

# Projects Abroad Thailand

## Marine Conservation

Projects  abroad

### 2017 Management Plan



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## Summary and Aims

The Marine Conservation Project, based in Nopparat Thara, Krabi, Thailand, was established in 2005.

The main focus of our project is to be a driving force along with the national park, government offices and other NGOs to raise awareness about the environmental issues that are present in the area; to organize and participate in activities such as beach and underwater trash cleanups, gathering data regarding biodiversity and abundance of life in our waters, promoting the recovery of key ecosystems such as mangroves and coral reefs through active reforestation and propagation. We engage in community oriented activities to educate the local population and business owners on the impact of trash and pollution on the environment, stressing the importance of making environmentally sound lifestyle and business choices in order to help solve the problem instead of being a part of it.

We are committed to preserving and restoring the marine and coastal environment through numerous activities in collaboration with multiple local and international partners such as Project AWARE, Ocean Conservancy, Ocean Quest, Sea Shepherd Dive, Mangrove Action Project, Raks Thai, the PhiPhi National Park, the Department of National Parks, the Department of Marine and Coastal Resources, the Phuket Marine Biology Center, Kasetsart University, and many more. Aside from the environmental aspects, our project also explores the cultural and social side of living in Thailand. Our location allows us to experience Thailand's natural beauty and traditions that is unique to the southern region. Our research work concentrates on science yet we strive to give back to the community through working with local schools, and government officials on various projects. Through our Education and Awareness program, we aim to empower the local community through knowledge and gaining new perspective on the environment through education, thus encouraging a deeper understanding of the local environmental challenges and increasing awareness of long-term solutions.



## Background Information

Thailand is located in the heart of the Southeast Asia region and is bordered by Laos, Burma, Cambodia and Malaysia. The total area is approximately 513,000 km<sup>2</sup> (198,000 sq. mi) with its coastline stretching over 3219 km, which makes it the 51st largest country in the world. The estimated current population is 68.2 million, while around 8 million people occupy its capital city, the metropolitan region of Bangkok. The country is ruled by constitutional monarchy. Thailand is the only country in Southeast Asia that has never been colonized by a foreign power. The official language is Thai, and areas within the south, north and east have their own distinctive regional dialect. About 75-95% of the population is ethnically Thai, while Thai with partial Chinese ancestry makes up about 40% of the population, and Thai-Malays represent about 3% of the population. The main religion practiced in Thailand is Buddhism (93.2%), while 5.5% are Islamic, 0.9% are Christian, and 0.3% has no declared religion.





## Climate

Temperatures in Thailand vary between 20 C in December and 38 C in April with an average humidity of 82 percent. The southern region has a tropical climate, with rainfall occurring virtually throughout the year. March and April are normally the driest months in the south. The rainy season is around July till October, although the periods of maximum rainfall in these areas vary according to climatic sub-regions.

## Project Base

Baan Por Ngam or the Marine Conservation “Base Camp” is located in Nopparat Thara, which is next to a popular tourist destination called Ao Nang. Base Camp is about 20 kilometers away or about 20-30 minutes if traveled by car from the airport and Krabi Town Centre. The base camp is equipped with Wi-Fi and, we also have a swimming pool. Other amenities are available such as televisions, DVD player and a PC for our volunteers to use. Our dive center is on site and all our equipment is also stored on site.





## Implementing the Plan

As Projects Abroad places volunteers, interns and professionals into hundreds of projects worldwide, it is vital that these resources are deployed in a way that utilizes their strengths and coincides with the aims and objectives of the project.

