Environmental Sustainability in Pandan Island, Philippines

An analysis on impacts of tourism and environmental awareness raising
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Internship rapport of D. van der Voort
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Preface

My name is Darell van der Voort and I am a 3th year BSc student of Tropical Forestry at Van Hall Larenstein, Netherlands. Van Hall Larenstein is part of Wageningen University. In order to gain practical experience in sustainable development and to explore graduate options, I was looking for an 18 to 20 weeks internship in eco-tourism.

When I was searching for my internship I came across the website of the Center for Sustainability and immediately became enthusiastic. I always had an interest in the Asian countries, especially the Philippines for it is one of the ten most biologically mega-diverse countries and is near the top in terms of biodiversity per unit area. This was a great opportunity for me to visit this beautiful country and learn about the nature, culture and language.

I really liked the way the internship was set up, especially the opportunity to work with a Filipino student. This is a great way of learning a new culture and learning from each other. I was especially interested in the eco-tourism program. My objective was to work in an ongoing project that combined eco-tourism with conservation and help promote eco-tourism activities to create a sustainable development of tourism in Palawan and at the same time creating a fair income for the local people. I found this project with Center for Sustainability and this is the rapport of my internship in the Philippines.

Fortunately many people, in the Philippines and in The Netherlands, were willing to provide me with data, advices, their own stories and other kinds of help. In this way I want to thank the people who helped me with my internship: Michelle Salibo for her great help during my whole internship, Kyra and Jonah from the Center For Sustainability for realizing my internship and always willing to help and assist, the Palawan State University for providing facilities, information and feedback, the people from the Legend Hotel for giving me all the assistance I needed, my supervisor in The Netherlands; Arjan Hettema, my parents and finally my fellow students for the great time we had in the Philippines.

It was great to be able to help protect the beautiful and unique nature of Palawan and help create a sustainable future for this ‘last ecological frontier’ of the Philippines.

Maraming salamat!

Darell van der Voort
Puerto Princesa, June 2012
### Table of contents

Preface

1. Introduction
   1.1. The project
   1.2. Why
   1.3. The company
   1.4. The goals and objectives
   1.5. Methods
   1.6. Time planning
   1.7. Structure of the rapport

2. Tourism in the Philippines
   2.1. The Philippines
   2.2. Palawan province
   2.3. Honda Bay area

3. Tourism analyses
   3.1. Tourism disadvantages
   3.2. Tourism advantages

4. Destination mix
   4.1. Introduction
   4.2. Attractions
   4.3. Facilities
   4.4. Infrastructure and transportation
   4.5. Hospitality
   4.6. Organizations

5. Analysis of the environmental impacts
   5.1. Introduction
   5.2. Water quality
   5.3. Boat routes
   5.4. Wastewater
   5.5. Waste disposal
   5.6. Environmental awareness

6. Analysis of environmental awareness
   6.1. Introduction
   6.2. Tourists
   6.3. Boatmen
   6.4. Surveys
   6.5. Signs/brochures

7. Analysis of the economic impacts
   7.1. Introduction
   7.2. Set up of organizations
   7.3. Set up of money system
   7.4. Poverty reduction of local communities

8. Conclusions and recommendations

   Literature list

   Appendices
1. Introduction

1.1 The project
For my 5 months during internship in Palawan, The Philippines I had to set up a research project which had the main objective to increase environmental sustainability of tourism activities on Pandan Island, Honda Bay, Palawan. I did this internship for an NGO called ‘Centre for Sustainability’.

The project is in collaboration with ‘Legend Palawan’ (http://www.legendpalawan.com.ph/) a Hotel business which are the owners of the project area, Pandan Island. The request for this project came from Legend Palawan and was passed on to the NGO, which in turn looked for people who could set up this project.

The overall requirements for this project were set by the Legend Palawan and the supervision was carried out by the NGO. For the rest I was free to come up with my own project, as long as the requirements of the Legend Palawan were met.

There requirements were;

- Main objective; increase environmental sustainability of tourism activities on the island;
- Create brochures with environmental information for use in the boats;
- Create some kind of information poster for use on the island;
- Analyze some of the environmental problems the island is facing and try to find sustainable solutions.

To meet all these requirements I had set up my project and to obtain knowledge about the subject and to look at problems in a structured way I set myself some research questions for the project;

Main question: How can tourism activities on Pandan Island be improved in an environmental sustainable manner?

Sub questions:

- What are the current problems on the island and how can they be improved?
- What are the current boat routes to the island and what is their impact?
- What is the current environmental awareness and how can this be improved?
- How are the communities and money system set up?

My main vision is that to increase environmental sustainability you have to increase environmental awareness among tourists and the people active in the business. This is explained in the following diagram:

![Fig 1.1 Vision of the project](image-url)
To increase this environmental awareness I;

- Choose to create the brochures in which information about the environment could be found, information on how tourist can keep their environmental footprint as low as possible and some snorkeling guidelines.
- Set up an environmental awareness corner on the island where poster and a 41 page booklet was placed with information on the different ecosystems on the island, the species that can be found and general information about the environment and how to keep your impact as low as possible for everybody to read.
- Create name signs on the different trees on the island on which information can be found about that tree species, like name, general information and uses of the tree.
- Set up a workshop for the boat men and tour guides in which information was given about environmental awareness.

Furthermore I had to analyze some of the problems the island was facing and impacts that tourism created. I did these following analyses;

![Diagram showing categories of analyses](Image)

**Fig 1.2** The analyzes.

In detail I looked at;

- Trash collection systems on the island;
- Waste water management;
- Boat routes and mapping of sea floor vegetation to set up new routes;
- Water quality around the island;
- Destination mix;
- Set up of money system;
- Involvement of local communities.

Of course to create the environmental awareness corner and to analyze the problems I had to carry out different kind of researches to obtain this knowledge. During my 5 months on the island I did the following;
Fig 1.3 The different researches
These researches, their importance and their methods will be further explained in Chapter 1.4.
At the end of my internship I came up with the following results, which will be discussed in detail in this report;

![Fig 1.4 Results](image)

- Background Information
- Destination mix
- Problem analyzes
- Survey outcomes
- Results & Recommendations
- Brochure
- 2 Posters
- Information pamphlet
- Name signs on trees
- Sea floor map
- Contour map

The background information, destination mix, problem analyzes, survey outcomes and recommendations will be written in the form of this report. In addition to this, 2 posters, 1 brochure an 41 information pamphlet (book) and name signs on trees will be developed, containing information for tourist on how they can keep their impact on the environment as low as possible as well as other general information about the biodiversity in Honda Bay and Pandan island. These posters will be put up on Pandan Island and the brochure will be used in the boats of the HOBBAI organization. The maps will be used to indicate new boat routes and further recommendations. In the end the whole project will be presented at the Palawan State University.

1.2 Why
Tourism is a fast growing industry in the Philippines, especially in Palawan it is a thriving industry. (Chapter 2, Table 2.1) Because of this growing industry the pressure on the environment is increasing. It is essential that tourism in the Philippines develops in a sustainable way, to ensure the protection of the environment and the livelihood of future generations to come. The wildlife resources and their habitats are also protected by law. The Republic Act No. 9147 states:

Section 2. Declaration of Policy. It shall be the policy of the State to conserve the country’s wildlife resources and their habitat for sustainability. In the pursuit of this policy, this Act shall have the following objectives:

- To conserve and protect wildlife species and their habitats to promote ecological balance and enhance biological diversity;
- To regulate the collection and trade of wildlife;
- To pursue, with due regard to the national interest, the Philippine commitment to international conventions, protection of wildlife and their habitats; and
- To initiate or support scientific studies on the conservation of biological diversity.

Honda Bay is attracting more tourists every year and therefore creating an ever higher pressure on the environment of the bay and the islands that are located within it. To ensure that tourism will remain possible in
this area for the coming years it has to evolve into a sustainable way of ecotourism. The impact from the tourists needs to be as low as possible without compromising the great experience that Honda Bay has to offer. This project will help to make this possible.

1.3 The Legend Palawan
Legend Palawan offers different day tours and specialized tours to the different tourist destinations around Puerto Princesa City. They have a tour package called PAX that offers the following daily tours: Honda Bay tour; Underground River tour; Nagtabon/Talaudyong tour; Estrella Falls tour; Dolphin Watching tour and Sunset Cruise & Firefly Watching tour. The hotel is located one kilometer away from the Puerto Princesa Airport as well as the seaport and just five minutes away from the city's main commercial district.

1.4 The goals and objectives

Research water & species

1.4.1 Determine the species in the swimming area.
The goals of this research is identifying the species and determine the health of the corals and other sea vegetation that can be found in the swimming area of Pandan island. Pandan island has 1 swimming area, wherein corals, algae and sea grasses can be found.
Why: With this data the health of the swimming area can be determined and a species list can be made on the biodiversity in the swimming area. This information will be used for information on the posters and brochures to make tourists interested for the species that can be found in the swimming area.
Method: The method that is going to be used is the random quadrat method. The quadrat will be randomly thrown into the sea in random directions. In this quadrat the following will be measured; the cover percentage of live corals, the cover percentage of death corals, the cover percentage of bleached corals, the cover percentage of sea grasses and the cover percentage of algae. More info on the method can be found in chapter 1.5.

