000), Batanes islands was rattled by an earthquake with an intensity of 6.9 on Sunday, July 16, 2000 that caused numerous landslides that forced the government to close some roads going to southern part of Basco. The bridge in Tamulong is the only passable route, but sizeable portions have been damaged by aftershocks. The national road from Basco to Uyugan needed rehabilitation, while Mahatao roads and bridges needed major repairs. For this reason the tourists were probably scared to visit the place.

In 2000 to 2002, there was a notable increase in the number of tourists. On the other hand, a slight decrease was noted in 2003. The decrease in the 2003 tourist arrival (specifically in Cagayan and Batanes) could be an offshoot of an unfavorable peace and order situation in the country brought by the destabilization plot against the government in the middle of that year and outbreak of SARS in the second quarter (National Economic and Development Authority, 2004).

Comparing these results with the tourist visits in two other famous ecotourism sites in the Philippines which are Mount Pinatubo and Quezon Island in Pangasinan, it can be noticed that from 1995 to 1999 the trend was increasing in Batanes. In 2000, it decreased but it started to increase from 2001 to 2006. In the findings of Abastilla, et al. (2006) in the impacts of ecotourism and indigenous forest management at Mount Pinatubo, Tarlac, the highest number of tourists who visited Mount Pinatubo was in 2000. This was perhaps due to the fact that the site has been newly opened for tourism activities and many visitors were interested to see the crater of the volcano. However in 2002, it decreased to almost half of year 2000's tourist arrival and increased in 2003 but decrease again in 2005. In the findings of Bobila, et al. (2006) on the ecotourism in Quezon Island, there was a gradual increase from 2000 to 2002 but it decreased in 2003 and 2004. Based on this information, out of the three mentioned provinces only Batanes had an increasing number of tourists from 2000 to 2006. This shows that the sites in Batanes were in demand and favorite destinations despite the distance.

As regards this increasing demand, one factor that influences the tourist arrival is the informal advertisement by the people who have seen Batanes and gained interest on the sites. These people who enjoyed their leisure trip may have related their experiences to others which again could have led to other peoples' interest as well as catching media attention. Also with the help of the Department of Tourism and television programs of local television networks such as ABS-CBN's "Trip na Trip", all these may have encouraged the tourists to visit and relax on the island.

Demand function. The demand function shows a definite trend of tourist visitation in the area. It can be said that tourists come as far as Singapore in Asia, Australia, Ireland, Canada and United States. With the help of the various promotions of the government, Batanes is now attracting more local and foreign tourists. This means that Batanes as a tourist site is a known destination in the world.

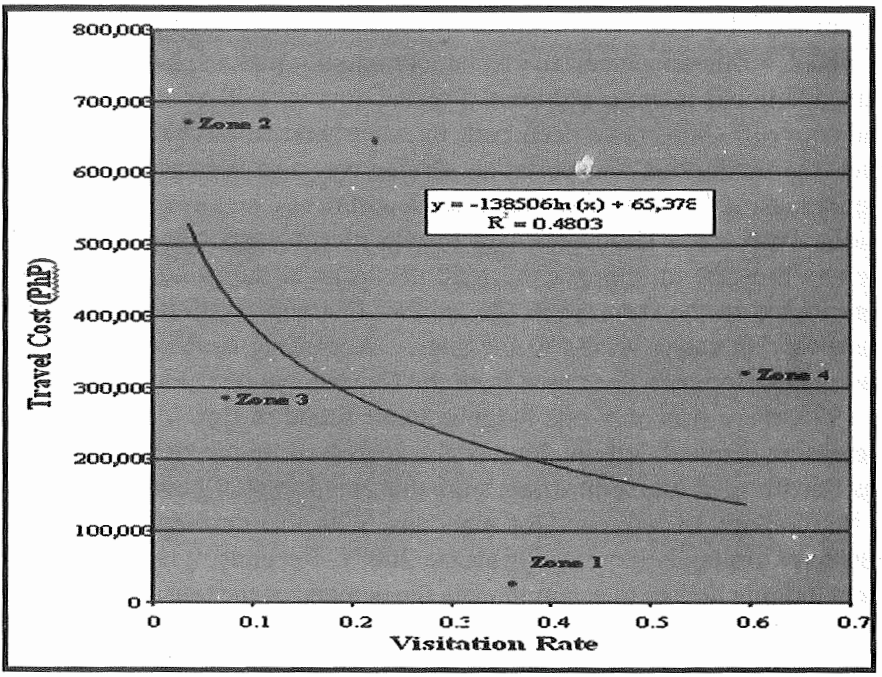

Fig. 4. Demand curve for ecotourism in Basco and Mahatao

Making use of the visitation rate as a dependent variable and travel cost as independent variable, the logarithmic form of regression analysis

was applied in the study because of its higher R2 value which was 0.4803. The equation derived was Y=- 138506 ln(x) + 65,378 (Figure 4). This explains that about 48% of the variation in the travel cost was attributed to changes in the visitation rate. The relationship between the visitation rate and travel cost could be interpreted as a demand curve for Basco and Mahatao, Batanes. This could also be used to estimate the willingness to pay (WTP) of an individual from each zone. The willingness to pay could be estimated by the visitation rate using a specific point in the demand curve and pointing to its respective value on the travel cost which is found on the Y axis. With a visitation rate of 0.361, the estimated willingness to pay (WTP) in Zone 1 (Philippines, Taiwan, Singapore and Vietnam) was not more than PhP 200,000.00 (based on the specific point in the graph) and a rate of 0.07 had an estimated willingness to pay of not greater than PhP 450,000.00 in Zone 3 (Ireland).