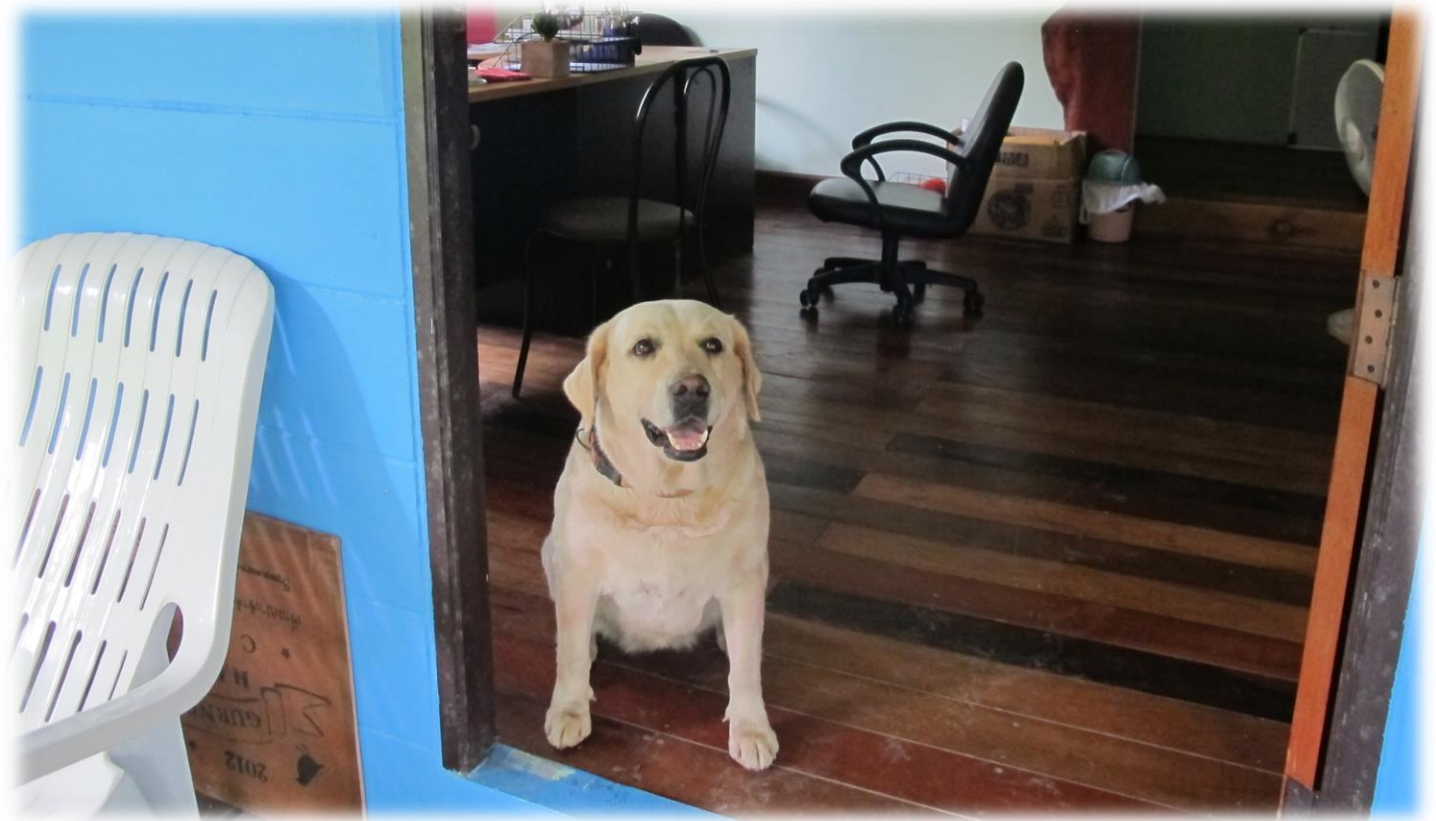
To ensure all resources available to the project are being used correctly Projects Abroad employs staff on site directing the daily activities and ensuring research is being carried in accordance with this plan. Projects Abroad also has a conservation program director ensuring constant consultation with experts and correct management of the project.

## Reporting on Research

Data collected at the project will be sent to Projects Abroad head office in the U.K. to be reviewed by the Conservation Program Director. Internal reports will be written using these data sets and made available to the public through a public domain.

When data sets are sufficient, reports will be peer reviewed by leading experts with the aim of publication in scientific journals.

The project will also produce an annual report outlining progress and recommendations. The project will also feature in Projects Abroad's Conservation Annual Report, made available to the public through a wide range of media.



# Dive Operations

## Introduction

As a marine project, much of our research requires diving. Volunteers get on-site training up to the required skill level in preparation of their research work later. In order to do this, we have a PADI registered, in house dive school and we work together with Poseidon Dive Center Ao Nang, a conservation-minded dive center in our area. Poseidon owns a large diving vessel from which we do our dives. This boat offers space for up to 30 divers. If the boat from Poseidon is under maintenance, we can head out with one of the other dive centers in the area.



We dive around the PhiPhi Islands as well as Ao Nang's local Islands. The reefs around these islands are very diverse but under heavy pressure from overfishing, coastal development and tourism. The limestone cliffs give this area a unique beauty both above and below the water and this attracts many tourists. In the waters around PhiPhi we regularly see sharks, turtles, moray eels, lion fish, etc. The many regular reef dwellers, like parrot fish, butterfly fish, damsels and others make the reef very colorful and lively. The local Islands are better known for the smaller creatures like the very colorful nudibranchs and seahorses. Stingrays are also regularly spotted on the local Islands. All the regular reef fish are there and the many soft corals make this an even more colorful experience than the PhiPhi Islands. The drawback is that visibility on the local islands is usually poorer than it is on PhiPhi.

## PADI Teaching System

### Methodology

We use the PADI dive courses as our basic dive training.

In addition, for our own survey program, we require volunteers to have PADI certification and the *Projects Abroad Survey Diver Distinctive Specialty*, which will be taught on location. This specialty takes a minimum of 3 days, excluding self-study (after the initial PADI dive course). Since we have 3 diving days each week, it doesn't make sense to let volunteers who stay less than 4 weeks join this survey. They will do Coral watch instead, since this will not take any additional training days.

- Volunteers who are not certified yet and are staying 4 weeks or more will do the *PADI Open Water course* and the *Projects Abroad Survey Diver Distinctive Specialty*, after which they will join the survey team.
- Volunteers who are certified divers already and are staying 4 weeks or more will do the *Advanced Open Water Diver course* or *Rescue Diver course*, depending on their current level and the *Projects Abroad Survey Diver Distinctive Specialty*, after which they will join the survey team.