1.4.2 Determine tree species
The goal for this research is to determine the main tree species that can be found in the tourist area of Pandan island. Name signs with a short description and uses of the species will be put on some of the main trees in the tourist area.
Why: The goal is to get tourists more interested in the tree species and learn about the environment.
Method: The determination will be done together with a local student and a tour guide, both which have profound knowledge about the local vegetation. Furthermore the book “Field guide to the common mangroves, seagrasses and algae of the Philippines by Hilconida P. Calumpong, Ernani G. Meñez” and ‘Diversity of flora in the Philippine mangrove ecosystems’ by P. M. Zamora will be used. Determination will be made on the basis of the characteristics of the tree.

1.4.3 Water quality research.
The goal for this research is to determine the water quality around Pandan island.
Why: To determine the changes in water quality and compare this with other areas or to create a baseline for further research.
Methods: 4 samples are collected, each with a interval of 1 hour. This interval is done because of the changes of diurnal. Samples are collect at 1,5 meter depth to minimize the sediments. The samples are later brought and examined in the lab of Centre for Sustainability. The parameters that were measured are: PH, gravity and Ammonia.
Limitations: Because of the limited facilities in the lab of Centre for Sustainability and the high costs of other laboratories in Palawan only the above discussed parameters can be measured.
Mapping

1.4.4 Mapping the seafloor around the island.
The goal for this research is to make an overall description of the sea floor around the island to about 10 to 50 meters in to the water.

Why: With this data an overall seafloor map will be made to indicate where the corals are located and make those areas protected (hence no go area for boats) and look for new points for loading and unloading the boats. In addition new swimming spots for tourist to go snorkeling and see corals will be considered, so that the pressure does not have to stay in 1 set area.

Method: The method that is going to be used is the manta tow method. A private boat will be hired that sails around the whole island and the observers will be dragged behind the boat (Manta Tow Method). More info on the method can be found in chapter 1.5.

1.4.5 Mapping the contour of the island.
The goal is to make an overall contour map of the island.

Why: The map can be used for indicating new boat routes and further recommendations.

Method: A detailed contour of the island is made with Google Maps and Adobe Photoshop.

Limitations: Unfortunately GIS data is not available so the map is created with alternative methods.

Analyze problems

1.4.6 Trash collection.
Good solutions for trash collection are already being implemented on the island, but there are still problems with trash on Pandan island.

Why: To determine if the current trash collections is working as intended, to look at the biggest problems and see if there is room for improvement.

Method: The trash collection system will be observed every 2 days to make sure it works as intended and to see if there is room for recommendations or improvements. Also at least 1 interview will be held under each of the following actos; the tourist, guides and the local people about their knowledge and opinion on the system. An analysis and recommendations for better trash collection will be written in this rapport.

1.4.7 Waste water management
There are 3 wells on the island. 2 freshwater wells and 1 salt water. Legend Palawan uses 1 freshwater well for the showers, toilets and hand wash facilities. This generates waste water which needs to be managed.

Why: To determine how waste water is being managed and to see if this can be improved so that pollution of soil can be minimized and sustainable solutions can be implemented.

Method: Observational research will be conducted to see how the waste water is being managed. Also interviews with the technical engineer of the island as well as the local communities are being held to obtain more knowledge about the systems that are in place right now.

Desk research will be done to find out sustainable solutions for managing waste water on an island and recommendations for tackling this problem will be written in this rapport.

1.4.8 Determine maximum capacity of the island
Legend Palawan expects a doubling of tourist coming to the island over the period of 2 years. Because of this they want to determine the maximum capacity of tourists per day on the island.

Why: Determine the maximum capacity of tourist per day to maintain a sustainable pressure on natural resources.

Method: This report can be a start for determining the maximum capacity. The biggest problem will be determining the ground water levels of fresh water. Because fresh water is used for the showers, the supply of freshwater needs to be indicated to determine the maximum capacity of the island.
Social research

1.4.9 Determine knowledge about environmental awareness of tourists, guides and boatmen

The goal is to indicate the knowledge of the tourist, guides and boatman on the environment of Honda Bay and to determine if they are aware of the local rules and regulations.

**Why:** The information that is being obtained will be used to determine what will be the most necessary and effective content on the brochures and signs.

**Method:** Interviews and a survey. The interviews with the guides and boatmen will be about their knowledge of the area and on what information they give to the tourists. The interviews with the local people will be about their livelihood, the situation on Pandan island and how this affects their way of living and livelihood. The survey will be held under the tourist and can be found in the appendix and is further explained in chapter 6.4.

**Limitations:** In considering the outcomes of interviews and talks with the (local) Filipinos, the culture characteristics of Filipinos must be considered. The Philippines has been highly influenced by its colonization by the Spaniards and Americans; to this attributable a certain sense of inferiority. Filipinos are strongly oriented towards the outside world and tend to imitate the Western countries, especially the United States. As a rule they do not place much value on anything produced in their own country. On the other hand, the Filipino sense of pride must not be underestimated. They are not prepared to listen to foreign advisors about the problems the Philippines are dealing with. Filipinos are polite and always try to satisfy other people, especially foreigners, who they perceive as having status. This is why clear and honest answers to questions are hard to get from Filipinos. Filipinos will choose their answers to please the other person, especially when that person is a foreigner. They will hesitate to say something negative about foreigners if they are speaking to one. Moreover they love the interest from foreigners for their country because they look up to Western people. Also, not knowing an answer means a loss of face for Filipinos. They would rather make up an answer than admit they do not know something.

Observational research

1.4.10 Determine methods.

The goal for this research is to observe the methods of the tour guides and boats men and to observe the behavior of the tourist.

**Why:** This observational research will be compared with the surveys and interviews to see if there is difference in what people say and what they do.

**Method:** This observational research will be conducted every day while on the island and notes will be taken.

Increase environmental awareness

1.4.11 Environmental awareness-raising of the tour guides, boatman and tourists

The environmental awareness of the tour guides, boatman and tourists needs to be improved.

**Why:** A few examples of things that go wrong are the boats that sail over the corals to land at the islands, boats that leak oil are just left overnight on the reef and tourist that pick up fish like starfish and leave them on the beach. Studies like ‘Outcome Research in Environmental Education: A Critical Review’ from Frank C, Leeming, William O. Dwyer, Bryan E. Porter & Melissa K. Cobern show that this can be greatly improved with raising environmental awareness among these actor.

**Method:** Creating brochures and signs. The brochures and signs will be created with Adobe Photoshop. Also workshops will be given to boatmen and tour guides about environmental awareness and how they can keep their impact as low as possible.

**Limitations:** Finding images that are not copyrighted and are of good usable quality, especially for the big signs. Solution for this would be websites like ‘stockphoto.com’ where you can buy high quality pictures that are allowed to be used in public. Another option is to use own pictures made on the islands. Another debatable thing is the information that has to be on these brochures. As of now there is no warning at all for the marine
stingers that are presented in the waters. The tour operators don’t want to tell too much about this, fearing to scare off the tourist. These decisions have to be made together with Legend Palawan.

**Other**

1.4.12  *Involvement of the local communities and ensuring their livelihood*

The goal is to look for additional ways on how to involve the families that live on Pandan island with tourist activities.

**Why:** To create alternative livelihoods for the local families.

**Method:** This will be done through interviews with the local communities to see what they want and what their abilities are. Besides that desk research to other similar projects will be done to look for ways to involve them more with the tourist activities on the island.

### 1.5 Methods

The methods for this project will consist of different components. The project consists of 5 phases;

- Phase 1: Literature study, gathering background information;
- Phase 2: Working within the Legend company and carry out researches;
- Phase 3: Analyzing data, developing recommendations;
- Phase 4: Implement recommendations and analyze their effectiveness;
- Phase 5: Write rapport about the project.

For phase 1 information has to be gathered to get enough background knowledge about the company, their methods and the area that is used for the tours. This will be done by gathering information on the internet, in the library of the Palawan State University and different research centers and governmental institutions that are located in Puerto Princesa City.

Phase 2 consists of working within the company. Here observation will be used in the first few weeks to gather information about their methods and how the tours are set up. After the general set up of the tours is indicated, the different researches will be conducted during a 1 month period.

In phase 3 all the gathered data will be analyzed and recommendations will be developed. These recommendations will be in the form of 2 big posters that will be put up on Pandan island and brochures that will be handed out to the tourist in the boat. In here, there will be information for the tourist on how they can keep their ecological footprint as low as possible while visiting the Honda Bay area. Software programs that will be used for creating this will be ‘Microsoft Word’, ‘Adobe Photoshop’ and ‘Illustrator’.

Phase 4 consist of working again within the company and implementing some of the recommendations so that their effectiveness can be analyzed. Also the rest of the remaining researches will be conducted during a 1 month period.

The last phase, phase 5, consists of rapport writing about the project. In this rapport all the aspects of the project will be described and future recommendations will be made. In the end a presentation of the whole project will be given at the Palawan State University.

