

EARTHWATCH INSTITUTE

Fourth Year Research Report

PI Name: Dr. Georg Heiss AND Kim Obermeyer, MSc.

Project title: Conservation and monitoring of coral reefs in Thailand

Date Completed: Feb. 16, 2009

Period covered by this report: from March 2006 to Feb 2009

Progress towards objectives

Objective 1

Specific questions to be addressed by Reef Check surveys in the first year:

1. What is the condition of coral reefs in the Andaman Sea and Gulf of Thailand?
 - A. What is the health of corals?
 - 1) What is the live coral coverage and recently killed coral coverage?
 - 2) What percentage of the coral shows signs of disease?
 - 3) What is the coverage of nutrient indicator algae?
 - B. What is the health of the reef fish populations?
 - 1) What is the relative density of fish species that indicate the presence of anthropogenic effects, such as over-fishing?
 - C. What is the health of the invertebrate population?
 - 1) What is the relative density of invertebrate species that indicate the presence of anthropogenic effects?
 - D. What is the correlation between coral reef health measures and anthropogenic factors including destructive fishing practices (dynamite and poison fishing), aquarium trade collections, invertebrate harvesting, recreational diving, sewage pollution, industrial pollution, commercial fishing, subsistence fishing.

In subsequent years, the project will continue to do a combination of baseline surveys and resurveys, asking the same questions as outlined above, as well as resurveying sites and building a long term database. For resurveyed sites, the questions will naturally focus on what if any change in the Reef Check parameters can be detected at the level of sampling that has occurred.

Reef Check baseline and monitoring surveys were completed successfully in all areas stated in original proposal. We conducted baseline surveys on approximately 40 reefs in four areas of the Gulf of Thailand and Andaman Sea. Approximately 22 of these sites were selected as monitoring sites for long-term, repeated surveys to track conditions and trends in coral reef health, including all of the variables mentioned in Objective 1 regarding health of corals, reef fish and invertebrates. Logistical challenges such as poor weather, insufficient underwater visibility, unreliable boats and several cancelled teams, limited our ability to conduct as many surveys as we had originally hoped; this estimate was revised after the first season of field work and is now approximately 6 surveys per Earthwatch team (10 days) multiplied by the number of teams per year (currently for 2008-2009 about 5-7).

Objective 2

Conduct reef surveys at Koh Chang Marine National Park for the purpose of monitoring. Establish a long-term monitoring protocol that can be used by the National Park staff to assess a) the effectiveness of protection afforded by the MPA and b) changes in reef condition inside the MPA over time.

We trained national park staff, community members changing livelihoods from fishing to ecotourism, and local dive operators, who joined our survey teams and who have since taken over the surveys. Three seasons (March 2006, November 2006, November 2007) of Reef Check training and surveys, supported by Earthwatch teams developed the capacity of local operators to begin conducting monitoring surveys in 2008. After baseline surveys, a set of eight monitoring sites both inside and outside the active marine protected area at Koh Chang, were chosen for long-term monitoring. These sites were surveyed during each of three field seasons, **for a total of 24 monitoring surveys**. Based on those surveys it was found that increased protection measures were needed at sites frequented by recreation snorkeling and diving boats (damaged hard coral) and illegal fishing. Dive operator and national park staff have since repeated survey of the permanent transects and carry on the monitoring.

Objective 3

Increase local capacity to manage reefs on Koh Chang. Provide Reef Check training with each Earthwatch volunteer team to local resource managers (National Park staff), local dive shop operators, recreational divers, and any interested members of the local communities. Present findings of Reef Check surveys to the local community and resource managers. In collaboration with the UNEP/GEF project, we will take part in public meetings and informational sessions prior to the onset of the project in order to identify community concerns with regards to reef management, commercial and subsistence fisheries and species of concern.

