Table of contents

1. Introduction .................................................................................................................................... 1
2. Course evaluation ........................................................................................................................... 1
3. Student grades ................................................................................................................................ 1
4. Field component ............................................................................................................................. 1

Appendix I  Course overview.................................................................................................................. 3
Appendix II List of participants............................................................................................................. 4
Appendix III ICM Certificate course evaluation (01 March 2013)....................................................... 7
Appendix IV Student project reports................................................................................................. 26

Group 1 Project report
Conservation and protection of critical coral habitats and restoring degraded coral reef areas on Racha Yai Island, Phuket, Thailand

Group 2 Project report
Assessing the carrying capacity and agreeing on conservation and protection strategies in Koh Racha Yai Island-Phuket

Group 3 Project report
Integrated Coastal Zone Management –A proactive, stakeholder led strategy to tackle an undeniable threat:
The RACHAI CASE STUDY

Group 4 Project report
Improving the environmental management at Racha Yai Island through informed decision making process and participatory approach

Group 5 Project report
Sustainable freshwater management
in Racha Yai Island
1. **Introduction**

This report fulfils requirement under 4a the Letter of Agreement between the Food & Agriculture Organization of the United Nations (FAO) and IUCN, International Union for Conservation of Nature and Natural Resources for the provision of services relating to the Integrated Coastal Management Training.

The course started on 21 January 2013, and the taught component of the course was completed on 01 March 2013.

The ICM course consisted of three class room / lecture modules and included a module for field based / practical project experience. The Course Overview is outlined Appendix I.

Altogether 27 candidates from 11 countries participated in the course. The list of participants are found in Appendix II.

In addition to the AIT lecturers, MFF Secretariat staff provided additional resource persons with practical field based experience. Invited experts from other regional programmes (BOBLME, UNEP, CSR - Asia) and the Bombay Natural History Society (ICM-2 training alumni) Dr Deepak Apte also provided valuable input as resource persons on the course.

2. **Course evaluation**

An evaluation of the course was undertaken at the end of the taught component of the course. All twenty-seven participants were included in the evaluation. Responses were anonymous to encourage participants to provide honest evaluations. The evaluation results are in Appendix III.

Overall, the course was rated 8 out of 10. The academic issues raised consistently were that the course was intensive but that all aspects were essential.

Participants were asked to identify at least three proposed actions they intend to initiate upon their return, concrete ways they would be able to use or apply or transfer the knowledge and skills gained during the course. A summary of these responses are included in Annex 1 as part of the course evaluation.

3. **Student grades**

The individual student grades were made available by AIT in May 2013.

4. **Field component**

Participants very much appreciated the in-country practical project at Raya Island near Phuket and expressed that this component was effective in bringing together all that was learned during the theory sessions and put into practice. The students worked in groups to assess the sustainable development issues of Raya Island and to develop Sustainable Development/ Integrated Management Plans for Raya Island. These plans were presented to the Municipal government responsible for Raya Island and form the basis for conservation action to be followed through by local stakeholders including DMCR.
Holding the practical project work in-country and group work was a departure from how the project work has been conducted during past courses, where participants returned to their home countries to pursue individual projects. In the past the results of the project work have been very varied based on the students’ capacity, their opportunity to take time from work once they have returned to their home country and their access to good supervision.

Appendix IV are the student project reports.
### Appendix I: Course overview

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Courses</th>
<th>Learning Outcomes/Goals</th>
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<tbody>
<tr>
<td>1</td>
<td>21-26 Jan</td>
<td>Orientation</td>
<td>Marine and Coastal Ecosystems:</td>
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<tr>
<td></td>
<td>28-30 Jan</td>
<td>Marine and Coastal Ecosystem</td>
<td>- Participants can explain the characteristics of marine and coastal ecosystems particularly mangroves, estuaries, seagrass beds and coral reefs and their interrelationships.</td>
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<td>2</td>
<td>31 Jan – 06 Feb</td>
<td>Principles of ICM</td>
<td>Principles of ICM:</td>
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<td>- Participants can explain the basic concepts and principles of ICM, framework and processes involved in developing and implementing ICM at the local, national and transboundary/regional level, and the strategies for initiating/developing an ICM programme</td>
</tr>
<tr>
<td>3</td>
<td>7-15 Feb</td>
<td>Tools for ICM</td>
<td>Tools for ICM:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Participants are familiar and can apply some ICM tools for:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Assessing environmental and socio-economic status of coastal areas and identifying strategies and approaches for developing an ICM programme.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Coastal planning and management: Spatial planning, conflict resolution, communication strategy development, participatory planning, engineering tools, MPA management</td>
</tr>
<tr>
<td>4</td>
<td>18 Feb - 01 Mar</td>
<td>ICM Project</td>
<td>Coastal Project Management and Evaluation (Field work):</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Field based Raya Island, Phuket</td>
<td>- Participants explore first-hand how the elements of ICM can be applied for coastal project management</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Participants interact with stakeholders and identify steps in ICM project planning and implementation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Participants are able to design and present an ICM project</td>
</tr>
</tbody>
</table>
## Appendix II List of participants