Several kinds of methods are being used for this rapport. Time and money obviously limit the choice, but for this rapport the chosen research methods are desk research and field research.
**Desk research**  
Information was gathered through:

- Literature study in the Netherlands  
- Literature study in the libraries of various institutes in the Philippines

**Field research**  
For the field research different methods were chosen for different purposes. Most of the methods are already explained in chapter 1.4, but some of the methods need additional explanation. These are:

**The random quadrat sampling method**  
The random quadrat sampling method measures the percentage of sea floor covered by particular organisms. The tool used to collect data from a number of sampling points inside a sampling site is called a quadrat.

![Picture 1.5.1 the quadrat](image)

The sampling points are randomly scattered over a sampling site by throwing the quadrat in a random direction and let it sink to the ocean floor.

**Materials needed:**

- 1m square quadrat made from thin iron rods welded together  
- Snorkeling equipment  
- Data slates  
- Boat for safety  
- Data book

**Data that is gathered:**

- % cover living corals  
- % cover dead corals  
- % cover by seaweed  
- % cover of non-living bottom  
- Types of coral
Strengths:

- Provides quantitative data. Allows to compare the condition of the reef with others. May help foster a sense of pride or motivation to restore/conserve a reef.
- Increases environmental awareness for village participants as well as sharing of local ecological knowledge.
- Involves direct observation of a reef in a systematic way. Many types of information can be collected at the same time and changes in the reef health reported to managers to stimulate an appropriate and timely response to any emerging problem.
- Method can be applied to a wide range of habitats

Limitations:

- Is based on a standard scientific method which is probably foreign to the local people
- Requires a period of training and practice
- Requires investment in equipment
- Suitable only for shallow water habitats. For deeper water monitoring scuba diving equipment is needed.

The mantatow method

This method was used to create the sea floor map around the island. The manta board is attached to a motor boat with a 17 m length of rope which has buoys placed at distances of 6 m and 12 m from the board. A snorkeler grips the board and is towed for approximately 2 minutes, at the end of which the boat pauses to allow the surveyor to record data (usually on water-resistant paper). The coverage of bottom features will be recorded on a percentage scale (for an example, see Figure 1.5.3). The manta tow method will also be used to map the greater seafloor around Pandan island to locate coral reefs and indicate new boat routes.

Figure 1.5.2
Detail of the manta board and associated equipment. It is recommended that the board be made from marine ply and painted white. Two indented handgrips are positioned towards both front corners of the board and a single handhold is located centrally on the back of the board. Redrawn from: English, S., Wilkinson, C., and Baker, V., 1997, Survey Manual for Tropical Marine Resources, 2nd Edition. (Townsville: Australian Institute of Marine Science).

Figure 1.5.3
Estimating percent cover on the benthos using a metre-square quadrat with string or fishing line strung across at 10 cm intervals. In each example, shaded regions represent different types of substratum that are included collectively in the total percent cover estimate. Based on a drawing in: Rogers, C., Garrison, G., Grober, R., Hillis, Z-M., and Franke, M.A., 1994, Coral Reef Monitoring Manual for the Caribbean and Western Atlantic. (St. John: National Park Service, Virgin Islands National Park).
1.6 Time planning

<table>
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<th>What</th>
<th>When</th>
<th>Where</th>
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<td>1</td>
<td>Literature study, gathering background information.</td>
<td>08/02/2012 – 29/02/2012</td>
<td>PSU, library</td>
</tr>
<tr>
<td>2</td>
<td>Working within the Legend company.</td>
<td>01/03/2012 – 31/03/2012</td>
<td>Legend Hotel, Honda Bay</td>
</tr>
<tr>
<td>3</td>
<td>Analyzing data, developing recommendations.</td>
<td>01/04/2012 – 30/04/2012</td>
<td>PSU, library</td>
</tr>
<tr>
<td>4</td>
<td>Implement recommendations and analyze their effectiveness.</td>
<td>01/05/2012 – 31/05/2012</td>
<td>Legend Hotel, Honda Bay</td>
</tr>
<tr>
<td>5</td>
<td>Write rapport about the project.</td>
<td>01/06/2012 – 30/06/2012</td>
<td>PSU, library</td>
</tr>
</tbody>
</table>

1.7 Structure of the rapport

Chapter 2 will deal with background information on the country, region, province and the bay itself. Existing tourism will also be discussed. In Chapter 3 general tourism analyzes will be discussed to show the pros and cons of tourism. In Chapter 4 detailed background information on Honda Bay and Pandan island will be given using the division of ‘the destination mix’ from Mill and Morrison. In Chapter 5 the environmental impacts will be discussed, in Chapter 6 the environmental awareness and in Chapter 7 the economic impacts will be discussed. In the last chapter conclusions will be drawn and recommendations will be made.
2. Tourism in the Philippines

2.1 Introduction
Tourism is a fast growing industry in the Philippines, especially in Palawan it is a thriving industry. In 2000, the Philippines' tourist arrivals totaled 2.2 million. In 2003 it totaled 2,838,000, a growth of almost 29%. In the first quarter of 2007, the tourist arrival in the Philippines grew as much as 20% in same period last year. In 2011, the Department of Tourism recorded 3.9 million tourists visiting the country, 11.2 percent higher than the 3.5 million registered in 2010 (source: Department of Tourism, retrieved June 2010)

Tourism plays an important role in the Philippine economy. In the year 2000, net tourism income in the Philippines totaled to 2.1 billion U.S. dollars. Most of the foreign tourists came from the United States, Japan, South Korea, Hong Kong, Australia, New Zealand, and The Netherlands. There were also tourists coming from Taiwan, Great Britain, Germany, Canada, Israel, Russia, Spain, Poland, France and Singapore. One of the fastest tourist market growths are those from China, and India.

<table>
<thead>
<tr>
<th>Year</th>
<th>Foreign tourists</th>
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<tbody>
<tr>
<td>1996</td>
<td>2,049,367</td>
</tr>
<tr>
<td>1997</td>
<td>2,222,523</td>
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<td>1998</td>
<td>2,149,357</td>
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<td>2,170,514</td>
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<td>2000</td>
<td>1,992,169</td>
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<td>2001</td>
<td>1,796,893</td>
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<td>2002</td>
<td>1,932,677</td>
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<td>2003</td>
<td>1,907,226</td>
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<td>2004</td>
<td>2,291,347</td>
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<td>2005</td>
<td>2,623,084</td>
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<td>2007</td>
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<td>2008</td>
<td>3,139,422</td>
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<tr>
<td>2009</td>
<td>3,017,099</td>
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<td>2010</td>
<td>3,520,471</td>
</tr>
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<td>2011</td>
<td>3,917,454</td>
</tr>
</tbody>
</table>

Table 2.1 Tourism statistics (source: wikipedia.org/wiki/Tourism_in_the_Philippines)

2.1 Palawan
Honda Bay is part of the island region Palawan. Palawan is an island province of the Philippines located in the MIMAROPA region or Region 4. Its capital is Puerto Princesa City, and it is the largest province in the country in terms of total area of jurisdiction. The islands of Palawan stretch from Mindoro in the northeast to Borneo in the southwest. It lies between the South China Sea and the Sulu Sea. The province is named after its largest island, Palawan Island, measuring 450 kilometres (280 mi) long, and 50 kilometers (31 mi) wide. Palawan's almost 2,000 kilometers (1,200 mi) of irregular coastline are dotted with roughly 1,780 islands and islets, rocky coves, and sugar-white sandy beaches. Honda Bay consists of about 10 of these 1,780 islands. Palawan also harbors a vast stretch of virgin forests that carpet its chain of mountain ranges. The mountain heights average 3,500 feet (1,100 m) in altitude, with the highest peak rising to 6,843 feet (2,086 m)

(Source: Wikipedia.org/Palawan)

2.2 Honda Bay
Honda Bay is a bay on the eastern shore of the island of Palawan near Puerto Princesa City in the southwestern Philippines. The bay is used for both subsistence and commercial fisheries and recreation. Boats can be rented for the day and used for travel to nearby islands, many less than 45 minutes from the shore by boat. Honda Bay is ideal for snorkeling. Starfish are commonly found near islands such as Starfish Island. Puerto Princesa is the nearest port city, and is accessible by plane.
There are various sandbars and islands where the snorkeling is rich. The many sea grass beds are home to sea horses and other marine life. Pods of dolphins making its way up and down the channels that act as highways to the larger marine species that occupy the bay can be spotted. Also the rare dugong can be spotted in the Honda Bay area.

Honda Bay is also a bird watchers paradise. Many endemic and migratory species make the many islands their home. The graceful white cattle egret is a common sight on the fish traps or the reef flats looking for meals during the tide. The egrets share the bay with many different types of heron, sandpiper, curlew, and terms of various types. Inland on the larger islands one might find the colorful sun birds, Maria Caffra, various kinds of owls, woodpeckers and kingfishers. The elusive Megapode or Tabon bird also makes its home on some of the islands. This chicken-like bird lays huge eggs depositing them in sand mounds many times their size.