Correlation of tourist visitation with 'tourism-support systems'. Because of the increasing number of tourists visiting the area in the past 11 years, businessmen and the Ivatan community took such opportunity to earn additional income. Additional restaurants as well as lodging houses and souvenir shops have been built to accommodate more tourists. Moreover, the number of transportation service was also increasing to support the increasing demand. The Planning Department Chief of the Department Public Works and Highways said that in recent years, they have implemented projects to improve the road networks in the province. This also contributed to the increase in the number of transportation units because there was an easier access to the sites. According to the Trade and Industry Development Specialist from the Department of Trade and Industry, in 1995, there was only one lodging house found in Basco but due to the increasing demand, lodging houses also increased. In recent years, Batanes has transformed into a must-see tourist destination after being only known to be the point of reference for typhoons. With this development, lodging inns have gradually increased (Salazar, 2007). Recently, it has increased to eight lodging houses to accommodate the demand of the tourists visiting the place (Table 1).

Moreover, the above-named specialist from the DTI also mentioned that the demand for souvenir items also increased. Many tourists have been fascinated to Ivatan handicrafts and souvenir items that was why the number of souvenir shops increased annually. From 1995 to 2006, there were about 10 registered souvenir shops operating. This has led to the gathering

of local raw materials by unemployed local residents to produce souvenir items and sell these to tourists as a source of income. Based on the cumulative number of restaurants, lodging houses, souvenir shops and transportation from 1995 up to 2005, it was also seen that they have the same pattern with the number of visitors. Every year the number of clients and tourists increased so it follows that the demand for services also increased.

Table 1. Number of registered restaurants, lodging houses, souvenir shops and transportation units from 1995 to 2006

YEAR	NO. OF TOURISTS	NO. RESTAU-RANT	NO. SOUVENIR SHOPS	NO. LODGING HOUSES	NO. TRANSPORTATION UNITS
1995	570	1	1	1	16
1996	902	0	0	1	29
1997	916	0	0	2	29
1998	956	1	0	1	37
1999	937	0	0	0	46
2000	593	1	2	0	66
2001	1,158	1	2	1	70
2002	1,219	4	0	0	81
2003	1,210	5	1	1	82
2004	1,456	1	0	0	86
2005	1,930	2	3	0	95
2006	2,481	2	1	1	43
Total	**14,328**	**18**	**10**	**8**	**680**
Mean	**1,194**	**1.5**	**0.83**	**0.66**	**56.67**
Sig.(2-tailed)	-	**0.236 ns**	**0.305 ns**	**0.427ns**	**0.031***

*=*significant at* $\alpha < 0.05$
ns= not significant

Comparing the situation of Batanes with Mount Pinatubo, the study of Abastilla, et al. (2006) on aspects of ecotourism in Mount Pinatubo, Tarlac, it showed that there were only 2 canteens, a restaurant and a souvenir shop in the area. With this number of tourist-related 'support systems', it can be presumed that Batanes is a more established ecotourism site than Mount Pinatubo.

The correlation between the number of tourist and the number of transportation indicated that the two were significantly correlated with each other. This means that as the number of tourist increases, the number of transportation units also increased. However, the correlation of number of tourists and the number of lodging houses, souvenir shops and restaurants had no definite trends.

Ecotourism and its Environmental Impacts

Being one of the protected areas of the Philippines, Batanes' indigenous cultures like the Ivatan culture are now starting to experience the impacts of ecotourism activities in their area. This is the reason why tourism officers are now being trained to improve the tourism management in the province as mentioned by the Provincial Tourism Officer.

Solid waste generation. One of the major consequences of ecotourism in the community is the generation of solid wastes. The increase in the number of tourists, lodging houses and others are usually associated with additional accumulation of garbage. According to the Municipal Environmental Management Specialist from the Municipal Environment and Natural Resource Office in Basco, the months from March to June are peak seasons in Batanes when the volumes of waste generation are highest. A similar observation according to Bobila et al. (2006), the most significant aspect of seasonality was that it involved the concentration of tourist flows in relatively short periods of the year. In Philippine setting, people usually go on vacation during summer time which falls during March to June.

Table 2 presents the number of tourists and the community population with the total waste generation. It shows that in 1995, the estimated weight of waste generated by tourists was 980.40 kilograms with a population of 570 while in 2006 it has increased to about 5,557.44 kilograms with a population of 2,481. This proves that the weight of waste increases as the tourist population increases. Out of the 1,227,431.44 kilograms of estimated total weight of waste generated by tourist and the local community in 2006, 0.45% of it was generated by the tourists.

Although this could be considered to be comparatively low and its impacts may take many generations to be realized, there might still be substantial impacts that may cause the destruction of habitat of organisms and

other environmental effects due to cumulative effects. Another reason is that there are times that the visitor is generally more sensitive about the impacts of garbage than the host in terms of aesthetic value of the place. Some of the visitors may come from high social status and these people are not used to seeing scattered wastes in their surroundings.