### Students

<table>
<thead>
<tr>
<th>Full name</th>
<th>Country</th>
<th>Email address</th>
<th>Position</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr Kazi Saidur Rahman</td>
<td>Bangladesh</td>
<td><a href="mailto:kayesh_wre@yahoo.com">kayesh_wre@yahoo.com</a></td>
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<td>Mr Mamuhdul Hassan</td>
<td>Bangladesh</td>
<td><a href="mailto:mahmudul_for@yahoo.com">mahmudul_for@yahoo.com</a></td>
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</tr>
<tr>
<td>Mr Ehsanul Karim</td>
<td>Bangladesh</td>
<td><a href="mailto:ehsan_tony@yahoo.com">ehsan_tony@yahoo.com</a></td>
<td>Scientific Officer</td>
<td>Bangladesh Fisheries Research Institute</td>
</tr>
<tr>
<td>Mr M Vijay</td>
<td>India</td>
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<td>Scientist-C, Zoological Survey of India, Chennai</td>
<td>Marine Biology Regional Centre, Zoological Survey of India, 130, Santhome High Road, Chennai – 60002</td>
</tr>
<tr>
<td>Dr Raj Kumar Rajan</td>
<td>India</td>
<td><a href="mailto:rajkumarrajan@hotmail.com">rajkumarrajan@hotmail.com</a></td>
<td>Planning Staff (Functional Planner)</td>
<td>Directorate of Forest and Land Rehabilitation, Ministry of Forestry</td>
</tr>
<tr>
<td>Mr Yuliarko Sukardi</td>
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<td></td>
<td>Directorate of Marine Affairs and Fisheries, National Development Agency, BAPPENAS</td>
</tr>
<tr>
<td>Ms Rahma Fatimah</td>
<td>Indonesia</td>
<td><a href="mailto:rahmiFatimah@yahoo.com">rahmiFatimah@yahoo.com</a>, <a href="mailto:pancazz37@gmail.com">pancazz37@gmail.com</a></td>
<td>Planning Staff (Functional Planner)</td>
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</tr>
<tr>
<td>Mrs Panca Berkah Susila Putra</td>
<td>Indonesia</td>
<td><a href="mailto:pancazz_37@yahoo.com">pancazz_37@yahoo.com</a></td>
<td>Staff of Data and Fisheries Statistic</td>
<td>Ministry of Marine Affairs and Fisheries</td>
</tr>
<tr>
<td>Mrs Riana Handayani</td>
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<td>Senior Environment Analys</td>
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<tr>
<td>Mr Ali Zahir</td>
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<td></td>
<td>Project Manager - NGO</td>
<td></td>
</tr>
<tr>
<td>Mr Tun Yee</td>
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<td>Email/Contact Information</td>
<td>Position/Role</td>
<td>Organization/Section</td>
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<td></td>
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</tr>
</tbody>
</table>
Appendix III    ICM Certificate course evaluation (01 March 2013)

In order to further improve the ICM Certificate Course for the benefit of the next participants and for its possible expansion, please evaluate the ICM Certificate Course. Please note that this is an evaluation of the whole course. For evaluation of the individual courses (Marine and Coastal Ecosystems, Principles of ICM, Tools for ICM, and Coastal Project Management and Evaluation) please do it online (SIS) as instructed earlier. If you have not done it yet, please do it before you go back to your country so that you can view your grades after the Academic Senate meeting in May.

A. Course Design and Contents

<table>
<thead>
<tr>
<th></th>
<th>1 Strongly disagree</th>
<th>2 Disagree</th>
<th>3 Neutral</th>
<th>4 Agree</th>
<th>5 Strongly agree</th>
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</thead>
<tbody>
<tr>
<td>1. The course objectives were clear</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. The course objectives were achieved</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. The content of this course met my expectations</td>
<td></td>
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</tr>
<tr>
<td>4. The order of the topics and learning activities made sense to me</td>
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<tr>
<td>5. The scheduling of the activities was appropriate</td>
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<tr>
<td>6. The pace of the course delivery was appropriate</td>
<td></td>
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</tr>
<tr>
<td>7. I was satisfied with the lecture time scheduling</td>
<td></td>
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</tbody>
</table>

Comments/suggestions:

3) For the next course should be more weeks.
4) Too tight
5) More detail in limit time
9) The ICM course objectives and topics were clear and will help me understand about ICM.
10) I suggest to move lessons that needs more thinking in the morning sessions and to shift the informative lessons in the evening.
11) The course should consist more practical rather than theoretical base.
12) – tightly practical
   - initial preparatory lecture took too long
   - Some lectures were not properly/professionally delivered.
13) Some less important courses should be removed or given less time if the same pace needs to be maintained. Otherwise, I work more required.
16) To make proper program of field trip. For exam: There is no farmer also self-care club’s function is very few. But you make program including about farmer and self-care club.
17) Some lectures were well delivered and there were interactions between lecturer and students. However certain lectures rushed through their questions because of time constraints and thus effective exchange between lecturer and students was missing.
18) the course was tightly packed, initial courses took long, I think the course could have been broken down into short components with more focus on how to integrate coastal management.
20) Flexibility, Fast change schedule

22) The course is very effective for me but the course period is very short.