Many of the islands are fringed with mangrove forests that are the life blood and nursery of the coral reefs that they co-exist with. Along with the rich bird life, the mangroves are where black tip reef sharks spend the early years of their lives having emerged from the purse-like egg casings deposited among the red brown root systems of the stress.

The many natural wonders one can experience here give an opportunity to see the vast web of life that the marine ecosystem is. It is a chance to interact with it and witness how the local community harnesses it and how it, in return, shapes their lives.

Honda Bay is an opportunity to witness the grandeur of Palawan in a short fun filled day full of wonder and discovery and therefore it is of great importance that the bay is used in a sustainable way.
3. Tourism analyses

The quality of the environment, both natural and man-made, is essential to tourism. However, tourism’s relationship with the environment is complex. It involves many activities that can have adverse environmental effects. Many of these impacts are linked with the construction of general infrastructure such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses and marinas. The negative impacts of tourism development can gradually destroy the environmental resources on which it depends.

3.1 Problems in the Honda Bay area

Domestic waste on the islands
The most widespread environmental problem, affecting almost all island countries, is the safe disposal of liquid domestic wastes, particularly human wastes and urban sewage. Few countries have adequate waste collection and treatment facilities even in the most developed urban areas, and those that exist are costly and seldom properly maintained. In spite of considerable efforts at rural sanitation, facilities in many rural areas are still rudimentary or entirely lacking. The result is serious water pollution both of fresh water supplies (rivers, groundwater and even rainwater catchments) and coastal waters around beaches, reefs and lagoons that are important for tourism, recreation and fishing. Pandan island is facing these problems, there are problems with their waste disposal, both solid waste as well as human waste.

Environmental pressure through tourism
The coral reefs surrounding the islands in Honda Bay are threatened by pressure through the growing tourism in the area. Coral reefs benefit the environment and people in numerous ways. For example, they

- Protect shores from the impact of waves and from storms;
- Provide benefits to humans in the form of food and medicine;
- Provide economic benefits to local communities from tourism.

The World Meteorological Organization says that tropical coral reefs yield more than US$ 30 billion annually in global goods and services, such as coastline protection, tourism and food. (Source: http://www.wmo.int/pages/prog/wcp/agem/publications/documents/Climate_Carbon_CoralReefs.pdf) The US agency NOAA (the National Oceanic and Atmospheric Administration) puts the economic value even higher and says that coral reefs provide economic services — jobs, food and tourism — estimated to be worth as much as $375 billion each year. (Source:http://www.noaanews.noaa.gov/stories2010/20101115_coralbleaching.html) So it is of great importance to protect these fragile ecosystems what some call ‘the rainforests of the sea’. The coral reefs suffer from different stressors, such as;

Pressure from boats
Anchor dropping on corals can inflict damage; boaters can protect coral by dropping their anchors on sandy patches of sea bed. Accidental groundings by boats can obliterate large areas of coral reef, so it is important to pick the right grounding spot to ensure no damage will be done to the surrounding coral reef. Sailboat keels, groundings in sand or even the churning action of propellers can cause major localized siltation, indirectly killing surrounding corals.

“There are 109 countries with coral reefs. In 90 of them reefs are being damaged by cruise ship anchors and sewage, by tourists breaking off chunks of coral, and by commercial harvesting for sale to tourists. One study of a cruise ship anchor dropped in a coral reef for one day found an area about half the size of a football field completely destroyed, and half again as much covered by rubble that died later. It was estimated that coral recovery would take fifty years.” Source: Ocean Planet
Pressure from tourists
Snorkeling in coral areas can be a stressor for the corals. Touching, stepping or accidently ‘crashing’ in the corals can cause serious damage. Tourist should be aware of the effects of their actions and should get a proper briefing beforehand to ensure they will keep their impact as low as possible.

3.2 How tourism can contribute to environmental conservation
Tourism has the potential to create beneficial effects on the environment by contributing to environmental protection and conservation. It is a way to raise awareness of environmental values and it can serve as a tool to finance protection of natural areas and increase their economic importance. The tourism industry can contribute to conservation through:

Financial contributions

- Direct financial contributions
  Tourism can contribute directly to the conservation of sensitive areas and habitat. Revenue from park-entrance fees and similar sources can be allocated specifically to pay for the protection and management of environmentally sensitive areas. Special fees for park operations or conservation activities can be collected from tourists or tour operators.

- Contributions to government revenues
  Some governments collect money in more far-reaching and indirect ways that are not linked to specific parks or conservation areas. User fees, income taxes, taxes on sales or rental of recreation equipment, and license fees for activities such as hunting and fishing can provide governments with the funds needed to manage natural resources. Such funds can be used for overall conservation programs and activities, such as park ranger salaries and park maintenance.

Improved environmental management and planning
Sound environmental management of tourism facilities and especially hotels can increase the benefits to natural areas. But this requires careful planning for controlled development, based on analysis of the environmental resources of the area. Planning helps to make choices between conflicting uses, or to find ways to make them compatible. By planning early for tourism development, damaging and expensive mistakes can be prevented, avoiding the gradual deterioration of environmental assets significant to tourism.

Cleaner production techniques can be important tools for planning and operating tourism facilities in a way that minimizes their environmental impacts. For example, green building (using energy-efficient and non-polluting construction materials, sewage systems and energy sources) is an increasingly important way for the tourism industry to decrease its impact on the environment. And because waste treatment and disposal are often major, long-term environmental problems in the tourism industry, pollution prevention and waste minimization techniques are especially important for the tourism industry.

Environmental awareness raising
Tourism has the potential to increase public appreciation of the environment and to spread awareness of environmental problems when it brings people into closer contact with nature and the environment. This confrontation may heighten awareness of the value of nature and lead to environmentally conscious behavior and activities to preserve the environment.

If it is to be sustainable in the long run, tourism must incorporate the principles and practices of sustainable consumption. Sustainable consumption includes building consumer demand for products that have been made using cleaner production techniques, and for services - including tourism services - that are provided in a way
that minimizes environmental impacts. The tourism industry can play a key role in providing environmental information and raising awareness among tourists of the environmental consequences of their actions. Tourists and tourism-related businesses consume an enormous quantity of goods and services; moving them toward using those that are produced and provided in an environmentally sustainable way, from cradle to grave, could have an enormous positive impact on the planet’s environment.

**Protection and preservation**

Tourism can significantly contribute to environmental protection, conservation and restoration of biological diversity and sustainable use of natural resources. Because of their attractiveness, pristine sites and natural areas are identified as valuable and the need to keep the attraction alive can lead to creation of national parks and wildlife parks.

Tourism has had a positive effect on wildlife preservation and protection efforts, notably in Africa but also in South America, Asia, Australia, and the South Pacific. Numerous animal and plant species have already become extinct or may become extinct soon. Many countries have therefore established wildlife reserves and enacted strict laws protecting the animals that draw nature-loving tourists. As a result of these measures, several endangered species have begun to thrive again.

**Alternative employment**

Tourism can provide an alternative to development scenarios that may have greater environmental impacts. A good example related to Palawan is the alternative income for whale shark hunters in the northern regions of Palawan. Because of the depletion of whale shark stocks the fisherman couldn’t hunt them anymore. They now provide tours to tourists who want to see the whale sharks an even swim with them. The fishermen have all the knowledge about where and when to spot the whale sharks and the tourist dollars provides them with a good alternative income. The women and children in the village run little shops and make food for the tourist. In this way the community as a whole benefits from these tourist activities and provides them with a steady and sustainable income.

**Community involvement**

Communities can benefit from tourism as a sustainable alternative income. In Palawan, especially around the Puerto Princesa area, most of the tourist tours are run by local communities. The ABS-CBN Foundation has set up and helps to assist most of these tours. The following tours around the Puerto Princesa area are run by local communities: Underground River tour; Nagtabon/Talaudyong tour; Estrella Falls tour; Dolphin Watching tour and Sunset Cruise & Firefly Watching tour.

Tourism can be a good alternative to other (often not sustainable) ways of income like slash & burn agriculture or fishing. The communities benefit as a whole from the money that is generated with the tourism activities while the tourists see the area in the best way possible and learn from the local people hence creating more environmental awareness.

**Regulatory measures**

Regulatory measures help offset negative impacts; for instance, controls on the number of tourist activities and movement of visitors within protected areas can limit impacts on the ecosystem and help maintain the integrity and vitality of the site. Such limits can also reduce the negative impacts on resources.

Limits should be established after an in-depth analysis of the maximum sustainable visitor capacity. This strategy is being used in the underground river tour. Because of the big media attention it being the 7th world wonder and Palawan listed among the top destination of the world in National Geographic the area is getting allot of tourist. After research, there is now a set limited capacity of 1,200 people per day, ensuring visitors have little impact on the sensitive environment and animal habitats.
4. Destination mix

4.1 Introduction
This chapter gives information about the attractions and facilities in Honda Bay and Pandan Island. The general situation is also dealt with. The elements that are analyzed are the attraction that people come to visit, facilities that serve the needs of visitors, the infrastructure and transportation to make the destination accessible and the hospitality of the destination.

