UNIVERSITY OF AGDER

Education for Sustainable Development

Assessing the development impact of environmental education (EE) on Roatan, Honduras.

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This master's thesis is carried out as a part of the education at the University of Agder and is therefore approved as a part of this education. However, this does not imply that the University answers for the methods that are used or the conclusions that are drawn.

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Abstract

This study explores the effect of environmental education for children on Roatan, Honduras. Environmental education of children is often used as a component in conservation efforts. The continuous and accelerating destruction and overuse of natural resources is a serious threat to humans, the nature and environment we depend on for our survival. There is a need to change these trends and it is believed that increased knowledge about the environmental issues, personal and societal values and attitudes towards nature are components that influence people's behavior. The focus on educating children is based on the idea that knowledge, attitudes and behavioral changes will transfer from children to parents. Some studies support this assumed knowledge transfer, however environmental education programs must be designed specifically in order to spur this intergenerational knowledge and value transfer. It is clear that environmental education is important in order to educate and shape future environmentally friendly adults but it is also advised that some focus is given on environmental education for adults. Adults are the ones with the power to act now in order to ensure sustainable development.

For this study, the case study approach was utilized, as well as mixed methods. Quantitative methods were used to measure the population's environmental attitudes, knowledge and their motivational factors for environmentally friendly behavior. Qualitative methods were used to explore and compare people's applied behavior to their quantitative replies.

The study reveals that the environmental education programs to some extent have affected the children's environmental knowledge and attitudes. The results also indicate that some inadvertent knowledge and attitudes transfer from children to parents can have occurred as a result of the programs. However, the programs have not caused a more environmentally responsible behavior among children or parents. The recommendations are therefore that the programs are further developed to last for a longer period of time, to be integrated in the natural science classes in school with educational material, to include action research and to promote activities that involve the parents actively.

Key words: Environmental Education, Conservation and Sustainable Development.

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List of abbreviations

AFE-COHDEFOR	The State Forestry Administration - Honduran Corporation for Forest Development
BICA	Bay Island Conservation Association
BINMP	The Bay Islands National Marine Park
CHEAKS	Childrens Environmental Attitude and Knowledge Scale
CIA	Central Intelligence Agency
CESS	Commitment to Environmental Sustainability Scale
CNB	National Basic Curriculum (*Curriculum Nacional Basico*)
EE	Environmental Education
EIA	Envidonmental Impact Assesment
ERB	Environmentally Responsible Behaviors
EMS	The Environmental Motives Scale
ESD	Education for Sustainable Development
FEE	Foundation for Environmental Education
GEAS	General Environmental Attitude Scale
HDI	Human Development Index
ICF	National Institute of Conservation and Forestry Development, Protected Areas and Wildlife (*Instituto de Conservacion Forestal)*
MBRS	The Mesoamerican Barrier Reef System
MDG	Millennium Development Goals
PMT	The Programme of Working Children
PROHECO	Community-based primary school programs in rural areas
RMP	Roatan Marine Park
SBWEMP	The Sandy Bay and West End Marine Park
SINAPH	The National System of Protected Areas of Honduras (*Sistema Nacional de Areas Protegidas en Honduras*)
UNESCO	United Nation Educational Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
VBN	Value-Belief-Norm model
3 R's	Reduce, Reuse, Recycle

Chapter one: Background of the study

1.0 Introduction

The continuous and accelerating destruction and overuse of natural resources is a serious threat to humans and the nature and environment we depend on for our survival (Fransson & Garling, 1999). There is a need to change these trends, but research show that it is difficult to permanently change people's behavior through interventions. It is believed that a necessary condition for change is an increase in environmental concern and knowledge about the current natural deterioration and it's negative effects for future generations (Fransson & Garling, 1999). It has been recognized for over 30 years now that environmental education (EE) plays a key role in assisting communities and individuals towards understanding the impacts they have on the nature (Hart, 1997; Duvall & Zint, 2010). Furthermore scientists and educators agree that EE helps with fostering the knowledge, attitudes and behaviors necessary to protect the environment and to promote sustainable development (Zelezny, 1999; Ballantyne, Fien, & Packer, 2001; Samuelsson & Kaga, 2008).

Most environmental educators focus on educating children to hopefully provide the next generation with the knowledge, desire, and ability to create a sustainable society (Duvall & Zint, 2010; Damerell, Howe, & Milner-Gulland, 2013). Even though the children are not able to influence large political and societal changes towards a more sustainable development, there is a belief that children have an impact on their parent's environmental knowledge, attitudes and behavior (Leeming, Porter, Dwyer, Cobern, & Oliver, 1997; Ballantyne et al., 2001; Damerell et al., 2013).

This thesis presents findings from Roatan, Honduras, where Roatan Marine Park (RMP) and Bay Island Conservation Association (BICA) have developed and implemented EE programs in the public and private schools. I chose this research area because I have visited the island previously, and I know that it is important to preserve the fragile ecosystems of the island. The area of study is Roatan, one of the Bay Islands, located 50 km off the northern coast of Honduras (Roatan Marine Park, 2013). The Bay Islands form an archipelago consisting of more than 70 small islands and three large islands. Roatan is one of the three large islands

(Forest, 1998). In the following chapter I will provide a more detailed description of the study area and the context.

The main research objectives and questions are presented in Chapter One of the thesis. The research area and context of the study is further presented in Chapter Two. The literature review is presented in Chapter Three and theoretical frameworks for environmental education is presented in Chapter Four. Methodologies used for the study is further presented in Chapter Five, and in Chapter Six I present the empirical findings followed by Chapter Seven where the analysis and discussion of findings, conclusions and recommendations are presented.

1.1 Statement of the problem

Poverty and environmental degradation are connected in complex ways, and unfortunately, poverty can increase degradation. For example, the poor need to exploit environmental resources in order to survive so they may in this regard destroy forests, soils, wetlands, marine ecosystems and water sources. It is not the poor who are responsible for the large environmental degradation, but unfortunately in their situation they often have limited possibility to preserve already scarce resources. This increased exposure to hazards and degradation of natural resources can lead people into chronic poverty (Ahrens & Rudolph, 2006). Economic development and so-called modernization processes can be a source of unsustainability, and overall the environmental impacts induced by human activity can lead to collapse of ecosystems. This leads to less food, less clean water and increase in diseases, which can result in worse conditions for the world's poorest (United Nations Development Programme, 2013).

Sustainable development is the process of change where the exploitation of resources, the orientation of technological development, investments and institutional change are in harmony (Ahrens & Rudolph, 2006). Sustainable development should enhance the current and the future potential to meet human needs. A central issue in sustainable development is environmental degradation (Adams, 2009) and EE is therefore a central part of sustainable development.
It is recognized that Education for Sustainable Development (ESD) is important for the future sustainable development of societies and one important part of ESD

is EE (Samuelsson & Kaga, 2008). ESD is fundamentally about teaching children values and to respect others, the environment, the present and future generations and to show respect for the resources of our planet (Samuelsson & Kaga, 2008). EE is mainly focused on children, but they are not the ones in charge and are limited in decision-making regarding development and a sustainable future for themselves. Some studies show that EE for children also impact their parents, and that there is a knowledge and environmental attitude transfer from children to parents (Leeming & Dwyer, 1995; Ballantyne et al., 2001; Duvall & Zint, 2007; Damerell et al., 2013). EE is therefore potentially an important conservation tool. It is further believed that increased knowledge of the environmental degradation and conservation opportunities will lead children and grown ups to act in more environmentally friendly and sustainable ways. This might not be so straight forward, as there are many factors that influence people's behavior. It is also mots likely that the EE programs must be designed in certain ways, in order to spur knowledge transfer from children to parents (Ballantyne et al., 2001). It is acknowledged that children often know the right thing, but don't always act in the right ways. It is therefore questionable how effective EE is for conservation, meaning that the main conservation efforts and sustainable development must be initiated and led by adults in order to conserve natural resources for future generations. It is clear that EE is important in order to educate and shape future environmentally friendly adults. The aim of this study is to investigate the effect of the EE for children on Roatan.

1.2 Research objectives and questions

1.2.1 Main objective

The main objective is to find out if the RMP and BICA programs have had an impact on the children's environmental behavior, attitude and knowledge. A second objective is to investigate whether or not the parent's have been influenced by their children and changed their behavior, attitudes and environmental knowledge.

1.2.2 Research Questions

1. What have the children been taught and to what extent have they learned and understood the issue at hand? How are they involved in conservation?

2. To what extent are the RMP and BICA programs designed to influence parents?

3. What are the teachers' perceptions of the potential impact the RMP and BICA program have on children and parents?

4. What have the parents learned about local environmental issues and reef conservation from their children?

5. How are parent's attitudes towards local environmental issues, reef conservation and local sustainable development? To what extent has the parents and children adapted an environmentally responsible behavior?

Chapter Two: Research area and context for the study

2.0 Introduction

This section presents information about the research area and provides contextual information of the social, economic and environmental situation in Honduras and Roatan. The chapter also looks at the educational system and situation in Honduras and on Roatan.

2.1 Honduras

Honduras is situated in Central America and borders to Guatemala, El Salvador, Nicaragua, the Pacific Ocean with the Gulf of Fonseca to the south and the Caribbean Sea to the north (European Commission, 2011). The size of the country is just over 112000 km^2 with a population of about eight million. The capital of Honduras is Tegucigalpa.

Map 1: Central America and Honduras

Source: Worldatlas explore your world (n.d).

Honduras is one of the poorest countries in Latin America (Central Intelligence Agency [CIA], 2013). The Human Development Index (HDI) in 2012 was 0.632. Between 1980 and 2012 Honduras's HDI rose by 1.3% and the country is ranked as number 120 out of 187 countries with comparable data. As the HDI of Latin America and the Caribbean region increased from 0.574 in 1980 to 0.741 today, Honduras is below the regional average (United Nation Development Program [UNDP], 2013). Furthermore Honduras has the highest murder rate in the world, the per capita income is the lowest in the region and over 50% of the population lives in poverty. The number of people living in poverty and extreme poverty decreased between 2005 and 2008, but it has increased again since 2009 (European Commission, 2011). The country also has the highest inequality rates in Central America. The income of the richest part of the population is up to 60 times higher than the income of the poorest group of people. Furthermore, during the past 30 years Honduras has transitioned from a military regime (1963 till 1981) towards a democratic rule. Regularly elections have been in place and alternately the two dominating parties *Partido Liberal* and *Partido Nacional* have been in power. *Partido Nacional* is currently in power. Throughout times, and also currently, the parties have had to deal with challenges in stabilizing the economy, the high level of corruption, debt, poverty and crime (European Commission, 2011).

The official language in Honduras is Spanish. Enrollment in primary school is very high, close to 100%, however the educational quality is not good, and drop-out numbers are high (CIA, 2013).

The three main economic sectors are manufacture, agriculture and commerce (European Commission, 2011). Mining and deforestation are important economic exploitations, and this has caused environmental degradation and heightened the vulnerability of flooding and landslides in many areas (European Commission, 2011).

2.1.1 Protected areas and conservation efforts in Honduras

Honduras is located in the northern part of the tropics, and the country has a large variety of climatic conditions considering it's relatively small size (Vreugdenhil, House, Cerrato, Martinez, & Pereira, 2002). The Caribbean islands are semi-dry, the North part of the country has wet humid tropical conditions and there are dry tropical conditions in the South. Furthermore the randomly spread mountains causes sharp differentiations in temperature and humidity within these areas. There can be as much as 10 degrees Celsius difference in temperature and variety in perspiration of 3000mm within a distance of only 20km. These conditions lead to a great variety of species composition and the national list of species is remarkable (Vreugdenhil et al., 2002).

The first conservation related law was the forestry law in Honduras, and it was implemented in 1971. The goal was to protect woodlands and rationalize the exploitation and commercial forestry production (Ludena, 2012). The State Forestry Administration - Honduran Corporation for Forest Development (AFE-COHDEFOR) was established three years later, but these institutions were not fulfilling their mandates. When the country faced depletion of water and natural resources in the mid 1990's, local communities erupted in protest and exposed the problems. They put on pressure so a new legal institutional framework was developed.

The National System of Protected Areas of Honduras (*Sistema Nacional de Areas Protegidas en Honduras*) SINAPH was established in 1993 under the General Environmental Law (Vreugdenhil et al., 2002). The SINAPH is under the management of National Institute of Conservation and Forestry Development,

Protected Areas and Wildlife (*Instituto de Conservacion Forestal)* (ICF), which replaced the AFE-COHDEFOR (Dupuis, 2013). The ICF is again operated under the umbrella of the Ministry of Environment and Natural Resources of Honduras, and is mandated the management responsibilities of the protected areas and national parks included in SINAPH (Vreugdenhil et al., 2002). Because of limited government resources, the ICF delegated the management of some protected areas to NGO's. In 2002 the NGO's were responsible for 21 of the protected areas (Vreugdenhil et al., 2002). BICA was the first of the two Roatan NGO's to cooperate with ICF. The Sandy Bay West End Marine Park (SBWEMP) was originally managed by BICA since 1991, but a Memorandum of Agreement was signed with the ICF in 2005 to allow the RMP to be a co-manager of the reserve (Bay Island Conservation Association [BICA], 2009; Roatan Marine Park, 2013).

According to the 2002 report there were 91 national parks and protected areas in the SINAPH. They comprise about 36% of Honduras land area (Dupuis, 2013). Conservation was seemingly taken seriously; however in 2009 the political situation in Honduras changed dramatically, and through the coup d'etat, a combination of military forces, businessmen, and a large group of the political class came to power. The defense and protection of the woodlands and nature were fragmented as a result of repression and institutional collapse after the coup. The forest protection is suffering from illegal forestry and the legislations are of little use when there are no mechanism for enforcement and no change in the culture of corruption, especially regarding illegal forestry (Dupuis, 2013).

2.1.2 Education in Honduras

Primary education is free and obligatory in Honduras (Republica de Honduras Secretaria de Educación, 2008). Furthermore according to the constitution the primary education is democratic and must cause the development of the pupil's personality and prepare for the civic life and involvement in the democracy. The Honduran school system underwent a transformation from the Sectorial Plan of Education 1994-1997 to a National Basic Curriculum *Curriculum Nacional Basico* (CNB) that was finished designed in 2001. The CNB includes purposes, principles, policies and objectives that guide the transformation of national education. The CNB was the framework for the new national curriculum presented in 2003 (Republica de Honduras Secretaria de Educación, 2008).

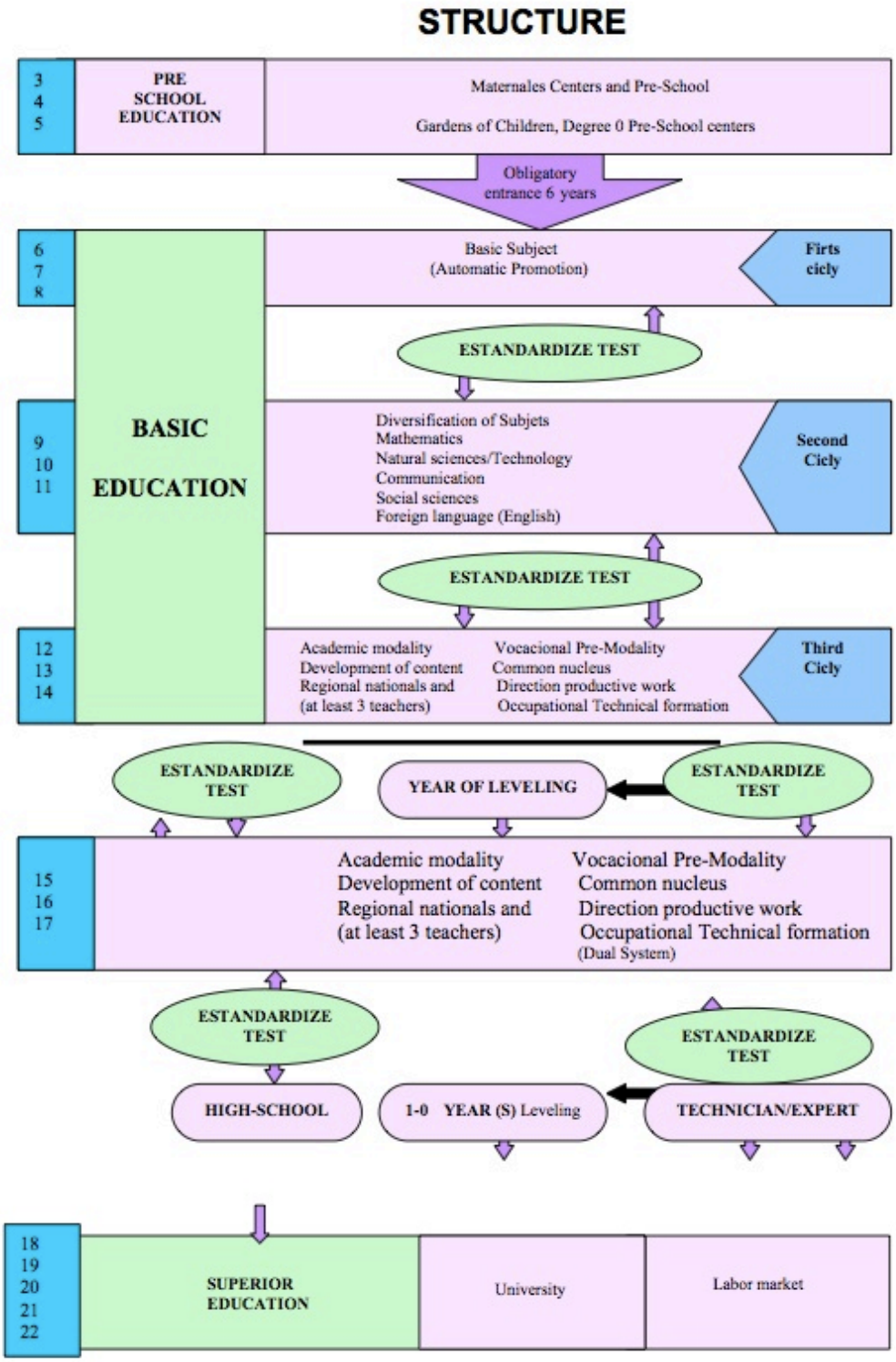
The Honduran education system is organized in three levels: Pre-School, Basic education (Middle High School and High school) and Superior (Republica de Honduras Secretaria de Educación, 2008). The curriculum of the pre-school education focuses on the development of motor essential abilities, the abilities for the knowledge of the body and the elaboration of a concept of itself. Furthermore there is a focus on cognitive and socio- affective aspects needed to learn habits and basic skills in order for the children to take care of the health and prepare them for coexistence with social groups.

The basic education is obligatory for children between the age of 6 and 15 (Republica de Honduras Secretaria de Educación, 2008). The basic education is divided in three cycles of three years where the first cycle focuses on the development of the instrumental skills. The next cycle further deepens the development of the instrumental skills and the third cycle focuses more on scientific and technological skills. At this level the education aims to give the children basic knowledge in the elements of science, culture and technology. It also aims to assure conscious practices of essential values in a harmonic coexistence in society and promotes respect for human rights. Furthermore the aim is that the pupils will develop their critical and autocratic senses, learn to reflect, reason and apply logic as well as develop their creative skills (Republica de Honduras Secretaria de Educación, 2008).

2.1.3 Curriculum and environmental education

The national curriculum for basic education is divided in areas including communication, mathematics, social science, natural science, physical education and sport, technology and technical education (Republica de Honduras Secretaria de Educación, 2008). The natural science object is the study of nature, the structure and operation of beings, methods of science, as well as the complex relations between sciences and the society. The classes included in natural science are physics, chemistry, biology and ecology. There is a focus on protection of the atmosphere, preservation of health, attention to women in the family, and improvement of quality of life. The subjects aim to prepare the children to contribute in the fight against environmental deterioration many are facing and prevent ecological deterioration that threatens the security of livelihoods (Republica de Honduras Secretaria de Educación, 2008).

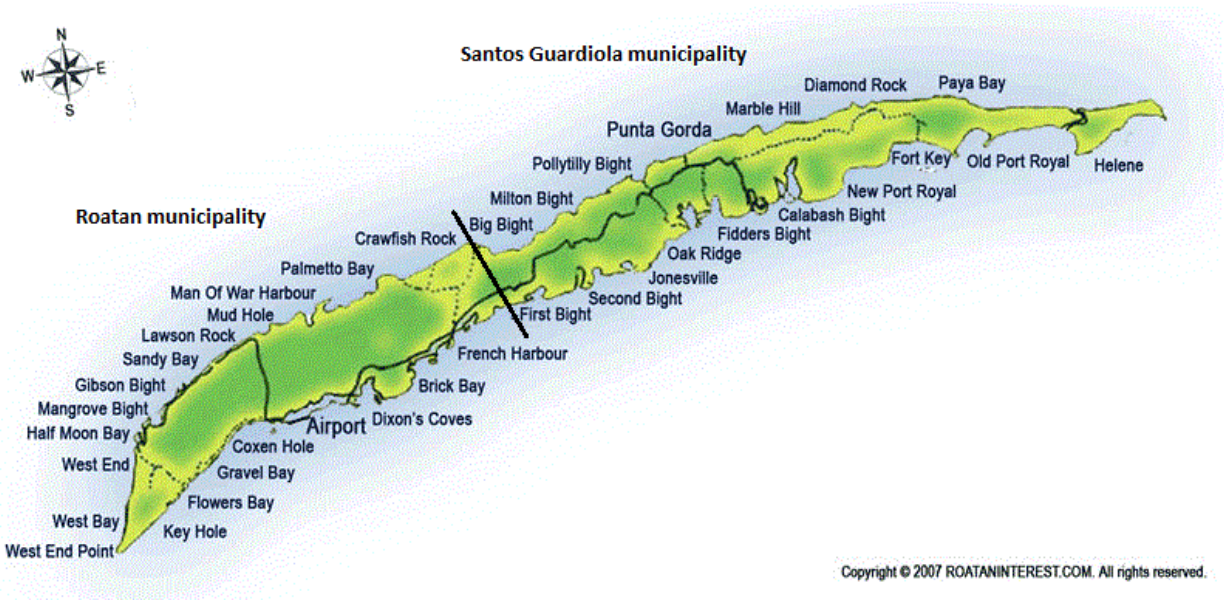
Figure 1: Structure of the Honduran school system



Source: Republica de Honduras Secretaria de Educación (2008)

2.2 Roatan

Map 2: Roatan



Source: Roatan Interest (2007)

The Bay Island are made up of 67 islands off the north coast of Honduras and located in the western Caribbean (The Roatan Education Commission, 2007). Roatan is the largest of the Bay Islands, and is divided in two municipalities, Santos Guardiola to the East and Roatan to the West. It is about 60 km long and 8 km wide with a surface area of 125km^2 (Doiron & Weissenberger, 2014).

According to the 2007 consensus 65000 people live in the Roatan municipality (Raven, Randolph, & Heil, 2010). The majority of the population live in the Roatan municipality, and the whole island have approximately 80000 inhabitants (C. Etches, Personal communication May 5. 2014). Illiteracy rates are about 80% in the rural areas, and 40% in the towns (Raven et al., 2010). The climate on the island is tropical with temperatures between 25°C to 29°C and rainfall exceeding 2000 mm annually (Doiron & Weissenberger, 2014). Furthermore the waters surrounding the island are home to 185 species of fish and other aquatic mammals and reptiles.