Table 2. Estimated weight of waste generated by the two municipalities together with the tourists

YEAR	POPULATION OF BASCO AND MAHATAO	WEIGHT OF WASTE GENEATED BY BASCO AND MAHATAO (Kg)	NUMBER OF TOURISTS	WEIGHT OF WASTE GENERATED BY TOURIST (Kg)	PERCENTAGE OF WASTE GENERATED BY TOURISTS (%)	TOTAL WEIGHT OF WASTE GENERATED BY TOURIST AND THE TWO COMMUNITIES (Kg)
1995	6,777	944,006.80	570	980.40	0.10	944,987.20
1996	7,366	1,027,518.80	902	1,659.68	0.16	1,029,178.48
1997	7,163	995,106.80	916	1,685.44	0.17	996,792.24
1998	7,229	1,008,334.40	956	1,682.56	0.17	1,010,016.96
1999	7,628	1,065,362.00	937	1,574.16	0.15	1,066,936.16
2000	7,871	1,099,905.60	593	749.55	0.07	1,100,655.15
2001	7,940	1,111,176.80	1,158	1,389.60	0.12	1,112,566.40
2002	8,083	1,130,478.00	1,219	2,096.68	0.19	1,132,574.68
2003	8,187	1,145,662.00	1,210	2,226.40	0.19	1,147,888.40
2004	8,488	1,189,958.40	1,456	2,446.08	0.21	1,192,404.48
2005	8,341	1,169,752.00	1,930	3,319.60	0.28	1,173,071.60
2006	8,681	1,221,874.00	2,481	5,557.44	0.45	1,227,431.44
Total	**93,754**	**12,817,520.37**	**14,328**	**25,022.38**	**0.19**	**13,134,503.19**
Mean	**7,813**	**1,165,229.125**	**1,194**	**2,274.76**	**0.19**	**1,194,045.74**
Sig.(2-tailed)	-	-	-	-	-	**0.000****

*** = highly Significant at $\alpha < 0.01$*

The information gathered on the impacts of ecotourism in Basco and Mahatao in relation to solid waste generation is similar with the findings of Jain et al (2003) in the article Solid Waste Management in Indian Himalayan Tourists' Treks: A Case Study in and Around the Valley of Flowers and

Hemkund Sahib. The study showed an estimate of 0.28 kg waste generation per capita while Batanes had an estimate of 0.30 kg waste per visitor per day. This estimated value was based on the average weight of the waste generated by tourists. According to Bobilla, et al. (2006), the volume of waste generated by visiting tourists in Quezon Island was 9,348.88 kg in 2005. On the other hand, the visitors in Basco and Mahatao only generated 3,319.60 kg in that same year. This shows that about 35.5% of the weight of solid waste generated in Quezon Island was the amount generated by the visitors in the two municipalities in Batanes, comparison wise.

Out of 50 respondents, 40 respondents who said they have not encountered solid wastes in the area were asked to rate the types of wastes observed in the area. The scale used in describing the observed wastes was explained to the respondents during the interview to emphasize the values between 5 to 1 (based on biodegradable wastes). Table 3 shows that in Basco, 30 respondents (96.8%) out of 31 respondents observed that there were no human wastes seen scattered in the sites (rank 5). For rank 4, the respondents observed that there were scattered papers (45.2%) and excess food (77.4%) on the site but "not frequent and in small amounts" as presented in Table 3. Generally, there were no encountered human wastes in both communities but papers and excess food were "not seen frequently and (if seen) in small amounts" (rank 4).

Table 3 also shows the observed solid waste generated by the tourists in Mahatao. Out of the three classifications of biodegradable wastes which were the following: human waste, paper and excess food, the respondents observed that there are no human wastes in the two sites (100%, rank 5). This was attributed to the availability of comfort rooms in Diura beach. Moreover, papers (55.5%) and excess food (77.7%) found in the area is said to be "not frequently" observed and these were in "small amounts" (rank 4).

Statistical analysis shows that the mean rating for biodegradable wastes in Basco is 3.66 while Mahatao has 3.50. These values can be interpreted to be leaning towards rank 4 which is "not frequent and in small amount". Levene's test for equality of variances was employed to analyze the probability of association. The result showed that the associated P-value is 0.334 for biodegradable wastes in both communities. This means that there was no significant difference in their variances or in other words they

have equal variances. This implies that tourists produced more or less the same types of wastes in both communities which included papers and excess food. The probability that these different types of waste are generated in both communities was similar.

Table 3. Volume and frequency of biodegradable waste generation by tourists in the two municipalities as perceived by the community (2006)

BIODEGRADABLE	1		2		3		4		5	
(BASCO) N= 31	No.	%	No.	%	No.	%	No.	%	No.	%
Human waste	-	-	1	3.2	-	-	-	-	30	96.8
Papers	-	-	10	32.2	7	22.6	14	45.2	-	-
Excess food	-	-	2	6.4	3	9.7	24	77.4	2	6.4
Total	**5**	**16.1**	**24**	**77.3**	**13**	**42.1**	**48**	**154.8**	**34**	**109.6**
Mean Rating					**3.66**					
BIODEGRADABLE	**1**		**2**		**3**		**4**		**5**	
(MAHATAO) N= 9	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Human waste	-	-	-	-	-	-	-	-	9	100.00
Papers	-	-	3	33.3	1	11.1	5	5.55	-	-
Excess food	-	-	-	-	-	-	7	77.7	2	22.2
Total	**4**	**44.4**	**8**	**88.8**	**1**	**11.1**	**12**	**133.2**	**11**	**122.2**
Mean Rating					**3.50**					
Sig (2-tailed)					**0.334ns**					

ns = not significant
Rank 1 = Frequent and plenty
Rank 2 = Not frequent but plenty
Rank 3 = Frequent but in small amounts
Rank 4 = Not frequent and in small amount
Rank 5 = None

Furthermore, non-biodegradable wastes (Table 4) were also ranked using the same scale used in Table 3. Fourteen respondents from Basco (45.1%) replied that there were beverage and water bottles scattered in the sites "not frequently but plenty" (Rank 2). However, plastic bags also known as cellophanes have the same value at 38.8 % for rank 1 (frequent and plenty) and rank 2 (not frequent but plenty). Disposable plastic silverwares (38.8%), and glasses (77.4%) have the highest percentage of under rank 4 (not frequent and in small amount). Moreover, 38.8 % of the community

respondents also observed that non-biodegradable wastes such as fast food packaging are "not frequently seen in the sites but plenty" especially during peak season (Rank 2). This type of waste is also seen "frequently but in small amounts" (Rank 3). In Mahatao, out of the 9 respondents, 4 (44.4%) of them assessed that there were beverage and water bottles "not frequently scattered in the area but plenty" (rank 2) and another 4 respondents (44.4%) assessed that it was under rank 4 (not frequent and in small amount).