23) Time should be managed better more time to appropriate. If the theory more practices and application parts less than to theory.

24) Special study to project proposal which want to more time as well as implementation part is very short period.

25) Time or length of the course suppose to be extended because some lecture only have a half day although the material was important

26) The course schedule and lecture time scheduling is excellent but in a day should be needed only 3-4 topics (closely related and each topics should 1 hr per lecture then everyone can easily concentrate that.)
B. Teaching Methods and Materials

<table>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>1. The course materials were sufficient/easy to understand</td>
<td></td>
<td></td>
<td>23</td>
<td>65</td>
<td>12</td>
</tr>
<tr>
<td>2. The course materials were sufficient/easy to use</td>
<td>3.8</td>
<td>0</td>
<td>23</td>
<td>50</td>
<td>23</td>
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<tr>
<td>3. Concepts were presented clearly in the lectures and course materials</td>
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<td></td>
<td>8</td>
<td>77</td>
<td>12</td>
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<tr>
<td>4. Examples and illustrations helped me understand the course materials</td>
<td></td>
<td></td>
<td>4</td>
<td>81</td>
<td>12</td>
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<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6. The mix of teaching/learning methods used in the course was appropriate</td>
<td></td>
<td></td>
<td>15</td>
<td>73</td>
<td>12</td>
</tr>
<tr>
<td>7. The course activities stimulated my learning efforts</td>
<td></td>
<td></td>
<td>8</td>
<td>58</td>
<td>35</td>
</tr>
<tr>
<td>8. The exercises and tasks were relevant and useful</td>
<td></td>
<td></td>
<td>12</td>
<td>54</td>
<td>35</td>
</tr>
<tr>
<td>9. The assignments were very helpful for me to understand concepts</td>
<td></td>
<td></td>
<td>23</td>
<td>54</td>
<td>23</td>
</tr>
<tr>
<td>10. The field trips and small group activities provided good experience to apply both the theory and tools taught to me</td>
<td></td>
<td></td>
<td>12</td>
<td>31</td>
<td>58</td>
</tr>
</tbody>
</table>

Comments/suggestions:

1) The contents of the course met my expectations however made me feel that may not be expedient enough when of comes to meeting the demands of the wasted manages who are at the top level of the system. I feel, the course should be able to rope in high level plays in coastal management, while also including people who support decision making.

3) For the next course should be more time for quizzes.

6) Need more time to stay in the field.

7) This courses is excellent.

Field trip: Ideal plan is Maldives one of Island. It’s cheap and all relevant information ICM students will get.

9) Teaching methods were international standards and the field trip helped me understand practically about ICM.

10) Field trips were very much useful in getting the experience to practical examples. However, just putting the quizzes at the end of the lessons were not appropriate, because sometimes in the evening time it is very difficult to absorb everything in these lectures at once. Some assignments in the classroom were not useful at all for the lesson.

11) Materials such as research papers are very useful, but for to go through there should be exams.

12) - poor quiz method orientated toward recall rather than learning
    - Assignments right after a heavy session did not give enough learning time.
13) The final field trip did not meet my expectations. Rather, the Mafia Island group activities are much helpful for achieving ICM tools.

14) Some lecturer speaks fast and sometime cannot understand.

16) Some participants come from South-East Asia. Their English level is a little low if you make quiz and test you should make every Monday.

17) There was some problem with group work because of lack of experience and language barrier from some group members.

18) The quiz/assignment were a good way to demonstrate learning however the timing is not right and should be done the hour morning, other than that there is a need to showcase more example during the lectures i.e. diversifying the concepts through more examples not just corals and mangroves. Fisheries is a major natural resource very lightly XXX (e.s. tuna stock)

20) Some activities student not yet dare. Complexities tools.

21) It is better if you can arrange more field trips with related in ICM

22) Teaching method and material are good but learning period is very short. The participants fell as pressure.

23) The problem of internet was a issue. Fact that we were using drop box. We had to do much background reading on concepts that we were not familiar with.

24) Suggestion, Increased to study activities in field area. At the place what are the main identification as much time.

25) Working in small group sometimes could be a handicap because some people are too dominate and couldn’t accommodate the suggestion of the member.