The Bay Islands and Roatan are surrounded by the world's second largest and one of the world's most magnificent coral reefs. The islands form the southern-most portion of the Mesoamerican Barrier Reef System (MBRS) also known as the Mesoamerican Reef (Roatan Marine Park, 2013). The MBRS stretches for 625 miles along the coastline of Honduras, Guatemala, Belize and Mexico. It is

estimated that about 2 million people depends on the reef for food, water, livelihood and income. Many local fishermen on Roatan depend on catching lobster, conch, snapper and grouper, and the local tourism industry highly depends on a healthy reef. Furthermore the tourism industry is estimated to account for about US$5 billion a year in the region around the MBRS (The Nature Conservancy, 2012).

The social situation on the island has changed a lot the past 20 years, and people on the island are wealthy compared to the main land Honduras (Doiron & Weissenberger, 2014). This is mostly because of the tourism development, and in 1995 the per capita GDP was US $2860 on Roatan compared to US $580 in Honduras. This has caused an increased inflow of people from the main land seeking work on Roatan, which has changed the demographic weight on the island. Previously Roatan was an English-speaking island, and the island culture was distinct. Many of the mainlanders who can't find work on the island end up living in poor communities in the forests and live of fishing, hunting, selling drugs or other criminal activities. The gap between rich and poor on the island is ever increasing, and large tourism development owners are well off while some people are living in poverty. Despite this development, the crime and murders rates on Roatan are far lower than in Honduras's mainland (Doiron & Weissenberger, 2014).

2.2.1 A brief history of the island

The first known inhabitants on Roatan were the Paya Indians During the Maya reign in Central America (Roatan tourist board, n.d). There is not much information about the Paya Indians, but it is believed that they lived on Roatan as early as 600 AD (Tourism Roatan, 2010). Christopher Columbus came to the Bay Islands and Roatan in 1502. The island has a rich pirate history, and became a hideout for French, English and Dutch pirates looking to conquer Spanish cargo vessels loaded with gold and other valuables heading for Europe. By the mid 17th century there were about 5000 pirates living on Roatan and the Bay Islands. By the end of the 17th century the Spanish had killed or sold most of the pirates as slaves, and took control over Port Royal which is the oldest European settlement on Roatan. Following, not very long after 1979, the British left about 2000 Black Caribs on the island. They established the Punta Gorda settlement and the people

became known as the Garifuna people, which still live on the island today. The Bay Islands and Roatan was under British ruling from the late 1700s until it was officially given back to Honduras in the 1960s (Roatan tourist board, n.d).

2.2.2 Recent development and tourism boom

Roatan is now home to a diverse group of people including the Garifuna Africans, black and white islanders from the Cayman Islands, Belize and other English-speaking islanders who settled on Roatan in the 1800s. Also people from the mainland Honduras that are increasingly looking for work on Roatan and non-Honduran immigrants from the USA, Canada, Italy, UK, and other European countries live on the island today (The Roatan Education Comission, 2007). Already in 1992 it was reported that the development on the island had led to constraints to the natural freshwater supply, electricity was inadequate and no sewage or water treatment plant existed (Roatan tourist board, n.d). In 1990 Roatan did not have electricity, no telephones and no paved roads (The Roatan Education Comission, 2007). A trip to the next town 5 miles away could take hours by foot or boat. There was little daily contact with the main land Honduras, and there was a bigger sense of pride and community on the island (The Roatan Education Comission, 2007). Now there is a power company present on Roatan, telephones, cell phones, Internet and a road that takes you almost through the whole island. All islanders can communicate outside of their small villages, and this has had an impact on the island culture. Tourism can also have a large impact on the sociocultural aspect of the community, especially on a small island (Andereck, Valentine, Knopf, & Vogt, 2005). Examples are increased intercultural communication and understanding and change in traditional cultures. Previously fishing was the major island economy, and a few divers and tourists visited the island to relax and get away from commercial tourism. Tourism has also brought with it a change in employment opportunities for the islanders.

The island has seen a big boom in tourism and during the past 10 years 100s of resorts, Bed and Breakfast's, homes, condos, restaurants, a cruise ship harbor and a golf course has been built (The Roatan Education Comission, 2007). About 1 million tourists visited the island in 2012 (Roatan Marine Park, 2013). The large growth is for some parts due to the new cruise harbor that was finished built in 2009. The port was expected to host 225 cruise ships annually, and the ships

would bring with them about 500 000 passengers every year (Baldwin, 2007). This is a big contrast to the 900 tourists that visited the island in 1969 and the 30000 visitors in 1992 (Forest, 1998).

Outside the main tourist resorts, some of the locals have limited access to clean running water and electricity (The Nature Conservancy, 2012).

The region has experienced a social and economic development over the past few years (Inter-American Development Bank, 2007). Large tourism projects such as hotels, resorts, cruise ship terminal and other residential housing areas have led to an increase in work opportunities on the island such as construction and other tourism related services. The increase in jobs has led to an increase of people migrating from the mainland Honduras (Inter-American Development Bank, 2007). Increased immigration has caused the housing prices to increase, and loss of green areas. For example, in 2002 a 1.5 acre lot on West Bay Road would have been listed for US$ 48000 and the same lot had increased to over US$ 300000 in 2010 (Doiron & Weissenberger, 2014). Furthermore many workers in construction have been employed with low pay and without good contracts, and have been fired before the company has any legal obligations towards the worker. Even when unemployed many of them stay on the island in poor living conditions and this has caused a pressure on the social services. Furthermore this is believed to have contributed to increased crime rates on the island (Inter-American Development Bank, 2007). The tourism industry and development is poorly planned, and also the fishing, agricultural and industrial development is poorly developed and controlled (The Nature Conservancy, 2012). Important mangroves and coastal wetlands are destroyed and replaced by tourist developments. Uncontrolled fishery has led to overfishing and decline in species, and climate change is adding stress to the reef in form of increased water temperatures, which leads to bleaching. Sea level rise, stronger storms and pollution from agriculture and tourist developments further affects the health of the ecosystem and the livelihood of the islanders (The Nature Conservancy, 2012). The main engine for development in Roatan is tourism, which again depends on the natural resources of the island, especially the coral reefs (Inter-American Development Bank, 2007). The social impact of the tourism industry development has not benefited the poorest on the island. For example, most of the cruise ship revenues fall in the hands of less than six families and many of the

poor don't have the skills to work in the tourism related industries such as tour operators, transport services and commerce in general (Inter-American Development Bank, 2007).

2.2.3 The economic and social situation on Roatan

There is in general a large gap between the richest and the poorest people living on the island (Inter-American Development Bank, 2007). There is a large middle class, and outliers in both ends of the economic wealth among the inhabitants (C. Etches, Personal communication February 20. 2014). The income on Roatan is higher than on the mainland Honduras. However, because of tourism and influx of people from the mainland Honduras and other countries such as USA, Canada and Europe, the prices are higher for both food and housing. There is only one electricity provider on the island, and the monopoly enables sky-high electricity prices and bad service. While I was there the electricity was gone at least once a day for about an hour, and many times for several hours. This makes it difficult to operate businesses such as restaurants and production that depend on electric power.

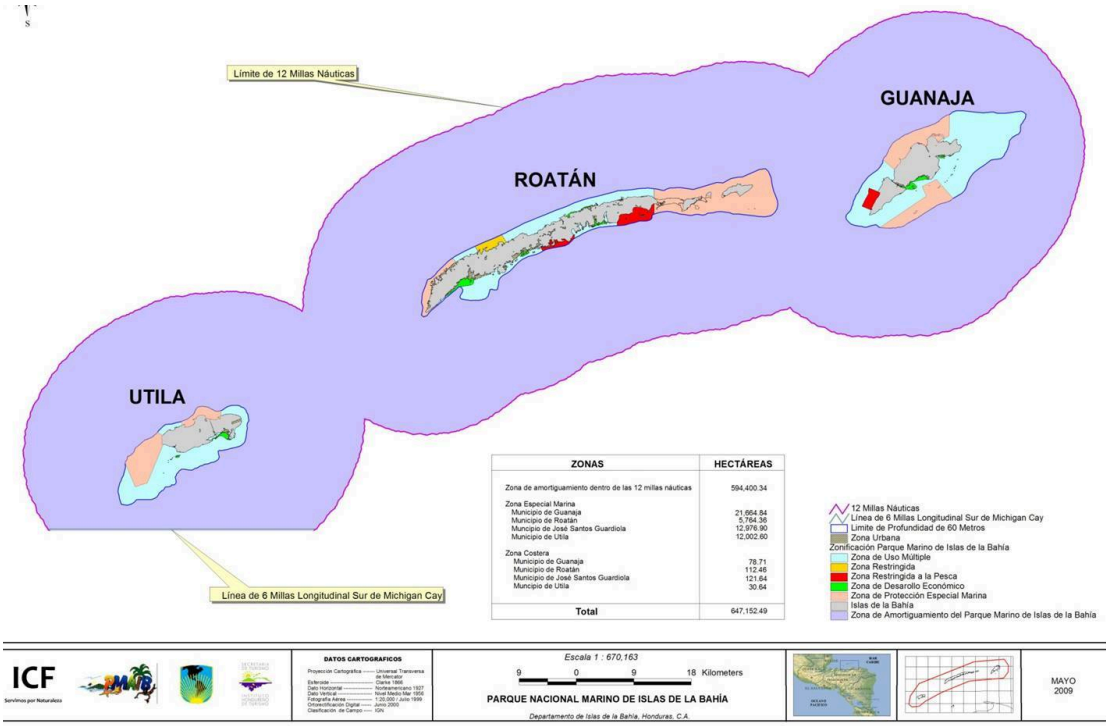
The communities on the island are very different in terms of culture. I was told this by one of my key informants, and also experienced it as I visited many of them during my stay. The local islanders living in West End of course have different culture from the foreigners living in West End, and the islanders living in Sandy Bay have different cultures from the majority of mainlanders living in a newer establishment in Sandy Bay. Also within the islanders there are differences, and the people regarded as locals are black Garifuna people that are indigenous to the island, white people that have been living there since colonial times and islanders mixed between black and white (C. Etches, Personal communication February 20. 2014). From what I understood the groups of islanders live in areas and towns, and have distinct cultures of their own. They speak English and Creole island English, as well as Spanish. Most of them are of middle class and I was told that many of the islanders own some property. For example two of the employees in RMP had built their houses on their family's land, so they lived together as neighbors. They both said it would be too expensive to buy land, and that it was normal that islanders had some land in the family. People from USA, Canada and Europe mostly live in newer areas close to

the sea, or in the tourist areas, with a relatively higher standard than in other areas. The immigrants from the mainland Honduras live in newer settlements a bit away from the coastline, and also in the bigger towns such as Coxen Hole, which is the largest city and the political center of the Roatan municipality.

The Roatan municipality is the most populated municipality, and approximately 80% of the island's population resides in the Roatan municipality. This is also where the airport, cruise ship harbor and main tourism development is located. The poorest people are mainly islanders and Hondurans, while the majority of people are regarded as middle class and is comprised of islanders and Hondurans. The upper middle class consists of American, Canadian and European small business owners or workers in the large diving industry. The upper class is islanders with political power and large business owners and investors both from the island, some from the mainland Honduras and foreigners. From what I saw in West End many of the American, Canadian and European small business owners worked in their business and had hired islanders with good English language skills as they catered mostly to tourists and divers. The Spanish speaking population worked mostly as taxi drivers, local bus drivers, in construction, fishing industry and sold handicrafts and souvenirs either in shops or on the streets and beaches.

2.2.4 Bay Islands National Marine Park and protected areas

Map 3: Bay Islands National Marine Park



Source: Roatan Marine Park (2013)

The Bay Island National Marine Park (BINMP) includes the three largest islands Guanaja, Utila and Roatan. Within the BINMP there are several zones and protected areas.

The protected areas on Guanaja are Half Moon Cay - South West Cay and Michael Rock. On Utila they are Raggedy Cay - South West Cay, Zona de Proteccion Especial Marina Turtle Harbour- Rock Harbour and on Roatan: Zona de Proteccion Especial Marina Santa Elena - Barbareta, Zona de Proteccion Especial Marina Sandy Bay West End or also called Sandy Bay and West End Marine Park (SBWEMP). The terrestrial parks are Port Royal National Park and Municipality of Santos Guardiola on Roatan, Turtle Harbour Wildlife Refuge on Utila and Zona Forestal Reservada on Guanaja (BICA, 2009).

SBWEMP is co-managed by BICA and RMP. The reserve was originally managed by BICA since 1991, but a Memorandum of Agreement was signed with the ICF in

2005 to allow the RMP to be a co-manager of the reserve (Roatan Marine Park, 2013).

SBWEMP is located on the Northwest coast of Roatan and includes the communities of Sandy Bay, West End, West Bay and Key Hole on the south side of the island (BICA, 2009). The SBWEMP was established in 1989 and extends 2 miles outwards from the high water mark and includes 17 miles of coastline and 10400 square miles of reef (BICA, 2009).

BINMP was officially declared a protected marine park in 2010 and covers an area of 647152.49 hectares classified in 3 different zones; Special Marine Zones (*Zona de Protección Especial Marina*), Buffer Zone (*Zona de Amortiguamiento*) (12 nautical miles) and Coastal Zone (*Zona Costera*) (Medina, 2011). In 2012 the ICF published the management plans for the BINMP and RMP aims to extend their co-management agreement with ICF to not only include SBWEMP, but the whole BINMP that is connected to Roatan (C. Etches, Personal communication March 10. 2014). The Bay Islands and the Mesoamerican Barrier Reef system are defined as a high priority area because it is so rich in biodiversity (BICA, 2009).

2.2.5 The Mesoamerican reef

The Mesoamerican reef is the second largest barrier reef in the world. The reef surrounds a rich variety of coastal wetlands, lagoons, mangrove, seagrasses, sandy cays and a common structure, the coral reefs. These ecosystems are homes to more than 500 fish species, 60 coral species, 350 mollusk and other marine mammals, algae and seagrasses (The Nature Conservancy, 2012). Also critically endangered species live in the reef.

The deterioration of reefs doesn't only affect the species and people depending directly on resources like seafood and tourism (Painting, 2011). The coral reefs are integral for the wellbeing of the oceans, are important ecosystems, and can also be described as an underwater rainforest (Painting, 2011). The algae in the reef carry out the photosynthesis, which provides food into the tropical/sub-tropical marine food chain. Furthermore this photosynthesis process binds carbon dioxide, and this makes the oceans the world biggest carbon dioxide sink (Scales, 2009). During the photosynthesis oxygen is released, however this chemical process is affected by temperatures, so if climate change and rising

ocean temperatures continue, the corals are no longer able to continue this chemical process. The absence of the chemical process of the reefs can also have an accelerating impact on global warming as a result of the greenhouse effect.

Another important part of the reef ecosystem is the mangroves, which are connected to the reef ecosystem (Rath, n.d). The mangroves are home to fishes, crabs and shrimps. Furthermore mangroves forests have a dense root system, which traps sediments floating down stream with rivers. The root system can also help prevent erosion from waves and storms (Rath, n.d).

2.2.6 Education on Roatan

Roatan provides elementary and high school education, however only one of three children attends school (Raven et al., 2010). Of these children, only 40% finish 6th grade. Not many students continue their education and attend college or university after completing their primary education in Roatan. The few who do attend college or university do so in Central America or the USA.

According to the report from Roatan Education Commission (2007), there were 33 schools in the municipality of Roatan in 2007. Now there are 28 elementary schools and 7 high schools in Roatan and 28 elementary and 8 high schools in the municipality of Santos Guardiola (C. Etches, Personal communication April 21. 2014). In 2007 14 of the schools in the Roatan municipality were *pre-básica* (kindergarten and nursery school), 16 primary schools (grade 1 to 6) 2 PROHECO (community-based primary schools), 2 C.E.B schools (grade 1 to 9) 1 Media (high school grade 7 to 9) and 2 adult schools that are primary schools for adults. These number changes from year to year depending on how many children are of school age (C. Etches, Personal communication February 5. 2014). Small rural schools can be opened or closed based on demand and number of students.

The classrooms are many times small and crowded and the size of the classes can be as much as 65 students per teacher down to 11 students per teacher (The Roatan Education Commission, 2007). Furthermore 69% of the primary schools have five or fewer teachers.

According to the Roatan Education Commission report (2007), any Honduran who has completed elementary school can become a primary school teacher.

While doing research for the report they could not access personal records of teachers, but through interviews they found that many teachers had not finished a full university degree in teaching, but many were attending weekend classes in order to complete their teacher qualification in order to receive a "*plaza*". As the system is now, any person with completed elementary school that has worked as a teacher for six months, whether or not the person holds a "*plaza*", is considered a permanent employee and can not be fired and removed from the teaching position without just cause (The Roatan Education Comission, 2007). All the teachers I talked to had finished their teacher school and did hold a "*plaza*".

Most community members and parents feel that there are severe problems within the current public education system, and they feel that they have no power to influence and make changes (The Roatan Education Commission, 2007). Also teachers on Roatan feel isolated without support from parents. Many parents don't send their children to school, do not follow up on their children's homework and don't attend parent-teacher meetings. Both parents and teachers distrust the hiring system, and teachers feel that unions are more focused on labor laws than providing the educational leadership teachers need. Union leaders often take out teachers on strike, and there is no system for substitute teachers so the children are left without school that day (The Roatan Education Commission, 2007). As much as 85% of the teachers are from the mainland Honduras, and it is difficult for them to reflect the life and culture of the islanders. Even the best of teachers find it very difficult to teach in Roatan because of lack of supplies, overcrowded classrooms and the attitudes and health of student's parents and family. Additionally, a teacher is not paid well, and is expected to participate and attend community work for 2,5 hours every Saturday, for free.

The school directors often have little control of their schools as they don't manage the curriculum (as it is a national curriculum) or budget, don't have any influence when staff is hired and can not promote, give bonuses, reprimand or fire anyone from their school. Complaints are sent to the central administration office, which passes it on to the national office where the final decisions are made. The process is very timely and often don't result in anything (The Roatan Education Comission, 2007).

Roatan does not have enough schools for all their children, and this results in overcrowded classrooms. Also many schools lack sanitary facilities, and another problem is the lack of maintenance systems. Even newer buildings or recently renovated buildings are already in need of repair and new equipment (The Roatan Education Commission, 2007).

2.2.7 Curriculum

All schools are expected to provide the primary school students with the following classes every week; four hours of mathematics, one hour of handwriting, four hours of science, six hours of Spanish, one hour of art, four hours of social studies, three hours of agronomy, one hour of music, three hours of health, four hours of industrial arts, one hour of orientation for fifth and sixth graders and two hours of recess (The Roatan Education Commission, 2007). Children should attend school for 200 days per year in order to follow the schedule, however a typical school year is 164 days. This means that some of the curriculum is not taught to the students. Furthermore, teachers are only allowed to work five hours per day, but many of them work in different schools, so they teach morning session in one school and afternoon sessions in another school. Some even teach in both elementary and high school, which means that the teachers are not able to adequately prepare their classes every day. Additionally many schools don't have a clock and teachers don't have a watch, so classes are rarely 45 minutes long as they should be (The Roatan Education Comission, 2007).

The Ministry of education has prepared a national standard curriculum for Spanish and Mathematics for grades 1 to 9 (The Roatan Education Commission, 2007). There is also a teachers' guide and books developed in natural sciences. Textbooks often reflect the life and culture of the mainland, not Roatan. Some books have a bit of island history, recipes, dances, folk tales and other traditions (The Roatan Education Commission, 2007). The environmental education should be adapted to fit the area it is taught, but this is rarely the case (C. Etches, Personal communication February 5. 2014).

2.3 Roatan Marine Park (RMP) and their educational and community outreach programs

The Roatan Marine Park (RMP) is a non-profit organization located on Roatan (Roatan Marine Park, 2013). The organization was founded in January 2005 as a collaboration between concerned dive operators and local businesses. The initial goal was to protect the fragile reef and to run a patrol program to prevent exploitation of the reefs.

My contact person in RMP was Christianne Etches. She is born and raised on Roatan and has worked as the director of community development at RMP for the past three years. She is also in charge of the EE program development, execution and implementation.

The RMP operates a large range of activities to protect Roatan's natural resources. In addition to patrols they run education, conservation and public awareness programs. They attend government enforced environmental damage inspections and provide environmental impact assessments (EIAs) on sites where island development is proposed. The organization also assisted in implementing the plastic bottle-recycling program on the island and introduced a "Bags for Life" campaign, which encourages the use of re-usable shopping bags. RMP also manage a mangrove replantation project (Roatan Marine Park, 2013).

The RMP educational program is developed so that a representative from the organization visits the school and gives a presentation about the goal of RMP and the importance of reef protection. Another aim of the presentation is to change the children's perception of RMP as the organization suspects that there is a bit of a negative attitudes towards RMP and their work (C. Etches, Personal communication February 21. 2014). The presentation lasts for 45 minutes, and is most of the time followed up by a field trip where the children get to visit the reef. The field trips are organized as glass bottom boat tours, where the children get to see the reef through the windows in the bottom of the boat, or snorkel tours. RMP also organize beach clean ups where children are involved and get familiarized with the marine garbage and how it affects the reef. The presentations are given every year, to every grade in the school. The tours are given once a year to one grade in the school. The public schools receive the field trips for free, and private

schools pay US$1 per child to attend a field trip. Sometimes RMP organizes beach clean ups with children from a certain grade on a local beach, but the Bay Island coastal clean up, where all school children are invited to participate, is organized several times every year.

The program has been implemented in many schools over the years, and since 2006 more than 4,000 school children in Roatan have been provided with environmental education (Roatan Marine Park, 2013). According to RMP the teachers are mostly positive when the organization approach the schools, and they are willing to give away 45 minutes of classroom time in order for the students to learn more about the reef and reef conservation. The presentations are given to all grade levels and adjusted according to the age group (C. Etches, Personal communication February 5. 2014).

The RMP have different presentations, but the main topic is reef conservation, marine ecosystem, importance of mangroves and seagrass, and waste management (C. Etches, Personal communication February 5. 2014). According to Etches the teachers are not good at adapting science classes to fit the location of the schools and students, and they don't have the knowledge to teach the children about the reef and importance of mangroves and sea grass for the ecosystem and health of the reef. Another aim of the presentation is to change the children's perception of RMP. As the organization had noticed some hostility towards their work, Etches decided to make it a point in her presentations that RMP is not only an organization caring for the reefs, but that the children live in a marine park (many times called Roatan Marine Park) so they are also responsible to protect the park.

Some of the locals think that RMP is trying to prevent people from surviving because they patrol the reef and report illegal fishing. According to Etches this is mostly fishermen and poor unemployed people that try to make an easy catch in order to sell some fish and make some money. The law allows people to fish for their personal use, but they have to obey certain rules about what equipment they can use and where and what they can catch. According to Etches the RMP has had most problems cooperating with the Garifuna people mainly located in Punta Gorda, because they claim to have special rights as an indigenous group on the island. The Garifuna people has been given permission to catch protected

species in only certain areas, however while I was there, a group of Garifuna fishermen was caught spear fishing for turtle (which is a protected specie) outside their area. The RMP patrol caught them and the police came to arrest them. Their arguments for the illegal fishing were that there were no turtles in their area, and they like to eat turtle meat as they have done for hundreds of years. Etches pointed out that the reason why they have no more turtles in their area is their unsustainable fishing and hunting activities.

Image 1: Vet trying to keep the speared turtle alive. Sadly the approximately 60 years old turtle died.

Image 2: Three Garifuna men arrested for illegal turtle hunt.

Source: Hanne M.E. Jelavic

Many poor people fish at the reef in illegal ways, and the RMP is trying to both stop the illegal fishing and teach the fishermen how to fish legally and in ways that are sustainable (C. Etches, Personal communication February 5. 2014).