- Volunteers who are not certified yet and are staying less than 4 weeks will do the *PADI Open Water* course and will do *Coral Watch* after that.
- Volunteers who are certified divers already and are staying less than 4 weeks will do the *Projects Abroad Survey Diver Distinctive Specialty* and the *Enriched Air Nitrox Specialty*. Depending on whether they pass the survey exam they will either join the survey team or do *Coral Watch*.
- Optionally- Volunteers can choose to join the *PADI Divemaster* program (for an additional price) if they stay at least 8 weeks depending on their current level and experience.

This means all volunteers, who do not have a certification yet, will do the *PADI Open Water Diver* course first. This is an intensive course which will take a minimum of 3 days excluding self-study time which has to be completed before the course starts. The first day the volunteer will be working on theory and skill practice in the pool. The second and third day will be on the dive boat and will each have 2 dives in the open water. On these dives the volunteers will learn how to use the skills we learned in the pool on real dives as well as buoyancy and movement control.

The theory/pool days starts at 9:00 with going over the dive theory with the instructor at the basecamp. Once the first 3 chapters are covered the class will move to the pool where the skill practice will be conducted. After the pool session, more theory study can be done.

The days on the boat start at 7:00 when the volunteers leave the resort with the car to the beach. From here we will go with a longtail boat to the dive boat. Around 8 the dive boat will leave to our destination for that day. On the boat, we set up our equipment and might work on some theory. Before the dives the student will be briefed about safety and the skill that will be done in the water. On the boat, we have plenty of relax time, especially on the PhiPhi days, since that is further out.





The *PADI Advanced Open Water Diver* course consists of 5 adventure dives, which are dives with a specific learning goal. While regular recreational divers who choose to take on the advanced course can choose from various different adventure dives, we have chosen a set of adventure dives that suits our research requirements for our volunteers. These are: Peak Performance Buoyancy, Deep Diver, Underwater Navigator, Search and Recovery and Underwater Naturalist. The last of these is integrated with the research training and will be executed by a staff member of the research team. The other four are spread out over two 2 days on the boat.

The *PADI Rescue Diver* course is an intensive course with lots of theory. Before the course starts volunteers will do the *Emergency First Response (EFR)* course, in which a volunteer will be trained what to do in any emergency and includes CPR. The *EFR* course takes 1 day and is a 'dry' course. The *Rescue Diver* course will focus on how to manage a diving related emergency. For this we start with 1 day to do theory and pool practice. On the second day, all skills practiced in the pool will be repeated in the open water. Once the skills practice is done the volunteers abilities will be tested in some realistic scenarios.

The *Enriched Air Nitrox Specialty* trains a diver how to use scuba tanks which contain higher oxygen / lower nitrogen levels than normal air. Using Nitrox will result in less absorbed nitrogen and more dive time at limited depths. This course can be taught as a dry course and will be combined with a 'regular' training / survey / Coral Watch dive.

The *PADI Divemaster* certification is the first professional level in a diving career. As a Divemaster you can guide certified divers and assist in dive courses. It's an intensive course with a lot of theory and skills. The requirements for the Divemaster course are to have at least 40 logged dives, to be a certified Rescue Diver and have a current (less than 2 years old or renewed) Emergency First Response certification. The Divemaster course alone will take 4 weeks.



There are several Divemaster add-on programs depending on the current level and experience of the volunteer:

If all requirements are met, the course can be done in 8 weeks.

- An Advanced Open Water Diver with 40 logged dives can do the course in 12 weeks.
- An Open Water Diver with 40 logged dives can do the course in 12 weeks.
- Any other volunteer can do the course in 16 weeks.

We require higher standards when it comes to buoyancy and control than what the PADI course states. This is needed to be able to work on the reef without doing damage to the ecosystem. We use all PADI required training materials. All divers, students and research divers alike, use a complete set of scuba gear.

## Results

By the end of their training all volunteers will be certified divers. They will be able to dive in such a manner that they can join our research team in a productive way. They will be able to do their research without causing any harm to the environment or putting themselves at risk.

## Conclusion

The dive school is a facilitating part of the Thailand Marine Conservation Project. As a project, we are looking to grow, which means we want to work with more volunteers on bigger projects. To accommodate more volunteers the dive school needs to grow with increased numbers and simultaneously reduce our dependence on external institutions.



# Marine Biology

## Introduction

Projects Abroad activities in Ao Nang started several years ago, initially focusing on Mangrove reforestation and in time expanding to include also marine conservation. In the past few years, the project's main aim has been to gather data regarding general reef health and to be a main contributor in data collection for our partners. We have recently made contact with the PhiPhi National Park Administration and have started collaborating in a number of projects aiming to aid the recovery of the reefs within the National Park boundaries. Our general aim for the future is to start shifting or focus from pure data collection to a more active and practical role. Data collection and surveys will still play a major part in our action plan but they will be now paired up with a number of practical activities and field work to aid the reef recovery process.

## Data Collection

### Overview

All the data gathered from 2011 to 2014 was analyzed into a brief paper titled "Ecological Study and Classification of the Coral Reef on the Low Andaman Sea: Influence of Sediments, Depth and Reef Status on the Substrate Cover and Species Abundance." The work provided insights into the health status of the coral reef in the project's survey area. Our initial and ongoing objective is to generate environmental coral reef data that is accessible to local and international organizations, scientists, conservation programs and, most importantly, policy makers.