26) Course materials were good enough to cover expectation but in class time it should be needed some video clips to easily realization of the topics

C. Services and Facility

<table>
<thead>
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</thead>
<tbody>
<tr>
<td><strong>1. The classrooms was well-equipped with</strong></td>
<td>0</td>
<td>4</td>
<td>19</td>
<td>38</td>
<td>35</td>
</tr>
<tr>
<td><strong>the facilities and supplies necessary to</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>support the course work</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>2. I was satisfied with the dormitory room</strong></td>
<td>7.7</td>
<td>15</td>
<td>35</td>
<td>27</td>
<td>12</td>
</tr>
<tr>
<td><strong>accommodation</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>3. I was satisfied with the food available on campus</strong></td>
<td>0</td>
<td>8</td>
<td>31</td>
<td>38</td>
<td>19</td>
</tr>
<tr>
<td><strong>4. I was satisfied with the coffee/tea break time scheduling</strong></td>
<td>0</td>
<td>8</td>
<td>8</td>
<td>54</td>
<td>27</td>
</tr>
<tr>
<td><strong>5. I was satisfied with the transport and accommodation facilities during field trips</strong></td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>38</td>
<td>46</td>
</tr>
<tr>
<td><strong>6. I was satisfied with the learning opportunities on the field trips</strong></td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>54</td>
<td>38</td>
</tr>
</tbody>
</table>

Comments/suggestions:
1) 4 people sharing a single bathroom in Raya Garden was indeed a problem!
3) For the next course, the dormitory should provide the AC and internet access.
6) need available (Specific Bus) bus (From TU dome) 2 times in a day.
8) All participants will closer if the travelled in the same big bus.
9) The classroom facilities and food services at cafeteria are excellent and met our need.

10) Selecting of food, sometimes was a challenge (at TU Dome)
- It is very useful providing internet facilities to the rooms as we have to learn from internet/Dropbox.
- Transport facilities were at satisfactory lend

11) Have to consider internet facilities in the accommodation rooms

12) Inadequate planning for international students with no effect made to rectify lack of internet although several complaints made.
- Dormitory very poorly equipped (no carpet, towel etc.)

13) Without internet, accommodation is useless. It is strongly recommended, that for next batch, there must be internet facilities in dormitory.

14) - No internet in room
- spent much time for travelling to class
- class start so early in the morning

15) – More power outlets is needed for laptop charging
- Internet facilities is needed ion dormitory room
- The distance from classroom to dormitory is quite close, but the way to get there is time consuming ( it using bus or van).

16) Dormitory room facilities are very poor. No internet, No TV, No newspaper. Staffs are not available in English language.

17) I have really lived comfortable for those six weeks spent in Thailand and I am grateful to all who organized our stay here.

18) No internet in TU Dome as working professionals it was a XXX. Moreover, halal food should be made available and looked into as well as the stipend should be increased 1,000 Bath/day.

20) Service provider should improve, facilities of class and accommodation proper than this course.

21) Please make internet facilities in the dormitory

22) The dormitory room is good but needed to be fixed TV for relax after study time, international news should be fixed.

23) Finding Halal food was very difficult in the course.

25) Dormitory is too far from campus and it takes time to get there, no internet access to the room it is bad. But no connection even we go to the office on the Saturday and Sunday it is ridiculous. Too much pressure in the field trips and the time was short.

26) The accommodation should be in campus based of AIT and also AC wifi is urgently needed.
D. Relevance to your work and career

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly agree</td>
<td></td>
</tr>
<tr>
<td>1. I can apply the theory and skills learned in my work</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>46</td>
<td>50</td>
</tr>
<tr>
<td>2. I can use and adapt the course materials in my own workplace</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>54</td>
<td>38</td>
</tr>
<tr>
<td>3. The course is very useful for me and my workplace</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>4. I would recommend this course to my work colleagues</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>31</td>
<td>65</td>
</tr>
</tbody>
</table>

Comments/suggestions:

1) Applying this course in my word place depends on the demands/mandate. Which of priority. However there are big opportunities.

3) For field trip/project report should be a week preparation.

7) Internet should be available in room. Other things were excellent.

8) The training courses is very useful and I hope it will be organized in the future.

9) The course helped me integrate various sectors involved in the projects which we are implementing through our ministry in our country.

10) I would recommend to start this kind of a course for respective countries. Then it will be helpful to implement the ICM strategy in the grammed.

11) Equal among of members from government as well as NGO need to be included.

12) – A very good imitative
   
   - Very applicable and relevant

13) The theoretical contents and Mafia Island group works will help me a lot in my future work. But I have a high expectation from final Racha Yai field trip; the design was very good.

18) Very good course although I had been doing this. I did not look at it as being integrated.

17) A lot of environment officers could really benefit from this course in the Seychelles but because it’s a post graduate course some people cannot apply though they have good working experience. I think this criteria of having a degree to be eligible to the course should change degree to be eligible to the course should change so as to give opportunity for other people to apply.

19) Rooms for accommodation were quite good but in future possible about internet

20) the course broadly but my work is small part of ICM.

24) Comments: I am working in Coast Conservation Department as very important for my future activities through in this course.

25) International course give me opportunity to learn from other countries how they manage and maintain resources; it is very good and useful to learn from other countries.