In addition, 44% of the respondents perceived that cellophanes are generated "not frequently and in small amount". The respondents observed that out of nine (9) respondents, four (4) of them observed that disposable plastic silverwares (44.4%) were 'frequently scattered in the area but when the wastes were seen it was in small amounts.

Also shown in Table 4, the mean rating for non- biodegradable wastes in Basco was 3.06 and Mahatao had 3.20. These values tend towards rank 3 which was "frequent but in small amount". For non-biodegradable wastes, the associated P-value is 0.54 which is greater than 0.05. This explains that the result of the equality test for means show that there was no significant difference between the variances in the two municipalities. This implies that tourists produced the same types of wastes in terms of frequency and amount which included beverage and water bottles, cellophanes, disposable plastic silverwares, fast food packaging and glasses. The probability that these different types of waste generated in both communities was similar.

Over the last few years, the consumer market has grown rapidly leading to products being packed in cans, aluminum foils, plastics, and others. As a result, these being are readily available in the market are widely utilized by the people including the tourists that visit the place.

Generally, the respondents in both Basco and Mahatao observed that the biodegradable and non-biodegradable wastes were not frequently seen and they are in small amounts. Since the summer months including even September and December are peak seasons, it was observed that solid wastes were also usually in large amounts during these months. The month of September is one of the peak seasons because this corresponds to dry period in Batanes. Based from the records of the Provincial Tourism Office, the tourist arrival during the month of September is high. Since these are months of traditional family holiday, this is also the time when the tourism activities

are at peak (Hinch and Jackson , 2000).

Table 4. Volume and frequency of non- biodegradable waste generation by tourists in the two municipalities as perceived by the community (2006)

BIODEGRADABLE	1		2		3		4		5	
(BASCO) N= 31	No.	%	No.	%	No.	%	No.	%	No.	%
Beverage and water Bottles	-	-	14	45.1	4	12.9	13	41.9	-	-
Cellophanes	12	38.8	12	38.8	5	16.1	2	6.4	-	-
Disposable Plastic Silverwares	-	-	5	6.1	10	32.2	12	38.8	4	12.9
Fast food Packaging	-	-	12	38.8	12	38.8	5	16.1	2	6.4
Glasses	-	-	1	3.2	1	3.2	24	77.4	5	16.1
Total	**12**	**38.8**	**44**	**142**	**32**	**103.2**	**66**	**180.6**	**11**	**35.4**
Mean Rating					**3.06**					
BIODEGRADABLE	**1**		**2**		**3**		**4**		**5**	
(MAHATAO) N= 9	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Beverage and water Bottles	-	-	4	44.4	1	11.1	4	44.4	-	-
Cellophanes	4	44.4	1	11.1	-	-	4	44.4	-	-
Disposable Plastic Silverwares	-	-	3	33.3	4	44.4	2	22.2	-	-
Fast food Packaging	-	-	1	11.1	3	33.3	4	44.4	1	11.1
Glasses	-	-	1	11.1	-	-	7	77.7	2	22.2
Total	**4**	**44.4**	**10**	**111**	**8**	**88.8**	**21**	**233.1**	**3**	**33.3**
Mean Rating					**3.20**					
Sig (2-tailed)					**0.522ns**					

ns = not significant
Rank 1 = Frequent and plenty
Rank 2 = Not frequent but plenty
Rank 3 = Frequent but in small amounts
Rank 4 = Not frequent and in small amount
Rank 5 = None

The local government of Basco and Mahatao also implemented

waste management projects in the municipality. In both municipalities, waste segregation at source was done. Composting of collected biodegradable wastes was also done to generate organic fertilizer to be used by the farmers in the municipality. The collected wastes in Basco were brought in the municipality's Eco-Park in Chadpidan while in Mahatao, their wastes were brought in the municipality's Eco-Center.

Water quality. The perceived water quality in Basco and Mahatao (some 10 years ago) is recorded in Table 5. It was evaluated to be "extremely clean" based on the assessment by most of the respondents in the three given usages; drinking, 78% of the respondents, for washing and bathing, 70%. The overall mean rating for drinking, washing, and bathing as perceived by the respondents from Basco was 1.33 while Mahatao had 1.38. This means that the water quality for drinking, washing and bathing is somehow between "extremely clean" and "very clean", though leaning more towards the former.

From the in-depth interview, a local resident from Basco stated that the quality of water in their area was "extremely clean" in the past. But in the past years, its quality continued to degrade because of the water system from the reservoir in Mount Iraya was not fixed until the present and some of the springs are also drying up. Because of this, people tend to use the water in a reservoir for different purposes. Like in the case of Miaga (one of the water sources), it is a reservoir which supplies water in Barangay Kaychanarianan, and Chanarian-Tukon. Some of the animal herders bring their animals to the reservoir to drink even it is against the local ordinance.

At present (around 2006), there was a slight change in the case of Basco wherein the water quality for drinking was rated to have decreased to "very clean" (48.7%) from "extremely clean" (83.8%) before, for washing and bathing from 72.9% moved down to 43.2% at present (Table 6). For Mahatao, it seemed to have maintained its water quality based on drinking usage with 61.6% of the respondents perceived that the water for drinking was still "extremely clean". This shows that the quality of water for drinking was more or less maintained.