One program run by RMP is promoting Lion fish hunting, as this is an invasive specie. They try to arrange connections between fishermen and local restaurants so that locals can make a living from Lion fish as well as helping with conservation of the reefs (C. Etches, Personal communication March 10. 2014).

Local cultures have traditionally used conch and turtles as a food source (Roatan Marine Park, 2013). Furthermore they used the shells for decorative or other purposes. It is currently illegal to remove the conch and turtles from the ocean, but no law makes it illegal to sell them. With the rise of tourism industry there is also a rise in demand and market for sales of conch shells. The lobster and some fish are threatened by overfishing as the restaurant demand increase with the increase in tourism. Sea horses are another threatened specie, and it is illegal to catch and sell them. While I was there I several times experienced that someone wanted to sell me some seahorses. The RMP patrol also confiscated seahorses

several times. In order to prevent illegal sales of sea horses, RMP volunteers are walking the beaches talking to tourists about the illegal sales and making them aware so that they don't buy the seahorses. One day the volunteer had been so effective that someone (most likely the people trying to sell seahorses) had reported him to the police for illegal sea horse sales. The volunteer had been arrested and went through interrogations. According to my informant they sometimes did so to get rid of the volunteer for a while and to be able to sell some seahorses in the meantime.

RMP operate several community outreach programs and try to create employment opportunities for the poor. RMP teaches legal fishing techniques, teach fishermen what fish to catch and have made agreements with restaurants so it is easier to sell the legal catch. They have bee hives and honey production courses and operate a local store where people can sell their products (C. Etches, Personal communication February 5. 2014). Furthermore they provide courses so locals can be certified snorkeling guides and diving instructors. The locals don't have to pay for the courses, but they have to complete ten hours of volunteering in order to receive the course. The local must on his own initiative find a volunteer job or effort he can contribute to the local community with. Etches said that she had implemented this approach on purpose so that people had to evaluate and think about how they could contribute to their community. RMP have made some agreements with local diving instructors and they provide the courses as a contribution to the community. These skills open up for many job opportunities, as diving and snorkeling are big activities for the tourists that visit. The businesses such as dive shops and tour operators are keen to hire qualified locals. Until now the positions have been occupied by many foreigners because there have not been enough qualified locals.

RMP also run a mangrove replantation project, was involved in founding the Water Taxi association and also provide and maintain mooring buys so that visitors in their sailboats and yachts can moor without destroying the coral reefs (Roatan Marine Park, 2013).

2.4 Bay Island Conservation Association (BICA) and their educational and community outreach programs

The Bay Island Conservation Association (BICA) was founded in 1990, and opened the first office in Coxen Hole in 1991 (BICA, 2009). BICA is a grassroots organization founded by a group of islanders and foreign residents. Since 1995 BICA has managed the Sandy Bay- West End Marine Reserve. BICA's mission is to protect and promote the sustainable use of the Bay Islands fragile ecosystems, to promote sustainable development of the Bay Islands' natural resources, to create consciousness of the importance of environmental resources of the Bay Islands through individual and community participation and education, and to conserve and restore the islands' habitats and rare species on the verge of extinction (BICA, 2009). BICA also help build environmental awareness among teachers and students.

For the past two years, the topics of BICA's educational program have been the Green Iguana, the Hawksbill Turtle, introduction to fish biology and identification, importance of recycling: the 3 Rs (Reduce, Reuse, Recycle) and importance of protected areas (G. Brady, Personal communication February 10. 2014). The programs tend to include 1-2 hours presentations given by a BICA representative, followed by a hands-on activity.

The programs are implemented at primary (1-6 grade) and secondary (7-12 grade) levels. Last year primary level received presentations on the Green Iguana, the Hawksbill Turtle and the Importance of recycling: the 3 Rs. In addition, two schools were chosen to work with and develop a play on the importance of recycling. A recycling fair was held where students made usable products out of reusable materials. A drawing contest was held between primary schools where the theme was the green iguana. Additionally 6 graders went on trips to the protected area via the glass bottom boat. The main focuses of the BICA programs have changed over the years, but they do have an education program every year (G. Brady, Personal communication February 10. 2014).

Last year secondary level received presentations on the Green Iguana, the Hawksbill Turtle, introduction to fish biology and identification, importance of recycling: the 3 Rs and importance of protected areas. In addition, after the

introduction to fish biology and identification of marine species, the students snorkeled in the protected area where they identified fish and took pleasure in the beauty of the coral reefs. Also, a mural contest between high schools was held where the theme was the Green Iguana. The presentations were first given to the schools in the protected area (Sandy Bay - West End Special Marine Protection Zone) and then to the other schools on the island. There are five schools in the Sandy Bay - West End Special Marine Protection Zone, four primary schools and one high school. The Green Iguana presentation has been given to 16 schools this far, and will continue this year with visitation to an iguana hatchery. Specifically, for the drawing, mural contest and recycling fair all schools were invited.

The Introduction to fish biology and identification for high school students began in 2012 and so far BICA have worked with nine high schools. This year they plan on continuing this, and include and intro to coral biology and identification. Also since 2012 BICA has run the programs the importance of recycling. This includes a presentations followed by recycling fairs for both primary and secondary levels, and last year it also involved a play for two of the schools.

BICA have not included parents directly in their programs. Indirectly, the presentations have been given to specific groups in the communities (G. Brady, Personal communication February 10. 2014). BICA also work with marine monitoring programs in collaboration with local fishermen. They arrange other community outreach programs such as workshops for women where they learn to make jewelry from materials otherwise regarded as waste.

2.5 RMP and BICA strategies for conservation management and community outreach

The two organizations try to educate the children and communities. RMP wants the communities to take control over and protect their local areas of the BINMP (C. Etches, Personal communication February 20. 2014). French Cay is an example of a local community that took control over their local area and made it a no fish zone. RMP thinks that this is the only sustainable way of implementing conservation in the BINMP. In order to reach this community participation and engagement they aim to educate and help locals so they can fish in legal ways and get training in other occupations than fishery (C. Etches, Personal communication

February 20. 2014). RMP focuses the educational program on elementary schools, but BICA also implements programs in high schools. According to Brady the programs in high school has resulted in some new volunteers wanting to work for the organization.

Chapter Three: Literature review

3.0 Introduction

In this chapter, a review and analysis of existing literature on the topics; the role of education for development, sustainable development, education for sustainable development and environmental education are presented. Furthermore the topic of intergenerational knowledge transfers and children's participation in conservation are presented. Background information on these topics are relevant for the study as it looks at the EE on Roatan as a possible conservation tool and further investigate the knowledge transfer from children to parents.

3.1 The role of education for development and poverty reduction

Education has been identified as an important factor for development, and to achieve universal primary education is one of the eight Millennium Development Goals (MDGs) (United Nations, 2013). Education is a great catalyst for realizing the other MDGs, if it is education of good quality (United Nations Educational Scientific and Cultural Organization [UNESCO], 2013). There is not one single solution for poverty reduction and development, however education is an important base because with reading, writing and mathematical skills one person have the basic prerequisites to learn more (Fujioka, 2002). With basic education people are also more prepared to make informed and good decisions for themselves and their communities. Education enables people to be active participants in the economic, cultural, social and environmental development in their locality. Furthermore, without basic literacy and numeracy skills people have less opportunity for work in a position better than a low wage, low skill job (Fujioka, 2002).

Education also promotes better health because it makes people more prepared to prevent diseases (UNESCO, 2013). Girls' education is very important for improving children health, and for example in areas with high Malaria transmission, the chances of children being affected is 22% lower if the mother have primary education compared to children of uneducated mothers (UNESCO, 2013). Furthermore if the mother has completed secondary education the chances of their children carrying malaria parasites are 36% lower. It can be discussed whether the education in itself causes these differences or whether education has led to different living conditions and living areas and that this is the cause of reduced Malaria cases in educated women. However, education is anyway regarded as important for mothers' and babies' health. Also in cases of diarrhea, immunization and pneumonia the numbers are lower for children of mothers with education (UNESCO, 2013). For example in Honduras the chances of children being stunted or short for their age is 54% if their mothers have less than primary education and only 33% if their mothers have completed primary education (UNESCO, 2013). This again can be related to higher economic income as a result of education and therefore better access to food, but also better knowledge of nourishment and diet for their children. Furthermore education also enables economic growth, enhances job opportunities and higher wages. For example in Pakistan working women with education and good literacy skills earn up to 95% more than women with lower literacy skills (UNESCO, 2013).

Education is also a prerequisite for food security for the poor in many developing countries (Fujioka, 2002). Many rural poor largely depend on agriculture for food, employment and income. In order to compete with global markets and big scale productions there is a need for education, knowledge and skills that can help poor small scale farmers thrive in times of socio-economic change and development (Fujioka, 2002). Poor people are sometimes caught in a vicious circle where they have limited access to education, employment, nutritious food, infrastructures and communication, which are fundamental services that can help people get out of poverty. Education is one of the most important elements that can contribute to get them out of poverty. The skills and knowledge that are needed in order to survive and grow with the society are not natural instincts, and most of these skills must be learned. Family members have no opportunity to pass on these skills if they have never been learned, so education, formal or

informal, is a way of learning the necessary skills (Fujioka, 2002). Education also helps people understand democracy and motivates them to participate in politics and community development (UNESCO, 2013).

Education has been identified as a part of the solution to global environmental problems (UNESCO, 2013). More educated people tend to be more concerned about the environment and support political decision that protect the environment. Again, it can be argued that higher educated people live in a wealthier society with more access to information and they have the money to make choices that are better for the environment. Organic food and fair trade products are more expensive than other products, so only people with enough money can buy the more environmentally friendly and sustainable products. Regarding poor people, they might not have a choice because they are poor, and in order to survive they engage in unsustainable practices. Nevertheless, in order to engage in sustainable practices one must understand what is unsustainable and why. One must understand the complex systems of nature and society and also know what action to take in order to prevent degradation of natural resources (Lysklett, 2013; Hart, 1997).

There has been good progress on reaching the MDGs regarding education for all, however the post 2015 goals for development should be focus on the quality of education (United Nation Children's Fund [UNICEF], 2013). The focus has been education for all, but the type of education and the results education produce among children and adults is very important for the economic and social development.

> Good quality education has been defined as education that equip people with the skills, knowledge and attitudes to: obtain decent work; live together as active citizen nationally and globally; understand and prepare for a world in which environmental degradation and climate change present a threat to sustainable living and livelihoods; and understand their rights (UNICEF, 2013, p. 22).

Furthermore learning must be a focus, and the learning goals must be established and measured (UNICEF, 2013). The level of basic numeracy and literacy skills should be measured, and there must be a focus on including the learning of critical thinking, problem solving, general knowledge as well as life skills into the

education. The indicators of whether such skills have been learned are the ability to use and apply knowledge in different contexts and encompass cognitive, metacognitive and non-cognitive interpersonal skills (UNICEF, 2013). The quality of curriculum, teaching materials, teachers and learning conditions and teaching strategies must be good in order to achieve good learning outcomes. Another focus for improving education is to prepare children, youths and adults for being active citizens and participate in the local development (UNICEF, 2013). Although education is seen as a fundament for development, one must not forget that education for many years have been focused on the economic, political and social development of society (Orr, 1996). Furthermore, the only people who actually lived in sustainable ways on planet earth were uneducated and could not read. They were living in one with nature, and Orr (1996) points out that education is not simply a guarantee for decency, prudence or wisdom. He argues that more of the same kind of education we are involved with today will only lead us further into problems and crisis. For example the notion that with enough knowledge and technology we can manage planet earth is completely off. The way education and the modern society today focus on consumerism and consumption of natural resources is not a way humanity can continue (Orr, 1996). Furthermore increase of knowledge does not lead to increase in human goodness and altruism but rather the individualism and need for personal achievements the modern and developed society promotes. As Orr (1996) sees it, education in the current system of capitalism does not lead to fair and sustainable development.

3.2 Education for Sustainable Development

The UN Conference on the Human Environment in Stockholm 1972 initially shaped the way the world look at the environment today (Sarabhai, n.d). On this conference the Indian Prime Minister Indira Gandhi asked in her speech: “Are not poverty and need the greatest polluters? The environment cannot be improved in conditions of poverty. Nor can poverty be eradicated without the use of science and technology” (Sarabhai, n.d, p. 1). After the Stockholm conference, in 1983, the UN Secretary General established the World Commission on Environment and Development, which became known as the Brundtland Commission. The report Our Common Future, also called the Brundtland report, was among the first to make use of the concept of sustainable development. Twenty years after the Stockholm conference the UN Conference on Environment and Development

(UNCED) was held in 1992 in Rio de Janeiro. The Rio meeting developed Agenda 21, which also emphasized the importance of education for development. In 2002 at the World Summit on Sustainable Development in Johannesburg, education was again pointed out as important for a sustainable future development. The UN declared 2005 until 2014 as the Decade for Education for Sustainable Development, and this show international recognition of the importance education is in the way forward in sustainable development (Sarabhai, n.d).

Education for Sustainable Development (ESD) enables everybody to acquire knowledge, skills, attitudes and values needed to form a sustainable future (United Nations Educational Scientific and Cultural Organization [UNESCO], n.d). ESD involves integrating key issues for sustainable development into teaching and learning. Themes that should be included are climate change, disaster risk reduction, biodiversity, poverty reduction and sustainable consumption (UNESCO, n.d). Furthermore ESD requires participatory education methods that allow the students to take action and empowers them to change their behavior to ensure a more sustainable development. Additionally ESD should focus on critical thinking skills and collaborative decision-making. Education is clearly linked with poverty reduction and sustainability. Marginalized and poor people are heavily affected by poor environmental and socio-economic conditions, and ESD can help implementation of sustainable environmental management and development. This could again improve livelihoods and increase economic security through income opportunities for the poor (UNESCO, n.d). ESD is fundamentally about teaching the children values and to respect others, the environment, the present and future generations and to show respect for the resources of our planet (Samuelsson & Kaga, 2008). It is recognized that ESD is important for the future sustainable development of societies (Samuelsson & Kaga, 2008).

3.3 Environmental Education

One important part of ESD is Environmental Education (EE). EE can be described as an approach, a philosophy, a tool and a profession (Monroe, Andrews, & Biedenweg, 2007). It is applied in many different ways, with many purposes, but in its most basic form, EE involves learning about the environment. It is important to define the environment of which the EE should be concerned with as there are two types of environments educators speak of (Hart, 1997). The one

environment is the built environment and the other is the natural environment and natural resources. The focus of the EE is the natural environment (Hart, 1997). Basically EE is education in, about and for the environment. EE programs often serve different purposes like providing opportunities to explore the nature in the outdoors, inform about conservation and environmental issues and provide the participants the knowledge, and skills that can be used to protect, defend, conserve or restore the environment (Monroe et al., 2007).

> UNESCO's three goals for EE are: to foster clear awareness and concern about economic, social, political and ecological interdependence in urban and rural areas, to provide every person with opportunities to acquire the knowledge, values and attitudes, commitment and skills needed to protect and improve the environment and to create new patterns of behavior of individuals, groups and society as a whole toward the environment (Monroe et al., 2007, p. 205).

The importance of EE was first recognized at the United Nations Human Environment conference in Stockholm in 1972 (Hart, 1997). At that time EE was seen as a top down approach in order to lead to mobilization for conservation in the civil society. In the Tbilisi Intergovernmental Conference in 1977, in Georgia, USSR, an EE framework was established. The focus was less top down and more focused on environmental awareness, knowledge, attitudes, skills and participation (Monroe et al., 2007). Three goals for EE was defined which are the UNESCO goals presented above (Hart, 1997). EE is continuously evolving and a more recent approach focus more attention on social dimension of environmental challenges, more actively address behavior change and to facilitate rather than lead the learning (Monroe et al., 2007).

3.4 Environmental education as a conservation tool

EE is often a large part of a community conservation program such as water conservation projects, energy conservation projects, traditional knowledge of plants and species conservation, air quality and particle sampling, local environmental problems, catchment awareness and land use, endangered flora and fauna, water pollution, species conservation, tree planting, community and beach cleanups and green school projects (Sutherland & Ham, 1992 ; Hart, 1997; Cuerrier, Downing, Johnstone, Hermanutz, & Collier, 2012; Damerell et al., 2013). EE of children is many times used as a conservation intervention (Ballantyne et

al., 2001; Monroe et al., 2007; Damerell et al., 2013). Increased environmental literacy and knowledge can be demonstrated through environmentally appropriate decisions and actions.

Most environmental educators know that there is a need to focus on EE for adults (Duvall & Zint, 2007). Also Sutherland and Ham (1992) recommend that EE programs should aim to reach out to most parts of the community, and not rely on children delivering the message to the adults. However, there are formidable barriers to adult EE education and few educational institutions targeting adults. Therefore there are limited locations where EE programs can be integrated in adult education. Furthermore, adults often have little free time to attend EE programs, and there have been little funds available to deveop EE programs for adults. With these obstacles on hand some claim that it is unlikely that EE for adults will be a part of the conservation strategy (Duvall & Zint, 2007). Hart (1997) points out that an important part of spurring behavioral change and more environmetnally responsible behavior (ERB) among children is to include parents in the EE programs. Also Sutherland and Ham (1992) argues that EE must reach the influential, persuasive and charismatic members of society in order to accelerate a change in a society's environmental behavior. The claim is that when opinion leaders and trend setters adopt environmentally responsible behaviors society is likely to follow. In the western world children and students are becoming more environmentally litterate because EE is increasingly a part of the curriculum. However, parents and grown ups mostly rely on media for EE (Ballantyne et al., 2001). Media can be an effective means of distributing environmnetal knowledge, but it has not been succesful in generating environmental action (Ballantyne et al., 2001).

The main goal of EE for children is to educate and inform the children about the environment and human caused degradation, in order to change their attitudes and behavior towards the environment (Damerell et al., 2013). Attitudes towards the environment are formed at a very early age, and once children have adopted these values and attitudes there is little chance that they will change (Damerell et al., 2013). Children are perceived to be easy to mold into taking care of nature and become more interested in leading a more sustainable lifestyle as they are growing up (Samuelsson & Kaga, 2008). Several studies show that EE have a positive effect on children's attitudes towards the environment, and that it also

increases their pro-environmental behavior (Leeming et al., 1997; Ballantyne et al., 2001). Most of the studies analyzed by Leeming et al., (1997) are from developed countries.

One of the main motivations to undertake conservation and environmental preservation is the desire to protect the environment for future generations (Ballantyne, Connell, & Fien, 1998). It is therefore believed that the process where school students act as catalysts for change, and intergenerational influence among parents and other community members could be powerful tools for addressing current environmental issues. Research and case studies from the Peruvian Andes and Colombia implies that children must be more than just aware of environmental issues in order to become involved in conservation activities (Hart, 1997). According to Hart's research and experience, what he refers to as conscientization (children are conscientisized about the environmental problems through conversations with community members) has a much bigger chance of leading to long lasting environmental concern in children than only being aware of the issues. In this process adults are involved in the learning process as both educators and learners. The aims of the EE program is to teach the children and provide them with knowledge and awareness of fundamental local environmental problems, then go out and do research about the local problems through conversations with locals. Together with the educators the children should come up with solutions to the problem. Then, when the solutions are learned, mostly through hands on activities, the adults (parents) are involved in the learning process. The children are not merely influencing the parents, but the parents are involved in the learning activities (Hart, 1997).

3.5 Intergenerational two-ways value transfer

Increasingly with age, children and adolescents can actively influence their parents' values and attitudes in a positive way (Ballantyne et al., 1998). In a study by Knafo and Galansky (2008) many parents reported that their children influenced their values. The different types of influences were organized in five categories as follows; 1. Passive child influence; when a change in parental values happens because a child is born. This passive influence can also continue as the child grow and enter new stages in life. This influence happens regardless of active child influence, 2. Active child influence, which happens when children

actively try to influence the parent's opinions, or provide parents with information that can indirectly change their values, 3. Differentiation; a change that creates a distinction in parent's values for their children compared to their own personal value and their socialization values. So parents have their own values they don't want their children to have, but want their children to have different values in a social situation, 4. Reciprocal influences are changes in parental values that come with a change in the child's values and 5. Counter – influence that happens when parents change their values in the opposite direction compared to their children (Knafo & Galansky, 2008). This list does not cover all types of influences from child to parent, and other things could also influence the value transition pattern (Knafo & Galansky, 2008). For our study active child influence and reciprocal influence are the processes that are important.

Child influence can also depend on the openness of parents to change, so it is likely that there are personal and cultural differences affecting the value change (Knafo & Galansky, 2008). One of the most efficient ways of value transfer from child to parent noted is where knowledge transfer is included.

Studies by Sutherland and Ham (1992) revealed three routes of transferal of environmental ideology; deliberate transferal, inadvertent transferal and parent-initiated transferal. Deliberate transferal is when children consciously share their knowledge with the intent to teach or change the adult's behavior. Inadvertent transferal is when children unknowingly share their knowledge or school work so that it may change adult's beliefs and behaviors. Parent-initiated transferal is when an adult ask for information from a child because the children has expertise knowledge on the topic (Sutherland & Ham, 1992). In their study from EE in Costa Rica it was revealed that deliberate transferal was rare and that most transferal were inadvertent.

3.6 Environmental Education and intergenerational knowledge transfer

Several studies show that EE of children can enable intergenerational knowledge and value transfers between children and parents (Leeming et al., 1997; Legault & Pelletier, 2000; Ballantyne et al., 2001; Damerell et al., 2013). Most of the knowledge transfer has happened because the EE programs were designed so

that parents were involved in the learning activities, and the programs focused on local issues (Duvall & Zint, 2007). Furthermore, the length of the programs influenced the amount of knowledge and value transfer. The longer and more extensive and interactive the program, the more likely it is that parents learn something from their children (Duvall & Zint, 2007). Also action research, hands on activities and homework projects were found to spur intergenerational knowledge transfer (Ballantyne et al., 1998).

In many families and cultures the conversations between parents and children are rare or often one-sided, and parents mostly act as the expert and leader in the parent-child relationship (Duvall & Zint, 2007). In such cultures it is more likely that an intergenerational value transfer will happen when the EE program is designed so that the children utilize the grown ups knowledge as Hart (1997) recommends, and the program leads to consciensization.

Chapter Four: Theoretical framework

4.0 Introduction

In this chapter the theories used for evaluation of the research is presented. The theories and frameworks for how to make people behave in environmentally responsible ways are presented. Furthermore the theories regarding EE and intergenerational knowledge and value transfer are presented, and the methods chosen and used to measure the environmental attitude, behavior, concerns, knowledge and motivation behind a persons environmental concern are discussed.