Reef Check training was given several times to various local groups within the Koh Chang National Park area, including National Park staff, local Thai and foreign dive operators, local ecotourism operators and school groups. We directly trained approximately **55 local community members** from the above groups and also trained trainers that have since trained another **20 recreational divers** in Reef Check in the Koh Chang area. We conducted joint surveys with teams from the UNEP/GEF funded Koh Chang Marine Protected Area Demonstration Site project as well as environmental education camps with local school children from the Saalak Phet School, the largest fishing community on the island. Reef Check survey data was included in the UNEP/GEF project results which were used to inform national park authorities of reef conditions inside the MPA. National Park staff and local dive operators joined Reef Check teams to survey reefs and received data from our project. Results and recommendations from our project helped lead national park authorities to implement a “no-boat” zone around key hard coral reef sites within the park, implemented with mooring ropes and buoys. This decreased boat-caused damage to reefs in the area. After several training sessions by our project, national park staff and local dive operators have formed Reef Check teams that have continued to carry out surveys and train more people to join teams. We have since decreased our focus on this site but continue to monitor survey teams there and provide guidance and training when required.

Non-technical overview of results

Data was collected from 2006 to 2009 on habitat composition and important ecological and harvesting indicator marine fish and invertebrate species. Fish taxa (Table 1) included in the surveys were butterflyfish (Chaetodontidae) groupers (Serranidae) parrotfishes (Scaridae), humphead wrasse (*Cheilinus undulatus*), bumphead parrotfish (*Bolbometapon muricatum*), sweetlips (Haemulidae), snappers (Lutjanidae), barramundi cod (*Cromileptes altivelis*) and moray eels (Muraenidae). Invertebrate species included in the surveys were *Diadema* (sea urchins), pencil urchin, giant clams (*Tridacna*), sea cucumbers (Holothurians), crown-of-thorns starfish (*Acanthaster planci*) and lobsters (*Panulirus*). Internationally recognised underwater visual surveys methods were used to census the marine environment according to Reef Check protocol. By collecting data in a standardized format Reef Check is able to detect spatial and temporal trends in reef health across the globe and make comparisons on the status of coral reefs all around the world, including Thailand.

Underwater visual censuses of fish and invertebrate taxa were conducted using 4 permanent 20 x 5 meter belt transects at each site. Transects were conducted at a depths ranging from 3-12m. Habitat composition was determined using 4 replicate 20m line intercept transects, with substrate type noted under every 50cm increment.

Table 1. Fish and invertebrate taxa recorded in surveys

Fish	Invertebrates
Butterfly fish (<i>Chaetodontidae</i>)	Banded coral shrimp (<i>Stenopus hispidus</i>)
Sweetlips (<i>Haemulidae</i>)	Diadema urchins
Snapper (<i>Lutjanidae</i>)	Pencil urchins (<i>Heterocentrotus mammilla</i>)
Barramundi cod (<i>Cromileptes</i>)	Sea cucumber (<i>Thelenota</i> and <i>Stichopus</i>)
Humphead wrasse (<i>Cheilinus undulates</i>)	Crown-of-thorns starfish (<i>Acanthaster planci</i>)
Bumphead parrot fish (<i>Bolbometapon murica</i>)	Giant clam (<i>Tridacna spp.</i>)
Moray eel (<i>Muraenidae</i>)	Triton shell (<i>Charonia tritonis</i>)
Grouper (<i>Serranidae</i>) >30 cm length	Collector urchin (<i>Tripneustes spp.</i>)
Parrotfish (<i>Scaridae</i>) > 20 cm length	Reef lobster (<i>Malacostraca</i>)

Reefs in the area are close to mainland activities and open for small scale, mostly unregulated fisheries. The tsunami of December had variable but occasionally strong affect on reefs (eg. Koh Pling suffered perhaps 90% reduction in hard coral coverage; anecdotal information). National Park covers some areas but have little monitoring or enforcement efforts.