4.2 Attractions
Puerto Princesa is promoted as the city in the forest and as the first carbon neutral city in the Philippines. The city has been acclaimed several times as the cleanest and greenest city in the Philippines.

The Puerto Princesa area has a lot of attractions that attracted tourists, with the underground river being the most important. The underground river is widely promoted as the new 7th world wonder and gets allot of attention in the Puerto Princesa area. Legend Tours offers daily tours to the underground river. Other attractions that surround the city are the crocodile farm, butterfly garden, eco-park with zip line, Bakershill with different facilities, the Immaculate Conception Cathedral and most important; Honda Bay. Honda Bay has several islands, each offering different aspects and activities;

- **Snake Island.** A long sandbar that slithers on the surface of the sea. Snake Island is closed at the moment to give way to its restoration and rehabilitation of the island. Due to great pressure from tourism the island and surrounding coral reefs got seriously degraded.
- **Starfish Island.** This small Island attracts tourist because it is easy to find varied sizes and colors of starfishes.
- **Lu-li Islet.** A short term for "lulubog-lilitaw", a tiny islet that is visible at ebb tide and disappears under water during high tide.
- **Señoritaislan.** Offers a glimpse of fish cage and seaweed culture.
- **Arreceffi Island.** The island resort of Dos Palmas with a variety of activities to enjoy such as; ocean and mangrove kayaking, fishing, boat rides, snorkeling, and scuba diving.
- **Bat Island.** Watches in awe thousands of bats making their way out.
- **Cowrie Island.** This island is ideal for picnic trips or simply basking under the sun and lazing around the sand.
- **Pandan Island.** This island has a small drop offs and good reefs, great site for snorkeling and diving. It also offers the most facilities of all the islands.

4.3 Facilities
Because this rapport is mainly about Pandan island the facilities of this island will be the main description. The facilities will be divided in lodging, food and beverage, supporting facilities and activities.

4.3.1 Lodging
There is no sleeping accommodation on Pandan Island. There are however 14 different huts that can be rented for the day. There are plans to build a small day-resort on the island. This plan has to still get permission.

4.3.2 Food and beverage
There are several grill areas on the island where different tour operators can prepare the buffet meal for the guests. Legend also offers their guest a barbeque buffet with different kind of meat, fish and vegetables. Other guest can also buy food and drinks at the bar. There is 1 bar located in the tourist area off the island which offers different meals and drinks. This bar is owned and operated by Legend hotel. The prices are higher than food on the main land.
4.3.3 Supporting facilities
There are 2 little stores on Pandan Island. They sell stuff like candy, drinks, cigarettes, soap and other small convenient stuff for the island guests. These shops are run by the local families of the island. The local people also sell souvenirs like t-shirts and jewelry and it is also possible to get a henna tattoo on the island. Next to these facilities there are a few local people that sell coconuts from the island to the tourists. Sometimes other people come to the island to sell different snacks (like sweet soy milk).

There are 2 toilet compartments and showers on the island. Both are set up and maintained by Legend hotel. The local people on the island can make use of these facilities too. The showers use fresh water from the well that is maintained by Legend hotel. There are also picnic tables for the guests to use.

4.3.4 Activities
There are different activities to do on Pandan island. The most popular one is swimming and snorkeling. These are the free activities. For other activities there has to be paid. These activities include: rental of beach volleyball, rental of kayaks, banana boat riding and massage. At the massage local woman from the mainland work and travel back and forth the island every day. Pandan Island is also popular for bird watching activities because of the unique species of owl that can be found here (the Otus mantananensis). Tour operators from everywhere in the Philippines offer tours to Pandan island among other destinations for bird watching.

4.4 Infrastructure and transportation
The accessibility of a tourist destination is very important, as are basic facilities like water supply and proper toilets. The infrastructure needed for a tourism destination is divided in parts.

4.4.1 Water systems
Pandan Island has 3 wells on the island. 2 freshwater wells and 1 salt water. Legend uses 1 freshwater well for the showers and hand wash facilities; the others are used by the local people. Legend hotel brings processed water for drinking from the mainland. Growing tourism puts pressure on the groundwater levels, but most tourists are not bothered by the eventually water shortage.

4.4.2 Communication
There is no land line available on Pandan island. However connection with mobile networks as GLOBE and SMART are possible throughout the whole island.

4.4.3 Power sources
There is no electricity on Pandan island. However there are 2 generators, 1 is used to pump water from the well to the buffer and the other 1 is used in the bar that is managed by the Hotel. The local people use no electricity at all on the island.

4.4.4 Sewage/drainage
There is no proper waste water disposal system in place on Pandan island. The waste water from the toilets gets collected in concrete septic tanks and water from the showers is being carried away through pipes and eventually leaked into the soil. This creates pollution of the soil and eventually the freshwater supply of the island could also be affected. It is hard to find a good solution for this problem because of the limitations of possibilities. More on this can be found in chapter 5.4

4.4.5 Transportation terminals
The main transportation terminal for island hopping is located at the Honda bay pier. It is located at about 30 minute tricycle or multicab drive from the city center. There are plenty of tricycles available and there is 1 multicab route to and from the pier. There are also a lot of tour operators who offer minivan shuttle between the hotel and the pier. Most people go to the pier at around 9 am and return at about 4 to 5 pm. There are a
lot of shops and rental possibilities located at the pier, making efficient use of the large amount of tourist visiting this area every day. There is also a coast guard office and signs with information about laws and regulations that are in effect in the bay.

4.4.6 Security
Honda Bay is a safe place for tourists to visit. There has been 1 terrorist attack in Honda Bay. It was the seizing of twenty hostages from the upscale island resort Dos Palmas by Abu Sayyaf members on May 27, 2001, and resulted in the deaths of at least 5 of the original hostages. However nowadays the threat of terrorist attacks is low and there is plenty of security present. The Maritime Police station is located at the pier. They can use about 5 boats in which they can patrol the bay. Unfortunately the Maritime Police doesn’t patrol the bay that much and most of the time they will stay at the station. The Philippine Coast Guard also has an office located at the pier, with at least 1 Coast Guard presented every day. The Coast Guard collects all the information about the tourists that go aboard boats so that they know who and where to look for in case of an accident.

4.5 Hospitality
It is important that tourists feel welcome when they visit an area. Welcome in a way that the local population is friendly and hospitable but also in a way that tourist services are offered. According to Mill and Morrison (1992) hospitality resources can be improved by, in effect, training tourism personnel to be hospitable and encouraging positive feelings toward tourism and tourists on the part of the general public.

The general hospitality is very high in Honda Bay. The boats men are very friendly and are always wanting to answer questions or assist with all different kind of things, like getting people of the boat or take picture of tourists. They listen to the tourist and take them wherever they want in the bay and stay till whenever the tourist wants (with a maximum of 4:30 pm). The tour guides from the Legend Hotel are very well trained in hospitality. They are very friendly to the tourists and try to help them with whatever possible. They make the tourist feel welcome and are inviting to ask questions. The bar personal on Pandan island is also very well trained and help the tourist with whatever they need.

The local families are somewhat hesitant to the tourists. They live on a separate part of the island and are a little more reticent towards tourists in comparison to other parts of Palawan, where not as much tourist visit. The local people from the shops however are very friendly.
5. Analysis of the environmental impacts

5.1 Introduction
Tourism can both have positive and negative effects on the culture and environment. It can create awareness and can function as an encouragement for protection, but it can also damage the environment. Like many tourist centers, the hop of point for Honda Bay is located in an urban area. Moreover the area typifies itself through underdevelopment. These are some of the reasons why Honda Bay is sensitive to negative impacts. However there are also a lot of positive aspects of tourism that contribute to the environment of Honda Bay.

5.2 Water quality
To determine the influences on water quality around Pandan island water samples were taken at different times on the same day. The parameters that were measured are: Salinity, PH and Ammonia. The idea was to compare this data with previous samples that were taken in Honda Bay. Unfortunately we had no access to this data.