4.1 What motivates environmentally responsible behaviors (ERB)

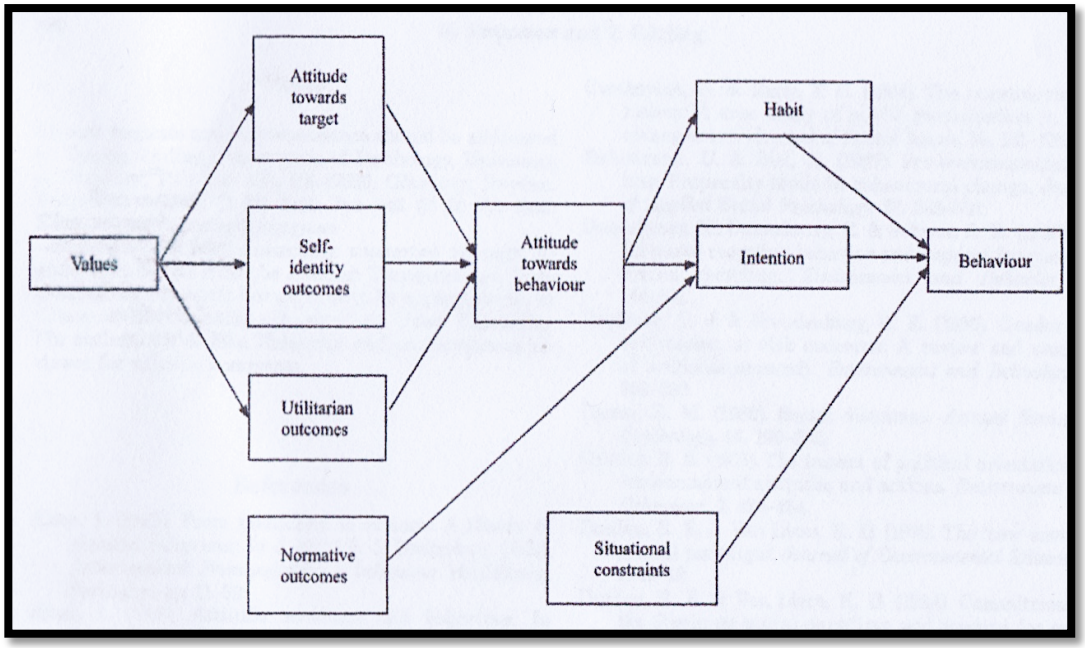
Environmentally Responsible Behaviors (ERB) can be motivated by many factors such as knowledge and attitudes, as well as a connection to and love for nature (Price, Vining, & Saunders, 2009). These are of course important attributes, however traditional teaching may not be enough. Research in Hong-Kong showed that inquiry-based learning, where the pupils pose questions, problems and scenarios rather than just receiving facts, promote both short and long term increase in ERB. Research by Price et al., (2009) also showed that intrinsic and extrinsic rewards helped maintaining motivation and interest in the participation

in a non-formal EE program. This again had led to an increase in ERB among both children involved in the program and their parents. The extrinsic reward of the program was that the children could spend fun time in nature. The intrinsic rewards could be individual but examples are pride, visibility and joy of being part of the program and action (Price et al., 2009). Other studies also show that inquiry-based learning or action research are more effective in facilitating intergenerational influence and improve environmental behaviors in children and parents (Zelezny, 1999; Ballantyne et al., 2001).

The individual's concern about nature can also be regarded as a fundament for whether or not a person behaves environmentally responsible (Bruni, Chance, & Schulz, 2012). If one is not concerned about the environment, why would one care and take action?

Several studies have been done on the relation between socio-demographic factors that influence the differences in people's opinion and attitudes toward the environment. The research has resulted in several hypotheses (Fransson & Garling, 1999). The age hypothesis was presented by Van Liere and Dunlap in 1980 and states that younger people are more concerned with environmental degradation than older people. One reason could be that younger people are less integrated and stuck in the existing social order, and environmental solutions are often seen as a threat to this order. The social class hypothesis was also presented in the 1980s and is building on Maslow's theory of needs published in 1970. The hypothesis states that environmental concern is positively associated with education and income. The upper and middle classes have satisfied their basic material needs, and can therefore focus on satisfying other needs that are higher up in the needs pyramid. Furthermore the residence hypothesis suggests that urban residents are more concerned about the environment than people living in the rural areas. This hypothesis received support in 1990 and a potential explanation is that people living in the cities are more exposed to the signs of environmental degradation. As a final note to these suggested differences in environmental concern, it must be clear that the relationship between socio-demographic factors and environmental concern is in general weak, but research has consistently found that education, residential area and political ideology are most likely to influence the level of environmental concern in people (Fransson & Garling, 1999)

Figure 2: Process model towards Environmentally Responsible Behaviors



Source: Fransson & Garling (1999)

Three components are identified as determinants for the attitude towards a specific behavior; Attitudes toward target, self-identity outcomes and utilitarian outcomes (Fransson & Garling, 1999). Attitudes toward target can be environmental concern. Self-identity outcomes refer to the positive or negative effects on one self following a change in attitude and behavior. The utilitarian outcomes are the practical outcomes of the change (Fransson & Garling, 1999). Even though a persons values and attitudes, self identity outcomes and utilitarian outcomes would lead to a change in attitudes and intention of changing behavior, the normative outcomes can still influence a person to not change. In other words, if the social norms oppose this attitude and behavior, it is less likely that a person will change. Furthermore situational constraints such as financial or lack of opportunities may also have a big influence on peoples behavior. Habit is also a factor, which influences behavior, and habits can be hard to change (Fransson & Garling, 1999).

To sum it all up we must be aware that there are several factors that influences people's values and behavior towards the environment.

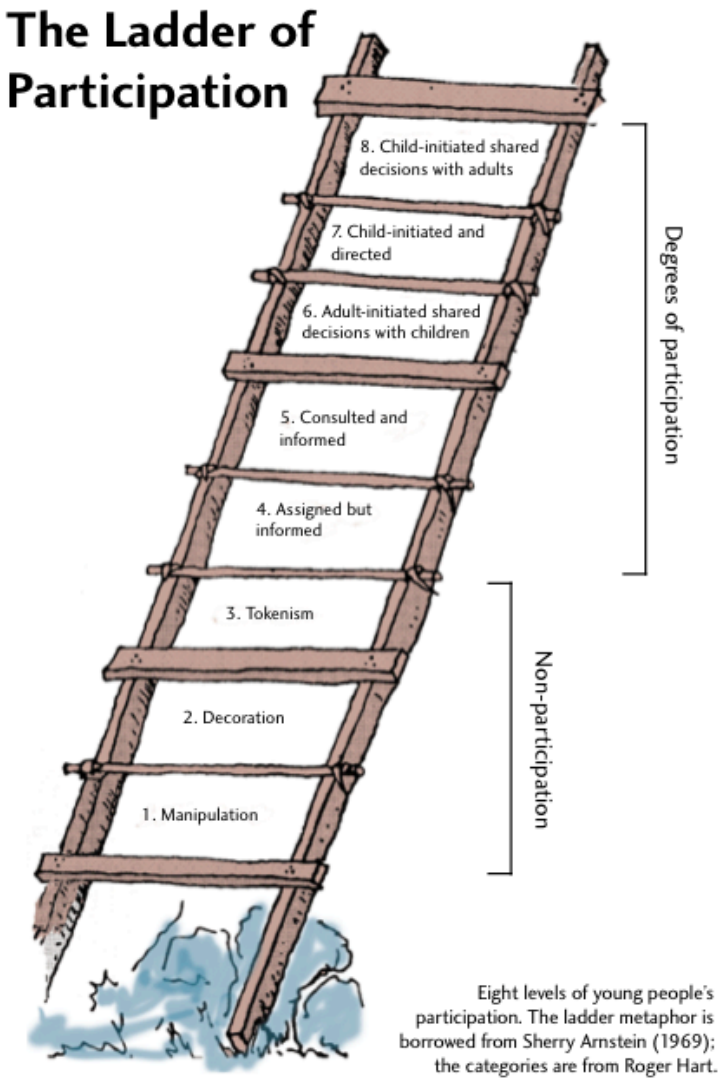
4.2 What makes a child active in community development and conservation

In order to reach sustainable community development it is important to involve and include citizen of all age groups and gender (Hart, 1997). Children's EE is

identified by Hart as an important part of community development. He argues that EE for children needs to be integrated as a part of community development in all countries and communities of the world (Hart, 1997). There are several approaches to involving children in community development and conservation. Hart has developed a ladder to illustrate the different levels of children participation in community development and conservation programs (Hart, 1997).

4.2.1 The ladder of participation

Figure 3: The ladder of Participation



Source: Hart (1997)

The three first categories; Manipulation, Decoration and Tokenism are not regarded as participation even though children are involved at some level (Hart, 1997). Manipulation and deception refers to those project or instances where grown up consciously use children's voices to spread their own message. An

example is publications where children's drawings are used, but the children are not aware that their drawings are in the publication or they have not participated in the selection of the best drawings to include in the publications. An example of deception can be those projects where grown- ups deny that they have been involved so that it will seem like the children are entirely responsible for the project. Decoration is for example cases where children are wearing t-shirts and costumes promoting a cause, but they don't really know much about the cause and are not involved in any projects for the cause. They can for example appear in demonstrations or sing a song for the cause in public gatherings, but these projects have been initiated by the grown ups and children are just participating because they are told to do so. As Heart (1997) argues, tokenism is a difficult issue to deal with because it is mostly executed and planned by adults that are very concerned about the children's voice. The grown ups design projects where children seem to have a voice, but they have not actually participated and their real voice is not heard. An illustration of this may be from children's conferences where the participants are carefully selected by adults in order to pick the most suited for the task, and the children don't have the opportunity to choose who they want to represent them and their voice. It must be said also that children's conferences are not always tokenism, and children participating can also contribute on the highest level of the ladder (Hart, 1997). The goal of EE and community development is to get the children involved on the levels four to eight (Hart, 1997). It must be clear that not all children can and should participate on the highest level. An important principle of participation for children is to remember that children must have a choice. A program should be designed so that every child have the maximum opportunity to choose to participate on the highest ability the individual child can, compared to the age and competencies (Hart, 1997).

The fourth step of the ladder is assigned but informed. This could be large scale environmental clean ups where the activities are planned by grown ups. If the activity is part of a larger educational program the children get an experience and exercise to start their critical reflection of the causes of the garbage problem. Projects on this level, also called the social mobilization level, can be used as a good first stage of more substantial participation projects at a later stage with the same children. Heart (1997) provides another example of projects on this stage;

when children are used as catalysts for adult actions. The children are educated in a certain topic in order to influence the adults at home. An example was in New York City when the major assigned the children to be deputy majors in a time of water crisis. The children learned about the water scarcity and what they could do at home to save water. They received badges and the mission to educate their parents on the issues and teach them what they could do. These projects are top down projects, where adults tell the children what to do, and have only short-term impacts on the sustainable development (Hart, 1997).

The fifth stage on the ladder concerns consultation and information. These are the projects that are designed by adults, but where children understand the process and are consulted and have their opinions considered in the project. An illustration is where adults have initiated EE programs in schools, but where children are involved in assessment of the school and give contributions to what projects should be initiated in order to make the school and it's operation more sustainable and environmentally friendly.

The sixth stage is adult - initiated, shared decisions with children. In order to achieve a real shared-decision project, children must be involved in the project from the beginning and to some degree be involved through the whole process. It can be tempting to involve them only in the suggestion and final design part of a project, such as mentioned when EE is initiated in school and the children are involved in assessment. On this stage the children should also be consulted of whether they want to be involved in an EE program. They may or may not be interested, but they should also be involved in the discussion and through this process may understand why the initiative is good. Furthermore they should be involved in the discussion of what initiatives should be implemented and also the discussion of what can be done to change the situation at school or in the community. Children may have crazy ideas to what should be changed, and it is an important process for them to be involved in the discussions and reasoning why and why not certain initiatives can be implemented (Hart, 1997). Projects at level seven, Child - Initiated and Child-Directed are very rare to find except in child's play. Play is an important arena for learning, and many kindergarten teachers are good at promoting play for learning purposes. It is also so that many children carry out projects secretly where they save animals and protect them in a place hidden from parents. They fear that they will not be allowed to carry out

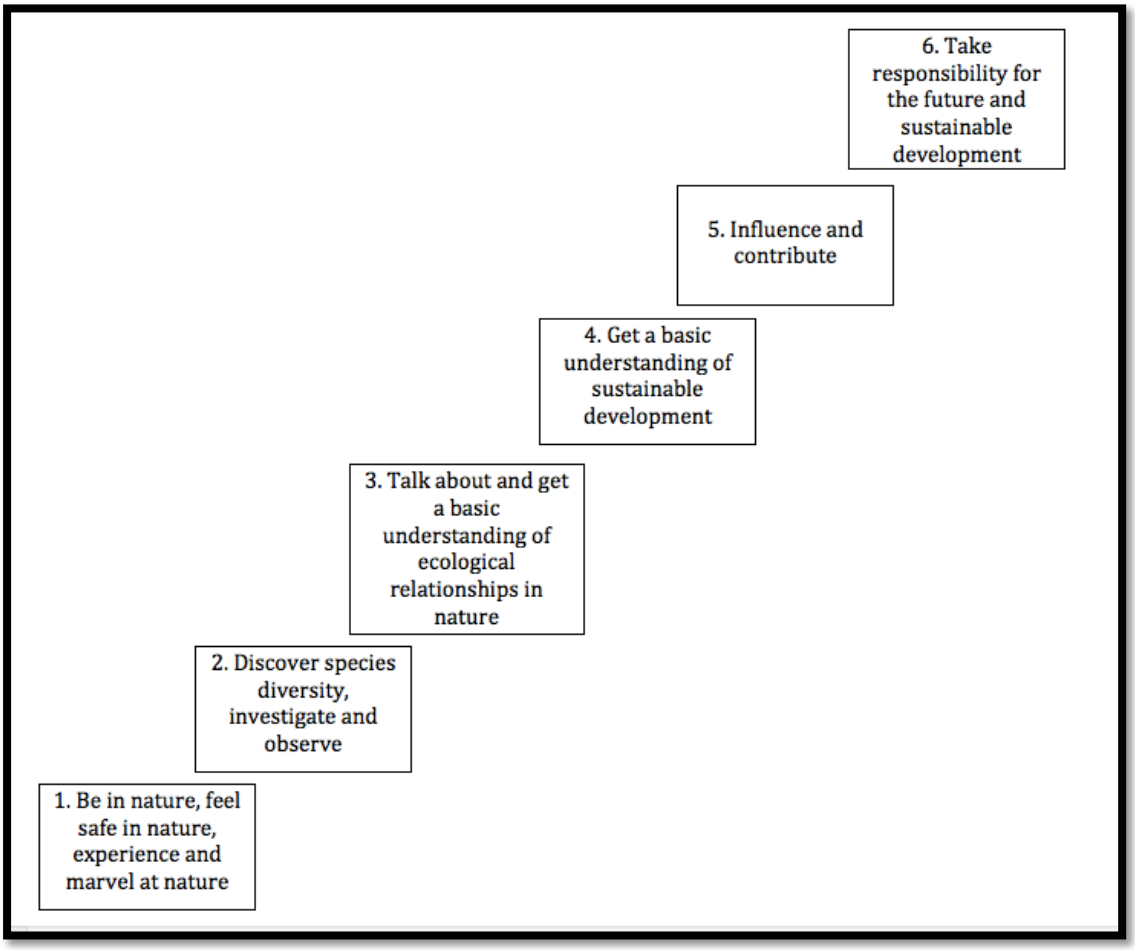
the projects (Hart, 1997). A special trust is needed for the children to involve the adults in their projects, and many times children don't want to subject themselves to adult control. If children have the knowledge and critical assessment abilities to initiate a project, it is crucial that adults support them and let them make the majority of decisions. Hart (1997) further says that the best way for children to participate in community development and conservation efforts it to be engaged in formal groups with regular attendance in the same group and with adult facilitators. Such groups can be youth organizations or youth groups in other NGOs or community organizations.

The ability for children to evaluate environmental issues critically as a guide to action (inquiry-based learning) is identified by Hart (1997) as a necessary basic skill in order for the child to develop competent, responsible environmental behavior. It is not always necessary for the child to engage in thorough investigation in order to act on the problem, but they should learn to act on the basis of critical analysis. Unfortunately, at least to Harts knowledge, there are not many projects involving children in research. Action research is identified as a good method of involving children in research, and it aims to improve a social situation through understanding of it (Hart, 1997; Ballantyne et al., 2001; Monroe et al., 2007; Price et al., 2009). Looking critically at the social and environmental situation of their local communities should be the basic for change. Action research is suitable for all age groups with just a variation of complexity in the research and analysis. For example from the case study on The Programme of Working Children (PMT) in Ecuador the success was based on children's participation in community research. The children identified ecological issues in their community, and after two months of diagnostic work they identified actions. The youths established a community patrol program where they monitored and reported people who contaminated. The main problem was identified as noise and air pollution by vehicles, damage to trees, water pollution, industrial air pollution and solid waste pollution. The youth group also established cooperation with the local police in order to make the program more powerful and influential. The issues reported were illegal by law, and the program helped reduce pollutions in the communities and cities, as well as make people aware of the existing laws (Hart, 1997). As a final recommendation on the action research strategy, the children should also be involved in evaluation of the project. This

could lead them to the conclusion that the action was successful or that another action must be taken in order to deal with the problem (Hart, 1997). Also research by Price, Vining and Saunders show that action research, identified by them as inquiry-based learning, promote both short and long term increase in ERB (Price et al., 2009).

4.2.2 The environmental staircase

Figure 4: The environmental staircase



Source: Modified from Lysklett (2013)

The environmental staircase [miljøtrappa] has also been developed as a strategic stepladder in order to understand the learning processes needed in order for the children to develop into environmentally responsible children that take action (Halvorsen, 1993). The staircase model was developed after a kindergarten project in Norway, and at the time it was developed, the main focus was to get the EE for children away from the 90's focus on non-participation projects as described by Heart (1997) (manipulation, decoration and tokenism). The aim

was to find projects and develop strategies for EE that help form children into taking action for the environment. Six steps are identified as important stages to go through in order to reach the highest level, which is to take responsibility and action for your own future and sustainable development. All children must go through the process step by step, no matter age, and develop through the steps with time and maturity.

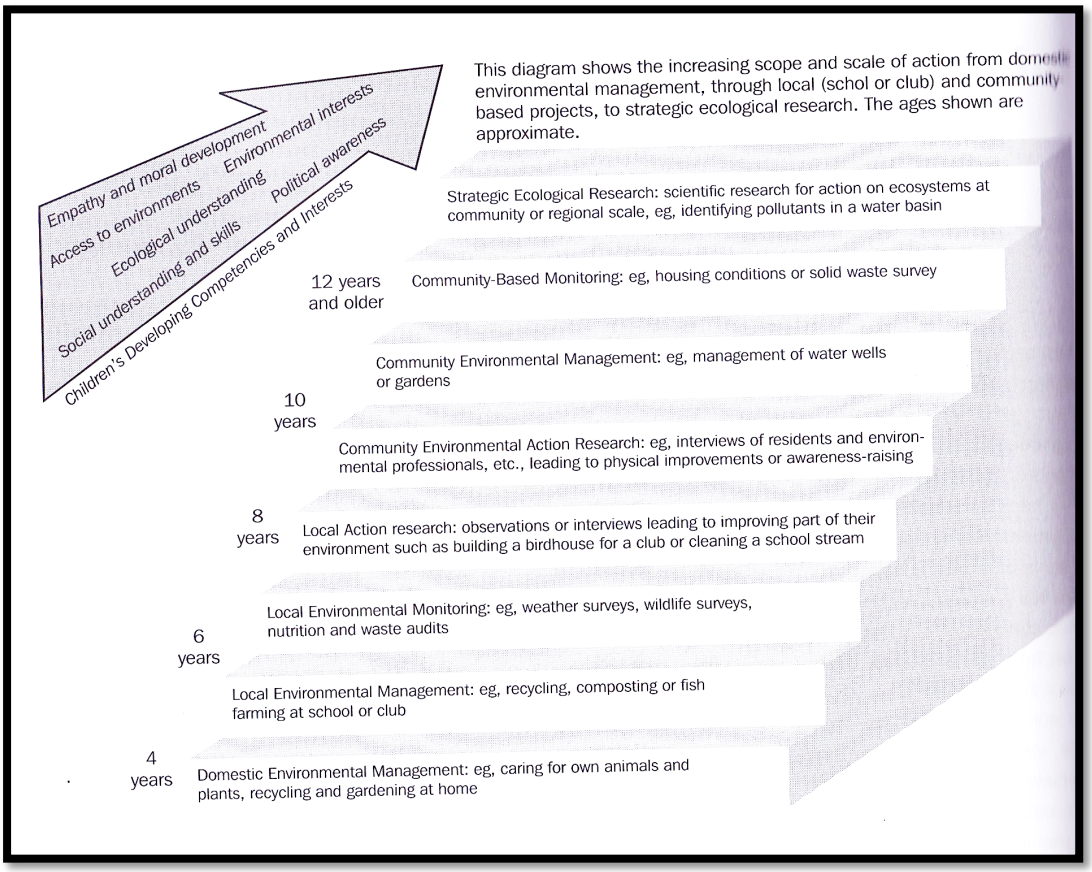
Step one is identified as just being in nature and feel good, experience and wonder about the nature. If children don't have a relationship and love to nature, they are not likely to want to protect it. Furthermore, they must learn about nature and understand it and feel secure in nature. Only then they can be outdoors and enjoy nature, not be afraid of it because it is unknown territory and surroundings. Step two is to discover and explore species and natural systems, research and observe nature. Step three is to talk about and get an understanding of connections in nature. Step four is to get an understanding of sustainable development, step five is to influence and contribute to conservation and environmental action and step six is when the children take responsibility of their future and sustainable development (Halvorsen, 1993; Lysklett, 2013). One must not forget that the extent of participation and action among children is limited regarding age and personal abilities. However, in order to spur environmentalism and action children must be involved in conservation and projects adjusted to their capabilities.

Many children in rural areas are already exploring nature and have a better understanding of it compared to children who grow up in urban areas (Halvorsen, 1993; Lysklett, 2013). When evaluating and designing EE programs it is not always necessary to focus so much on step one and two, as the children may already have an understanding and love of nature. At the time the model was developed one had observed that urban children was lacking knowledge and connection to nature. An important part of the learning and development process of the EE programs was therefore to take the children out and into nature (Halvorsen, 1993). Furthermore it is important to understand the natural processes and how they relate and influence each other in order to take the right actions in the conservation efforts (Lysklett, 2013). Hart (1997) has pointed out that there is no exact way of developing children and people into citizens with long lasting concern for the natural environment, and some claim that just being

exposed to the natural environment could develop this. As I see it, the natural system and society we live in is too complex to understand without specific knowledge of the natural processes and the threats to the environment. Furthermore it is not enough to know and be aware of the threats as this could make one feel sad about the negative development and deterioration of nature and natural resources, so therefore it is important to find ways to protect the environment and take action in the local settings.

The model below is a suggestion by Hart (1997) on what activities could be suitable for children at certain ages.

Figure 5: Children's developing capacity to participate in environmental research, planning and management



Source: Hart (1997)

4.3 A framework for environmental education

The framework for EE includes a vast range of teaching methods and topics developed by EE professionals over the past 30 years. Monroe et al., (2007) have

incorporated several strategies and presented a framework to help educators develop an EE program and help them identify the strategies available to them (Monroe et al., 2007). The framework is built up in categories, stages and steps considered important to enable sustainable action among the learners.

The first step in developing a program is to identify the problem and determine appropriate goals, recognize strategies most appropriate to reach the goal, and evaluate why an intervention works or not.

An EE program should include four categories of intervention: convey information, build understanding, improve skills and enable sustainable actions.

For this section the people who design and deliver the programs are referred to as educators. This could include schoolteachers, instructors and people working for other organizations. Learners are the people or children receiving an EE course.

Another framework based on case studies in the Netherlands also identified a certain and similar framework for EE (Wals, Geerling-Eijff, Hubeek, van der Kroon, & Vader, 2008). Wals et al. (2008) call the elements instrumental and emancipatory learning, while Monroe et al., (2007) has named the goals of the same techniques as skill application and sustainable actions. According to studies done by Biedenweg (2012) skills application has resulted in effective skills building and participation in communal management and conservation (Biedenweg, 2012). Another study show that the framework is applicable and effective, but has weaknesses when applied in informal settings (Oo, Sutheerawatthana, & Minato, 2010). The study concludes that this is specially the case in rural areas in developing countries because the information provider might not have access to up to date information. Otherwise the framework is regarded effective for EE.