Reef Substrate

Eighteen surveys were used for data analysis in the Northern Andaman Region. Reef substrate types (Figure 1) in our Northern Andaman study area were dominated by hard coral (mean 38%), followed by rock (mostly old dead coral; 31%), rubble (11%) and sand (6%). Percent hard coral coverage ranged from a high of 70 to a low of 9. Of the eighteen reefs surveyed, 28% were considered in poor condition, 55% in fair condition, and 17% in good condition (following the categorization scheme of Gomez and Alcalá 1979; Table 2). Sites in the northern part of our study area, least affected by the tsunami, had the highest mean coverage of live hard coral (63%). The area worst hit by the tsunami wave, Koh Pling had a hard coral cover of only 9%, but increased in one year (from 2007 to 2008) to 27%, indicating the ability of reefs to recover hard coral cover rapidly. Coral recruits at this site also increased from 2.5 recruits per 50 square cm to 7, mostly represented by one fast growing species of branching *Acropora*. Koh Luk Kam Tai, also hit hard by the tsunami wave, had 23% hard coral cover in 2008 and 35% in 2009; coral recruits also increased from 2.3 to 6. All other sites in the Northern Andaman showed relative stability in hard coral and other substrate types over the study period.

Twenty surveys were used for data analysis in the Gulf of Thailand Region. The Gulf of Thailand sites had an average of 53% hard coral coverage with a range of 15-71% (Figure 1). Hard coral dominated the substrate cover, followed by rock (27%), sand (7%) and rubble (7%). Of the sixteen reefs surveyed, 6% were considered in poor condition, 38% in fair condition, and 50% in good condition and 6% were in excellent condition. Substrate cover did not change significantly during the study period.

Table 2. Classification of reef live hard coral cover in Andaman Sea and Gulf of Thailand surveyed sites, after Gomez and Alcala 1979.

Survey area	Poor (0-25%) No.	Fair (26-50%) No.	Good (51-75%) No.	Excellent (76-100%) No.
Andaman	5	10	3	0
Gulf	1	6	8	1

Invertebrates

Sites in the Northern Andaman region had were characterized by low relative density of most invertebrate indicators including *Diadema* urchins with an average of 18 per 100 sq. m. Additionally, 95% of this abundance was represented by only three sites. In 2009, there was a significant decrease (from 24 to 0.25 per 100 sq. m transect; 2-tailed t-test $p=0.05$) in *Diadema* sea urchin abundance at Koh Pling. The project staff has been inquiring about urchin collection at Koh Pling to determine if this may be the cause. Rapidly changing reef succession associated with recovery from tsunami and coral regrowth likely play a role as well. Other invertebrate indicator densities did not change during the study period.

The Gulf of Thailand sites had much higher relative densities of *Diadema* (mean 188 individuals/100 sq. m) which was by far the most abundant invertebrate. Giant clams (*Tridacna sp.*) were also more prominent in the Gulf with a mean of 3 individuals/100 sq. m. There were no significant changes in invertebrate densities at monitoring sites between 2006-2007.

There is a Thai government hatchery and release program for giant clams in the Gulf. The Crown of Thorns starfish (*Acanthaster planci*), a predator of hard coral, was most abundant at Chumpon sites with two counted on every transect ($n=4$). Banded coral shrimp (*Stenopus hispidus*) were not found at any sites and hardly any triton shells (*Charonia tritonis*; the main predator of crown of thorns starfish) were found; both are commonly collected for aquaria and curio sales. Reef lobster (*Malacostraca*) which fetch a high price in the seafood market were not found except for at Northern Andaman sites, possibly indicating a lapse in fishing pressure since the tsunami.

Fish

All sites surveyed, in both the Andaman Sea and Gulf of Thailand, showed signs of overfishing with low abundance of food fish (e.g. Grouper (*Serranidae*), sweetlips/grunts (*Haemulidae*), parrotfish (*Scaridae*), Figure 2). Snapper (*Lutjanidae*) showed higher abundances that can be explained by the presence of several large schools of small individuals that were occasionally encountered on survey transects. Butterfly fish (*Chaetodontidae*) were relatively abundant with potentially indicating a low level of aquarium captures. All sites had low abundance and size of groupers. There was a complete absence of three highly sought after food fishes the Bumphead parrotfish (*Bolbometopon muricatum*), the Baramundi cod (*Cromileptes*), and the Humphead wrasse (*Cheilinus undulates*). However, between December and February, 2009, we saw Bumphead parrotfish off transect at three of our sites where they had never been seen before. They were seen on multiple occasions in schools of 8-15 individuals and perhaps indicate a recovery.