The data gathered by volunteers is the foundation for our studies. The more data we gather, the more accurate our idea of what the current situation within the PhiPhi National Park is. We want to use this data to prove that a healthy reef produces a more abundant fish population, which translates directly into increased catches for the fishermen and a more attractive reef for the tourism industry. Ultimately, we seek to prove that an unhealthy and heavily overfished/damaged coral reef will not be able to sustain any kind of fish population, let alone a profitable one, and will not be an attractive destination for tourists.



As a secondary goal, we wish to investigate the correlation between the health status of a reef and the abundance/types of fish found within it. What we hope to determine is a strong positive correlation. This will allow us to understand if a reef is decaying or recovering based on the fish we observe.

Finally, the data from trash collection will be recorded and presented to the local authorities to further strengthen our position regarding the need for an appropriate trash collection system throughout the region and to raise awareness of trash and its proper disposal within the local community and with tourist operators.

As an extra education activity, we visit the Phuket Marine Biology Center (PMBC) and the Phuket Aquarium on a monthly basis.

PMBC hosts a large and successful sea turtle rehabilitation program and has always welcomed us to visit their facilities and help with their work. Occasionally PMBC organizes turtle releases, which we usually attend also.

The Phuket Aquarium holds a number of local marine species and it is a great opportunity for volunteers to see a range of fish from those species that are rarely seen in the wild as well as those that we survey.

Volunteers will take part in different activities depending on the length of their stay and their willingness to learn and work. Details regarding the different surveys the volunteers will be involved with and the survey methods are explained in the Volunteer Handbooks, which are provided to the volunteers online once they sign up for the project.

## Fish & Invertebrates Surveys

### Methodology

During the first year of data collection (2015) we decided to survey the abundance of fish within eight families: Rabbitfish, Surgeonfish, Parrotfish, Butterflyfish, Snappers, Groupers, Barracudas and Jacks.

The first four families are herbivorous fish, which keep under control the algae coverage on coral reefs, increasing the competitiveness of newly spawned coral larvae. Over time this will increase the survival rate of new colonies and consequently increase the total coral coverage on the reef. The last four families are predator fish and are the ones fished mostly for commercial purposes. These families represent the main food source for local villagers and businesses.

After collecting a year's worth of data, we decided to review the surveyed organisms to better suit our goals. Our aim was to remove some of the less significant species while adding other, more specific bio-indicators. We also wanted to make the learning process for volunteers easier, minimizing the time required for training and maximizing the time used for data collection. The 2016 survey method saw some slight changes in the fish counts. The changes simplified the process as we worked with families of fish and not species. Fish sizing estimates were also simplified from 10cm increases to below average, average, and above average sizes. Substrate estimation was also added in order to further show how fish abundance is related to coral and other substrate coverage.



As we reached the end of our second year of data collection, we gained much knowledge and insight regarding fish population and the health of the reefs on our dive sites. We have been involved in a number of activities organized by the national park such as underwater cleanups, setting up mooring lines and positioning buoy lines to mark areas that have been designated as no-entry zones in order to promote the recovery of the reef and to increase diver and snorkeler safety.

Since January 2017 started collaborating even more closely with the PhiPhi National Park as our survey method has been modified to match the one used by the scientists working for the Department of National Parks throughout Thailand. All our data is now part of a nationwide research effort and we have access to data coming from different regions in Thailand which allows us to have a much broader understanding of the health status of our reefs and of those in the rest of the country.

Volunteers who stay 4 weeks or longer can train for the Invertebrates part of the survey, while volunteers who stay 5 weeks or longer can train for both Fish & Invertebrates.

## Results

Data gathered in 2015 and 2016 has been analyzed and the results have been summarized in a short paper which is available to the volunteers and has been shared with our collaborators. There is much more that can be done with this data, especially when it comes to content creation and infographics. Tables, graphs and quick glance sheets will be created throughout the year and will be updated as we receive the 2017 data so that volunteers can see the fruit of their work and are kept up to date. This material will also be very useful when it comes to showing the local community what the effects of uncontrolled tourism and pollution is on the environment.



## Coral Watch

### Methodology

Coral watch has been developed by the University of Queensland and is a worldwide effort to survey coral reef health and bleaching events.

The biggest advantages of coral watch is that it requires no training and that it can be conducted with or without scuba gear. This flexibility makes it our go-to option when we have volunteers which do not have the time to train for any other type of survey or that cannot dive.

### Results

Data collected for Coral Watch is immediately inputted on the Coral Watch website or on the Coral Watch Mobile App. The data is analyzed instantaneously and the volunteer will receive an email with the results.

## Anemone & Symbiont Survey

### Methodology

The Anemone & Symbiont Survey has been initiated in 2017 with the aim of investigating the relationship between different species of host anemones and their possible symbionts. A certain degree of species specificity can be easily observed during any dive, but we are interested in backing up this intuition with statistical data. The Anemone & Symbiont Survey requires minimal training and is our preferred activity for volunteers which are more interested in learning about marine organisms but who do not have the time to complete the Fish & Invertebrates training.



### Results

The Anemone & Symbiont survey data will be analyzed once we reach a significant amount of entries and the results will be summarized in infographics which will be available to the volunteers and our collaborators.