Below follow the steps and stages the EE program must go through in order to at the last stage enable action.

4.3.1 Convey information

In this category, and first stage of the framework, the goal is to convey one-way information, meaning that instructors communicate information to learners. In

this step the instructor provide the learner with information, facts, data, knowledge about ways to access more relevant data and build awareness of a specific topic. Information can be conveyed in lectures, presentations, books, videos, news articles, web sites and brochures (Monroe et al., 2007). The goal is to provide details and information that people want or need to clarify issues and increase awareness of environmental issues.

Conveying information usually forms the core of EE programs, but this method excludes participation. However, participation is an important element of learning, and will be included in the next category.

4.3.2 Build understanding

The second stage of the education should build understanding and include a two-way information flow. The aim is to engage the learners so they can better understand the concept and build values and attitudes (Monroe et al., 2007). Understanding implies multiple thinking skills like remembering, recognizing, interpreting, summarizing and explaining. Strategies to facilitate such understanding could be guided nature walks, workshops and public meetings for adults, and inquiry based learning activities for children. Also, an assessment of the program by the learners could be a good exercise for them to build understanding. These strategies are also helpful to uncover misconceptions in new and complex issues (Monroe et al., 2007).

4.3.3 Improve skills

The aim is to improve the learner's skills so they can change practice, performance and behavior (Monroe et al., 2007). The educator facilitates this skill building and should actively incorporate theories of persuasion, social marketing and behavior change. School programs can let youth practice citizenship and give them hands on training techniques and practices (Monroe et al., 2007).

4.3.4 Enable sustainable action

The final purpose is to transform the learners, the issue, the educator and maybe the organization through the process of critically addressing problems (Monroe et al., 2007). Now it is time to let the learners suggest solutions to problems and come up with programs or initiatives. The educator may facilitate and support,

however the product is a specific product developed by those parties involved. For example, when a youth group develops a community service program, they will likely become more involved, feel empowered and be more committed to improving their community (Monroe et al., 2007).

This framework is suggested as a good framework for enabling environmental action among participants, but several factors may influence people, so even if they are involved in an EE program designed within the framework, it does not necessarily mean that they will take action. Also programs that are designed in ways differing from this framework might be effective in spurring environmental action and conservation, however this framework will be used in the analysis of the EE implemented in Roatan.

4.4 Criteria for intergenerational knowledge transfer in EE

Although family communication and culture influences the possibility of information and value transfer, a research done by Ballantyne et al., (2001) recommended that any EE program for children that aim to spur conservation actions in the local society and among parents, should include elements that motivate for discussions with parents (Ballantyne et al., 1998; Hart, 1997). Duval and Zint (2007) reviewed research results from seven studies on EE and intergenerational knowledge transfer, which had been conducted in England, Costa Rica, Australia, Canada and the USA between 1992 and 2003. Their analysis of these studies showed that schools can act as agents for social change at community level. If the programs aim is also to involve community change and participation in community efforts, the teachers and students should be encouraged to take action on local issues. The programs should be designed so that parents are actively involved with for example homework activities, research activities, and class presentations. They also concluded that it is good if the EE projects enable children to redefine their status in the parent-child relationship by involving child and parent in environmental investigation, problem solving and action (Duvall & Zint, 2007). Hands on activities are also an important factor that can stimulate to intergenerational information transfer (Ballantyne et al., 2001). Children like hands-on activities and it is more likely that they would like to share this interest with their parents. Even though parents are not involved in the hands-on activity, the children are likely to tell their parents about their

positive experience. Furthermore, when children were motivated to come up with solutions to the environmental problems, they were more likely to talk to their parent's about it. It is also important to include an action component in the EE program and provide the children with a positive experience where they feel that they actually can make a difference (Ballantyne et al., 2001). Focus on local issues and enthusiastic and knowledgeable teachers are also factors that makes it more likely that children talk to their parents about what they learn and experience through their EE programs (Duvall & Zint, 2007). EE programs that are not designed according to the recommendations mentioned in this chapter may also contribute to intergenerational knowledge and value transfer. Cultural factors can also influence the effect of an EE program, so that a program designed according to the recommendations may not be successful in transferring knowledge and values from the children to parents (Duvall & Zint, 2007).

There are many factors that influence people's environmental attitude and concern, and there is no evidence of whether children influence parents' attitudes or parents influence children's attitudes (Leppanen, Haahla, Lensu, & Kuitunen, 2012). Furthermore, the environmental attitudes may differ in different societies depending on what influences one is exposed to in everyday life as explained by Fransson & Garling (1999) and elaborated on in chapter 6.8.

4.5 Methods used for measuring environmental attitudes, behavior and knowledge

Duvall & Zint (2007) reviewed seven relevant articles about environmental education and the knowledge transfer between children and parents. All seven studies used a quantitative approach in order to investigate whether the children that had received environmental education had a higher knowledge and different attitude towards the environment. The studies also explored if EE had any influence on the parent's attitudes, knowledge and behaviors towards the environment. Some studies were over time where result before and after implementation of the EE programs was compared. Some studies were comparative where test scores of children and parents that had received EE and children and parents that had not received EE were compared (Duvall & Zint, 2007).

Most research on the impact of EE programs focus on measuring environmental attitudes, behavior and knowledge (Legault & Pelletier, 2000; Ballantyne et al., 2001; Duvall & Zint, 2007). It is believed that EE is linked to environmental behavior, and it is assumed that education leads to greater awareness and attitude change, which again improves the environmental behavior (Zelezny, 1999). Based on these previous studies I have chosen some of the same tools for my research. The utilization of the same tools also enables comparison between research results.

For my study the Children Environmental Attitude and Knowledge scale (CHEAKS) was applied to measure the environmental attitudes and behavior of children. I chose to use the Commitment to Environmental Sustainability Scale (CESS) to measure parent's environmental attitudes. Knowledge questions have been developed to measure the knowledge, and The Environmental Motives Scale (EMS) was used to assess children and parents motivation behind their environmental concerns as done by Legault & Pelletier (2000). Another reason for choosing these already developed and tested tools was to ensure the validity and reliability of my research. Following is an introduction and explanation of the different tools I utilized.

4.5.1 Children Environmental Attitude and Knowledge Scale (CHEAKS)

The Children Environmental Attitude and Knowledge Scale (CHEAKS) was developed as a standardized testing tool to investigate the impact of EE on children's attitude, behavior and knowledge (Leeming & Dwyer, 1995). Many researchers develop their own testing tool, and it is therefore difficult to compare the results of the studies. CHEAKS consist of two sub- scales that measure attitudes and knowledge. The attitudes scale is divided so that 12 items measures verbal commitment, 12 measures actual commitment and 12 measures affect. A total scale score is derived from the combination of scores received based on the answers on a 5 point Likert scale (very true, mostly true, not sure, mostly false and very false). The most pro-environmental response to each item is given five points and the least pro-environmental response is given one point. Validity, internal consistency and stability of the tool was tested, and it is evaluated to be a

suitable tool to measure children's environmental attitudes (Leeming & Dwyer, 1995).

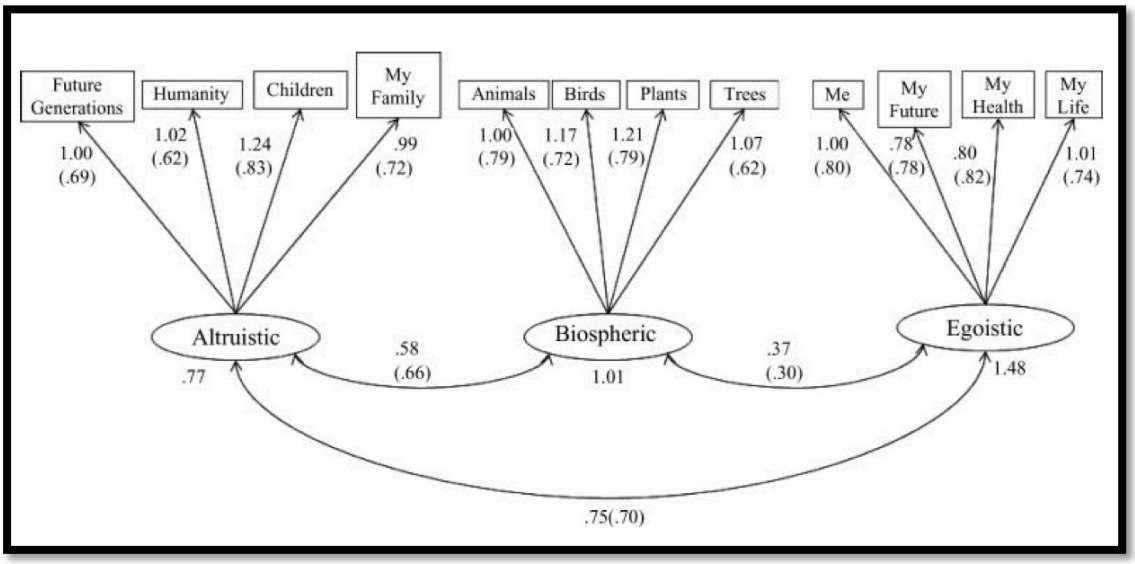
4.5.2 Commitment to Environmental Sustainability Scale (CESS)

The Commitment to Environmental Sustainability Scale (CESS) was developed to measure commitment to environmental sustainability (Alcock, 2012). "Commitment is here conceived to be a quality of individuals which can vary between people and within a person over time" (Alcock, 2012, p. 14). CESS examines a person's commitment to the environment in general terms. How the person will behave towards the environment varies in different social contexts. An individual CESS score is calculated as the sum of the respondent's scores.

4.5.3 The Environmental Motives Scale (EMS)

The Environmental Motives Scale (EMS) was developed based on the Value-Belief-Norm model (VBN) developed by Stern and Dietz (Bruni et al., 2012). The EMS has been utilized in order to quantify the motivation behind a person's environmental concerns. The EMS has been utilized in this research in order to try to understand what motivates the children and parents to conserve and preserve nature. The EMS has been used to assess adults' motivation behind environmental concerns, and have been evaluated and modified by Bruni et al., (2012) to be suited for children as well. The model measures the motivation behind people's environmental concerns, and the reasons are divided in three categories; egoistic, altruistic or biospheric reasons (Bruni et al., 2012). Peoples' environmental concerns are rooted in their beliefs and basic value systems, and can differ compared to the relative importance a person puts on themselves (egoistic), other people (altruistic) or nature (biospheric). When these values are coupled with awareness of the harmful environmental issues and their consequences towards what people value, it could spur behavioral change (Bruni et al., 2012).

Figure 6: The Environmental Motives Scale model



Source: Bruni et al., (2012)

I have chosen to incorporate these three models in my quantitative research (questionnaire) as it measures values, knowledge, affect and a person's motivations for their environmental concerns. As values, affect and knowledge has been the major interest of other studies, and is believed to be a fundament for ERB, I find it important to measure children and parents value and knowledge. Furthermore it can be interesting to learn more about what motivates people's environmental concerns as this could indicate how one best could focus the EE. Should one focus on the personal benefits one can get from acting more environmentally friendly, or on the biological benefits? This could give indications of reasons why the RMP and BICA EE program has had the influence it has, or it could give guidance for how to further develop the programs. These are some of the reasons why it seems useful to use these methods for my research and analysis.

Chapter Five: methodology

5.0 Introduction

The following chapter will introduce the research design and approach, scope of the study, the methods used for data collection, data analysis and sampling, the

reasons why these methods were chosen, and ethical considerations regarding this study.

5.1 Research design and approach

For this study I chose the case study approach because the case study allows the researcher to get an in depth of the case (Bryman, 2008). Based on the previous studies, where they all used quantitative methods, I chose to use quantitative methods in my research. However, in order to open up the study and allow for a better and more in depth understanding of the situation and EE impacts, I also wanted to use qualitative methods. RMP and BICA's work on Roatan provides a suitable context for the research questions chosen to answer this study's overall objective, which is to investigate the impact of their EE programs on the children and parent's environmental behavior, attitude and knowledge.

The case study approach has been criticized because the findings cannot be generalized (Bryman, 2008), yet the case study approach is regarded as a good method since it allows the researcher to utilize several tools in order to get a better insight in the topic explored. The goal of this study was not mainly to produce generalized knowledge, but rather to understand and evaluate the impacts the EE programs have on development and conservation on Roatan. A positive aspect for this research is that the case study allows for the use of several data collection methods.

5.2 Study scope

The data was collected during a period of four weeks on Roatan. This can be regarded as a short field visit, however I have visited Roatan on several occasions before while working on a cruise ship. Even though the visits only lasted one day at the time, I had already established contacts with RMP, and had an idea of the islands geographic, culture and infrastructure. My work as an Eco-Schools coordinator for Foundation for Environmental Education (FEE) Norway and previous visits to the island had spurred my interest in EE in this particular context. My knowledge of the area and its people made it easier to plan and prepare for the field visit. Ahead of the field visit I also conducted phone interviews with representatives from RMP and BICA.

5.2.1 Study area

The research was mainly conducted in the Roatan municipality, which I have described in Chapter Two. This is where the two organizations are located, and have had their main community outreach. I visited only one school in First Bight in the Santos Guardiola municipality. The RMP head office is located in West End, and the BICA head office is located in Sandy Bay. Because of logistics and costs, the two organization's EE programs have mainly been implemented in the schools in the vicinity. Both RMP and BICA strive to reach out to all the pupils in the Roatan municipality. They have not yet had the opportunity to spend too much effort on the Santos Guardiola municipality.

5.3 Research strategy

The research strategy for this project was mixed methods. The goal was to apply both qualitative and quantitative strategies and use triangulation in order to cross-check the results from the quantitative research with results from the qualitative research (Bryman, 2008). A more complete answer to the research questions can often be achieved when mixed methods are applied. By using mixed methods one can generate data, which addresses certain research questions while also simultaneously leave open the possibility of coming up with unexpected novel findings. Furthermore the quantitative research also guided the sampling and interview questions as some people were selected for interviews after the qualitative research had been completed (Bryman, 2008). While visiting the classes I asked teachers if they could assist me in finding interview objects among parents, so some of the interview objectives were found with teachers' help following the completion of the questionnaires. A quick review of the responses also led me to include questions in my interview guide for parents. The data collection method chosen for the quantitative analysis was self-completion questionnaires, and the qualitative data collection methods utilized were phone interviews, semi structures interviews and participant observation.

5.4 Quantitative approach and methods

5.4.1 Self - completion questionnaires

The data collection method chosen for the quantitative analysis is self-completion questionnaires. One set of questionnaires was distributed to the pupils in 6th and 7th grade in the Roatan municipality that had received the RMP and/or BICA EE, and was completed in school while we were there. Another questionnaire for parents was given to the pupils to take home so the parents could answer. I tried to motivate the children to return the questionnaire, so the class who had the highest return rate from parents could win a glass bottom boat trip. The self - completion questionnaire was distributed to 261 pupils in 6th and 7th grade and their parents in seven public and one private school located in Sandy Bay, West End, Coxen Hole, French Cay, French Harbour and First Bight. Only the one school in First Bight is located in the Santos Guardiola municipality and have not been visited by RMP or BICA.

All the questionnaires were distributed while I was visiting the schools together with RMP at the time they had the in-class presentations. While with RMP either Veronica Yanes (intern and presenter for RMP) or Christianne Etches (RMP employee in charge of education) were there to translate my questions to teachers and pupils. They also instructed the children before they started answering the questionnaires.

Some benefits of the self-completion questionnaire are that it is quite cheap and quick to administer and the respondent can complete the questionnaire in peace whenever they want (Bryman, 2008). The negatives are that one cannot ask follow up questions and one do not know who answers it. It is difficult to ask many questions and if the respondents are illiterate, they are not able to answer it. Furthermore it is normal to have low response rate. It is also very difficult to design a good questionnaire that collects all the data one needs. This is why I also chose to collect additional data using qualitative interviews.

The questionnaires were developed based on previous studies, and are composed of questions about demographics, environmental attitudes, behavior and knowledge (Leeming et al., 1997; Damerell et al., 2013). Two self-administered questionnaires were developed to collect paired data from parent and child

(Damell, Howe and Milne-Gulland, 2013). In their research they used the Childrens Environmental Attitude and Knowledge Scale (CHEAKS) in order to measure the students environmental attitudes and knowledge. CHEAKS includes 36 items where 12 items reflect verbal commitment, 12 measure actual commitment and 12 assess affect. The knowledge scale includes 30 questions (Leeming et al., 1997). The 30 questions knowledge part was excluded from this research and replaced by five knowledge questions more relevant for the area and the EE programs developed by RMP and BICA. Furthermore, after testing the questionnaires, the number of questions to assess the environmental attitudes and behavior were reduced. The five poit Likert scale was changed and made in to a three alternative answer. Questionnaires are not commonly used on Roatan, (as in many Central American communities where the education level is low). It took too much time for the children to answer the questions, and it was too confusing for them to have more possible answers than "I agree", "I neither agree or disagree" and "I disagree". With this feedback I found it better to shorten the questionnaire down to five questions for each category. This also increases the liklyhood that the children actually answer the questions with their real opinions, and not just rush through and answer something without actually reading the questions properly. After evaluation I also realized that the remaining questions were sufficient to gather the data I needed. The decisions were also based on previous research by Damell, Howe and Milne-Gulland (2013), where they used five knowledge questions based on the informations given in the EE programs. While Leeming et al., (1997) used the General Environmental Attitude Scale (GEAS) developed by Weigel and Weigel in 1978 to assess the parents environmental attitudes, this study used the Commitment to Environmental Sustainability Scale (CESS) which has been developed based on Weigel and Weigels model (Alcock, 2012). CESS is considered the more recent and updated version compared to the GEAS. The CESS methodology was also a more available tool and I evaluated it to be easier to use than the GEAS. Furthermore it is more likely that other studies will use the more recent tool, and this enable comparison of studies. The questionnares further investigates what motivates their (pupils and parents) environmental concerns as done by Legault & Pelletier (2000). The Environmental Motives Scale (EMS) was used for this purpose (Bruni et al., 2012). I chose the EMS because that was the tool available for such mesurements, and has also been developed to suit both parents and children. The tool can

enable comparison of parents and childrens motivations, which can be an interesting factor. After testing the questionnaire it was decided to change the question a bit so that the respondents were asked to rate with one most valuable and seven least valuable.

5.5 Qualitative approach and methods

5.5.1 Phone interviews

To learn more about the environmental programs developed and delivered by RMP and BICA, phone interviews were conducted with representatives from the organizations (C. Etches from RMP and G. Brady from BICA). During the interviews I established what the children have been taught through their programs, and at what age they have received this information. This helped me decide the age and year level of the sample (6^{th} and 7^{th} grade). These interviews were semi - structured and unstructured. The phone interviews helped me prepare the interview guides and questionnaires for further studies. The interviews were conducted in English. Both Etches and Brady grew up on the island and their first language is English.

5.5.2 Semi structured face - to - face interviews

In order to collect data for the qualitative analysis I conducted semi-structured face-to-face interviews with teachers and some parents of children involved in RMP programs. The interview is a better way to deeper investigate the parents attitudes and knowledge (Bryman, 2008). It also provides a body of information for cross-reference and triangulation. The teachers interview guide was developed based on the research questions and conversations with the RMP representative. The interviews with parents and teachers helped me understand what they considered environmentally friendly behavior, and also what was difficult about acting in environmentally friendly ways. The quantitative questionnaire gave me a picture of the children's and parents' attitudes, and the interviews gave me a more complete picture of what they actually do that is environmentally friendly. I also had the opportunity to further understand what kind of knowledge, if any, was transferred between children and parents. I had developed an interview guide, however while talking to the interview objectives I added and skipped some questions as the conversation evolved. The interview

guide and questions were in English and I used a translator to translate into Spanish during the interviews.

Interviews were conducted with 15 teachers, 10 parents of the 6th grade children in two of the schools, and 25 random people (men and women) who mostly were parents of children in the Sandy Bay public school, or had children in private schools in other towns. Five additional interviews were conducted with people in West End as well as continuous communication and conversations with representatives from RMP and BICA. I also talked to some pupils in French Cay and a few teenagers in French Harbour.

5.5.3 Participant observation

Through the participant observations I was able to observe the behavior of the children, teachers, parents and presenters from RMP and BICA. This gave me additional data to include in my findings. It enabled me to get a more complete picture of the RMP and BICA programs, as well as the actual behavior of children and parents. Although the questionnaire includes a section on actual behavior, this most likely describes the intended behavior. Sometimes in real life people do not behave exactly as they intend, and therefore it is important to include real life observation in the study. I visited all the schools where the questionnaires were distributed and had the opportunity to observe the pupils and teachers behavior in school and during the EE presentations by RMP and BICA. I also did observations on the beach during Sundays when many children and their families spent the day there. On the glass bottom boat trip organized by RMP and snorkeling trip organized by BICA I had the opportunity to observe the children's behavior and fascination with the reefs that the organizations aim to protect. During the walk about while looking for random interview objects in the local communities I saw how people live and got to observe some of their every day life activities. Also by living and being in the areas I had the opportunity to observe every day life and infrastructure regarding waste management and locals' behavior regarding trash and waste management. Furthermore I observed the daily life and activities in the communities mainly in Sandy Bay and West End. I lived in Sandy Bay and it is also where the BICA office is located. West End is the main tourism town in the area, the main beach children and families from Sandy

Bay and West End visit during the weekends, and also where the RMP office is located.

5.6 Sampling

The sample for the questionnaire was selected using the stratified random sampling method. This allows identification of members of the population according to the stratifying criteria (Bryman, 2008). The stratifying criteria in my particular case was that that the school must be an elementary school. The sample were pupils in 6th and 7th grade in schools that have implemented the RMP and/or BICA programs for some time, and the schools that have not been a part of the programs. Pupils in 6th and 7th grade are able to read and write and therefore able to answer the questions without help. Furthermore, they might have learned about the environment and the material taught in the RMP and/ or BICA program from earlier years in school.

The sample for qualitative interviews was selected with the snowball sampling technique, random and purposive sampling. For interview with teachers I made the initial contact while I was visiting the schools, and they again helped me get in contact with some parents. Snowball sampling is described as the technique where the researcher make initial contact with a small group and then get in contact with other relevant people through the initial sample (Bryman, 2008). For interviews and conversations with teachers, RMP and BICA representatives I applied purposive sampling, which is the method that helps the researchers select interview objects with direct reference to the research questions (Bryman, 2008). I talked to 15 teachers of fifth, sixth and seventh grade. As my aim was to test and evaluate the sixth and seventh grade pupils and parents I considered that their opinion on the program was most relevant for my study. They were also the teachers available for interviews as most of them were the teachers of the pupils that completed the questionnaire. Some were teachers of other classes that received the presentation during the school visit. I also interviewed 10 parents of the 6th grade children in two of the schools through purposive sampling. I also walked around and talked to random people in the communities in Sandy Bay and West End, and interviewed 25 people by random sampling.

5.7 Data analysis

The quantitative data was plotted and organized in an excel sheet and further analyzed utilizing the statistical software SPSS.

Firstly the environmental attitudes scores were calculated for both children and parents as instructed by the CHEACKS and CESS models. The highest environmental attitudes (CHEAKS) score achievable for children was 28, and the lowest was zero. The total achievable knowledge score was five and the lowest was zero. The highest environmental attitudes (CESS) score achievable for parents was 28 and the lowers zero. The total achievable knowledge score was five and the lowest was zero. (See appendix 1 for more information on how the data was coded).