26) I think this course is very useful for me and my workplace and also this course will be helpful for entry level personnel because they adopt it easily and take part in every session more attentively.
Three concrete ways that I will be able to use and share the ICM skills I have learned, to my work in my country:

1) 1. Reviewing the Coastal Zone Management plans (already developed in my country) based on the ICM principles and tools I have learnt here.
   2. Volunteering to contribute to the Coastal Zone Management plans, involving ICM.
   3. Preserving some of the issues (exists) from the ICM perspective.
3) 1. Lecture about LFA work
   2. Lecture about participatory learning
   3. Lecture about coastal spatial planning.
4) 1. Present what I learned to my colleagues.
   2. Apply tools (ICM) in my research project.
5) Apply tool for ICM for my research project.
6) 1. Coordination
   2. Integration
   3. Participation
7) 1. Project Implementation
   2. Project management
   3. Project preparation and use of ICM strategies.
8) 1. Sharing ICM documents and knowledge with colleagues in the workshop and training course.
   2. I can use the ICM skills in approving and adapting a new project in VASI and VN-MFF also: when I am a MFF-NCB member.
9) 1. To implement a project successfully is all about to study the human behaviour.
   2. To integrate various sectors, Government, NGO to implement a coastal and marine project successfully
   3. The way to reduce the conflict across various sectors during implementing the projects.
10) 1. Directly applying the learning to the programs conducted by me
   2. Introducing the concept to my parallel officers.
   3. Applying the ICM strategy to the yearly action plan at my level and proposing new ICM programs.
11) 1. IUCN can arrange small skill sharing meetings in the countries in which ICM students can be facilitate.
   2. Be contact with the ICM students to show their works.
   3. Making additional credit hours for projects in home country.
12) 1. On the job, daily application of my new learnt skills
   2. Logical thinking and project management based skills will help my own work.
   3. Integrating the people management aspect to my work.
13) 1. Make a ICM plan for small island like Mafia Island or Racha Yai Island.
   2. Assessment of carrying capacity of a tourist area.
   3. Prepare Zoning or design MPAs for important coastal area.
14) 1. We have the capacity to identify the problem of need for the real situation at the coastal area after we will try to integrate the concept of ICM for planning to resolve this problem.
   2. We will explain the local people (stakeholder) to understand the important of coastal resource and we must word to gather to manage of this resource for the future use.
   3. I will use the concept and tool of ICM to build my staff capacity for effective work and management.
15) 1. Distribute materials
   2. Sharing and discussions
   3. Implement ICM skills for coastal development planning
16) 1. In my country, tourism business is started developing in coastal area. But they have poor awareness of the value of marine ecology. After, this training course, we have a chance to advice the conservation business EIA, SIA and the value of coastal area.

2. In my country, the new government invites the foreigner investment regarding the environment resources use. The new government allowed forming NGO INGO and he accepts our suggestion.

3. To share the awareness of the environmental conservation.

18) 1. Project development
2. Project Implementation
3. Coastal Development project and ICM principle, Function very important part of learning.

17) 1. My section in the Ministry of Environment is currently organizing workshops for District Administrators to include Environment Management in their annual planning. A lot of the tools earned can be used to help them come up with efficient planning and environmental projects.

2. Feel more knowledgeable about ICM and can thus help and bring my contributions to coastal zone management of my country since all sectors usually work in close collaboration.

4. I will be able to help wildlife club leaders conduct field surveys for their environmental projects.

19) 1. Proactive action
2. Participatory approach
3. Problem analysis

20) 1. Improve mangrove planting in my country
2. Sharing socio-economic activities in coastal area
3. Improve collaboration among stakeholders in coastal area.

21) 1. To planning programmes in coastal area
2. I can focus people in coastal area rather than natural resources
3. I can give my knowledge and experience to any level of ICM program in my country.

22) 1. I would be able to use in my country future plan for coastal management
2. I have to share this course lecture and practice to my own language to understand for local people.

23) 1. Will be able to apply in project plan
2. Tools can be applied for spatial plan. Identification of core problem stakeholders
3. Stakeholder involvement is very important. I got new idea. How I can get more stakeholders on projects and get the courses.

24) 1. Actually my work place in very sensitive coastal area. It may have more issues. I can implementation or applying to this ICM strategies
2. Rehabilitation to coastal ecosystem
3. Develop to fisheries sector

25) 1. I will implemented in my work especially to maintain and manage fisheries resources, even its just a apart from coastal resources but it is also important.
2. The principal of ICM, it looks like theoretically but it needs to adopted and make some adjustment depend to each country which is implemented.

26) 1. All of ICM course personnel should be continued the communication with ICM course participants by mail or phone.
2. In my workplace when I will face some difficulties then I need the consultation with the related resource person through AIT/MFF. So in my point of view, AIT/MFF should be keep in touch with me.

3. In my workplace I will try to give a presentation about ICM and what things I learnt from this course to my colleague and high officials. I think this is the best way to...ICM... my country.

E. Course topics

1) What topics should be added or excluded in the following courses/subjects

Please mention which sessions you would reduce or remove from the course. As it is a challenge to design a six week ICM course to fit the time availability of course participants (time away from work) so if there are sessions or session content to be added then something must also be removed.