# Reef Propagation

## Introduction

Our latest endeavor is a reef propagation and restoration project in conjunction with the PhiPhi National Park, Ocean Quest and Sea Shepherd Dive. Our final aim is to restore the reef on one of the dive sites in PhiPhi which has been destroyed by uncontrolled tourism over the years. Once we have mastered the technique and if it proves to be effective, we will expand our efforts to restore as many dive sites as possible.

While embarking on this new and exciting project, we still continue to work alongside our worldwide partners towards cleaner reefs (debris collection data for Project AWARE, Ocean Conservancy) and monitoring the status of endangered species populations in the local area (shark, turtle and ray population monitoring for Projects Abroad Global Shark Campaign, eOceans and the Phuket Marine Biology Center).

## Methodology

The reef propagation methodology follows the guidelines developed by Ocean Quest and Sea Shepherd Dive. Volunteers who take part in this activity will receive a student kit and will also receive a dedicated certification card.

The reef propagation method has been developed with a few key points in mind:

- Anyone can take part in the propagation effort. There is no age, fitness, skill or knowledge requirement upon signing up.
- The tools required are very basic and easy to obtain.
- The substrate used is natural, and all chemicals used are biocompatible and biodegradable.
- The propagation effort itself has no negative impact on the existing reef.



## Results

Since this is a hands-on project, Volunteers will be able to see some results immediately. At the end of a coral propagation activity day volunteers will see a new section of the reef has been created and populated. The long-term effects of this projects instead will only be appreciated after 2-3 years of work. At that point, the corals we are planting now will have grown to a size large enough to be harvested and propagated to nearby reefs.

## Discussion

As stated in the introduction, one of our main goals is to prove to the local community that enforcing environmentally friendly laws and regulations within the PhiPhi Marine National Park will be both ecologically and economically beneficial.

The PhiPhi Marine National Park is a world-famous diving location; the beauty of the coral reefs in this area used to be stunning and attracted divers from all around the world. The recent explosive tourism industry development in this location, paired up with environmentally unfriendly policies, caused the reefs to suffer and degenerate greatly and at an alarming rate.

A better management of the park area will reduce anthropic impact such as:

- Irresponsible tourism: tour operators in the area often don't operate in an eco-friendly manner. A high number of tourists on snorkeling trips damage the coral reef every day by stepping on live coral and feeding the fish. The tour guides don't take action to avoid these practices and instead are often the ones providing the bread to feed the fish and showing what an "entertaining" activity it can be.
- Boat handling damage: most of the speedboats and longtail boats used by the tour operators prefer throwing their anchor rather than using the mooring lines present on most of the islands. This practice destroys countless coral colonies every day and must be stopped. The government has made steps by providing additional mooring lines on the busiest tourist hotspots, but we need to push for the Marine Park Management to tighten their controls and start handing out substantial fines to whoever uses their anchors inappropriately.
- Overfishing and use of unsustainable and irresponsible fishing techniques: fishing is the main source of income for many local families. For years, fishermen have scavenged the seas using environmentally unfriendly techniques such as dynamite fishing and trawling. These fishing methods are now illegal or heavily regulated but the local government has not made an effort to enforce their laws and perform the required checks on fishing vessels.
- Trash: the close-by towns of Railey, Ao Nang, Ao Nummao, Koh Klang and numerous other population centers do not have appropriate trash handling systems. Local residents and tourists often throw trash directly on the ground both through negligence and due to a lack of trash bins. Where present, trash bins are often overflowing and trash collection does not happen nearly as often as it should. Simple environmental education is close to non-existent for the local population; most people are simply not aware of the consequence of trash mishandling.



To allow for our project to be successful, we need to make sure that the environmental policies defined in the PhiPhi Marine Nation Park guidelines are followed and respected at all times by everyone. Local fishermen need to understand that establishing, maintaining and respecting the Marine Protected Area will have a positive economic effect on their catch and not a negative one. A working Marine Protected Area will increase the internal and adjacent fish population due to a spillover effect, increasing the marketable catch as well as the reef's attractiveness. This will increase the revenue for both local fishermen and the tourist industry.

Another one of our goals is to actively promote reef growth and recovery. We have made noticeable progress in these past few months by securing the collaboration with Ocean Quest and Sea Shepherd Dive. Our reef propagation project is progressing well and will hopefully give us the results we need within a couple years.

## Conclusion

Our main objective was to establish very good relationships with the local community and the local authorities. We have gathered a noticeable amount of data that will be processed and summarized not only in a number of documents, but also in graphs, drawings, maps, and other different formats making it accessible and understandable by everyone in the community, from policy makers to children. We need to work on multiple fronts and tackle the problems from every possible angle: scientific, cultural, bureaucratic and educational.

Regarding the scientific aspect, we will let the data speak for itself. As long as we proceed with scientific integrity and gather data following our own high standards, the results will be non-refutable. Data will be consistent and abundant, allowing us to document the development of our project in a timely matter providing our partners with continuous updates and insight.

Properly managed Marine Protected Areas have been proven to work and be extremely beneficial in countless studies globally; we need to make these findings accessible to the local community so that they understand it is in both their best interest and that of the authorities not have to enforce the laws with a tight iron fist.