This finding was somehow consistent with the study conducted by Cabangdi, et al. (2005) in assessing the biodiversity and carrying capacity for Ecotourism of Mt. Pulag National Park. The water quality for drink-

ing in Mahatao and Mount Pulag remained to be "extremely clean". Since the reservoir in Mahatao is uninhabited, while most part of Mount Pulag may also be described as uninhabited because it is extremely diverse, with regards to its intact biodiversity, so it was expected that the water was extremely clean. This shows that the water was safe and clean for general utilization. This may also give the idea that the present status of water quality in Mahatao is very ideal. Nevertheless, washing and bathing usage follows the same pattern with the situation in Basco at present (before 61.6 % and 53.8% at present).

Table 5. Quality of water for drinking, washing and bathing ten years ago 1995)

FOR DRINKING PURPOSES	BASCO (n= 37)		MAHATAO (n=13)		TOTAL (N=50)	
LEVEL	No.	(%)	No.	(%)	No.	(%)
Extremely Clean (1)	31	83.8	8	61.6	39	78.0
Very Clean (2)	3	8.1	5	38.4	8	16.0
Fairly Clean (3)	3	8.1	-	-	3	6.0
Quite Dirty (4)	-	-	-	-	-	-
Polluted (5)	-	-	-	-	-	-
Total	**37**	**100.0**	**13**	**100.0**	**50**	**100.0**
FOR WASHING PURPOSES	**BASCO (n= 37)**		**MAHATAO (n=13)**		**TOTAL (N=50)**	
LEVEL	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**
Extremely Clean (1)	27	72.9	8	61.6	35	70.0
Very Clean (2)	6	16.2	5	38.4	11	22.0
Fairly Clean (3)	4	10.9	-	-	4	8.0
Quite Dirty (4)	-	-	-	-	-	-
Polluted (5)	-	-	-	-	-	-
Total	**37**	**100.00**	**13**	**100.0**	**50**	**100.0**
FOR BATHING PURPOSES	**BASCO (n= 37)**		**MAHATAO (n=13)**		**TOTAL (N=50)**	
LEVEL	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**
Extremely Clean (1)	27	72.9	8	61.6	35	70.0
Very Clean (2)	6	16.2	5	38.4	11	22.0
Fairly Clean (3)	4	10.9	-	-	4	8.0
Quite Dirty (4)	-	-	-	-	-	-
Polluted (5)	-	-	-	-	-	-
Total	**37**	**100.0**	**13**	**100.0**	**50**	**100.0**
Mean Rating	**1.33**		**1.38**			
Sig (2-tailed)					**0.793 ns**	

ns= not significant

However, at present the overall mean rating for drinking, washing and bathing in Basco has increased to 2.18 from 1.33. This shows that this value tend towards rank 2 which is "very clean". Similar with Basco, the mean in Mahatao also increased to 1.46 from 1.38 as shown in the same table but it was still leaning towards "extremely clean". Statistical analysis showed that at present the associated P-value is 0.001 for quality for drinking, washing and bathing in both communities. This implies that the variances are highly significant. It implies that the water quality in Basco during the time of study (2006) was less clean as compared to Mahatao for the three given usages. In the in-depth interview, a respondent noted that in the past there were no water refilling stations in the locality but at present such establishments were now operating in the municipality. This could mean that some of the community people might believe that the water supplied to their homes was not as clean as compared to the quality of water in the past. Moreover, this could also mean that the local people are now aware that the quality of water supplied in the community has declined. For this reason, the local people are now more conscious of the effects on their health and as well as the health benefits they could get from using very clean water for drinking.

In the past 10 years, the respondents observed that the water for drinking (78%), washing (70%) and bathing (70%) was "extremely clean". However, at present the respondents noted that the water for drinking (46%), washing (46%) and bathing (46%) was "very clean".

As for the 'inland waters' (fresh water ecosystems), Batanes was also classified as one of the nineteen identified priority areas on terrestrial and inland water conservation in the country. The province is considered to be under very high priority level (Santos-Borja, 2002).

Table 7 shows that 24 out of 37 community respondents assessed that inland water in the tourist sites in Basco are "fairly clean" (64.9%) and only 16.2% said that it is "very clean"). However, eight out of 13 respondents (61.6%) in Mahatao observed that it is still considered "very clean" (61.6%) and five (5) answered that it is "fairly clean".

In the statistical analysis for the assessment of perceived 'inland

water' quality, the mean rating in Basco was 2.03 and 1.38 in Mahatao. That in Basco could be interpreted as strongly leaning towards rank 2 which was "fairly clean". This also showed that the mean rating of Mahatao which was 1.38 was leaning more towards "very clean". The result of the Levene's test for equality of variances in the two communities is 0.001 which is lower than 0.01. This could mean that 'inland waters' (fresh water ecosystems) in Basco were less clean than the 'inland waters' in Mahatao based on the perception of the community.