Koh Chang Marine Protected Area

Hard coral coverage was identical inside and outside the MPA, with the highest hard coral coverage site actually outside the MPA. Snapper, diadema urchins, and giant clams all had higher densities inside the MPA but not significantly. There was no significant difference between inside and outside MPA in any other indicator variables. Coral damage which was present both inside and outside the MPA was significantly higher outside (2-tailed t-test, $p < 0.05$). Also trash including fishing nets was more numerous outside the MPA.

How do these data contribute to achieving conservation impacts?

Results from our project have been used to educate local communities, collaborators and Thai government agencies about the condition of coral reefs. Local communities have agreed to follow best practices and exercise special care around the area's best condition reefs as described to them using our reef-health data. Laem Son National Park has agreed to install mooring buoys at select locations of prime hard coral based on our data. At Koh Chang National Park mooring buoys and exclusionary buoyed ropes were installed at key reef sites to limit the access of boats. We have used our data in discussion with the Phang Nga (Northern Andaman) Provincial government to create coastal zoning regulations and steer the area in the direction of a "Green Coast" specializing in nature and community tourism and away from Thailand's current model of over-development and mass-tourism. We presented our findings to local fishing communities in conjunction with reef best practices, the logic of protecting their fishing grounds' habitat against anchor and boat damage and other impacts, was well received.

What are the significance and benefits of your research at the following levels?

- **Local (to the area of the research site)**

Our projects benefits the local area directly through jobs to project staff and support staff to service the volunteer teams. Our project has worked directly with eight local villages providing 1) Reef Check training, 2) environmental education camps to school children, 3) ecotourism guide training to local fisherfolk, 4) guide and hospitality training and tourism clients (Earthwatch volunteers) for community-based tourism programs, 5) SCUBA diver training in collaboration with the Ecotourism Training Center (see Section 7 below). Our project has also partially contributed to several spin-off projects such as handi-craft development (handmade crafts such as natural soap, carved Sea Gypsy boats, batiks, hammocks and others) that we sell through our projects with proceeds going to the village. Another benefit has been through conservation of local reefs (monitoring, protection, education), sea turtle populations (nest surveys), and mangrove areas (replanting), through environmental education and awareness programs conducted in-village and at our new (since 2008) research base and learning center (see Section 7 below for details). For example, in one community, Laem Now, we assisted them in development of a community protected area for Reef lobster (*Malacostraca*) one of our focal species. They now self-enforce a no fishing area for this species as they recognize the benefits of having a source population to promote the growth of surrounding populations that can be harvested.

- **National / Regional**

Our project has contributed finding to provincial (Phang Nga Province focal site, called “Northern Andaman Islands”, in the proposal) government to promote the province as a “Green Coast” in Thailand and also advocate for coastal sustainability related to tourism and development in order to protect the regions coral reefs and other marine resources. Through our new sustainable island research base (Koh Ra Ecolodge; not described in the original proposal but becoming a more prominent part of our program; to be described fully in the renewal section), supported via Earthwatch volunteer accommodations, we have been able to influence tourism policy in the region, advocating for sustainable coastal development along the study site coast.

We have also been involved in marine protected areas management and networking projects at the regional and federal level. Reef Check, through this project’s support, has become the preferred method of rapid survey used to increase the community stakeholder involvement that federal national parks have been moving towards. Used by national park staff and private partners (eg. dive operators) to collect information on coral reef health, Reef Check has formed a national network of survey teams.