For the measurements of what motivates children and parents to care fore the environment (question 13 for parents and 15 for children), the EMS score was calculated as per instruction of the model. The score for each category was calculated. In order to establish if the children and parents were motivated to protect the environment because of egoistic reasons, biospheric reasons or altruistic reasons. The data was further analyzed by univariate analysis and descriptive statistics were generated.

Another interest was to see if there is a variation in knowledge and behavior in children and parents that have been part of the RMP program and/or BICA program and parents of children who have not been part of the programs. The cross sectional research design provides a systematic and standardized method for gauging variations (Bryman, 2008). One negative effect of this research design is that if a relationship between the variables is discovered, it is not certain if this is a casual relationship because the features of an experimental design are not present. Therefore one can only say that the variables are related (Bryman, 2008).

The quantitative data collected from interviews with teachers was organized and categorized. The organized replies were analyzed and discussed using non-statistical techniques. Key themes that emerged from the interviews are identified in the empirical field findings in Chapter Six and discussed further in Chapter Seven.

Also the data from the observation and interviews with parents and people in the community were categorized and key themes are presented in the empirical field findings in Chapter Six. The findings are further discussed in Chapter Seven.

5.8 Ethical considerations

The ethical principals of research is by Bryman (2008) broken down in four main areas: 1. Whether there is harm to participants, 2. Whether there is a lack of informed consent, 3. Whether there is an invasion of privacy and 4. Whether deception is involved.

"Harm to participants can be physical harm, harm to participants' development, loss of self-esteem, stress and inducing the participants to perform a dishonest act" (Bryman, 2008, p. 118). During my studies the participants were not harmed in any way, and the responses were voluntary and anonymous.

As to the issue of lack of informed consent, I always introduced myself and the participants were explained the purpose of the study. The purpose of the research was also written and explained on the parents' questionnaires. When walking around in the community talking to people I always presented myself, my research and how I was working with RMP and BICA while doing my research (Morrow & Richards, 1996).

Before the questionnaires were distributed the children and parents were informed that they were to be answered anonymously. The questions were not of such character that the research was invasive to people's privacy. While walking around talking to people I always asked politely if they had time to answer some questions, and never forced the interview object to answer any questions. All of the teachers, children and other interview objects were clearly informed of the purpose of the research so they were at no point deceived.

Another ethical issue could be the question of involving children in social research (Morrow & Richards, 1996). The ethical issues that apply for research should also apply for children. In addition Morrow and Richards (1996) mention three issues that require special consideration when including children in social research. Children's competencies are different from adults' competencies, which can have implications for the consent process, data collection methods and

interpretation. Children must be explained the purpose of the research, and they should have the opportunity to refuse participation. Secondly, children are also potentially vulnerable, so consideration towards content of the research questions must be thoroughly considered. One must make sure not to share inappropriate information through questions that can harm the child and make the child concerned or afraid. Thirdly, while interpreting the data, one must remember that children are not in the position of challenging the research findings and how they are presented (Morrow & Richards, 1996).

An ethical issue with this research is that the children can feel pressured since there was a competition on how many replies they could gather from the parents. It is important to remember that children often are regarded as less important and less influential in the family setting, and parents might not wish to participate (Morrow & Richards, 1996). This can have negative effect on the children. The pressure could also motivate them to cheat and just fill in the questionnaire for the parents, which can have an effect on the validity of the data.

Regarding the ethical dilemmas with including children in the research I made sure not to expose the children of any new and potentially harmful information. The topic environmental education is by nature not an offensive topic. However, if information about worst-case scenario effects of global warming was exposed to the children, this could have scared them and made them worried.

In regards to consent, the teacher was the one who decided if the children should participate in the research, and regarded it as a test or educational practice. This could be deemed as unethical, however, when children are in school they are obliged to follow the educational decisions done by the teacher. The teachers had the opportunity to read through the questionnaires and decide whether or not they were willing to distribute them to their pupils during class.

Throughout the data interpretation and presentation I kept in mind that children are not in the position of challenging the research findings and how they are presented.

5.9 Challenges and limitations during the studies

The main challenges during my field research in Roatan was related to the time limit, language and the fact that people were not used to answer questionnaires. Even thought I had prepared the questionnaires, some interview questions and conducted phone interviews with representatives from RMP and BICA, the time frame of four weeks limited my studies a bit. If I had stayed longer on the island I would have had the opportunity to visit more schools and talk to more people. In my planning I had forgotten to include the factor of "island time", meaning that most things take more time, and people are quite relaxed towards time frames and deadlines.

As I speak no Spanish, I depended on a translator for my research. My translator was Soguey Ariza, a young woman in her 30's currently living on Roatan. She was originally from mainland Honduras but had lived on the island for the past two years, as well as one of the other Bay Islands. She was educated as a teacher, but had not found a job teaching. She had been teaching Spanish language to foreigners on the island and also worked as a tour guide on the glass bottom boat. While I was there she was working on getting her license as a diving instructor. She had a good knowledge of English and Spanish, and was knowledgeable about the reef, ecosystem and conservation efforts being an active diver and tour guide on the reefs. This made it easier for her to understand the topic of my research and also made it easier for her to convey and translate my questions and the people's answers. She was not working for or connected to RMP in any way. She had only stopped by to ask if they knew of any work just before I contacted the organization. I am pleased with her work, however it must be noted that I do not speak any Spanish, so there is the chance that some information got lost in translation without me being aware of it. After she had translated the questionnaires bot Etches, Yanes and Jackson who works at RMP went through the questionnaires to make sure the translation was good. After each interview Ariza and I went through my notes to make sure I had got the correct information. We also discussed the findings and people's opinions and it seems that I had understood their opinions. Some of the people I interviewed also spoke English so they understood my questions directly and answered a bit in English and a bit in Spanish so I had a better chance to ensure that my understanding was correct.

While visiting schools I was accompanied by RMP or BICA representatives so they could always help translate my questions. During observation I did not have the opportunity to just talk to local people and ask questions. This left me with a few unanswered questions. Also, a few children did not read Spanish so well, even though everything in school is taught in Spanish, and they found it a bit hard to answer the questionnaire that were in Spanish.

The fact that the pupils and islanders in general are not used to completing questionnaires, examinations based on multiple choice and true or false questions seems to create some misunderstanding among the pupils. As we were present while they completed the questionnaires this gave us the opportunity to clarify the misunderstandings. It can be assumed that some of the parents also found questionnaires confusing, having an impact on the results. Therefore it was important to additionally use other methods as well. Since I was associated with RMP and BICA there is a chance that the pupils answered the questions in a way that the RMP and BICA wanted to hear, and not their true opinions. It could also cause them to withhold information about their real opinions about the organizations.

The questionnaires were distributed right after presentation, so this could have affected the answers. They might feel more environmentally aware and their attitudes more pro-environmental after being reminded of the importance of conservation and environmental protection.

The fact that we motivated them with an award for the class that returned the highest percentage of questionnaires from the parents could also disrupt the replies. It is impossible to know whether the children answered the parent's questionnaires just to return something in order to win the price, or if the parents actually answered them. Some children cheated and talked to each other while answering the questionnaires, so the replies might not be their own opinions and the knowledge level could be false.

It was also a bit challenging to get interviews with parents because people were at work and didn't have time to give interviews during the day. I didn't feel safe wandering around in the different neighborhoods in the evening, so this limited the amount of interviews with random locals and parents.

Chapter Six: Empirical field findings and analysis

6.0 Introduction

In this chapter I will present the empirical findings from the study and I provide some initial analysis. The findings will be further analyzed and discussed in Chapter Seven. The findings are organized according to the research objective and questions.

The first objective is to find out if the RMP and BICA programs have had an impact on the children's environmental behavior, attitude and knowledge. A second objective is to investigate whether or not the parent's have been influenced by their children and changed their behavior, attitudes and environmental knowledge. The main findings refer to the quantitative results from the questionnaires distributed to the pupils and their parents that attend schools that I visited together with RMP. The result referred to as the comparative results, are the quantitative responses from the pupils and parent in the school located in First Bight, where they had never received the RMP or BICA presentations. The result from the semi- structured and more informal interviews with parents of school children and random people in the neighborhoods are also presented.

I have first organized and displayed the demographics of the parents that replied in the quantitative questionnaire followed by summary of findings from the research questions.

6.1 Demographics of the respondents

261 questionnaires were distributed to the parents and pupils. 220 of these were distributed to the schools that have been visited by RMP and/or BICA. Only 193 were used. Some were discarded because of lacking information and obvious mistakes such as several answers when it was only allowed to give one answer. Only 121 of the 220 parents responded, and 79 of these responses were used. Of there respondents, 63% were women and 34% were men. 25% of the respondents classified themselves as lower class, 48% as middle class, and 26% as upper class. 0,2% of the respondents belong to the Garifuna people. 38% are

from Roatan, 0,2% from Guanaja, 0,3% from other countries and 53% from mainland Honduras.

41 questionnaires were distributed to the school that had not been visited by RMP or BICA. All the pupils responded and all their responses were used. 21 of the parents responses were received and 20 used. 20% were men and 80% women. 50% regarded themselves as lower class, 25% as middle class, and 25% as upper class. 65% of the respondents are from Roatan, 20% from mainland Honduras, 15% from other places.

6.2 The children's environmental education, their understanding of and involvement in conservation

Through observations and school visits I learned more about how the EE programs developed by RMP and BICA were designed. Furthermore through interviews with teachers I learned more about what they were teaching the pupils about in the natural science class, and whether or not they had implemented any programs developed by other organizations or school projects of their own to promote conservation among pupils.

6.2.1 Natural science and environmental education classes in the schools

All the teachers I talked to were teaching environmental science classes to their pupils. During their teachers education they had learned about natural science, and felt that they were competent to teach the subject. As I understood it, this subject had not been the major focus of the teacher's education, but they had learned enough to teach what the national curriculum and teacher's guides instructed. Only some of the schools had books for all the pupils, and in some schools they only had a teachers guide for the environmental science class and no book for the students. In the cases where they only had a teachers guide they had to find their own material to distribute to the children, and the teachers had to pay for the material themselves. The teachers guide was not very thorough on what ought to be taught in the environmental science classes, and the teachers therefore found it difficult to know what to teach during the classes. In general they covered topics like eco systems, animals, plants, water, energy, earth systems, body and health. All the teachers that had access to one book, or books

for the whole class, said that the book was quite general and did not involve much on what they referred to as conservation and what the presentations from RMP and BICA focuses on. The books and teachers guides did not have any special focus on the local environment on Roatan, and they were therefore happy that RMP and BICA provided information on the topics as they found it important for the children to learn about it. As I understood, the resources were limited, and the teachers had to pay for any extra teaching materials. One parent also told me that they had to pay a few US dollars a month for each child attending school so the teachers could buy toilet paper and other things they needed for the everyday life in school. Some of the teachers I talked to had tried to implement some recycling activities in class, but they said it was too difficult to get the pupils involved so they just stopped it.

6.2.2 The RMP presentation and environmental education

The RMP presentation this year did cover the topics of reef conservation and waste management. It was a Powerpoint presentation given by Veronica Yanes who was an intern at RMP at the time. Yanes had been an intern at RMP for six months. Usually Christianne Etches is giving the presentation. The presentation lasted about 30 minutes and was followed up by questions from the children and for the children. The introduction was a short animation video about waste and consumption. As I was present in classes where it was given, I could see that it caught the children's attention. In my opinion it was a smart and informative video, and the information conveyed in the video was clearly connected to the topic of the presentation. Following the video the presenter introduced herself, the RMP as an organization and me as a researcher. Most of the children had heard of RMP, but did not know exactly what their main focus was. The presenter made clear how the RMP protects the marine reserve and all the species that inhabits the marine reserve. RMP had noticed some dissatisfaction about the organization in the local communities, so they try to make a point to the children that RMP is not just an organization, but the marine reserve they protect; The Sandy Bay and West End Marine Park and The Bay Islands National Marine Park with the area surrounding Roatan, referred to as Roatan Marine Park. It is made clear for the children that they actually live in a marine park, and that all the reefs and oceans surrounding their island are protected and part of the Roatan Marine Park.

The introduction focus of the presentation was furthermore to explain that the RMP organization is here to help protect the marine reserve, and that the children also are important in the job of protecting the marine park. Furthermore the children were taught about the coral reefs. The children were asked whether or not the corals were plants or animals. The majority of them answered plants, and then they were taught that they are animals and alive and very fragile. The presentation also pointed out that it is not allowed to touch corals, and that they are sensitive of inorganic materials like plastic garbage. Such garbage may sink down and land on the corals. That destroys the millions of polyps and their tentacles that surround the mouth opening. If the tentacles are destroyed the polyps cannot eat and will die. This has negative consequences for the fishes and other marine species living in the reef eco systems. The presentation also included pictures showing the similarities of plastic bags floating in the oceans and jellyfish. Yanes told the children that some species, especially the turtles that are an endangered and protected species in the marine park, eat jellyfish. They can easily be confused and eat plastic bags, thinking it is food. This can cause them to die. It is therefore important to clean beaches and make sure that garbage does not end up in the ocean.

During the presentation the children were also taught about the difference of organic and inorganic waste. They were taught how long it takes for different wastes to deteriorate in nature, how plastic and aluminum cans may be reused and what plastic and aluminum can be recycled into. The presentation was rounded up with showing the same video as it was introduced with, as the children probably had a better chance to understand the message of the video after learning more about waste and waste management during the presentation.

During the presentation I observed that the children were tentative in the majority of the classes we visited and the presenter kept their attention. Only in one sixth grade in Sandy Bay some of the pupils were very noisy and restless and did not pay attention. The whole class had about 80 pupils and one teacher. The class was divided in one girl group and one boy group for the presentation. The presentation was given in a classroom without chairs and desks, so they had to sit on the floor. The teacher was also not present at the presentation so this made it more difficult to keep the pupils calm and attentive during the presentation. Otherwise, in the other classes we visited the pupils paid attention and stayed

involved by questions during the presentation so they could answer and be active. At the end of the presentation the children had the opportunity to ask questions, but only in a few of the classes did the children actually have any questions. The presenter also had questions for the children, and if they answered correct they could get a small award. They were very eager to answer, and after a few trials and errors they managed to answer correctly. From my observations and conversations with the Yanes after the presentation, my impression was that they seemed to have a good general idea of the topics, and rarely did anyone give an answer that was completely off. I talked to a few of the pupils and they seemed to understand the information given in the presentation. As shown in next section the knowledge score among pupils were quite high. However, one must remember that the questionnaire was given them just after the presentation, so the information was fresh in memory. This research then does not show whether or not the knowledge stays with the children over time.

All of the schools (except the one in First Bight) I visited had been visited by RMP previous years, and the pupils in those classes seemed to already know a lot of the information conveyed. They were more active at answering questions during the presentation. In the school located in West End, the school closest to the RMP office, they had made some art and decoration in the classroom by reusing garbage such as plastic caps, CDs and cardboard boxes. On the knowledge score this class did have an average score of 3.00, which is a bit under the overall average (mean) score of 3.48. The average attitude score was 17.86 which is also a bit lower than the overall average (mean) knowledge score 20.39. At the time of the visit in this school I had been observing the local community and spent a lot of time in West End. Etches had told me that she had had a difficult time with the pupils from the West End school at a beach clean up. They didn't seem to understand the difference of organic and inorganic waste, and while cleaning the beach some pupils had thrown their own plastic waste in the sand, and picked up seaweed and grass and thrown it in their garbage bag. I had observed some children on the beach burying their empty chips bag in the sand instead of throwing it in the garbage. I therefore asked the pupils if they thought that burying the chips bag in the sand on the beach would make it disappear, and a majority said yes. I also asked if they thought it was more important to clean the beach than to clean the side of the roads and their own yard, and also the

majority said the beach. This made me think that the RMP presentation had taught them about keeping the beaches clean, and how to reuse waste instead of throwing it, which have been main topics of the previous years presentations. It also made me think that the pupils had not understood the difference between organic and inorganic waste and the importance of keeping other areas free of garbage, not just the beach.

When I asked the same question to the pupils in the First Bight school where RMP and BICA have not been present before, the majority answered that it was just as important to pick up garbage in the streets and forests as on the beach.

Only two of the schools I visited received the BICA presentation on the Green Iguana in June - August in 2013. The BICA EE program includes 1-2 hours presentations given by a BICA representative, followed by a hands-on activity. The programs were implemented at primary level.

6.2.3 The children's understanding and knowledge level

After the presentations it seemed like the children had a good understanding and had learned something from the presentations. They knew the importance of protecting the animals and eco systems, and most of them seemed to grasp the concept of organic and inorganic waste. They also remembered how long it took for different material to deteriorate in nature, that the coral reef is an eco system and that the corals are animals and not plants.

The results from the questionnaire show that 20% of the children made no mistakes (five points) in the knowledge test. Furthermore 34.7% scored four points, which is the second highest score. This means that over half of the children had a high score. The scores are equivalent to A and B in the European school system, and I would consider this a high score.

Knowledge score in schools visited by RMP and BICA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	2	1.0	1.0	1.0
	1	8	4.1	4.1	5.2
	2	31	16.1	16.1	21.2
	3	46	23.8	23.8	45.1
	4	67	34.7	34.7	79.8
	5	39	20.2	20.2	100.0
	Total	193	100.0	100.0	

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Knowledge score	193	0	5	3.48	1.164
Valid N (listwise)	193				

In comparison the knowledge score from the First Bight school which had not received the RMP or BICA presentations before was 4.69. The reason why this class had a higher knowledge score could be because they were a smaller class with a better learning environment, and the teacher had a personal interest in biology and conservation. Furthermore none of us (observers) were present at the time the pupils completed the questionnaire as we delivered them the first time we visited the school, and picked them up three days later. At the time we picked them up Yanes gave the RMP presentation to the younger and older pupils. There is of course the chance that some pupils had help from the teacher to answer the questions, or that they helped each other. However, when we were present in the classroom while the pupils completed the questionnaires, some of the pupils were whispering and trying to get help from other pupils, so all the data could be influenced by this possibility that some cheating has happened.

6.2.4 Children's environmental attitudes

As done in previous research regarding EE, I measured the children's environmental attitudes. It is assumed that the higher the environmental attitudes score the children have, the more they are concerned with and involved in conservation.

Environmental attitude score

Score	Frequency	Percent	Valid Percent	Cumulative Percent
5	1	.5	.5	.5
10	2	1.0	1.0	1.6
11	4	2.1	2.1	3.6
12	1	.5	.5	4.1
13	4	2.1	2.1	6.2
14	6	3.1	3.1	9.3
15	6	3.1	3.1	12.4
16	10	5.2	5.2	17.6
17	8	4.1	4.1	21.8
18	18	9.3	9.3	31.1
19	11	5.7	5.7	36.8
20	22	11.4	11.4	48.2
21	14	7.3	7.3	55.4
22	24	12.4	12.4	67.9
23	14	7.3	7.3	75.1
24	27	14.0	14.0	89.1
25	5	2.6	2.6	91.7
26	9	4.7	4.7	96.4
27	4	2.1	2.1	98.4
28	3	1.6	1.6	100.0
Total	193	100.0	100.0	

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
23	193	5	28	20.31	4.068
Valid N (listwise)	193				

Compared to other studies done in Canada and USA (Legault & Pelletier, 2000; Maritn & Urban, 2008) the sample children from Roatan have a similar average (mean) environmental attitude score. In the US study the children had a mean attitude score of 23.29 of 36 (64.69% score) and in the Canadian study they had a mean score in attitude of 134 of 180 (74.44% score). The children involved in this study that have received some EE from RMP and/or BICA had a mean attitude score of 20.31 of 28 (72.53% score) so they have on average a similar score to other children involved in EE programs. The average environmental attitudes score at the school in First Bight, which had not received presentations from RMP, or BICA was 19.61. This is not significantly lower than the score of the other schools, however this could be because the class' teacher had a personal interest in conservation and had implemented recycling activities in school. The teacher said that he found it very important to teach the children the importance of waste management and protection of the reefs.

When I talked to a few of the pupils while answering the questionnaire I asked if they really would and did the things they answered yes to, and they said yes of course. However, as I observed and talked to parents and teachers it became clear that the children were not acting upon these claims. This is not to conclude that they are not aware and that their environmental attitudes are not real, however, this could be because they are not really taught and guided enough to act and get involved in conservation activities on a regular basis as will become more clear in the following chapter 6.2.5.

6.2.5 Children's involvement in conservation activities

Both BICA and RMP are involved in arranging beach clean ups for the children. They also promote the Bay Island Coastal Clean up, which is organizing several community and beach clean ups annually. Everybody on the island, including pupils and students, businesses and people, are invited to join the clean ups.

RMP and BICA do not have any special conservation programs that they engage the schools in, however some of the schools I visited had their own small conservation activities. In one school the pupils had to pick up all the trash in the schoolyard after every recess. They were very committed, and almost all of them brought a piece of garbage with them in to the classroom and threw it in the

trashcan while the teacher was monitoring them. In one school they had community and schoolyard clean ups. They did not have a program for daily cleanup of the schoolyard. They also focused on reusing paper and used old newspapers for art projects. This was an activity only for pupils in 8th grade and up. In one school they had made some arts and decoration of garbage and focused on reuse. The one private school celebrated earth day and the graduating high school class designed the activities for the day. The theme was conservation and environment.

None of the schools I visited, where RMP had visited before, were separating garbage for recycling. On the island you can separate plastic bottles and metal cans from soft drinks only. One teacher explained that they had tried to separate waste in the school, but the children did not follow instructions and did not manage to throw it in the right bin, so they gave up on it. At the school where the children had not been willing to participate in the recycling program, the average (mean) environmental attitudes score was 22.64 compared to the overall average (mean) environmental attitude score of 20.31. Furthermore the average (mean) knowledge score was 3.30 compared to the overall average (mean) knowledge score of 3.48. The attitude score was a bit higher, and the knowledge score was a bit lower than the overall average. From conversations with RMP and BICA representatives I understood that it was difficult to get the children to actually participate and take responsibility for cleaning up on the beaches and not throw garbage in the streets and on the beaches. From observations I saw that the children did not pick up garbage along the school roads or on the beaches as 72.5 % of the children claimed that they did. This indicates that there is a divide between what people say they do and what they actually do. This also highlights the importance of using mixed methods in order to get a comprehensive understanding of how people react and respond to EE. While talking to the parents in the communities they also expressed their frustration with kids that just threw the garbage on the ground. However, they also pointed out that this was the case for many grown ups as well, so they did not blame only the children for the garbage in and along the streets.

Only at the school in First Bight, where RMP and BICA had not been present before, a recycling program had been implemented. The sixth grade teacher had a personal interest in conservation and said he found it very important that the

children learn waste management and how to take care of nature. His strategy was to teach the older pupils why and how they should separate garbage, and then he gave them an extended responsibility to teach and make sure the younger pupils also followed the waste management program. He said that the pupils were far from perfect and that they needed constant reminders of where to throw the garbage. None of the pupils at this school reported in the questionnaire that they had been involved in a beach clean up.

In the questionnaire the children were asked if they had been involved in beach clean ups, if they pick up trash on the beach and throw it in the garbage and if they separate bottles and cans for recycling at home.

Beach cleanup participation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Blank	2	1.0	1.1	1.1
	No	100	51.8	57.5	58.6
	Yes	72	37.3	41.4	100.0
	Total	174	90.2	100.0	
	Missing data	19	9.8		
Total		193	100.0		

37.3% of the children reported that they had participated in a beach clean up.