Table 6. Quality of water for drinking, washing and bathing at present (2006)

FOR DRINKING PURPOSES	BASCO (n= 37)		MAHATAO (n=13)		TOTAL (N=50)	
LEVEL	No.	(%)	No.	(%)	No.	(%)
Extremely Clean (1)	12	32.4	8	61.6	20	40.0
Very Clean (2)	18	48.7	5	38.4	23	46.0
Fairly Clean (3)	7	18.9	-	-	7	17.0
Quite Dirty (4)	-	-	-	-	-	-
Polluted (5)	-	-	-	-	-	-
Total	**37**	**100.0**	**13**	**100.0**	**50**	**100.0**
FOR WASHING PURPOSES	**BASCO (n= 37)**		**MAHATAO (n=13)**		**TOTAL (N=50)**	
LEVEL	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**
Extremely Clean (1)	5	13.6	6	46.2	11	22.0
Very Clean (2)	16	43.2	7	53.8	23	46.0
Fairly Clean (3)	16	43.2	-	-	16	32.0
Quite Dirty (4)	-	-	-	-	-	-
Polluted (5)	-	-	-	-	-	-
Total	**37**	**100.00**	**13**	**100.0**	**50**	**100.0**
FOR BATHING PURPOSES	**BASCO (n= 37)**		**MAHATAO (n=13)**		**TOTAL (N=50)**	
LEVEL	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**
Extremely Clean (1)	5	13.6	6	46.2	11	22.0
Very Clean (2)	16	43.2	7	53.8	23	46.0
Fairly Clean (3)	16	43.2	-	-	16	32.0
Quite Dirty (4)	-	-	-	-	-	-
Polluted (5)	-	-	-	-	-	-
Total	**37**	**100.0**	**13**	**100.0**	**50**	**100.0**
Mean Rating	**2.18**		**1.46**			
Sig (2-tailed)					**0.001****	

** = *highly Significant at α < 0.01*

Table 7. Respondents' perception on the quality of inland waters at present (2006)

RESPONSE		BASCO (n= 37)		MAHATAO (n=13)		TOTAL (N=50)	
		No.	(%)	No.	(%)	No.	(%)
Very Clean	(1)	6	16.2	8	61.6	14	28.0
Fairly Clean	(2)	24	64.9	5	38.4	29	58.0
Quite Dirty	(3)	7	18.9	-	-	7	14.0
Polluted	(4)	-	-	-	-	-	-
Total		**37**	**100.0**	**13**	**100.0**	**50**	**100.0**
Mean Rating		**2.03**		**1.38**			
Sig (2-tailed)						**0.001****	

** = *highly significant at α < 0.01*

Seemingly, local people in Mahatao are more disciplined than in Basco because local ordinance are strictly implemented. In one of the in-depth interviews, a local resident noted that " *nu nakateptep a mayor du ka 1990's am naypavid u municipyo namen aya. Uyud a trikto du kapaypuha, ninanawu na yamen a my paychepechepej sira su majta kan diya majta. kaychuwa am aru saw maypuha du uyugan nayan ranum. Sichanguriaw am bawal dana ta vinata na diyamen an diya kami umhes a maypuja du uyugan nayan ranum ammayparudit ya mandad kadinaranan ti masirbi. As du ngangayan dasa yan turista am malinis uri pero du kapaychakuhaten nayam masanib kayan rudit ta aru mariribi as dekey paw ranum ta makulay dawa nu kadwan sam sirbiyen da saw ranum du ahsung.*" (Our mayor in the 1990s strictly implemented the local ordinance on solid waste management. He explained to the people the importance of proper waste management. If the community people will not stop throwing their waste in to the brook in the town proper, the waste will pollute the water in the brook as well as the sea. If that would happen we will not be able to use the water. The tourist sites are always clean during non-peak season but during summer the number visitors are at peak but the water supply is limited. This is because some of the reservoirs are drying up and as a result only few water sources are available for the users. This is the reason why water will not be as clean as during off–peak season. During summer months, the demand for water is high but there is limited water supply so that some of the people will tend to

go to streams to get water... so the water quality would decline.)

In the in-depth interview in Basco, a respondent said that since Basco is the most populated municipality it also needs to compensate with the demand on water supply. As the population increases, some of the community members are migrating near the water reservoir especially in Miaga.

In 'inland waters' (freshwater ecosystems), considering the total percentage, 29 respondents (58%) of the two communities said that inland water is "fairly clean" and 14 respondents (14%) observed that it is "quite dirty". The seeming decline in the quality of 'inland waters' coul be attributed to fact that the community people might have utilized the resource faster than it could purify itself. This result seemed to be consistent with the result of the mean rating which was "fairly clean" in Basco.

Water supply. Table 8 shows the number of tourists from year 1995 to 2006 and the estimated volume of water consumed by tourists during their stay in the place. It was noticed that the number of travelers who visited the Basco and Mahatao in 1999 decreased in 2000. The volume of water consumption also decreased when the number of tourists decline during these years. The seeming decline in the water consumption supply may be due to the earthquake that hit Batanes in 2000 causing the decline of number of tourists. Basco's principal source of water (Mount Iraya watershed) was hardest hit during the said calamity. The main pipeline from spring source to distribution lines were severely damaged due to landslides (Bandillo Batanes, 2000). Rehabilitation of the water system from Mount Iraya, was expected to be completed in one year.

Based from the Pearson correlation, the correlation between the number of tourists who visited from 1995 to 2006 and the volume of water consumed by tourists had a high correlation. This means that as the number of visitors increased, the volume of water consumed by the tourists also increased.

It can be seen that the community perception on water supply in the two municipalities are different (Table 9). Water was perceived as "insufficient" (72.9% of the respondents) in Basco while respondents from Mahatao had perceived that they still have sufficient water supply (84.6%) for the whole year. Looking at the over all situation, 28 out of 50 community

members (56%) perceived that there was insufficient water supply for the whole year round.