- **International**

The data from our project has been a substantial source of survey information collected on reefs in Southeast Asia for inclusion in Reef Check’s central database and used for global and regional (Indo-Pacific) analysis on reef trends. Data is also shared with global databases including Fishbase housed at the World Fish Center, Reefbase, and the International Coral Reef Initiative database. This data has been useful for tracking trends in coral reef condition, and specifically coral bleaching, related to global temperature changes.

Dissemination of results

In line with our mission, the Earthwatch Institute is committed to research and results that will be disseminated to local, national, and international audiences.

Printed:

Books / book sections; peer reviewed scientific publications; reports, management plans or policies; fact sheets, brochures, leaflets, pamphlets, posters, academic dissertations, annual reports, proceedings of conferences or workshops; letters; newsletters.

Publication type (from the list above): Peer reviewed scientific publication

Author: Richard Stone

Full reference: R. Stone. 2007. A world without corals. Science 316: pp.678-681

Audience: International

Acknowledged Earthwatch? Y/N: Y

PDF submitted? Y/N: Y (Earthwatch already has a copy)

Publication type (from the list above): Report

Author: Hodgson et al.

Full reference: 10 Years of Reef Check 1997-2007: global analysis of coral reef condition, In prep.

Audience: International

Acknowledged Earthwatch? Y/N: Y

PDF submitted? Y/N: Y (will send when published)

Visual: artwork; visitor centre, poster or display, slides, photographs

Publication type (from the list above): coral reef educational poster

Acknowledged Earthwatch? Y/N: Y

Photographs submitted? Y/N: Y (with this report)

Digital: database; internet - websites, email group/ blog/forum; CD Rom, e-newsletter

Publication type (from list above): internet website

If website/ blog/ forum provide URL: <http://www.reefcheck.org>

Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): e-newsletter, The Transect Line

If website/ blog/ forum provide URL: <http://www.reefcheckthai.org>

Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): internet website

If website/ blog/ forum provide URL: <http://www.reefcheckthai.org>

Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): internet website

If website/ blog/ forum provide URL: <http://www.thaiecolodge.com>

Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): e-newsletter- Koh Ra Ecology Newsletter Nov 08-Jan 09

If website/ blog/ forum provide URL: <http://www.thaiecolodge.com>

Acknowledged Earthwatch? Y/N: Y

Mass media: broadcast production; film; TV, radio, print (newspaper/ magazine coverage);
Press releases; press conference; interview, article creation; press trip

Publication type (from the list above): Popular press- Magazine

Author: Dan Linstead

Full reference: Wanderlust, "Voluntary Service Underseas" by Dan Linstead, February 2007, issue 85

Audience: International

Acknowledged Earthwatch? Y/N: Y

Publication type (from the list above): Popular press- Magazine

Author: Jeff Goldbloom

Full reference: On Earth, "My Fabulous Virtuous Vacation", by Jeff Greenwald, September 2006.

Audience: International

Publication type (from the list above): Popular press- Newspaper

Author: Fraser Morton

Full reference: Phuket Post, Volun-tourists make a difference, Feb. 9, 2009

Audience: National

Publication type (from the list above): Popular press- Magazine
Author: Jim Algae
Full reference: **Untamed Travel**, in press
Audience: International

Meetings and conferences: presentations/ lectures; conferences; workshops; training sessions; discussions; local community meetings and events.

Publication type (from list above): Workshop
Title: Green Fins workshop on best practices certification for dive operators, project summary and best practices presentation.
Audience: Agencies and dive operators, southern Thailand
Audience size: 30-40
Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): Workshop
Title: WWF-Thai Department of National Parks workshop on private sector reef monitoring.
Audience: Agencies and dive operators, southern Thailand
Audience size: 20
Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): Workshop
Title: Tourism Operators Initiative- workshop on coastal sustainability in tourism.
Audience: Agencies, local government, tourism operators
Audience size: 20
Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): Workshop
Title: UN WTO- workshop on sustainable tourism and resort green certification
Audience: Agencies, local government, tourism operators
Audience size: 15
Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): Workshop
Title: USAID Sustainable Livelihoods Initiative- workshop on post-tsunami alternative livelihoods
Audience: Agencies, non-profit organizations, communities
Audience size: 40-50
Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): Workshop
Title: IUCN- Northern Andaman Community-based Tourism Network- workshop on northern Andaman Coast sustainable tourism and natural resource sustainability
Audience: Agencies, tourism operators, communities
Audience size: 25
Acknowledged Earthwatch? Y/N: Y