<table>
<thead>
<tr>
<th>Marine and Coastal Ecosystems</th>
<th>Topics to be added</th>
<th>Topics to be excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of ICM</td>
<td></td>
<td></td>
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<tr>
<td>Tools for ICM</td>
<td></td>
<td></td>
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<tr>
<td>Coastal Project Management and Evaluation</td>
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</table>

5) No topics to be added and to be excluded, but each topic will be more long time.
8) I think all sessions in 4 courses are necessary for the ICM courses. They gave us a overall look about marine environment and resources. However, time frame was not suitable it pulse and press on us. Studying schedule of course 2,3,4 need more time.
9) Please retain all the topics in all courses/subjects
17) I believe that the whole course content was important for the holistic understanding of ICM.

**Marine and Coastal Ecosystems**

**Added**

10) General nature or coastal environment (physical, chemical, biological, ecological)
11) Principle of Ecology
15) – Wetlands ecosystem
   - Transboundary assessment
16) Lecture from each participant about their experience (1 hr.)
18) - Fisheries
   - Coastal Engineering
19) Some subject as an Silviculture of mangroves regarding resilience and physiology of trees
20) Expand time for topic climate change
21) Reef fish and more on coral ecosystems
23) How ecosystem is linked more to people
More on application of the tools
More time to Social Science
Include the project implementation stage

**Excluded**
12) Too much on ecology and time wasted in introductory materials
18) - Introduction
   - Basics
   - Background

**Principles of ICM**
1) Course materials and precise enough.
18) all good

**Added**
10) Summarizing all the principles rather than going in to separate parts
15) Integrated river basin and coastal management
16) Group discussion for every week (2 hr)
20) Should be include law and advocacy
25) Regional Fishery Management Organization
26) Benthic, Microbial Flora and Fauna (plankton), Biomass related topics

**Excluded**
13) The last part of the course seems not so important.
25) not to be excluded but time to be extend

**Tool for ICM**
1) Same of the tools are vague e.g. DPSIR perceptions vary in terms of XXX and pressure and Symptoms and Impacts. Better to stick to well adopted and proven tools (e.g. problem tree and objective tree worked fine out of DPSIR)
11) PCM

**Added**
13) – More GIS based course.
   - some more soft engineering courses need to be incorporated.
14) Remote sensing
15) Cost benefit analysis
25) Biological assessment

**Excluded**
12) CSR and gender analysis could be shortened a presented more professionally
13) – Planning of coastal cities
   - PRA/RRA
18) Gender, CSR and communication should be shortened but given
25) Private sector engagement

**Coastal Project Management and Evaluation**
1) A good learning experience!
18) all good

**Added**
10) Evaluation of project needs more weight than this
11) Finance and Auditing
12) Increase course on problem tree to LFA formulation.
13) The design of the course was very good, but implementation not accordingly to the design.
15) lesson learned from different projects among the globe
16) on line course for one month when the participant are in their country.
20) - project management
   - Expanse time for project design
21) Should allocate more time
26) Project monitoring related parts.

**Excluded**
10) XXXX field work suitting to rather simple.
13) The main problem is finally we could not use important ICM tools in our project, though there are opportunities. Much concentration are given to LFA, Problem tree which should not be the only tools.

1. If this certificate course will be expanded to become a [one-year professional program](#), what courses should be included?

1)  1. Fennel and floral I components of important ecosystems.
   2. Basic Biogeochemistry of the different ecosystems.
   3. Case studies demonstrating ICM principles and tools.
3)  1. Marine biology
   2. Fisheries
   3. Fishing gear
4) Change partner to university/institute that located near coastal area and have concrete demonstrate site to apply ICM in reality.
5) Implementing the project.
6) Climate change strategy and action plan to reduce vulnerability
7) – More tools in ICM
   -Technical information and
   - Engineering parts in coastal zone management
8) – project Cycle Management
   - Establish a communication strategy
9) Socio-economic, geo-engineering, bio-statistics, the above mentioned courses added would enhance the value of the course.
10) – In depth explanations on coastal environment (ecosystem)
    - Management strategies of coastal systems (different)
    - Existing legal framework on marine related activities in the world (in depth)
    - Readjusting/Recorrecting the past failures of coastal management attempts
11) – project cyclic management
    - financing and Audit
12) – Coastal project and engineering design, quantity surveying and project drafting
- Land base and terrestrial management area to be increased or most attention on near shore and coastal.

13) GIS application in Integrated Coastal Management - at least 3 credits.  
   - Some courses which include soft engineering activities.

14) – All the theory that study at class should apply at the field work like case study.  
   - Remote sensing practice

15) Basically, all topics are relatively sufficient. One year program would be a such good idea to absorb all information and skills giving some time to digest.

16. No, it should be expanded not more than three months course because the IUCN should share the awareness not to only group, to many participants in each country.

17) - Project writing, project management and evaluation, reporting.
   - How to conduct research and surveys (different tools)

18) – Coastal and Engineering
   - Fisheries management
   - Community based management

19) Silviculture (including physical chemical aspects)

Wildlife Management

Subject on Coastal Engineering

Entomology

Community of Farm Forestry

Marine Biology

20) The course should be including the sustainable agriculture in coastal region. Expand time for learn about project design actual practices.