Q6. I pick up trash from the beach when I see it and throw it in the bin where it belongs.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	20	10.4	10.5	10.5
	Maybe	31	16.1	16.2	26.7
	Yes	140	72.5	73.3	100.0
	Total	191	99.0	100.0	
	Missing data	2	1.0		
Total		193	100.0		

As many as 72.5% of the children said that when they see trash on the beach they pick it up and throw it in the bin where it belongs. The children and their families from the West End school and the Sandy Bay schools are mainly visiting and spending their days off at the beaches in West End. In the questionnaire 91% of the children from these two schools said that they do pick up trash on the beach and throw it in the bin where it belongs. However, from observations on the West End beach, I realized that the majority of the children did not pick up garbage while they spent their day at the beach. This indicates that there is a discrepancy between what children say and what they actually do, which again show the importance of participant observation for this research. I spent a few Sundays observing children and their families on the West End beach, and I saw that most of the younger children were playing with disposable plastic cups, large soda bottles and plastic bags while on the beach. Some of the plastic cups and bottles were floating away between people swimming and playing in the sea. I did not observe any of the older children picking up the bottles and cups. At the end of the day most of the garbage was left on the beach, and only a few families gathered and brought with them the cups, bags and bottles that their kids had been playing with. I talked to one of the ladies working on that beach all day renting beach chairs and braiding hair. She said that she never saw children pick up garbage on the beach. However, she said that sometimes some of the older children would tell tourists not to step on the reef and be careful while snorkeling at the reefs.

Q8. I separate plastic bottles and aluminum cans for recycling at home.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	50	25.9	26.0	26.0
	Maybe	20	10.4	10.4	36.5
	Yes	122	63.2	63.5	100.0
	Total	192	99.5	100.0	
	Missing data	1	.5		
Total		193	100.0		

63.2% of the pupils reported that they do separate plastic bottles and aluminum cans for recycling at home. 84% of the parents reported that they separate plastic and aluminum cans for recycling. While walking around talking to people in the neighborhoods, about half of them said that they separated the bottles and cans at home. Only a few knew what happened to the cans during the recycling process. One lady was amazed that the plastic and metal was used to make other products, and she said that that would motivate her more to actually separate the cans and bottles at home. Some of them actually brought their own cans and bottles to the depot where they received some money for delivering the separated materials. Others just gave it to the one person collecting them in the neighborhood. Hence there is no public infrastructure system for collection, so every person wanting to recycle must deliver the material themselves. There are three locations for this in the Roatan municipality. One in Coxen Hole, one in French Harbour and one close to Oak Ridge. There are also some people that do collect the bottles and cans as their income. They collect from the garbage bins, from peoples' houses and from the public collection bins that RMP has placed in different locations. The RMP bins can be opened and anyone can remove the bottles and cans and get money for it. RMP does not collect the bottles and take the money themselves. Some of the people I talked to did separate the bottles for a person that collected them in the neighborhood. Some did just throw them in the bin with the other trash. The same people were actually a bit upset at the people digging for bottles and cans in the garbage bin because it increased the problem of trash flying around from the garbage bins.

Overall the result from the questionnaire and the interviews show that the schools do not implement special conservation programs. The parents are to some extent involved in separating trash, yet only a few of them did this as a conservation effort. They did not understand the positive effect it could have on the environment. Furthermore, when asking the parents and people in the community what they considered to be environmentally friendly and their efforts for conservation, they mostly taught that keeping their house and garden clean and free from trash was environmentally friendly. Some also mentioned not cutting down trees and keeping the environment clean was being environmentally friendly. None of them said recycling and none of them

mentioned using reusable bags instead of disposable plastic bags while shopping as being environmentally friendly (the Bags for Life program initiated by RMP). This indicates that the perception of being environmentally friendly and engaging in conservation is a bit different among the locals on Roatan than they are for RMP, BICA and the general definition of conservation used by experts writing and teaching about conservation. Etches and one teacher also mentioned that the children did not seem to understand what waste is. I did not have the time to investigate more about people's understanding of and perception of what waste is. It is recommendable that future research on EE and waste management also look into this aspect.

6.3 To what extend are the RMP and BICA programs designed to influence parents?

The RMP and BICA programs are not specifically designed to influence parents. During the presentation the children are encouraged to tell their friends and family about the importance of keeping the communities and beaches clean from garbage so they all together can help protect the reef ecosystem from garbage and deterioration by human activities such as overfishing and touching.

However, even though the EE programs in themselves are not designed to influence the parents, the organizations are reaching out to the communities and grown ups in other ways. RMP also have many signs and information boards located around the beaches and touristic areas. They try to be visible to visitors and locals. From what I understood from conversations with staff at RMP and BICA, the two organizations are mostly trying to reach out to the grown ups through other community outreach programs where there is higher focus on stopping illegal fishing and teaching the fishermen and poor new trades or new more sustainable fishing techniques. There is not much information provided to adults about waste management. RMP onced organized a community clean up after a request from the local government because there was a Dengue fever outbreak at the time. People were then taught that trash such as plastic cups, bags and other items lying around can collect water and become spawning locations for mosquitos that can carry Dengue (C. Etches, Personal communication February 21. 2014) The signs located at the beaches are mainly targeting tourists in order to inform them about the reef and that it is a protected

area. The signs are mostly in English and inform them that they should refrain from purchasing seahorses, conch, turtles and other artifacts produced from the protected sea creatures. RMP also post guides for eating sustainable fish in restaurants and encourage tourists to eat dishes that do not contain vulnerable species.

The only involvement where parents are directly informed about RMP or BICA through the school children are when the pupils need permission to go on a field trip arranged by the organizations.

6.4 Teachers' perceptions of the RMP program and the potential impact the program have on children and parents

All the teachers I talked to were very positive to the RMP program and presentations. They find it good to involve experts in the field of conservation and stressed how the children enjoyed and learned from such presentations. They all said it was important to teach the children about the environment and conservation. Many felt they had limited knowledge to teach on local conservation issues, and that the natural science class books or teachers guide did not give them enough information and guidance on the topic. One teacher said: "We highly appreciated the RMP effort and what they do for the island. We all need a constant reminder of best practice and what we can do as individuals to conserve and preserve nature on the island." (Female, 45 years old, teaching fifth grade).

They all thought that the program had an impact on the pupils, and that it was important for them to learn about conservation.

Only one teacher in one school thought that the RMP program had an impact on the parents. She said that her students were very likely to go home and tell them about what they had learned from the RMP presentation that day. One boy in her class also told me that he intended to go home and tell his parents what he had learned. He said: " I have to tell them and teach them about the environment because they don't know much about it". (Male student, 12 years old).

Most of the teachers had the opinion that the parents don't care much about the education for their children, and that it was difficult to involve them in school

activities or getting them involved in the pupils homework activities. It must be stressed how this was teachers opinions, and I did not try to get the parents opinion on this. However, from looking at the data collected I would not assume that the reason for this is that the parents are too busy with other things like work or making ends meet.

15% of the respondents had only one child, 24% had two children, 25% had three children, and 19% reported that they have between four and seven children. The remaining population did not report on number of children. The numbers could indicate that the parents do have time to follow up the education of their children, as they in general don't have so many children. 31% reported that they were employed, 7% that they were unemployed and 54% reported that they were stay at home mums. Additionally 25% of the respondents classified themselves as lower class, 48% as middle class, and 26% as upper class. I find that these numbers may indicate that the majority of the respondents seemingly do not struggle to make ends meet and hence could have a more active involvement in their children's education.

57% of the respondents finished elementary school, 26% had attended college, 8% had attended university and 7% had not attended school. This also indicates that about half of the parents don't know the importance of education as they have only finished the mandatory elementary education.

There may also be cultural reasons why the parent's are less active in following up their children in school in general. Now, these are just speculations, and the sample is not representing all the parents. I should also mention that teachers were generalizing, and I assume that there are many parents that also follow up and do care about their children's schooling. Some parents were willing to come to school and give interviews, perhaps representing the type of parents valuing their children's education and this type of research activity.

The teachers believed the program to have a bigger impact if it included some teaching materials like books and activities the children and parents could engage in.

Q7. I have talked to my parents about how to help with protecting the reef and marine animals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	59	30.6	30.7	30.7
	Maybe	16	8.3	8.3	39.1
	Yes	117	60.6	60.9	100.0
	Total	192	99.5	100.0	
	Missing data	1	.5		
Total		193	100.0		

Question seven was developed to find out if children talk to their parents about topics taught by RMP or BICA. More than half of the children (60.6%) said that they talk to their parents about how to help with protecting the reef and marine animals.

From interviews with parents I found out that such presentations could spur a conversation during dinner because the children were asked about what they learned about in school and the topic came up. Some of the parents also said that they knew a lot about the need to conserve the reefs because they worked in tourism related jobs and knew that it was important to protect the reefs and be environmentally friendly. Some said that the children were the reason why they were separating bottles and cans for recycling at home, and that the children were the ones pushing them to do so because they had learned about the importance of recycling. Some parents said that they had to remind their children to throw garbage in the bin, and not on the ground, as well as separate plastic bottles and aluminum cans for recycling. In some families the children had the responsibility of collecting the cans and bottles.

Also while walking around in the community I talked to a few families with younger children. In three cases the child was present while we talked to the mother and they were attending first and second grade. When we asked them

they remembered that they had had a presentation by RMP in school, but they had not told anything to their mum. The children remembered some facts and information from the presentation, but not enough to really teach their parents anything about the topics. This was also the case for many of the parents of the older children (5th and 6th grade), where the children could tell the parents something about the importance of conservation and waste management, but not really teach the parents much as they could not remember all the facts from the presentation. While talking to the parents, some mothers expressed the wish to receive more information about RMP and the conservation efforts and what they could do to also be more environmentally friendly.

6.5 What parents have learned about local environmental issues and reef conservation from their children

During my qualitative interviews with parents in the school the majority said that their children sometimes talk about topics they have learned in school or from presentations from RMP or BICA. (I talked to 10 parents that teachers had helped me get in contact with). They could not say that they had learned much, and since the children don't bring home any material on the topic presented by RMP or BICA, they did not receive exact facts and info from their children. The majority of these parents with children in 6th and 7tn grade said that the children sometimes made them think twice before they threw the garbage out and some of the kids had actually made the parents separate bottles and cans at home for recycling. During walks around the communities, some random mothers of children in first grade had not been told anything about the RMP presentation. Two of the children were there, and one could remember the presentation and talked a bit about what he had learned. He couldn't really teach the mother any details about the importance of conservation and waste management. Many of the adults, (both from interviews with parents I had been connected with by teachers and the random people in the communities) also said that they frequently had to remind their children not to throw garbage in nature but in the trash can, and that they felt they had as much knowledge as the children on the topics.

Knowledge score and parents report of whether their children had received EE from RMP, BICA or both

	N	Minimum	Maximum	Mean	Std. Deviation
None Knowledge	31	2	5	4.10	.831
RMP Knowledge	30	0	5	3.63	1.426
BICA Knowledge	4	4	5	4.75	.500
Both Knowledge	14	0	5	4.07	1.439
Total	79				

As one can calculate from the table above, 39.24% of the parents reported that their children had not received education from RMP or BICA. 37.97% of the parents reported that their children had received education from RMP. 5.06% reported that their children had only received presentation from BICA and 17.72% said that their children had received EE from both organizations. By comparing average knowledge scores (mean) we can see that the parents where the children had not received EE by the organizations, or where the children had not told them about the EE, have a similar average knowledge score to the parents where children had received EE or told their parents about the EE programs by both organizations or BICA. Where the parents reported only hearing about the RMP program the average (mean) score was lower. This can indicate that the EE programs do not influence the parent's knowledge. This again is in line with what the parents said during interviews. In comparison the average (mean) knowledge score of the parents in the First Bight school was 4.5.

A higher number of parents reported that their children had a presentation by RMP. The reason for this could be that the questionnaires were distributed to all the pupils that just had received the presentation, and the children have probably told them about the RMP presentation since the parents had to fill out the

questionnaires. It doesn't mean that the RMP program is more successful or has a better outreach than the BICA program. It could indicate that when the program has an activity that involves the parents in any way, it may increase the parent's awareness of the organizations efforts. The fact that the parents that knew that their children had had a BICA presentation (which was not recently) had a higher average knowledge score could suggest that they are more aware and interested in conservation, that the children talk to them about what they learn in school and also tell them when BICA or RMP have visited the school. These are only suggestions, and no data can confirm this relationship. As one can see below the attitude of the ones who reported the BICA presentation is also higher.

Parents environmental attitude score

	N	Minimum	Maximum	Mean	Std. Deviation
None Attitude	31	10	25	17.23	3.998
RMP Attitude	30	8	27	17.73	4.274
BICA Attitude	4	18	26	22.25	3.304
Both Attitude	14	8	25	17.36	4.500
Total	79				

From the table above one can see that there is no large difference in the parent's average environmental attitudes score, which indicates that the EE programs do not influence the parents too much.

In comparison, the average (mean) environmental attitude score of the parents in the First Bight school was 18.15, which is a little bit higher than the overall for the parents of the children who had received the RMP and or BICA programs.

6.6 Parent's attitudes and behavior

6.6.1 Parents' attitudes towards local environmental issues, reef conservation and local sustainable development

While talking to parents they were mostly positive towards RMP and their EE program. They said conservation is important, and were very aware of the

importance of conservation because of tourism. Some of them worked in tourism, and they had to take an extra effort in keeping the beaches clean. One mother that sells self-made bracelets on the beach to tourists said that there is a law that if you work in tourism (with a license as she had) you have to pick up garbage and contribute to keeping the tourist areas clean. If you fail to comply with this law you can be fined.

Q8. I think it is important to protect the reef and marine life.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	2	2.5	2.6	2.6
	Yes	73	91.3	96.1	98.7
	I don't know	1	1.3	1.3	100.0
	Total	76	95.0	100.0	
	Missing data	3	5.0		
Total		79	100.0		

As shown in the table above, 96% of the parents said that it is important to protect the reef and marine life. 33.75% of the respondents are male and 62.50% are female. Three of the respondents did not inform about their gender. 25% of the respondents considered themselves as belonging to lower class, 47.50% considered themselves as belonging to the middle class, and 26.25% as belonging to upper class. From the upper class the respondents 42.85% were female and 47.61% were male. Two respondents did not inform about their gender. The average age of the respondents were 37 years old. 73.68% of the middle class respondents were female and 26.31% were men. The average age of this group was 39 years old. Furthermore 65% of the lower class respondents were women and 35% were men. The average age in this group was 37 years old.

The overall average (mean) environmental attitude score among parents were 17.69 (of maximum score of 28 points) and 3.94 (out of a maximum of five points) on knowledge score. Divided by social class the average attitude score was 15.65 in the lower class, 18.73 in middle class, and 19.95 in upper class.

Furthermore the knowledge score in lower class was 3.65, in middle class it was 4.18 and upper class respondents had an average knowledge score of 3.80.

A few parents (male) I talked to were not in general happy with the RMP's activities like patrolling to prevent illegal fishing. They said that the rules are too strict, and that they are difficult to understand. They felt they have the right to fish for lobster all year for private use. The regulation sets a lobster season where the catch must be over a certain size. Other than the issues of fishing regulations they said RMP is doing a good job and that their school and community outreaches are good. These men and the other men and women I talked to would actually like to learn more about the conservation efforts, the rules and things that they could do to help protect the reef and nature. Both men and women said that the information didn't always reach out to the communities and that the focus was strong on tourists' behavior in the tourist areas. They were of the opinion that it would be good to get information leaflets or that the children had books in school that they took home so that parents could learn if they were interested.

6.6.2 Parents' environmentally responsible behavior

Most of the parents (both men and women) I talked to said that they considered themselves to be environmentally friendly in their everyday life. Also the results from the questionnaire show that they engage in environmentally friendly activities.

Q9. I have talked to my children about how to help with protecting the reef and turtles.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	11	13.8	14.5	14.5
	Maybe	6	7.5	7.9	22.4
	Yes	59	73.8	77.6	100.0
	Total	76	95.0	100.0	
	Missing data	3	5.0		

Total	79	100.0		

As mentioned before, the parents I interviewed also confirmed that they did sometimes talk to their children about the environment and how to protect the reefs. These conversations could be spurred from news report, articles in magazines or when the children brought up the topic of environment. In the lower class group of respondents, 65% said that they talked to their children about how to help with protecting the reef and turtles. 73.68% of the middle class respondents and 85.71% of the upper class respondents said that they talked to their children about how to help with protecting the reef and turtles.

Q10. I pick up trash from the beach when I see it and throw it in the bin where it belongs.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	9	11.3	12.3	12.3
	Maybe	8	10.0	11.0	23.3
	Yes	56	70.0	76.7	100.0
	Total	73	91.3	100.0	
	Missing data	6	8.8		
Total		79	100.0		

Again the majority of the parents (70%) report that they do pick up trash on the beach when they see it. However, from my observations I saw a lot of garbage lying around in the neighborhoods. I did not observe many parents that picked up the plastic cups, bottles and plastic bags on the beach after their children had played with them on the beach (as described in chapter 6.2.5). All of the parents and people I talked to during my walks in the neighborhoods (men and women) said that they observed grown ups and children throwing garbage in the streets.

Q11. I recycle plastic bottles and aluminum cans at home.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	7.5	8.0	8.0
	Maybe	6	7.5	8.0	16.0
	Yes	63	78.8	84.0	100.0
	Total	75	93.8	100.0	
	Missing data	4	6.3		
Total		79	100.0		

The majority of the parents reported that they separate aluminum cans and plastic bottles for recycling. 75% of the lower class respondents, 71% of the middle class and 100% of the upper class claim to separate cans and bottles for recycling. As mentioned above in chapter 6.2.5, conversations with parents and community members revealed that the minority actually took the bottles and cans to the depot themselves. They either gave it to a person collecting them in the community or threw them in a separate bag or just loose (not inside a bag with the other garbage) in the garbage bins. Only one parent I talked to (male) did know more about the process of recycling. In a conversation with a mother I mentioned that plastic never really disappear from nature even though it deteriorates and is no longer visible in the sea. I explained that the plastic is broken down to microplastics and is eaten by plankton, which again is eaten by fish that humans eat, so the plastic toxins are actually polluting us people. She was very surprised and said that she would like to learn more about these things. If she had known that it was so important to recycle, she would be better at separating all the plastic bottles and give them to the ones collecting or deliver them herself. I talked to one of the men collecting the bottles and cans. He knew what happened to the bottles and seemed to know what recycling was. He collected the bottles and cans in order to make some money, and not for the sake of the environment. He said that there were a few families that gave him the bottles already separated, but he also found a lot in the neighborhood's garbage collection bins. A few people expressed to me that they were not happy with the

person digging in the bins for bottles and cans, because it contributed to trash flying out of and around the garbage bins.

6.6.3 Parents' opinion on EE

All of the parents I talked to, men and women, parents of young and older pupils said that they thought it was important to teach EE to the children. Many of them found that children could influence grown ups to make them more environmentally friendly, especially tell the grown ups not to throw garbage in the streets and nature. A few said that the adults had to set a good example for the children, so they had doubts that children would behave better if the parents didn't. Some of the mothers especially expressed the desire to learn more about the environmental impacts of plastic and also more about the recycling process. They said that if the children had some reading materials on the topics it would be easier to learn. Parents also encouraged RMP to give out more information to the communities, not only to the tourists.

6.6.4 Difficult aspects of being environmentally friendly

From the quantitative research I noticed a trend that the parents environmental attitudes were high, yet they also reported that it takes too much time and effort to be environmentally friendly. This made me interested in further exploring what they considered difficult and why. It made me question what acts they considered environmentally friendly, as I assume that the more opportunities of environmental responsible acts you are aware of, the more you can do, the more time consuming it becomes to be environmentally friendly.

1. It takes too much time and effort to do things that are environmentally friendly

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	38	47.5	50.7	50.7
	Maybe	13	16.3	17.3	68.0
	No	24	30.0	32.0	100.0
	Total	75	93.8	100.0	
	Missing data	4	6.3		
Total		79	100.0		

Almost half of the respondents said that it takes too much time to be environmentally friendly. Of these respondents 60% of the lower class respondents, 36.84% of the middle class respondents and 57.14% of the upper class respondents said that it takes too much time to be environmentally friendly.

After a quick analysis of the responses I realized that many respondents thought they were environmentally friendly, but that it was difficult to be environmentally friendly. I also realized that from the questionnaires it is not clear what they consider being environmentally friendly. When I walked around in the communities I learned that the general perception of being environmentally friendly, and what they could do that was environmentally friendly, was to keep their house and garden free from garbage. No one mentioned recycling until I suggested it, and only a few said that being environmentally friendly is to also not cut down trees and preserve nature. They also did not think of conserving the reefs as being an environmentally friendly act until I mentioned it.

In one community there was a large understanding that one should not let garbage lye around outside because it could be a spawning ground for mosquito and increase the risk of Dengue fewer. No one liked the sight of plastic bags, crisp bags and other rapping lying around in the streets and nature.

From walks in the communities I observed that there was a lot of plastic bags, crisp bags and other plastic and paper materials lying around in the streets. After talking to people I was informed that the biggest problem they faced being environmentally friendly (taking into consideration how environmentally friendly seems to mean keeping the garden and nature garbage free) was that the trash collection system was poor and that the community garbage bins were in bad shape, lacking a lid. The lack of lid implies that during the night dogs would dig through the trash and spread trash around. Many of them said that the problem of paper and plastic waste along the streets and roads would be smaller if there were more trashcans along the roads and beaches. They suggested nice and clearly recognizable trashcans so that people would know where to throw their papers and plastic raps instead of throwing them on the ground. My

informants were eager on getting a better infrastructure for the garbage collection, including better bins and more rapid collection. In one neighborhood they only collected every second week, and when I was there the bins were full and the truck would not come until the next week.

Image 3: Waste collection bins

Source: Hanne M.E. Jelavic

Image 4: Waste collecting bins and garbage lying around

Source: Hanne M.E. Jelavic

6.6.5 The motivation behind parent's and children's environmental concern

The EMS results show that the parents are mostly concerned about the environment because of biospheric reasons. These values could explain their positive opinions and attitudes toward conservation and EE. Only 19% of the respondents had the highest score in egoistic reasons and 61% of the respondents had the highest score in biospheric reasons. 15% had the highest score in altruistic reasons, and the remaining respondents had one or two categories with equal score.

Q13. Mean score for parents' motivation for environmental concerns

	Egoistic	Biospheric	Altruistict
Schools visited by RMP and BICA	9.4	11.84	6.75
First bight school	9.56	12.24	6.2

Q15. Mean score for children's motivation for environmental concerns

	Egoistic	Biospheric	Altruistict
Schools visited by RMP and BICA	10	13.56	5.46
First Bight school	10.19	11.78	6.02

27% of the respondents from schools where BICA and RMP had visited had the highest score in egoistic (relative importance a person puts on themselves) reasons for their environmental concerns. 64% had the highest score in

biospheric reasons, and 13% scored highest on altruistic reasons for caring about the environment.

38% of the First Bight respondents had the highest score on egoistic reasons. 50% had the highest score on biospheric reasons, and 12% scored highest on altruistic reasons. The remaining respondents had one or two categories with equal score.