# Land Based Conservation

## Beach Cleanups

### Introduction

Litter and sewage pollution is not only an eyesore but is also a danger to the amazing wildlife in our seas and on our beaches. Litter is swamping our oceans and is washing up on beaches. It kills wildlife; looks disgusting; creates a health hazard and costs millions to clean up. There are nearly 2500 items of rubbish on every kilometer of beach. Marine wildlife gets entangled in litter and can accidentally ingest it. Turtles mistake plastic bags for jellyfish and the bags block their stomachs, often leading to death from starvation or constipation. Plastic litter on beaches has increased 140% since 1994. Plastic never biodegrades, it just breaks down into small pieces, which are called micro plastics, that never disappear. Microplastic particles are now found inside filter feeding animals and mixed in with sand grains on our beaches.

### Objectives

- Remove rubbish from the beaches around the Krabi Province and local islands.
- Collect data by recording each item of rubbish removed.
- Record and analyze the data collected to show the impact of the rubbish on the coastal environment.
- Provide the Phuket Marine Biological Centre with the data collected for analysis- this will then be shared with the Ocean Conservancy.
- Be a part of the global network of volunteers regularly cleaning beaches around the world and report on the items and amounts of marine debris salvaged using a standardized method.
- To generate and publish data that is highly valued by local and global scientists and the conservation organizations: Phuket Marine Biological Center, Ocean Conservancy and DMCR (Department of Marine and Coastal Resources) to name a few.



## Methodology

Projects Abroad runs a marine debris project which involves beach sampling using different strategies. The first looks at macro debris on the sediment surface where we use multiple transects which run from the water's edge to the terrestrial vegetation. At the moment two transects are used per sampling site with a transect interval of 50m but more can be used. All debris that is encountered a meter either side of the transect line is collected (selective sampling). The collected debris is then organized into debris categories and is counted and weighed. We use a compass and a GPS so that we sample the same section of beach every sampling session which enables us to work out accumulation rates of debris. Sampling is conducted on a once every two weeks during the high tourist season on the Nopparat Thara beach.

Volunteers are trained in safe and environmentally conscious debris collection, sorting and disposal. All volunteers undertake workshops on the effect of marine debris.

At the end of the activity, all the information is submitted to the Projects Abroad database (internal procedure) and to Ocean Conservancy. Data is entered using an online questionnaire system; the information is then automatically filtered onto a spreadsheet.

Developing awareness through learning and play, we incorporate marine debris issues into our Environmental Education Program in the Krabi province to help create a new generation of environmentally aware citizens.

Whenever feasible, we invite a local school to join us on a beach clean-up. The volunteers present an educational slideshow before the activity starts. The volunteers each take a small group of children and clean the beach together, separating the trash into recyclable, dangerous and non-recyclable items. The volunteers become positive role models and help to inspire this next generation to dispose of trash with environmental awareness.

## Results

From January 2016 to August 2016, a total amount of nearly 3500kg has been collected from the survey areas. We are clearly seeing changes in the amount of rubbish we are collecting in certain areas, but there is still a lot of education that is needed in local communities. By next year we hope to see stricter law enforcement when littering takes place.

## Conclusion

### 1. Nopparat Thara Island

On the East side of the island a lot of rubbish is being found. The rubbish that we collect are mostly plastic water bottles, food containers made out of Styrofoam and plastic, straws and plastic spoons. All this rubbish comes from the pier. Around 3pm, longtail boats and speedboats come back from their island daytrips and toss their black binbags on the beach. Once high tide starts setting in, all these bags are being dragged into the ocean. We calculate that 20% of these rubbish sacks get washed up on this island, the other 80% ends up in the ocean.



## 2. Long Beach

This beach is well known for families and friends that want to spend a calm day at the beach. We would find mainly drinking bottles, cigarette butts, food packaging, clothes and a lot of plastic bags. This suggests that all the rubbish is picnic related.

## 3. Ao Nummao Pier

This area is being used by longtail boat drivers to fix their boats. The rubbish we find is all related to boat maintenance. We would find mainly ropes, electrical wires, PVC tubes, nets, lightbulbs, engine oil and rubber.

With the help of volunteers, our partners and the local government, we are aiming for clean beaches and stricter law policies when it comes to littering. A reliable trash collecting system has to be implemented among local communities and schools. On an educational level, we hope to see awareness increasing in schools and social meetings.



# Microplastic Pollution

## Introduction

Nearly everything contains plastics, which can enter the waters when plastic products are left behind at the beach or waste is dumped illegally. In addition, plastics from sewage treatment plants, shipping, and oil and gas production often end up in the ocean. Plastic in the form of very small particles, known as nanoparticles and microparticles, is polluting the marine environment. Primary microplastics are plastics fabricated for use in items such as personal care products, whereas secondary microplastics are formed from the breakdown of larger pieces of plastic left in nature.



## Methodology

The method entails looking at micro debris within the beach sediment. We conduct core sampling (bulk sampling) in which we take samples from beach sediment. Core sampling is done at the same beaches and along the same transects that are used for the macro debris study. Core samples are most often taken from the uppermost debris line or high tide mark. Once we have taken the core samples we then perform a sample processing and analysis procedure which includes sieving, density separation, filtration and visual examination. Sieving is done to remove all large debris that is not needed. Density separation is where the core sample sediment is placed in a saline solution so that the sediment sinks and the debris floats to the surface. We can then isolate the debris by scooping it off the water's surface. The collected sample is then passed through a filter to remove the water. Once the filter is dry we then look at the debris collected under a microscope. We try our best to identify the debris type as far as we can, however, this is often challenging, especially when your sample contains a lot of natural debris.