The water sampling testing however was carried out anyway and the results are shown below:

<table>
<thead>
<tr>
<th>Sample 11</th>
<th>Sample 12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time:</strong></td>
<td>11:00 AM</td>
</tr>
<tr>
<td><strong>Date:</strong></td>
<td>17th of May 2012</td>
</tr>
<tr>
<td><strong>Salinity</strong></td>
<td>31</td>
</tr>
<tr>
<td><strong>PH</strong></td>
<td>8.3</td>
</tr>
<tr>
<td><strong>Ammonia</strong></td>
<td>0.12</td>
</tr>
<tr>
<td><strong>Table 5.1</strong></td>
<td><strong>Table 5.2</strong></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Sample 13</th>
<th>Sample 14</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time:</strong></td>
<td>12:00 PM</td>
</tr>
<tr>
<td><strong>Date:</strong></td>
<td>17th of May 2012</td>
</tr>
<tr>
<td><strong>Salinity</strong></td>
<td>31.5</td>
</tr>
<tr>
<td><strong>PH</strong></td>
<td>8.3</td>
</tr>
<tr>
<td><strong>Ammonia</strong></td>
<td>0.12</td>
</tr>
<tr>
<td><strong>Table 5.3</strong></td>
<td><strong>Table 5.4</strong></td>
</tr>
</tbody>
</table>

The Salinity of the seawater fluctuates between 31 and 31.5 depending on the time of day. The PH is in all cases 8.3 which is on the high side of normal for PH levels of seawater. Seawater PH levels is limited to the range of 7.5 to 8.4. The high PH is likely due to the time of measuring. The daily change in pH in the seawater comes about because of the biological processes of photosynthesis and respiration. Photosynthesis is the process where organisms convert carbon dioxide and water to carbohydrate and oxygen.
The reaction is:

\[ 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 \text{ (carbohydrate)} + 6\text{O}_2 \]

So there is net consumption of carbon dioxide during the day. This consumption leads to the water becoming deficient in CO2 during the day, and because of that the pH rises. Likewise, organisms also carry out the process of respiration, where this carbohydrate is converted back into energy for other processes. You could see it as the opposite of photosynthesis:

\[ \text{C}_6\text{H}_{12}\text{O}_6 \text{ (carbohydrate)} + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy} \]

This process is happening all of the time and it tends to reduce the pH due to the carbon dioxide produced. The effect of these processes is that pH rises during the day and drops at night. This change varies from less than 0.1 pH units, to more than 0.5 pH units in most waters.

The ammonia levels are 0.12 and are constant. The level of 0.12 NH\text{3} with a PH level of 8.3 is normal as can be seen in the graph below:

![Graph 5.1 Fractions in Seawater](image)

Right now, nothing can be said about possible changes in these parameters over the years, because it cannot be compared with previous data. However this data could be used as a reference in a possible further research.

### 5.3 Boat routes

Pandan island is only reachable by boat. Tourist can go their either by renting a boat with the HOBBAI organization or with the Pacifica from the Legend Hotel. Most boats follow a set route entering Pandan island. The Pacifica comes in on a slightly different direction because of its size and place it comes from. Everyday around 40 boats arrive at Pandan island, of which most of them sail to the loading & unloading area or the docking point of the island. The waters are not very deep and boats have to sail right over the corals and sea grasses to reach Pandan Island. Sailboat keels, groundings in sand or even the stirring action of propellers can cause major localized siltation, indirectly killing surrounding corals. The following map shows the direction of the boats that come into Pandan Island;
Fig 5.1 sea map of Pandan island

- Seagrass
- Beach/offshore sandbar
- Mangrove
- Coral reef
- Degraded/dead coral
- C: Seaweed farming
- SI: Snorkeling area 1
- SII: Snorkeling area 2
- Boat
As can be seen in figure 5.1 the boats must first go over a patch of corals and then into a sea grass area. Research conducted with the Manta tow method showed that nearly all of the corals were death or seriously degraded on the boat route to the island. Most of the seafloor was spread with death, bleached and broken of corals. The only main life form in this area is sea urges, which seemed to thrive in some areas. It is most likely that this dying and breaking of corals is for some part caused by the stirring action of the propellers, which causes sediments to be stirred; covering the corals with sediments and breaking of corals. The sea grasses also suffer from the boats sailing into the sea beds, causing sedimentation and tear up the sea grass beds. Another problem is the anchoring into the corals. Some boats sail away after the tourists arrived on the island to anchor further away. During the manta tow research I have seen several boats anchoring on top of the corals. Some of the boatmen go looking for shells that they can sell to the tourist. They often sail with big boats into the corals, anchor on top and walk on the corals to go looking for the shells. I have observed large pieces of corals which were broken and ripped of due to the anchor and chain ripping the corals apart.

5.4 Wastewater
A common environmental problem, affecting almost all island countries, is the safe disposal of liquid domestic wastes, particularly human wastes and urban sewage. Adequate facilities on Pandan Island are still basic or entirely lacking, such as with the local families that live on the Island. The result could be serious water pollution of both the fresh water supplies (groundwater wells) and coastal waters around the beaches, swimming area and the reef that is important for tourism, recreation and fishing.

The setup that is now in use for collecting all the wastewater coming from the toilets (or black water) are the so called concrete septic tanks. The basic idea is that a hole is dug into the ground in which a concrete sealing is put in. In here all the black water gets collected until the tank is full. When the tank is full a switch to a new tank is needed. There are 3 concrete septic tanks underneath the toilet building on Pandan island. These tanks collect the wastewater coming from the toilets. Once these tanks are full, the toilets need to be moved to a different location and new septic tanks need to be installed. The full concrete septic tank stays in the ground, as there is no way of getting it out or emptying the tank. The local families on the island use this same system. They have to install their own concrete septic tank while the Legend Hotel offers them the toilet bowls to be put on top.

The main concern with concrete septic tanks is that they are susceptible to cracking or even separation. The tanks are usually quite durable for several decades, but these cracks can occur earlier when a low quality concrete mix was used or the septic system hasn't been properly maintained, which is often the case on Pandan island. These cracks will allow waste to seep out of the concrete septic tank and/or allow groundwater to seep in. Either case is bad and will pollute the soil and groundwater. Blockage can cause the system to back up. Runoff is dangerous but also won't be detected by a standard dye test. Unless a concrete septic tank is manually inspected the problem may not be detected until it's too late and serious problems have arisen.

The wastewater from the showers and hand wash area is collected in a separate tank. When that tank is full the water is pumped out and leaked into the soil nearby. This includes all the soaps, detergents and other products/chemicals that are used in the shower and hand wash area. This water is called ‘grey water’. Although this sounds bad, the soapy water can have beneficial effects for the surrounding plants. According to Umbra Fisk at Grist.org, gray water contains nutrients that will feed the plants. These nutrients can include dead skin cells, food bits, and residue from the soap. Some soaps used to wash dishes contain phosphate, which is a natural plant fertilizer. The problem however is that exposing plants to too much soapy water, the soil can get toxic causing the plants to die. Also soaps with sodium, boron or chlorine will harm the vegetation and can make the soil toxic. Other potential problems for plants depend on the level of the various chemicals included in the greywater. For instance, some plants will be more tolerant of greywater with substantial salinity; whereas, others may be sensitive. The chemical makeup of the greywater on Pandan island would vary from day to day depending on the amount of tourists that use the showers and their choice in soaps and other cleaning solutions.
Several studies have investigated the effect of greywater on soil composition. A study by M. Travis, N. Weisbrod and A. Gross ("Accumulation of oil and grease in soils irrigated with greywater and their potential role in soil water repellency". *Science of the Total Environment* 394 (2008) pp. 68-74) suggests that oil and grease from greywater can accumulate in soils and affect the ability of the soil to absorb water—essentially making it water repellent. Another study by A. Gross et al. ("Environmental impact and health risks associated with greywater irrigation: a case study" *Water Science & Technology* Vol 52, no. 8 pp. 161-169) found evidence that: "Long term irrigation of arid loess soil with greywater may result in accumulation of salts, surfactants and boron in the soil, causing changes in soil properties and toxicity to plants."

### 5.5 Waste disposal

Waste collection on Pandan island. The local families collect and separate bottles and bring them to the mainland sometimes if they have enough bottles. Other garbage never gets collected and is being dumped in dumpsites on the island or burned. Garbage from Legend hotel gets collected every day and is being brought back to the mainland with the Pacifica or an alternative small boat.

Good solutions for trash collection are already being implemented on the island. On this moment there are no garbage bins and tourists are stimulated to bring back their own garbage to the boats. Of course this not always happens and litter stays behind. Legend collects their own litter every day and takes it back to the mainland.

In the near future Legend is installing garbage bins on the island with recycle options. They will also care for the collection of the garbage and bringing it back to the mainland for processing. Legend will also donate garbage bins to the local families that live on Pandan island, but they will not collect their garbage. The biggest littering from the local families is at the dishwashing well, were allot of plastics were being littered. Legend is also going to install a composting pile for everyone to use.

### 5.6 Environmental awareness

The environmental awareness on Pandan Island can be indicated as average. In some area this can be greatly improved. This is where this project aims to help. The following chapter is about the analyzes of the environmental awareness on the island.
6. Analysis of environmental awareness

6.1 Introduction
Tourism greatly increased the awareness of the local population and the government. The local population is getting fully alive to the fact that the islands and reefs of Honda Bay are special and can serve as a tourist attraction. The environmental consciousness of some of the foreign tourists and interest of different research facilities and universities in the area also contribute to the awareness the local people have. The City Government also recognizes the value of the environment for tourism. New rules and regulations have been set in place to further protect the area (for example on Pambato Reef) and plans are being developed by the city government to further improve sustainable tourism in the area.

6.2 Tourists
Tourism can function as an incentive for protection and conservation of the environment. The interest of tourists could result in measurements to further protect the environment. It could also generate additional revenues that can be used for protection. The current environmental awareness of most of the tourist could be considered average according to the outcome of the surveys. However observations often conflicted with the survey results. The main problem is that tourists do not get information on what is allowed on the reef and what not. The tour guide never tells them that stepping on the corals or touching them is bad for the corals. As a result of this tourist often step, or even walk on the corals. Another problem is the collecting of starfish by tourists. The crown starfish can be found all around Pandan Island and tourist often like to make pictures of these starfishes. Most tourists however don’t know that starfish are alive and cannot breathe once taken outside of the water. The can also get stressed out and die. Tourists have no knowledge about this, because there is nobody that tells them and there is no information whatsoever on the boats or island with this kind of information.