In general the children score a bit higher in biospheric reasons for caring about the environment compared to the grown ups. Overall it seems like both parents and children are motivated to care about the environment because they want to protect the nature and animals. While talking to one of the foreigners that had lived on the island for 20 years, she said that she had the impression that the islanders have a close relationship with nature and that they care about nature. The island is very lush and has a beautiful nature, a vast biodiversity and is surrounded by beautiful coral reefs. During the presentation the children were asked if all countries and island had coral reefs like they have, and all the children answered no. They knew that they had a special and very beautiful reef very close to the island, and that it was not normal that the reefs are so close. For example, to reach the Great Barrier Reef one must travel from the mainland Australia for hours by boat before one is on the reef. Most of the reef surrounding Roatan can be reached by a two minute swim from shore. It is therefore even more important that locals and tourists are aware and knowledgeable about why and how to protect the reefs.

Chapter Seven: Discussion and recommendations

7.0 Introduction

In this chapter the empirical findings will be further analyzed and discussed. The chapter ends with a conclusion and recommendations.

7.1 Discussion

For the final discussion it is important to be aware of the fact that the environmental degradation of the reefs located close to Roatan is not mainly because of local peoples daily private actions, rather the large tourism, fishery

and agricultural industries. These industries put large stress on the reefs ecosystems, which has made them more fragile. Because the reefs are fragile the locals cannot carry out fishing and activities on the reefs as they have done through generations. Population increase add additional stress to the system, making it impossible for all to harvest whatever they want on the reefs as the system cannot support an increasing population. The natural resources would fast become exhausted. Many people living on Roatan are employed in the tourism industry and understand the value of the reefs and it's good health. Hart (1997) point out how communities must have knowledge about conservation in order to contribute politically in planning and development activities concerning their local area. Children are the future managers and they must have sufficient knowledge about environment and conservation in order to manage the nature and island properly in the future as well.

The first research objective was to find out if the RMP and BICA programs have had an impact on the children's environmental behavior, attitude and knowledge. Some previous studies show that EE have a positive impact on the children and parents. Yet the EE programs with the highest knowledge transfer or attitude change in parents and children are mostly designed in ways where they are more likely to spur change in children and parents. My study did not intend to measure a before and after situation from a program implementation, as the RMP and BICA programs have been implemented over several years. Rather I compared the data from schools that had received the RMP and BICA EE and one school in First Bight that had not received the RMP and BICA EE. There was no significant difference in the attitude or knowledge score. The motivations for their environmental concern are also similar. This does not indicate that the RMP and BICA programs are insignificant. Rather the First Bight teacher was personally interested in conservation and had spent time teaching his students about the environment. The teachers and parent's appreciated that RMP and BICA make an effort teaching children about the environment and conservation, and as none of the teachers (except the First Bight school) had implemented any special education on local conservation themselves, this could indicate that the program do have an effect. The pupils seemed to enjoy the visit from RMP, and BICA have the experience that some of the high school pupils want to volunteer after they are introduced to BICA and their work (Brady, person com 2014).

Staff from both RMP and BICA said that it was difficult to influence the children and actually make them change their behavior. There are several factors that influences a persons environmental behavior as has been pointed out by Fransson & Garling (1999), Hart (1997), Price et al., (2009), Halvorsen (1997) and Lysklett (2013). One component, which is commonly mentioned, is the persons concern and knowledge about nature and the threatening degradation. My research show that there in general is a high knowledge and attitude towards nature, and that people's environmental concern is motivated by biospheric reasons, meaning that they care about the nature and animals. One hypothesis is that the age influences people's attitudes, and that younger people are more concerned about the environment than older people. The results from my study also show that children have a higher average (mean) attitude score 20.31 compared to grown ups' average attitude score of 18.64.

The social - class hypothesis states that environmental concern is positively associated with education and income. The upper and middle classes have satisfied their basic material needs, and can therefore focus on satisfying other needs that are higher up in the needs pyramid. My results also show that the lower class mean attitude score (15.65) was lower than the middle class (18.74), and the upper class had the highest attitude score (19.95). However, the attitude score does not correlate with the knowledge score as the middle class had the highest mean knowledge score (4.18) followed by the upper class (3.80) and lower class with the lowest knowledge score (3.65). As mentioned before in other research, the socio-economic links are in general weak, as they probably are in my research as well. Another weakness with my study is that in the questionnaire the parents were asked to decide what class they belong to. In other social research respondents' class is determined by factors indicating the social class. It is therefore not sure whether or not my respondents have placed themselves in the right social class.

I find it interesting to compare my results with previous results. Fransson and Garling (1999) identify three components as determinants for the attitude towards a specific behavior; Attitudes toward target, self-identity outcomes and utilitarian outcomes. Attitudes toward target can be environmental concern, which my research shows is generally high in the sample population. Self-identity outcomes refer to the positive or negative effects on one self, following a change

in attitude and behavior. According to the EMS scores the sample population's environmental concern is to some extent motivated by people's definition of their self-importance (egoistic). Some people I talked to said that they did take care of their garbage in order to avoid spread of Dengue and also because they didn't like the sight of garbage in the nature. It is therefore possible that they are motivated by the self-identity outcomes. The health issues are what concerns them, and they act environmentally friendly by cleaning up the garbage because of the positive effect it has on themselves as they can avoid Dengue. The utilitarian outcomes are the practical outcomes of the change, and I found out that most people find it difficult to be environmentally friendly (waste management) because of the poor infrastructure for garbage collection. Even though a person's values and attitudes, self-identity outcomes and utilitarian outcomes would lead to a change in attitudes and intention of changing behavior, the normative outcomes are still likely to have an important influence a person's ability or willingness to change. My research shows that most of the parents and teachers are positive towards conservation, and I did get the impression that it is considered good to be environmentally friendly. Therefore, one of the reasons why the knowledge and attitudes don't lead to behavioral changes in parents could be because of the difficulties mentioned and the poor system for waste management.

There is a discrepancy between stated behavior and actual behavior among children and parents. Even though a majority stated that they did engage in conservation activities, my observations did not confirm this. RMP and BICA staff, teachers and parents said that both adults and children throw garbage in nature and are not good at participating in picking up garbage on the beach during everyday life. Again, the attitudes and knowledge score is high and it seems like they know what the right thing to do is, yet the behavioral change is absent. To me it seems as if parents and teachers must lead by example. If adults throw garbage and teachers don't implement waste management systems or other EE activities in school the children are not motivated to behave differently.

Most theories and research show that inquiry-based learning or action-research, where the pupils pose questions, problems and scenarios rather than just receiving facts, promote both short and long term increase in ERB. Neither of the two institutions nor general educational practices on Roatan focus on a more involvement based type of learning. The RMP and BICA EE programs are non-

participant according to Hart's ladder of participation. The ability for children to evaluate environmental issues critically as a guide to action (inquiry-based learning) is identified by Hart (1997) as a necessary basic skill in order for the child to develop competent, responsible environmental behavior. The RMP and BICA programs don't give children the choice of whether they want to participate or not. They merely receive the presentation. I am sure all children are happy to go on a glass bottom boat trip (as I observed that the children were ecstatic and really pleased with the glass bottom boat trip), yet it is more unlikely that they enjoy beach clean ups as much. A choice to participate is an important motivational factor and this is where the two programs in Roatan fail.

The second objective of this research was to investigate whether or not the parent's have been influenced by their children and changed their behavior, attitudes and environmental knowledge as a result of the RMP and BICA EE programs. The research results don't show any significant connection between parents' and children's increased knowledge and attitudes as a result of the RMP and BICA programs. The programs have not been intentionally designed to influence parents, yet there is of course a hope that the children will go home and talk to the parents about what they have learned from the RMP and BICA presentations. Even though there is no significant impact, the presentations seem to spur potential conversations about conservation in the families. As one teacher also said, it is always good to be reminded that one must take care of the environment. Duvall and Zint (2007) has identified that in order to intentionally spur intergenerational knowledge and value transfer the EE programs must run over time, include activities which engages parents and also focus on local issues. The RMP and BICA programs do focus on local issues, but otherwise they fail on the criteria to stimulate intergenerational value and knowledge transfer.

When looking at the framework for environmental education developed by Monroe et al., (2007) the RMP and BICA programs are at stage one where one-way information is conveyed. They have in some way incorporated activities that are present on level two, such as glass bottom boat trips and snorkeling trips. Still they have not incorporated a two - way information flow. It is not normal to see change on behavior and actions until an EE program has developed in to level four, providing another potential explanation as to why there is no visible action.

It is not my interest to criticize the programs as they are likely to have some influences on the children's attitudes. Rather I would point out how the programs have great potential to develop into being more influential. This potential rests in the approval of such EE programs by parents, teachers and the national curriculum. Moreover both organizations are knowledgeable on what programs and conservation activities one should educate on. The national curriculum for natural sciences states that the subjects aim to prepare the children to contribute in the fight against environmental deterioration many are facing, and prevent ecological deterioration that threatens the security of livelihoods. This is a good fundament for further development of the RMP and BICA EE programs. According to the environmental staircase model developed by Halvorsen (1993) and modified by Lysklett (2013), the pupils have all prerequisites necessary to become active environmentalists. According to my research they are probably on step three or four. The environmental staircase was developed because urban children did not spend enough time in nature, and one realized that it is difficult to care about nature when one don't have a relationship or love towards nature. Because Roatan island still has a lot of natural beauty and the urban areas are not very large, people and children do spend time in nature. It seems like they have a close relationship to nature, and have already stepped up on level two without any help from EE programs or educators. Children at Roatan are taught environmental science in school, and the knowledge tests show that they have a basic knowledge. Yet, while observing presentations and asking questions after the presentations it seemed that the understanding of ecological relationships are not as clear. One example was in one school where children did not find it as important to pick up garbage in areas other than on the beach.

The RMP and BICA programs are on the right track in the sense that they focus on motivating people to get involved in conservation and be more environmentally responsible by focusing on protection of the animals and nature as well as the positive impacts it will have on one self. The EMS results show that these are the values of the locals. Furthermore, they focus on local problems, which are easier for people to relate to and take action towards.

7.2 Concluding remarks

It is clear that the RMP and BICA programs have not led to a big change in children's behavior or parent's behavior. There are several things influencing such change, but in the case of the children it is possibly because the EE programs are not designed according to the models that more actively can spur such change. One must not forget the importance of adults leading by example, so adults' behaviors have a large impact on children's behavior. Even though the RMP and BICA programs have not spurred the desired behavioral change, it is likely that they have influenced the children's attitudes and knowledge to some extent. Education for sustainable development, including environmental education, remains important in order to ensure sustainable development.

7.3 Recommendations

I find that that the two organizations should continue their important work. Yet if they really want to see an impact of their programs in terms of behavioral change it is necessary to develop the EE programs further.

As I see it, the program should evolve into a continuous program running throughout the school year, not only as a once or twice a year activity. The program should also include inquiry-based learning or action-research, where the pupils pose questions, problems and scenarios rather than just receiving facts. Research show that this promotes both short and long term increase in environmentally responsible behavior. This could help bring the pupils up a few steps on the environmental staircase, so develop through step three and four and reach step five where they influence and contribute.

The research should guide the pupils towards some action they can take in order to improve the situation. This would also bring the program through the second, third and fourth steps in the framework for environmental education. It is not always necessary for the child to engage in thorough investigation in order to act on the problem, but they should learn to act on the basis of critical analysis.

A goal should be to gradually get the children more actively involved through the ladder of participation. I think RMP and BICA have the knowledge to develop program and activities similar to the suggestions below: Level four activity: An

example was in New York City when the major assigned the children to be deputy majors in a time of water crisis. The children learned about the water scarcity and what they could do at home to save water. They received badges and the mission to educate their parents on the issues and teach them what they could do. RMP and BICA could implement similar programs about waste management and reef conservation. These projects are top down projects, where grown ups tell the children what to do, and have only short-term impacts on the sustainable development, however, such programs could be a first step in the right direction.

All the schools I visited had a potential to improve their waste management system, so it is possible to send the pupils on inspection and small EIA assignments. This type of activity can also be coupled with teaching the children about the EIA work of RMP. A research done by children where they interview their parents and community members might also result in the same answers as I have found; that the waste management system is insufficient and does not motivate to good waste separation practices. The children could then write a letter to the major and suggest and request a better solution. The children should also be consulted of whether they want to be involved in an EE program. They may or may not be interested, but they should be involved in the discussion. Through this process they may understand why the initiative is good. Furthermore they should be involved in the discussion of what initiatives should be implemented and the discussion of what can be done to change the situation at school or in the community.

I also find it important to educate the teachers so that they can be in charge of some of the implementation of these programs. Firstly it would be too time consuming for RMP and BICA to implement such programs in every school and be the educators and facilitators through the whole program. They are small organization with only one person in charge of the education programs. The teachers would like some teaching material for their environmental science classes, and they find it important to teach about local issues and conservation. In order to take the right actions in the conservation efforts it is important for the children to understand the natural processes and how they relate and influence each other. This requires more than just an EE program. It is easier for the children to understand the natural processes and connections if the EE is integrated in the environmental science classes. It is important that the teachers

are actively involved and leading by example. Research shows that EE integrated in school improved the children's environmental behavior more effectively than EE programs in non-formal settings (Zelezny, 1999). Research by Duvall and Zint (2007) show that committed and interested teachers had a higher success rate of making their students more enthusiastic about environmental protection, which could make the students more likely to discuss environmental issues with their parents. Also parents wanted more material so they could learn more, which again is a good way of teaching the parents and get them involved in conservation activities.

Hart (1997) says that the best way for children to participate in community development and conservation efforts it to be engaged in formal groups with regular attendance in the same group and with adult facilitators. Such groups can be youth organizations or youth groups in other NGOs or community organizations. Both RMP and BICA are great organizations for such activities, and this could be combined with the educational in school programs. My suggestions include a group of environmental detectives or perhaps youth patrol groups.

Based on my findings I find that the EE programs should be designed so that parents are actively involved with for example homework activities, research activities, and class presentations. Hands on activities are also an important factor that can stimulate to intergenerational information transfer. The parents are teachers and learners. My research findings also indicate that it would be beneficial to teach more about the waste cycle and what recycling actually is. This could motivate to more waste separation and recycling.

Finally I would like to stress how it is not enough to teach the children about the environmental threats and make them aware of the threats as this could make them feel sad about the negative development and deterioration of nature and natural resources. Rather it is important to involve and facilitate the children in finding ways to protect the environment and take action in the local settings. Hence recommendation for RMP and BICA is to put pressure on the local government so that they can improve the waste collection infrastructure, put pressure on the recycling company to improve their infrastructure for collection or increase the price for recycled bottles and cans. Conversations with the locals showed that many are currently not separating for recycling because they are not

aware of the environmental benefits and not motivated to deliver for recycling because it is too much work for too little money. These are potentially good project to involve the children in. This in combination with increased information flow to the parents, and inquiry-based education of children could help motivate the parents towards ERB.

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Appendices

Appendix 1: Data coding

CHEAKS coding and calculations

In order to calculate the children's environmental attitudes (CHEAKS), the replies were given a value from zero to two, where the most pro environmental response was given two points and the least pro environmental response was given zero points (questions one to 14). The highest environmental attitudes score achievable for children was 28, and the lowest was zero. In the knowledge score part of the children's questionnaire (question 16 to 20) the correct answer was given the value one and the wrong answer was given the value zero. The total achievable knowledge score was five and the lowest was zero.

CESS coding and calculations

In order to calculate the parent's environmental attitude score (CESS), the replies were given a value as instructed by the CESS. After testing the questionnaire the response options for some of the questions were adjusted from a four and five point Likert scale, to a three point response. The replies were given a value from zero to two, where the most pro environmental response was given two points and the least pro environmental response was given zero points (questions one to four and eight to 12) and the most pro environmental response was given three and the least pro environmental response zero (questions five and seven) and for question six it was given four points for the most pro environmental response and zero for the least pro environmental response. The highest environmental attitudes score achievable for parents was 28 and the lowers zero. Furthermore in the knowledge score part of the parent's questionnaire (question 14 to 18) the correct answer was given the value one and the wrong answer was given the value zero. The total achievable knowledge score was five and the lowest was zero.

EMS score coding and calculations

The replies were coded with the values between one and seven. The question had originally rated one as highest value (most important) and seven as least valuable (least important). In order to calculate the highest score the values were recoded

so that one was given seven points, two was given six points, three was given five points, four was given four points, five was given three points, six was given two points and seven was given one point. The score for each category was calculated in order to establish if the children and parents were motivated to protect the environment because of egoistic reasons, biospheric reasons or altruistic reasons.

Appendix 2: Quantitative research tool; Self - completion questionnaire

Children's questionnaire

Have you been on a field trip with Roatan Marine Park to visit the reef?
___ Yes ___ No ___ I don't remember
Have you been involved in a beach clean up?
___ Yes ___ No

Mark one of the answers that best describe how you feel about the statements below:

	True	Not true, not false	False
1. I would be willing to separate plastic bottles and aluminum cans for recycling.			
2. I would be willing to pick up trash on the beach and throw it in the bin where it belongs.			
3. I would be willing to go from house to house asking people to recycle.			
4. I would be willing to tell my parents about illegal fishing on the reef so that they can report it.			
5. I would be willing to tell tourists not to stand on the reef while snorkeling.			
6. I pick up trash from the beach when I see it and throw it in the bin where it belongs.			
7. I have talked to my parents about how to help with protecting the reef and marine animals.			
8. I recycle plastic bottles and aluminum cans at home.			
9. I have told my parents about illegal fishing on the reef.			
10. I am frightened to think people don't care about the environment, the turtles and the fishes.			
11. It makes me happy when people recycle used bottles and aluminum cans.			
12. I do **not** worry about environmental problems, the reef and the turtles.			
13. It makes me sad seeing houses being built where animals used to live.			
14. I am **not** frightened about the effects of pollution on my family.			

15. Please rate each of the following items from 1 (not important) to 7 (very important) in response to the question:

I am concerned about pollution because of the consequences for:

Animals	1. _____
Birds	2. _____
Humanity	3. _____
Future generations	4. _____
Other countries	5. _____
Me	6. _____
Other people	7. _____
My future	
My health	
My lifestyle	
Plants	
Fishes and turtles	

Mark (x) for the correct answer. There is only one correct answer.

16. Marine animals living in the reefs today are most likely to die and become extinct because:

___ natural selection kills weak animals
___ there are too many fishes and turtles so there is no space for them
___ the reef where marine animals live is destroyed by people and trash

17. An item which can be collected and recycled on Roatan is:

___ coffee mugs
___ plastic bags
___ plastic bottles

18. How long does it take for a glass bottle to deteriorate in nature.

___ 4000 years
___ 100 years
___ 10 years

Mark (X) for true or false. Mark only one answer:

19. Plastic is good because it lasts forever and does not destroy the nature

___ True ___ False

20. Mangrove root system is important because it is home to fishes, crabs and shrimps.

___ True ___ False

Parent's questionnaire

Thank you for taking time to complete this questionnaire. The responses are anonymous. The data will be used as a part of my master thesis. The class with highest response rates from children and parents will receive a price.

Please mark (X) for the suitable answers.

I am illiterate and received help to complete this questionnaire: Yes____ No ____

Male _____ Female ____ Age _____

I completed:

Elementary school ____ High school ____ College ____ University ____ I did not complete school ____

I am:

Employed ___ Unemployed ___ Home maker___ Student ___ Volunteer___

I am:

Single ___ In a relationship ___ Married ___ Divorced ___ Widowed ___ Live with my family____

I consider my family as:

Lower class ___ Middle class ___ Upper class ___

I descend from:

Garifuna Africans ___ Roatan___ Utila ___ Guanaja___ Honduras___ Other country: _____ (name of country)

Number of children: _____ Children's age: _____

Has your 6th grader received environmental education courses from:

Roatan Marine Park (RMP) ___yes ___ no Bay Island Conservation Association (BICA) ___ yes ___ no

Mark (X) on one of the answers that best describe how you feel about the statements below:

	Agree	Neither agree nor disagree	Disagree
1. It takes too much time and effort to do things that are environmentally friendly			
2. Scientists will find a solution to reef degradation and pollution without people having to make big changes to their lifestyle			
3. The environment is a low priority for me compared with a lot of other things in my life			
4. I am environmentally friendly in most things that I do			

5. Most people on Roatan today need to change their way of life so that future generations can continue to enjoy a good quality of life and environment.

__ I agree strongly __ I agree __ Disagree __ Disagree strongly

6. I personally need to change my way of life so that future generations can continue to enjoy a good quality of life and environment.

__ I agree strongly __ I agree __ Disagree __ Disagree strongly __ Already changed

7. How frequent does the need to conserve the reef and environment on Roatan affect what you do? (for example by reporting illegal fishing, not using plastic bags, separating garbage and refraining from illegal fishing on the reef.)

___ Frequently ___ Sometimes ___ Rarely ___ Never

	Agree	Neither agree nor disagree	Disagree
8. I think it is important to protect the reef and marine life.			
9. I have talked to my children about how to help with protecting the reef and turtles.			
10. I pick up trash from the beach when I see it and throw it in the bin where it belongs.			
11. I recycle plastic bottles and aluminum cans at home.			
12. I have reported illegal fishing activities.			

Please rate each of the following items from 1 (not important) to 7 (very important) in response to the question:

13. I am concerned about pollution because of the consequences for:

Animals
Birds
Humanity
Future generations
Other countries
Me
Other people
My future
My health
My lifestyle
Plants
Fishes and turtle

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Please mark (X) for the suitable answers. There is only one correct answer

14. Marine animals living in the reefs today are most likely to die and become extinct because:

___ natural selection kills weak animals
___ there are too many fishes and turtles so there is no space for them
___ the reef where marine animals live is destroyed by people and trash

15. An item which can be collected and recycled on Roatan is:

___ coffee mugs
___ plastic bags
___ plastic bottles

16. How long does it take for a glass bottle to deteriorate in nature.

___ 4000 years
___ 100 years
___ 10 years

Mark (X) for true or false. Only one possible answer:

17. Plastic is good because it lasts forever and does not destroy the nature
___ True ___ False

18. Mangrove root system is important because it is home to fishes, crabs and shrimps.
___ True ___ False

Appendix 3: Qualitative research tool; Interview guides

Interview guide for parents

1. Do you enjoy nature? Appreciate it?
2. What do you consider to be environmentally friendly/responsible behavior?
3. What do you do to be environmentally friendly?
    - Do you separate bottles and cans for recycling?
    - What can be collected and recycled here on Roatan?
    - Can you explain the process of recycling? What happens with the bottles and cans that are collected?
4. Do you have children?
    - Are they in school? What grade?
    - Do you talk to them about what they learn in school?
5. Have your children told you about presentations on conservation and waste management from RMP or BICA?
6. What is your opinion on RMP and BICA and the work they do?
    - Has it impacted you or taught you something?
    - Do you think EE of children is important?
    - Do you think children can influence the parents to be more environmentally friendly?
7. What makes it difficult to be environmentally friendly?
8. Does the garbage along the road and on the beaches bother you?
    - Do you pick it up?
    - Why/why not?

Interview guide for teachers

1. Where are you from?
2. How old are you?
3. What is your education?
4. What grades are you teaching?
5. What subjects are you teaching?
6. How long have you been teaching?
7. What is your opinion on the EE program delivered by RMP / BICA?
    - Is it educational and important for the pupils?
8. Have you taught your pupils about the reef and marine ecosystem?
    - Is that a part of the national curriculum?
9. Do you have any extra training or knowledge in environmental education?

- Any personal interest in conservation?

11. In your opinion, is the EE in the national curriculum sufficient to teach the children about sustainable development and conservation on Roatan?
    - Are the books adapted to local environment?
    - Are books provided at all?
12. Do you find it difficult to get parents involved in children's learning process?
    - If so, what do you think are the reasons for this attitude among parents?
    - Do they help their children with homework?
13. Have you implemented any environmental/conservation projects in school?