21) Ecosystem development in the coastal area

   Environment pollution measurements and interpretation
   EIA procedure in coastal area

23) - Project writing
   - Finding funding

24) Marine and coastal ecosystem;

   1. More added to scientifically advance study area.
   2. Include to practical parts

25) Marine biology = plankton, rektion, bentos

Aquaculture= mariculture, brackish water, fresh water

Conservation= conservation program has to implement, how to manage

Marine law= MAEPOL, Solas, RFMO, LOK, CCSKT, WCPFC

Data collection= Statistical, logbook, Observer

26) If this certificate course will be expanded to become one year professional program, the following course should be included. Economics, statistical analysis, hydrodynamics fisheries management, oceanography, geography, disaster management, and legal and administrative parts and also social science.
2. Would you be interested to enrol in the professional program? Why or why not?

1) No. Too long time to be away from my career.
2) No. Because it take too long time.
3) Yes, under certain circumstances.
4) Yes, gain more experience?
5) I would be interested to enrol in the professional program, because I want to get more experience in the program.
6) Yes. Need more learn because our country like Bangladesh is more vulnerable to climate change in the world?
7) Yes, very much interested. Because the course is well structure to gain professional carries.
8) Yes, I think it will be useful for the young persons; they can get a professional knowledge.
   No, because it will be difficult for officials. They will not able to attend the long term program.
9) Yes, to do Ph.D. program.
10) Yes, I would like to join with it; As it is very useful for my present work
11) Yes, will be more knowledge gathering.
12) – Very much interested or it in extremely practical, and much valuable lessons were learnt.
   - Good interaction between countries allowed for new methods/approaches to be learnt.
   - Resource people and Non-academic staff teaching skills must be greatly improved.
13) – Not in this one-year professional program as this ICM course, and my previous master program (Erasmus Murdus; CoMEM) is sufficient at this level.
   - But if any PhD program I will definitely welcome such opportunities.
14) Yes, we are highly interested to study it for develop and increase my carrier for effective work and gook planning for coastal zone
15) Not for the time being. Since my educational background is already master. I am looking for Ph.D. However, this program definitely sounds interesting.
16) Yes, each participant, if who can study clear understanding more detail, it is vary effected to make the design of project in coastal area. After this course, the participant can introduce any NGO or INGO which have been done the conservation of environmental resource.
17) I would be more than delighted to enrol in the professional programme because for me it’s a way of enriching my knowledge and skills so as to be more efficient in my work and also to be able to participate actively in decision-making with regards to coastal management.
18) Yes I would like to but it would be nice to enrol in the programmed by being in a country where simultaneously a project could be developed and implemented. (Practical approach) Before enrolling, the project support many be required.
19) I am interested to enrol in Ph.D. programme and in Professional one year program as I have done Master Science in Professional one.
20) I interest to enrol in the professional because I think that this course can be solve conflict and fit to apply in my country. And I think that this course very important to development in coastal area.
21) Yes, it is needed to develop my career and I can give more input to my country
22) No I could not pay more time
23) Yes, ICM case will be useful in my work, also good step forward in my country.
24) I have interested because that system is never removing on memory.
25) No, I will not interesting because it is very hard and full pressure. I need sometimes relax and enjoy program.
26) I am very much interested to enrol in the professional program because I am fisheries graduate and also my post-graduation in fisheries. In this course, fisheries science play a vital role, so it is more or less related to my study and also my work because I am now working in Bangladesh Fisheries Research Institute (BFRI) as a scientist.
3. Do you think there would be benefit in developing a national ICM course for your country? (i.e. adapt the ICM regional certificate course to your country).

1) Certainly
2) Yes
3) Yes
4) Yes
5) It would be benefit in developing a national ICM course for Thailand.
6) Yes this would very helpful to develop skills about coastal zone management.
7) Very important, its urgently require in my country to adapt and implement ICM strategy.
8) Yes, in many countries lacking human resources in ICM. They would like to learn ICM but limited time and finance. We need the ICM course like this in our countries.
9) Yes, ... would be definitely benefit in developing a national course for my country like ICM regional certificate course.
10) Exactly, It will be very much useful
11) Yes, more people can gather knowledge.
12) – great benefit to local practitioner back home
    - would enhance the co-management and stakeholder participates.
    - can link to university of Seychelles.
13) Yes, Bangladesh was already developed some ICM courses, but not systematically. One national coordinating body (like WARPO) should organize/facilitate such ICM course.
14) Yes, it’s very good that the local officer or NGOs staff can get knowledge of this course. In my country only a few people have knowledge of coastal.
15) Yes, definitely.
16) Yes, it can be benefit in developing previous time our government did not emphasize the value of EIA and SIA when they allowed to use the natural resources. Now the new government accepted the suggestion of NGO, INGO and the scientific technologist.
17) I am very much in favour of running the ICM course in the Seychelles because as a small island state, we really need to experts in managing our coastal resources as Fisheries of Tourism are the main economic activities. Running the course in the Seychelles means that more Seychelles could benefit and increased knowledge and capacity may lead to better coastal management for the country.
18) Yes, that would be good, in a country where development, MBA, It etc are prioritized it is essential to have ICM course for capacity building and increasing the scope of Environmental Management.
19) Yes, regarding regional environmental sectors, it would be beneficial is developed national ICM course.
20) My country should develop a national ICM course because its very important for development coastal and also improve National economic.
21) Yes, the ICM certificate course is very effective for developing country. More useful for my country because the country start to open democracy.
22) It will be very interesting/ important to have such program but we will be need lot of help as we have lack of multidisciplinary experts
23) Yes exactly
24) 4. Actually Sri Lankan is very low to aware in coastal ecosystem habitatator. So very excellent to this ICM course otherwise one year professional course.
25) Yes exactly
26) It would be very essential for our country to develop a national ICM course and also it would be helpful for sustainable management of coastal zone.
4. Who would be key national partners (organizations and individuals/resource people) for the development and implementation of a national ICM course (government, non-government, academic institutions, INGOs operating in your country) already engaged in or teaching aspect relevant to ICM or a version of the ICM course itself.