The same applies for the collection of death corals and shells. According to the survey results 57% of the tourists know that it is against regulations to collect corals of the beach. However it still happens regularly, every day I observed tourist collecting corals and shells of the beach. Littering does not happen too much by tourists and they take most of their garbage back to the boats. Tourists are made aware of this by signs that are placed everywhere on the island that request the collection of garbage and it be taking back to the boats, instead of leaving it on the island.

The environmental awareness of tourists can be greatly improved, especially because tourists indicate that they find it of great importance that the environment is conserved and their willingness to contribute (in both actions and money) is fairly high. Interviews with tourist also indicated that most of the tourists are enthusiastic to learn more about the environment and are willing to help wherever possible. Another positive effect of this is that tourists correct each other if they have more knowledge about the environment and are more confident about what is allowed and what not. The knowledge and awareness of the tourist is further discussed in paragraph 6.4.

6.3 Boatmen
The boatmen of Honda Bay play a very important role in conserving the bay, especially the coral reefs. The boats can have a huge impact on the environment when operated in a wrong way. The current environmental awareness of most of the boatmen could be considered average according to the observational research and interviews conducted with the boatmen.

The main concern is the sailing over the corals with the rotor turning, the anchoring in corals and tearing up sea grass beds by grounding in them. Another problem is that some of the boatmen go looking for shells that they can sell to the tourist. They sail with big boats to a nearby coral reef and anchor on top of the corals to then walk on the corals to go looking for the shells. I have observed this several times and did some snorkeling in
this area. I saw large pieces of corals which were broken and ripped of due to the anchor and chain ripping the corals apart.

Another concern is that the boatmen give insufficient information to the tourists when it comes to rules and regulations and how the tourist can lower their environmental impact. They give little to no information about corals and in what way the tourist could damage the corals. They also collect starfish for the tourists and make pictures of them. The tourists mostly really enjoy this, but have no idea that it could potentially be harmful for the starfishes.

In essence the boatmen just want to make sure that the tourists have a good time and don’t want to limit them in their actions.

6.4 Surveys

The surveys have been held under tourists from the Legend Hotel for a period of 5 weeks. The surveys consisted of 11 questions including environmental awareness questions. In this chapter the outcome of the most important questions will be discussed. The complete survey, including answers can be found in the appendix.

The first question was about what tourist thought is the biggest environmental issue in Honda Bay. They could only fill in 1 answer. The outcome shows that 50% of the surveyed think that trash and litter are the biggest issue. This is probably due to the visibility of the litter on the islands and sometimes in the waters and that tourists are made aware of this problem with signs. 16% answered with waste disposal what in essence comes down to the same problems. It is notable that 17% of the surveyed indicated coral degradation as the main issue. This is fairly high and indicates that the issue worries tourists. Only 10% of the tourists see pressure from tourism as an issue in the Bay.
The question was; ‘In comparison to other tourists, how important is the environment to you?’ This outcome shows that nearly 50% of the surveyed think the environment is very important. Merely 10% indicates that they do not find the environment very important. This is a positive outcome and means that tourists care for the environment and find it of importance that it is being conserved.

The following up question was about the importance to tourists that Legend Tours is caring for the environment. Again the outcome shows that the tourists find it of great importance that their tour operator is caring for the environment and handles according to the rules and regulations.

The next questions were about the knowledge about corals and the impact that tourism can have on them. The first question indicates that 33% of the surveyed knows that touching the corals is bad. This is fairly low. It is notable that 40% think that it is ok to touch some types of corals and nearly 30% of the tourists think that it is ok to touch all of the corals. This knowledge has to be greatly improved and the posters and brochures from this project are adjusted to these outcomes of the survey in order to give the best information to the tourists.

A good thing however is that nearly 50% of the tourists say that they avoid stepping on the corals for most of the time and 33% indicates to always avoid this. This outcome is more positive and shows that tourists know that stepping on corals can harm and damage them.
The following questions was; “It is ok to collect death corals from the beach and take them home with me as a souvenir”. It is good to see that 57% of the surveyed filled in that it is prohibited by law, however respectively 13% and 30% think it’s either ok to collect some corals or just as much as they want. This shows that there is room for improvement in this area.

The outcome of this question was fairly striking because it contradicted greatly with the observational research. Here 43% indicate that it is not ok to pick up starfish, however during the observational research I’ve seen people picking up starfish every day and leave them on the beach while nobody seemed to care to put the starfish back into the ocean. This contradicts with the 43% that says it is not ok and even the 17% of the surveyed that say it is ok to pick them up for less than 1 minute. The reason for this could be that people know it is not really ok to pick the starfish up and leave them on the beach, but that they don’t know exactly why, thus making them care less.

The outcome of this questions shows that the measurements Legend has taken on the island to prevent littering works. The greatest percentage of tourists indicates that they either collect their garbage or leave it in the boat. Merely 10% indicates to litter on the islands and no tourists says to litter in the sea.
The outcome of this question is interesting for the Legend Hotel. The question states if the tourists are willing to pay 100 Peso more so that the Legend Hotel can use this for improvement of their environmental sustainability. The majority of the surveyed answered this with yes. Another 30% is also willing to pay more, however they are divided into 2 groups. As the graph above shows they consist of people that are willing to pay more than 100 Peso (respectively 17% of the surveyed) and people that are willing to pay more, but less than 100 Peso (respectively 13% of the surveyed). Only 17% declined to pay more for environmental sustainability, which is relatively low.

The full list of questions and answers can be found in the appendix. The data of the surveys is, combined with the observational research, used to develop the posters and brochures.

6.5 Signs/brochures
I have created 3 posters and brochures for this project with information about the environment and the impact tourists can have on it.

The brochure is set up as 3 fold duplex print. The brochure is to be used in the boats that carry tourists' through the Honda Bay area. In this brochure the following information can be found:

- A general map of Honda Bay with the location and information of the different islands.
- Snorkeling guidelines.
- Water safety.
- Species list with general information on species of fish, corals, sea grasses and mangroves that can be found in Honda Bay.

The first poster is aimed especially at Pandan Island, with all the information about species that can be found on and around the island. The following information can be found on the first poster:

- A visual image of a cross section of the seafloor around Pandan island.
- Information on mangroves including the species that can be found on the island.
- Information on sea grasses including the species that can be found on the island.
- Information on algae including the species that can be found on the island.
• Information on corals including the species that can be found on the island and an aerial picture of the island.
• Information on starfish including information on how to handle them.
• Information and a species list of fish that can be found in the waters around the island.

The second poster is about snorkeling guidelines when snorkeling in the swimming area of Pandan island. On this poster there are general guidelines on how to protect the reef and how tourists can keep their impact as low as possible.

The posters and brochure can be found in the appendix of this rapport.
7. Analysis of the economic impacts

7.1 Introduction
The biggest earners of tourism in Honda Bay are undoubtedly the tour operators, travel agencies and the government. However, due to the structure of the tours in the local people also profit fairly from the tourists activities. This chapter will give a short description on how these systems and organizations are set up.

7.2 Set up of organizations
There are 2 main organizations that are set up in Honda Bay to support the local people and to give them a livelihood in tourism.

The first one was founded in 1996 and is called HOBBAI. This stands for ‘Honda Bay Boat-owners Association Inc.’ HOBBAI is an organization that makes it possible for local people from the Honda Bay community to make their livelihood with tourism. You can only be a member of HOBBAI if you live inside of the community, outsiders are excluded. Members of the community that own a boat can use this for transporting tourists in the Honda Bay area. In this way it is possible for community members to work in tourism, even if they do not own their own boat. The boatmen don’t own the boats, but can work on them for a set loan per day. The boat owner has to be a member of the community and organization. If they are not from the community, no boat is allowed. This is to protect the livelihood of the people from the Honda Bay community. The money that is generated with the boats gets split between different stakeholders. This is further explained in Chapter 7.3 Furthermore HOBBAI sets up, and pays for different kinds of trainings for the boat men. They for example organize water safety trainings that are given by the Puerto Princesa Coast Guards. It is obligated for the boat men to follow these trainings. When the boat men pass, they get certified by the PPCG. The organization also sets up trainings in environmental awareness and tourists trainings.

The second main organization was founded 2 years later, in 1998. This organization is called SAKAHOBABA which stands for: ‘Samahan ng mga Kababaihan sa Honda Bay’. This is Tagalog for ‘Association of Women in Honda Bay’. This organization helps to give the woman of the Honda Bay alternative employment. They for example set up the shops at the Honda Bay pier for the woman to work in. This was a problem before, the men were working all day on the boats, while the woman would stay at home and only sell dried fish and pass the time with gambling. The organization helped them with trainings on how to run a shop and provided the woman with buildings in which they could run the shops. They also set up funding’s and a money system for the shops. This is further explained in Chapter 7.3 Furthermore they provided the woman with trainings on woman rights and general knowledge. The woman of Honda Bay react very positively on the organization and are helpful that they get help and support to improve their rights and livelihoods.