Educational resources: lesson plans; resource packs, other

Publication type (from list above): lesson plans
Author: Kim Obermeyer, Sirikanjana Chantakian, and Heather Raitel
Title: Coral Reef Workbook

Audience: local Thai school groups and international student groups
Acknowledged Earthwatch? Y/N: Y

Publication type (from list above): poster
Author: Kim Obermeyer, Sirikanjana Chantakian, and Heather Raitel
Title: Coral reef ecology and conservation poster
Audience: local Thai school groups and international student groups
Acknowledged Earthwatch? Y/N: Y

Partnerships and Collaborations

Provide a brief report on the involvement of partners and other stakeholders in project delivery for the period covered by this report. *Specify the nature of the collaboration. If you have a formal agreement with an organization, please note whether a memorandum of Understanding is in place, letter of agreement, etc.*

1. UNEP/GEF Koh Chang Marine Protected Area Demonstration Site Project- participated in Reef Check training and surveys, community meetings and educational camps (2) organized and implemented by our project.
2. Ramkhamhaeng University, Marine Biodiversity Unit- participated in Reef Check training and surveys, community meetings and educational camps (2) organized and implemented by our project (Koh Chang site).
3. Chulalongkorn University- joined Chumpon and Northern Andaman surveys and trained our staff in line intercept transect reef survey methods
4. Kasetsart University, Ranong Coastal Resources Research Center- their staff joined our training and subsequently performed surveys. Jointly help educational activities for local youth groups, collaborated to start mangrove nursery at their center for use in our community mangrove restoration project at Baan Koh Ra
5. Rajapat University- When we were asked in our last field report, "Has your project helped lead to the completion of Masters' theses, or other educational research findings", we could not answer "yes". Because of this suggestion, we began collaboration with Rajapat University in Phuket and agreed to mentor a Thai Master's student in marine ecology. Ms. Naam was trained in Reef Check along with Earthwatch Team X, 2007 (and further Team III, 2009) and began her research on the condition of coral reefs on Phuket Island. We continue to mentor her progress and assist her and Rajapat University in their coral reef research.
5. Phuket Marine Biological Center- provided project guidance and support through site selection, local contacts, data analysis and more.
6. Department of Marine and Coastal Resources- collaborated with coral reef camps at Koh Chang and Northern Andaman, provided staff and educational material
7. Department of National Parks including specific national parks of Koh Chang, Mu Koh Chumpon, Koh Similan, Koh Surin, Koh Lanta, Laem Son, Thai Mueng, Koh Ra National Parks. Koh Chang and Laem Son have already joined Reef Check training. Koh Chang has started monitoring. We are currently making a schedule to train the other parks in collaboration with the WWF project (Strengthened Andaman Marine Protected Areas Network- SAMPAN)
8. Northern Andaman Tsunami Relief- Letter of agreement in place. Our main collaborator on community capacity building, education, and development in eight villages in the Northern Andaman region. Co-funded our ecotourism training in five communities.
9. Andaman Discoveries- Local community-based tourism operator; project started after tsunami and works with local communities doing ecotourism and traditional lifestyle participatory programs. Our project sends Earthwatch volunteers on their programs to experience village life and contribute to their programs and villages.