Table 8. Estimated volume of water consumption annually in the two municipalities

YEAR	BASCO (m^3)	MAHATAO (m^3)	TOTAL (m^3)
1995	228,679.8	68,152.8	296,832.6
1996	250,755.0	71,875.8	322,630.8
1997	237,702.6	76,036.8	313,739.4
1998	245,980.8	70,649.4	316,630.2
1999	261,617.4	72,489.0	334,106.4
2000	270,859.2	73,890.6	344,749.8
2001	275,677.2	71,832.0	347,509.2
2002	279,575.4	74,460.0	354,035.4
2003	228,022.8	74,460.0	302,482.8
2004	297,840.0	73,934.4	371,774.4
2005	293,284.8	72,051.0	365,335.8
2006	311,899.8	68,328.0	380,227.8
TOTAL	**3,181,894.8**	**868,159.8**	**4,050,054.6**

Source: Office of the Department of Public Works and Highways, Batanes Engineering District. 2006

Table 9. Perceptions on sufficiency of water supply for the whole year in the two municipalities at present (around 2006)

RESPONSE	BASCO (n= 37)		MAHATAO (n=13)		TOTAL (N=50)	
	No.	(%)	No.	(%)	No.	(%)
Sufficient	10	27.1	12	84.6	22	44.0
Not Sufficient	27	72.9	1	15.4	28	56.0
Total	**37**	**100.0**	**13**	**100.0**	**50**	**100.0**
Sig (2-tailed)					**0.000****	

** = *highly significant at* $\alpha < 0.01$

The sufficiency of water supply in the two municipalities were highly associated. This implies that Mahatao may have more sufficient water supply than Basco. During the in-depth interview, a local resident noted

that Mahatao has more sufficient water supply because they have enough reserve in their reservoir. Another reason was that, the municipality had a smaller population and since Mahatao was more rural than Basco, there were only few establishments found in the area as compared to Basco. The tourist support systems were mostly located in Basco. This meant that most of the tourists would stay in this municipality; hence the water that the tourists consumed would come from Basco.

According to the key informant from the Municipal Budget Officer of Basco, there is sufficient water supply in the reservoir in Mount Iraya but since the water works system was destroyed in 2000 they had a problem regarding how they would distribute the water to the community because the original path for pipelines was destroyed by landslides. At present, the water can now reach the town proper but it is still insufficient.

SUMMARY, CONCLUSIONS & IMPLICATIONS

The study was conducted in the municipalities of Basco and Mahatao in Batanes Group of Islands during the months of May and June 2006. It focused mainly on the characteristics of ecotourism and assessment of its impacts on solid waste generation, water quality and quantity.

The level of tourism was described by determining the tourist arrival from 1995 to 2006. The result showed a gradual increase in the number of tourist arrival from 1995 to 2001, generally it was observed to be continuously growing to date. As of 2006, the tourist arrival of about 2,481 may be described as 'quite or relatively high' since the visitors run in the thousands. It shows that it is quite frequented by tourists. Comparing the tourist arrival in Batanes with the number of tourist visiting the two other famous ecotourism sites in the Philippines which are Mount Pinatubo and Quezon Island in Pangasinan, it can be noticed that the present tourist arrival in Batanes was 2,481 while Mount Pinatubo had 2,120 in year 2005. The tourist arrival in Batanes and Mount Pinatubo may be described as relatively high since the number of visitors visiting these places is more or less similar. However, in the case of Quezon Island as part of the Hundred Islands in Pangasinan, the total number of tourists who visited the place in 2004 was 94,998. It can be said that Quezon Island (or Hundred Islands in general) is a more established ecotourism site because it is highly visited based on its tourist arrival

as compared to Batanes and Mount Pinatubo. Based on the demand curve, the travel cost shows the estimated amount of money a visitor would spend in order to enjoy the place in Basco and Mahatao, in which the respondents from Zone 2 (Australia) had to spend the highest amount of travel cost of about PhP 671,101.07 to be able to enjoy the sites in Basco and Mahatao. In analysing data for the demand curve, a logarithmic form of regression analysis was used to derive the equation $Y= -138506\ln(x) + 65,378$. The R2 value of the given equation was 0.4803 and R of 0.69 which means relatively high correlation. The demand curve reflects that Batanes is a more or less well visited place. The demand curve shows a more definite pattern of visitation by tourists. This also means that Batanes is an established eco-tourism site.

The number of transportation units had an increasing trend with the number of tourists. Statistical analysis showed that there was no significant correlation between the number of tourists with number of lodging houses, restaurants and souvenir shops. However, the number of transportation units and the number of tourists were significantly correlated.

In the assessment of ecotourism impacts, the attributes on waste generation, water quality and quantity were considered. For waste generation, the weight of waste generated by tourists (5,557.44 kg as of 2006) is relatively small as compared with the volume of waste generated by the community (1,221,874 kg as of 2006). This shows that only 0.45% of the total waste generation was generated by the tourists in 2006. Most of the respondents encountered wastes generated by tourists but in minimal amounts. Moreover, biodegradable wastes were "not frequently seen" and "in small amounts" (Rank 4) while non-biodegaradable wastes were observed to be "frequently scattered in the sites but in small amounts".(Rank 3). For water quality, the results showed that the water utilized for drinking, washing and bathing purposes was still generally "very clean" (Rank 2) in the municipalities of Mahatao and Basco at present (around 2006). For water quantity, majority of the respondents perceived that the water supply for the whole year is insufficient especially in Basco, but not in Mahatao.

In terms of level of ecotourism, the tourist arrival shows an increasing trend form 1995-2006. This implies that the demand for ecotourism in Batanes is continuously growing. Futhermore, the demand function shows that Batanes is well-visited by tourists since it is an established ecotourism

site. The increasing pressure brought by ecotourism may further lead to socio- cultural changes that impinge on the environmental sustainability of the province.

In the correlation of 'tourism-related' amenities and support systems with the number of tourists, there was a significant correlation between the number of tourists with the number transportation units. This means that the number of transportation service is increasing with the number of tourists to support the increasing demand. This condition might increase air pollution in the place. This is possible due to the increasing ubanization pressure.