There are also many other studies one can do regarding micro plastics including looking at gut contents of various marine species searching for the presence of micro plastics. Studies can be conducted to look at the bioaccumulation of toxins (in particular persistent organic pollutants) through the food chain as micro plastics have the ability to absorb these toxins.



Volunteers are trained in safe and environmentally conscious beach sampling, fish dissection and the use of a microscope. All volunteers undertake workshops about the effects of microplastics on the environment.

## Results

Micro debris is found in the sediment samples that are collected. Most of the debris is secondary, which means that the plastic found are the plastics that are broken down into small particles. The source of this plastic is mainly bottles and bags. Microbeads, plastics that originally come in tiny sizes are also found. This type of plastic is found in shampoo, soap, dishwasher soap, toothpaste and clothing and make their way through the sewage into our oceans.

During fish dissections, micro plastic is being found in the intestines of dead fish that we collect during our dives and beach clean-ups. Also, fish that we buy at supermarkets contain pieces of micro plastic. The results are shocking as 98% of all the fish being dissected contained microplastic.

## Discussion

Tiny particles of plastic litter in oceans cause deaths, stunted growth and altered behavior of some fish that feed on them. Fish are being killed, and prevented from reaching maturity, by the increase of plastic particles finding their way into the world's oceans. Microplastics are nearly indestructible in natural environments. They enter the oceans through litter, when waste such as plastic bags, packaging and other materials are discarded. All these end up in our oceans due to inadequate rubbish disposal systems and sewage overflow. This has a big negative impact for our marine life but for us humans as well. When we eat plastic contaminated fish, over the years, these plastics affect our health. It is scientifically proven that plastic causes cancer and disturbs our hormone level.

## Conclusion

Education and public engagement are often referred to as ways of improving public understanding and working towards social solutions for environmental problems such as microplastic accumulation. In terms of education, there are two main ways to increase the public understanding of environmental issues: formal and informal education. Formal education refers to the inclusion of scientific topics in centralized curricula in a country's educational systems. Informal education refers to volunteering projects where self-directed, voluntary learning is guided by individual interests and needs. For example, beach clean ups represent educational opportunities that have been useful for improving the involvement of local populations and increases in marine awareness have recently been demonstrated. To avoid further accumulation from microbeads in our oceans, better filter systems need to be introduced and general awareness of hygienic products needs to be conducted by the government.



# Mangrove Reforestation

## Introduction

Perhaps the most important role of mangroves is that they protect vulnerable coastlines from wave action because they hold the soil together and prevent coastal erosion. Mangroves shield inland areas during storms and minimize damage. Mangroves forests provide homes for several species of plants and animals. Birds establish large roosting and nesting sites in mangroves. Several species of fish, birds and monkeys also find refuge there. Mangroves are fish nurseries and provide a safe haven for juvenile fish, shrimp and crab. Mangroves therefore contribute significantly to Thailand's fishing industry and provide us with our fish resources. Mangroves break down pollutants and play a large role in carbon sequestration. A mature mangrove forest acts as a sediment trap, thereby assisting in the accretion of coastal sediments and further adding to the protection of low-lying inland areas. Mangroves these days are being destroyed in order to make room for land developments. Along with our local partner Raks Thai, we transplant mangroves (*Avicennia marina*) in order to slow down the erosion process.

The production of shrimp by means of coastal pond systems has been a traditional practice in Thailand for hundreds of years. However, advances in technology coupled with an increased international market demand for shrimp led to the development of intensive aquaculture systems that departed from traditional sustainable systems. These intensive systems were poorly planned and/or managed and have since proven to be unsustainable, with the result that large areas of 'land', much of it former coastal wetlands, now lie idle and unproductive, and new sites are being developed in an effort to maintain production output. With our partner, Mangrove Action Project (MAP), we restore abandoned shrimp ponds back into a mangrove community.



## Objectives

- To work in partnership with the Mangrove Action Project (MAP) and the Thailand Department of Marine Coastal Resources (DMCR).
- Protect the mangrove forest and environment through education and workshops in schools and within the local community.
- Mangrove restoration through seed collection, growing saplings and replanting. Support existing mangrove forest.

- Protect wildlife through research in the forest, rehabilitation and release of indigenous species of flora and fauna.

## Methodology

Volunteers take part in workshops each time they work on the mangrove project. Full training is provided by Projects Abroad staff on each of the day's activities. Where applicable our partners will also help in the training of volunteers to ensure accurate data collection and quality management in the conservation work.

### *Forest Regeneration*

Working with Raks Thai, volunteers transplant juvenile mangrove plants in order to slow down the erosion on the south-west side of the island Koh Klang. Working with MAP, volunteers restore reclaimed land (usually disused shrimp farms) through hydrology. MAP reclaims areas with the support of local landowners. The sites are surveyed, focusing on the flow of tides. Surveyed sites that are ready for restoration will be dug out to allow the brackish tides to flow through. The mangroves are left to reclaim that area naturally through regeneration, although this is sometimes aided by focused plantings of a small number of saplings. To enable a constant supply of mangrove saplings, volunteers will help in seed collection from natural forests, planting and general maintenance of a Projects Abroad mangrove nursery.