10. International Union for the Conservation of Nature- collaborator and funder on educational programs, receives our data and collaborates with our project on making policy recommendations to local government.
11. World Wildlife Fund Thailand- Formal Memorandum of Understanding (MOU) in preparation; collaborator and funder for national park training program.
12. PADI Project Aware- Formal MOU in place; co-promotes Reef Check as community monitoring program.
13. Green Fins- co-promotion of reef best practices in Thailand
14. Mangrove Action Project- Letter of agreement in place for collaboration on marine and coastal resources conservation and sustainability promotion.
15. Naucrates Foundation- Collaborator at the Andaman study sites for more than six years; we share tasks for sea turtle nesting surveys between our two neighboring islands
16. Ecotourism Training Center- MOU in place, Kim Obermeyer on board of directors, collaboration to train young Thai divers as dive professionals (dive masters, instructors); we have provided Reef Check training and support for dive training.
17. About 11 local coastal communities- received training, educational programs, volunteers as guests
18. About 10 local dive operators- trained as Reef Check EcoDiver instructors who can now train other EcoDivers

Educational Opportunities and Capacity Building

a) If appropriate, provide a brief report on how the project has created or enhanced educational opportunities for project stakeholders, including the local community (excluding Earthwatch volunteers)

Almost all project partners (**about 30 people in total**) have had been trained in Reef Check by our project (with the exception of #9 above and #5 which had already been trained) thereby learning about coral reef ecology, threats, solutions and survey methods. Some of these partners (#3, 12, 16, 18) received training allowing them to subsequently train other people as certified Reef Checkers, thus multiplying the capacity building impact (at least **60 additional divers** have been trained in this way).

Educational programs-

Eleven coastal communities in four provinces (Baan Talay Nok, Laem Now, Bang Ben, Tung Nang Dam, Baan Koh Ra, Tung Rak, Bak Jok, Kuraburi, Klong Naga, Thai Mueng in Phang Nga and Ranong Provinces and Saalak Pet in Koh Chang) have been part of our project's educational programs consisting of coral reef camps, environmental leadership and networking camp, and ecotourism livelihood training. **Approximately 200-300 local Thai community members** have been involved in these programs.

Our project has provided SCUBA training opportunities to several local Thai people through the Ecotourism Training Center (ETC). In collaboration with ETC, we have developed a training program whereby young local Thai village members, can receive PADI SCUBA certification up to the Dive Master and Instructor level. Part of this training includes Reef Check training and Reef Check instructor training. We completed this training for **12 Thai people** in 2007-2008.

The Koh Ra Ecolodge: Reef Check research base, environmental learning center and coastal sustainability demonstration site. Since this project component is both substantial for the future direction of the project and in its relative infancy, we will consider it an important part of the project's future direction, but herein describe its origin and first few months of operation. Initially used as a study site accommodation for Earthwatch volunteers and Reef Check research team members, the facility at Koh Ra was opened as the Koh Ra Ecolodge

officially in November 2008 as a sustainable financing project for local conservation and community support projects as well as a learning center and demonstration site for coastal sustainability. The concept is to provide a venue for conservation and education projects and a model for sustainable island and coastal tourism development (alternative to mass-tourism resort development) that local Thai entrepreneurs and developers can visit to learn about energy and resource conservation and the “green tourism” niche. The sustainable financing aspect comes into play as the Ecolodge is open to guests interested in nature travel and ecotourism, a portion of their accommodation fees going towards Reef Check and other conservation and community projects. Since opening in November 2008, the Ecolodge project has had over **100 guests (each receiving education about the local ecology and culture sustainability)**, visits from several local community groups to learn about sustainable technologies and permaculture (eg. solar power, bioswale waste water filtration, organic gardening, green building techniques, agroforestry, etc.), started a community-based tourism program with three neighboring communities (including a community fund for community improvement projects from guided tours to the village), and developed a learning center in English and Thai for guests, visitors and local school groups.

b) If appropriate, explain how the project has increased capacity to work towards a sustainable environment in the local area/country

Through the capacity building and educational opportunities cited above (all our educational opportunities are sustainability-based), **we have increased the capacity of between 400-500 people** (including all stakeholder groups mentioned in this section without double-counting any) through direct Reef Check training, additional educational programs and the Koh Ra Ecolodge, from a diverse cross section of society including local community members, collaborating agencies and international travelers. All of these people have gained a better understanding of marine and coastal ecology, conservation and sustainability and how Reef Check and Earthwatch are working together towards this goal.