On the issue of solid waste generation, the tourists visiting the area have contributed to the generation of wastes but very minimal. This may have minimal effect on the tourist sites and its impacts may take many generations to be realized. However, there may still be substantial impacts that may cause the destruction of habitat of organisms and other environmental effects especially if its cumulative effects are taken into account.

On the issue of water quality, the result showed that there was a slight change in the water quality maybe because of the ecotourism activities in the sites. Though the water quality deteriorated from "extremely clean" to "very clean", the water could still be considered to be safe for the needs of the community people and the tourists. Urbanization, partly brought about by tourism may have slightly contributed to the decline in the quality of water especially in the more urban town of Basco.

Generally, the perceived insufficient water supply in the two municipalities is a problem felt by community people, tourists alike, especially in Basco. Actually, the over all effect of tourism on water supply may further aggravate the insufficiency of water in the future.

Recommendations include a holistic, integrative but still comprehensive review of plans and policies on ecotourism that would conform to the needs of the Ivatan contemporary society at large without necessarily sacrificing the environment and thus should positively push for realistic and acceptable development agenda. The ecotourism activities should have minimal impact on the environment, the facilities to be used should be adaptive to the Ivatan culture and the structures should blend with the environment of Batanes. Programs should be geared towards enhancing the

tourists visiting the place to learn and adjust to the local culture. It is further suggested that the Provincial Tourism Office should conduct a deeper and wider study on the extent of ecotourism in the place to acquire additional information that will serve as basis for effective management and to be able to mitigate the negative impacts of ecotourism activities.

LITERATURE CITED

ABASTILLA, P. M., A. E. ANONUEVO, G. N. CARONONGAN, A. J. CORPUZ and L. N. RAFAEL. 2006. Impacts of ecotourism and indigenous forest management at Mount Pinatubo, Tarlac. Unpublished undergraduate thesis, Benguet State University, La Trinidad, Benguet. P. 24-25

AGNEW, M. D. and D. VINER. 2001. Potential impacts of climate change on international tourism. Tourism and Hospitality Research, 3(1): 37 and 59.

BANDILLO BATANES, 2000. Earthquake Aftermath. http// www.batanesonline.com

BANDILLO BATANES, 2000. Strong Earthquake hits Batanes. http// www.batanesonline.com

BOBILA, J. A. ,C. M. LAGUARDIA, D. P. MATIAS, A. C. ROSARIO and A. B. VILLAFANIA. 2006. Ecotourism in Quezon Island. Unpublished undergraduate thesis, Benguet State University, La Trinidad, Benguet.

CABANGDI, R. B., P. CATUBING, H. O. CELINO and A. D. SUGANO. 2005. Assessing the biodiversity and carrying capacity for Ecotourism of Mt. Pulag National Park. Unpublished undergraduate thesis, Benguet State University, La Trinidad, Benguet. P. 41, 43-45

HINCH, T. D. and E. L. JACKSON. 2000. Leisure constraints research: Its value as a framework for understanding tourism seasonality. Current issues in tourism. 3(2): 87.

HORNEDO, F. H. 2000a. Batanes born of fire and water. In: A. Ty (ed.)

Batanes born of fire and water. Local Color. Manila: Next Step Creatures, Inc. Pp.7-12

HORNEDO, F. H. 2000b. Taming the wind, Ethno-Cultural history on the Ivatan of the Batanes Isles. Manila: University of Santo Tomas. Pp.394-405

JAIN, A. P., KUNIYAL, J. C. and SHANNIGRAHI A. S. 2003. Solid waste management in Indian Himalayan tourists' treks: A case study in and around the Valley of Flowers and Hemkund Sahib. G.B. Pant Institute of Himalayan Environment and Development, Himachal Unit, Mohal-Kullu-175 126 (H.P.), INDE Elsevier Science, Oxford, ROYAUME-UNI. P. 10. http// www. cat.inist. fr/?aModele=afficheN&cpsidt=15240146 -

LIBOSADA, C. 1995. The study on ecotourism development in the Philippines, Visayas Division, Office of the Product Research and Development

LIBOSADA, C. 1998. Ecotourism in the Philippines. Makati: The Bookmark Inc. Pp.25-41

LIBOSADA, C. and F. SANTIAGO. 1997. Ecotourism development in the Philippines. In: J. Bornemeier, M. Victor and P. B. Durst (eds.) Ecotourism for forest conservation and community development. Thailand. FAO-RECOFTC. Pp. 117-119

MACLELLAN, R. 2005. Ecotourism. Microsoft ® Encarta ® Premium Suite. © 1993-2004 Microsoft Corporation.

NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY. 2004. Region II: Cagayan Valley Development Plan. 2004-2010. http:// www.neda.gov.ph/RDP/NRO2/nro2_rdp.pdf.

PROVINCIAL GOVERNMENT OF BATANES. 2001. ONWARD BATANES. Updated Master Plan.

SALAZAR, M. D. 2007. Heaven on Earth . Philippine Daily Inquirer. 22 (105): H8

SANTOS-BORJA, A. C. 2002. Marine Group. In: P. S. ONG and R. G. ROSELL-AMBAL (eds.). The final report. Philippine Biodiversity Conservation Priorities. A second iteration of the National Biodiversity Strategy and Action Plan. Department of Environment and Natural Resources-Protected Areas and Wildlife Bureau , Conservation International Philippines, Biodiversity Conservation Program-University of the Philippines Center for Integrative and Development Studies, and Foundation for the Philippine Environment, Quezon City. P. 47.

SINGH, A 1997. Asia Pacific tourism industry: Current trends and future outlook.http://www.hotelonline.com/Neo/Trends/AsiaPacificJournal/AsiaPacificTourismOutlook_1997.html