### *Educational Mangrove Trail*

Projects Abroad are building a mangrove educational walkway for school children, local people and tourists. The walkway will dissect the mangroves in a non-destructive manner at Koh Klang Island. The work will initially involve removing the old walkway and replacing it with a new concrete structure. Upon completion, volunteers will then conduct research from the pathway and lead educational groups around the site.

### *Target Area*

The main area that the conservation team will be focusing on is known as Koh Klang (GPS coordinates: 8.05753, 98.942085). Koh Klang is an island within the Krabi river estuary. The estuary of the Krabi River is listed as a RAMSAR wetland site, number 1100, and has been since July 5<sup>th</sup>, 2001. The protected area of 213 km<sup>2</sup> comprises of more than 100 km<sup>2</sup> of mangrove forests. Water quality in the area has suffered from nearby community encroachment, the rapid growth of tourism from nearby Krabi and an increase in aquaculture industries. Projects Abroad will monitor the quality of water as part of the ongoing research at the project.

## Results

### *1. Planting*

Planting usually does not succeed due to a failure to appreciate the physiological tolerances of mangroves to tidal inundation. Even if it works, the result is often replacement of one productive marine habitat, like seagrass meadows with mangroves, a questionable trade-off.

### *2. Hydrologic restoration*

With proper planning, this way of restoration has a high success rate. Successful restoration of abandoned shrimp aquaculture ponds is an example of this method. Planting should only be done if natural recolonization fails. Scientific data indicates that using this method, ecological functions are quickly restored, with fish populations typically reaching reference site diversity and densities within 5 years.

## Conclusion

Mangroves fulfill many necessary functions yet increased population pressures in coastal areas and lack of awareness have led to large scale conversion of mangrove areas to other uses. Numerous case studies and anecdotal evidence exist describing mangrove losses over time. However, access to comprehensive information on the status and trends of mangrove areas at the global level has been limited. Some areas in Thailand have now banned the conversion of mangrove areas for aquaculture purposes and require environmental impact assessments prior to large scale conversion of these areas for other uses. This has led to new legislation, better protection and management and, in some countries, to an expansion of mangrove areas through active planting or natural regeneration. Even though mangroves have been used for the collection of wood and as a source of subsistence for local populations, wood removal is rarely the main cause of loss. Human pressure on coastal ecosystems and thus competition for land for aquaculture, agriculture, infrastructure and tourism are often intense and are among the major causes of the reported decrease in these forest areas over time. More specifically, the relatively large losses in Asia during the 1980's were caused primarily by large scale conversion of these areas for aquaculture and tourism infrastructure. On a positive note, integrated coastal area management has been identified as a possible solution to competing land uses in several countries.

Better information is needed on both the extent and the condition of mangroves as an aid to policy-and decision making for the conservation, management and sustainable use of the world's remaining mangrove ecosystems. Despite efforts by several organizations, conventions and governments, the true value of mangroves and other wetlands is still underestimated. Much remains to be done to reduce the rate of loss, which is significantly higher than for other forest types. If deforestation of mangroves were to continue, it could lead to severe losses of biodiversity and livelihoods, in addition to salt intrusion in coastal zones and the siltation of coral reefs, ports and shipping lanes, with consequent losses of income from tourism and the loss of knowledge of mangroves and their use as recreational sites for coming generations. The health of mangroves and of all the related marine and terrestrial ecosystems depends on their effective conservation and sustainable management.



# Education and Awareness

## Teaching Program

### Introduction

Community education and awareness integrates long term solutions and changes in local communities so that all of the people, not only the children, care about helping the environment.

### Objectives

The Education and Awareness Project aims to educate Thai children within the region of Ao Nang and the neighboring areas. We hope that the children will learn about the local environment in fun and interactive lesson plans. Along with awareness, we hope that the knowledge will be passed on to their parents and community.

### Methodology

We work with local schools including Baan Din Dang Noi School, Baan Na Wong School, Baan Tub Pon School, as well as several others. Aside from schools, we also participate with the local government Sub District Administrative Organization on special events.

About twice a month, our volunteers and field coordinator will go to the selected schools on rotation. This education project started in November 2014.

Marine related topics are initially given to volunteers, and the lesson is planned around the topic selected for that week. Volunteers need to come up with ideas to work on together regarding the teaching topic. After we have picked an idea, which may be certain games or activities, we will start to prepare materials during the week.



We also will work with the Plastic Pollution Project by giving local schools and community information and education on what we are doing. We will also get local people to join us on field activities, such as beach clean ups.

We will have an hour with the school children. In the first five minutes, we will introduce ourselves and brief the children on the topic we will be teaching them about. Then we will spend half an hour showing a PowerPoint presentation or enact a shadow puppet show, always related to educational topics. After the presentation, we will ask them questions to see if they understand the material and we will answer any questions they have. The last 25 minutes will be used to play games and activities based on the topic we taught them about. Some other topics that we can teach the children include the importance of recycling, marine biology, mangrove forests, etc.