Sustainability of the Project

If measures have been taken to secure the future sustainability of the project (e.g. securing funding, implementation of management plans etc) please provide a brief report here:

We have taken action since the start of this project to ensure that Earthwatch’s support is supplemented to allow for financial sustainability and impact. We have sought sustainable financing mainly through a three-pronged approach, 1) garnering support from local, regional, and federal Thai and international non-profit agencies, 2) developing the Koh Ra Ecolodge research base as an income generating project, and 3) disseminating Reef Check training through PADI dive operators in a fee-based system. Promoting conservation is a slow process in Thailand and our project has learned to accept a steady pace in working with local agencies that has paid off with support from various levels of government for our project. The provincial governor’s office has sought our advice on development of the province as a “Green Coast” and the Department of National Parks has accepted Reef Check as its preferred community coral reef monitoring method.

The Koh Ra Ecolodge has had a very successful start and we hope that by the 2009-2010 tourism season (November-May) it will generate profits towards supporting the project. Some revenues in 2008-2009 have already gone towards local community projects and developing the Center for Coastal Sustainability including the learning center and coastal sustainability demonstration site.

Reef Check has developed a new training system, “EcoDiver”, whereby PADI dive professionals (dive operator instructors and dive masters) can become Reef Check trainers who can subsequently offer Reef Check as a specialty course, charging recreational divers a

course fee. Reef Check in turn has been able to charge dive operators a training fee for this and increase its financial sustainability.

Figure 1.

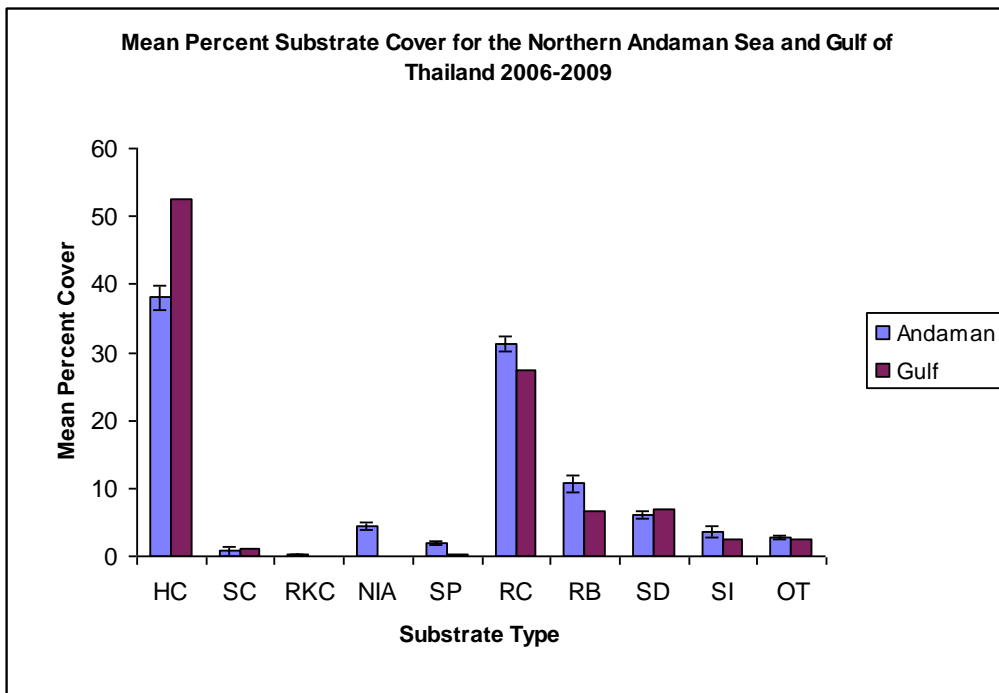


Figure 2.