Finally there were several otherorganizations and NGO’s that were involved in different kinds of development and trainings of the Honda Bay community, among which OXAM Novib and ILAC Foundation.

7.3 Set up of money system
The HOBBAI organization is set up in such a way that the money that is generated with the boats is divided between the different stakeholders. Renting a boat costs respectively 1300 PHP or 1500 PHP, depending on the motor type and capacity of the boat. This money is divided into the following stakeholders:

- 20% goes to the boatmen that work on the boat
- 40% goes to the HOBBAI organization
- 3% goes to City Government
- The remaining 37% goes to the boat owner for providing the boat, the fuel and the repairs.
Of the 40% that goes to the HOBBAI organization, part will flow back to the members. This money is also used to invest in new improvements and for the trainings of the members.

The SAKAHOBA organization makes it possible for woman of the Honda Bay community to rent a shop for a reduced price. The prices are as follow:

- 250PHP rent per month for members of the Honda Bay community
- 500PHP rent for non-members

Furthermore OXFAM Novib sponsored 60,000 USD (citation needed) to help build all the shops at the Honda Bay pier.

7.4 Poverty reduction of local communities

Tourism plays an important role in poverty reduction of the local communities around and in Honda Bay. Like discussed in the previous chapter, organizations help the communities to set up alternative livelihoods in tourism. Interviews with community members show that they react positively on these developments and overall they like to work with the tourists. They generate money with shops, boat rides, tour guiding and transport.

Pandan island is the home of 5 local families that have lived there for a long time. The owner of Pandan island let them live on one side of the island, while the other side is intended for tourists. The main livelihood of these families is fishing. They have their fishing grounds around Pandan island and other parts of Honda Bay. They also generate money with tourism on the island. They have a total of 2 shops on the island in which they sell little necessities like snacks, cigarettes, water etc. They also sell souvenirs on the island like bracelets, necklaces and t-shirts. It is also possible to get a henna tattoo by one of the local artists. A few younger people of the island sell buko (coconut) juice to the tourists. In overall they generate good money with these activities and they are happy that they are able to do this. The owner however does not let them expand their activities, as there would be too much competition for the resto-bar from the Legend Hotel. The local families are also allowed to make use of the facilities from Legend Hotel, like the toilets and showers.

The local families however don’t have any say in the decisions that Legend or the owner makes. In interviews conducted the families say that they don’t mind that they don’t have a say, but that they are just happy that they can live on the island and make some extra money of the tourists.

The biggest fear of all the local communities is that an outside company is going to start tour business in Honda Bay, thus making it harder for the HOBBAI organization to compete against that, or even putting them out of business.
8 Conclusions and recommendations

Sustainable situation?

There are many definitions of sustainable tourism, here I will use the following statement:

“Sustainable tourism meets the need of present tourists and host regions while protecting and enhancing opportunity for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems.”


This definition consists of multiple parts:

- Sustainable tourism meets the needs of present tourists and host regions
- While protecting and enhancing opportunity for the future
- Leading to management of all the resources in such a way that economic, social and aesthetic needs can be fulfilled
- While maintaining cultural integrity, essential ecological processes, biological diversity and life support systems

Tourism in Honda Bay meets the needs of present tourists and host regions. It also meets the needs for local people as they can have their livelihood with tourism and create opportunities for the future. Tourism contributes to the awareness of the need for protection of the environment, but at the same time it puts great pressure on the same environment.

Although fairly good management is already in place and there are some good plans, tourism is not leading to management of all the resources yet. Resources as nature are not managed properly and should be improved to create more sustainability. Ecological processes are disturbed by rotors of boats, anchors, grounding into corals and water pollution.

The factors above illustrate that tourism is not (yet) sustainable in Honda Bay.

8.2 Recommendations

In this paragraph recommendations are made based on the outcomes of this rapport. These recommendations give guidelines on how tourism in Pandan island can get more sustainable. The term ‘guidelines’ is chosen because solutions cannot simply be given for every problem.

Recommendations are given on how negative impacts can be reduced and positive impacts can be increased. In this way the situation on Pandan island becomes more sustainable.

Recommendations for boat routes:
To help preventing that the boats need to sail over the corals and sea grasses, reef mooring buoys should be installed. There are already several, but not nearly enough to facilitate all the boats. From there, tourist can be brought to the island on small pedaling boats. An alternative option would be to make several loading and unloading zones where boats can drop off the tourist and then sail back to moor on a buoy. This loading and unloading zone should change to a different location every so often to help spread out the pressure on different areas. If reef mooring buoys are not available the boats should anchor in sandy areas away from coral and sea grasses so that anchor and chain do not drag on nearby corals or tear up sea grass beds.
The map below shows the improved situation where buoys are installed in the deeper waters and the location of the 4 different loading and unloading zones. These zones should be switched at least every month so that the previous loading and unloading zone has time to recover.

To help prevent boats sail into the corals further away from the island to collect shells, more patrolling by the Maritime Police should be conducted. It is not allowed for boatmen to carry out these activities, but as there is...
very low patrolling the risk is very acceptable for the boatmen. In the 2 months I've spend on the island I have seen 1 Police boat patrolling the waters of Honda Bay. More education on environmental awareness and making them aware of the consequences for their actions on the reef will also help reducing these activities.

**Recommendations for wastewater:**

It is hard to find a good solution for this problem because of the limitations of possibilities. A good solution for the toilet water, or so called ‘black water’ would be to install plastic waste tanks to store all the waste water. These tanks can be removed or emptied. The problem with this is the limitation of expenses and that there is no good way of emptying the tanks and carry the waste water back to the mainland for processing.

The soapy, or so called gray water needs to checked for pH levels, the salinity, the sodium content, and the phosphorous content. In general, greywater is alkaline because of the cleaning products it contains and, as such, should not be used on acid-loving plants (e.g., Rhododendrons). Unless greywater is treated, it is recommended that it not be used to water plants with edible roots and only surface watering should be used to protect edible leaves or fruits from possible bacterial exposure. Storing greywater is not recommended unless it treated for bacterial growth; thus, greywater must be used when it is created.

A solution for the soapy, or so called gray water, would be to not leak the water into the same spot for a long time, but change the drainage spot every week. This way toxic levels cannot build up to such a level that the soil gets toxic, which eventually will negatively affect the fresh ground water on the island. The chance that bad chemicals like sodium, boron or chlorine will leak into the soil however will still exist. A solution for this would be to look into ways of filtering the wastewater before leaking it into the soil. Another option would be to use the gray water for flushing the toilets, but this will be only of little benefit.

More research has to be done to look for other, simpler and cheaper solutions. Like the example of filtration of the wastewater.

**Recommendations for environmental awareness tourist:**

To create more environmental awareness under the tourists, the tour guides and boat men should give a short talk every time new tourist board the boats and go island hopping in Honda Bay. They should give them all the information on the rules and regulations and should be made aware of the negative impacts their actions can have on the environment. The tourists should be made aware by the tour guides and boat men on how they can keep their environmental impact as low as possible. A brochure should be available in every boat with more additional information about the environment and rules and regulations. The brochure that I created with this project could be of great help.

Another improvement would be to put up informational posters and signs on the island. In this way tourists are again made aware of the importance of their actions and at the same time get more interested in the environment. The posters that I created with this project could again be of great help with this issue.

**Recommendations for boatmen and tour guides on environmental awareness:**

More workshops should be set up for the boatmen. They should get more information on the impacts their boats can inflict. They have to get even more aware that the tourist come mainly for a clean environment and the corals and that it is of great importance to conserve them. They should also learn to give tourists information about the environment and set rules and guidelines which the tourists have to follow. The boatmen should learn that they can do this without comprising the great experience they are offering the tourists now. Giving the tourists more information can make them become really enthusiastic and in return get the tourists more concerned about the environment. The tourists will not feel limit in their actions if they know why certain thing are allowed and certain things not. If they understand the importance of the rules and guidelines they will, in most cases, easily accept it.
Recommendations for HOBBAI:
Interviews with the President of the HOBBAI organization, Annaliza A. Magoling indicated that the organization sees tourism as purely positive. They did not see the different aspects of tourism and that it could also have negative impacts. The organization should consider all the aspects of tourism and take also negative impacts into account. Legend hotel should invite the members of the board of HOBBAI to their seminars so that they can anticipate on that and create opportunities to improve.

Recommendations for poverty reduction of local communities on Pandan island:
Their rights could be more respected and their involvement in the decision making could be bigger. It also needs to be ensured that the families can keep their fishing grounds and that they will not be affected by the tourist activities.
There are possibilities for the families to involve in more tourist activities, especially in environmental awareness. They could give small tours on the island in which they give more information to the tourist about the local plants and what they use them for, they can tell more about their fishing methods and even show some of those methods on the island and they can show the tourists were and how they live. In that way tourists become more aware about the importance of the environment to the local people and their dependence on the natural resources.
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