1) 1. Zoological survey of India Kolkata
   2. Ministry of Environment and Forest, New Delhi

3) University
5) Non-government would be the key national partners.
6) - Forest Department
   - Fisheries Department
   - Water resources ministry
   - Environment Department
   - Land Department
   - Forestry education institution

7) – Government
8) I think it will be more effectiveness of all partners cooperates to develop and implement the national ICM course. They can share knowledge, experiences and budget.
9) – Government: Zoological survey of India
   - NGO: Bombay Natural History Society, Wild Life Institute of India

10) In my country already there are some integrated natural resource management master level courses conducted by national universities. But teaching it is not adequate to implement in on the ground level. It needs involvement of the government institutions to implement it. It needs practical support to otherwise it will not be practicable. If you can get the support of both three lectures. It will be a success.
11) - NGO’s (Mostly involve in coastal programs)
    - University fellows
13) – Department of Forest, Fisheries, Water Resources, Environment
    - Engineer, geologists, economists, scientists
14) Its should be link with 3 institution for develop curriculum
    1. Government
    2. Academic
    3. NGO
15) Institute Pertanian Bogor (IPB) Indonesia etc.
16) The resource peoples are key national partners. Some INGO already engage in teaching aspect relevant to ICM.
17) Government
    - Ministry of Environment
    - Ministry of Education
    - Ministry of Natural Resources
    - Ministry of Tourism
    - Seychelles Fishing Authority
    - Seychelles National Parks Authority
    - The Seychelles Coast Guard
    - Maritime training Center
    - The Tourism Academy
NGOs

- The fishermen association
- Sustainability for Seychelles
- Wildlife clubs of Seychelles
- Terrestrial restoration action
- Society for Seychelles
- Green islands foundation
- Seychelles island foundation
- Global vision international
- Save our seas
- Marine conservation society

Others

- The University of Seychelles
- Consta...XXX...........

18) University (Alumni, Faculty, Setup)
   - INGO (Funding, Support-environment and conservation)
   - Government (Education Department- Endorsement)

19) Department of Marine Biology
    - Department of Oceanography
    - WWF
    - IUCM
    - University of Karachi
    - Forest Department
    - Wildlife Department
    - Fisheries Department
    - Revenue Department
    - Port and Shipping
    - KMC

20) The course should have and conduct in each country in Asian.

22) Government organization should be key partner. Government and Non-government are the main driving force to my country.

23) Maldives national university
    - Ministry of environment
    - MOMP Project

24) Government academic institutions as well as INGOs

25) University of Indonesia

26) In my point of view, both government and NGOs would be key national partners for the development and implementation.
5. Who should be the target participants or beneficiaries of a national ICM course and why?

1) – Coastal Managers (India Forestry service)  
   - Naval and Coast Guard officers  
   - Marine Police  
   - Fishery Inspectors/officers  
   - Researchers from Institutes like Central Marine Fisheries Research Institute, Iocchi  
   - National Institute of Oceanography, Goa.

3) - Decision maker  
   - Scientist/researcher

4) - Staff/officer that work related to coastal and marine management  
   - Should select participants in same/similar age and skills.

5) The person who worked in the field of coastal management.

6) - High level official along with the policy makers  
   - Those who were working with project development.

7) - Politicians  
   - Government stakeholders  
   - local people

8) – Managers in all sectors, they keep the important role in approving and adapting a project related with marine and coast.  
   - Researchers: they have task on designing and developing projects  
   - Lecturers: they teach for students about ICM and they can have skills to do with ICM after graduation.

9) The target participants or beneficiaries should be the research scholars (JRF+SRF) and Ph.D students doing research work in the relevant subject in various research institution.

10) – Important (participants)– currently working professionals in the field as they are working in the ground already.  
   - Beneficiaries – coastal people, if ICM strategy implemented.

11) Person holding big positions, related to coastal management.

12) CAMS, marine parks authority, DRDM, DOF, UNISEY, PELO (refer to Seychelles team for complete names of acronyms)

14) It’s should be coastal stakeholder (government and NGO officer that work relate to coastal work)

15) Policy maker at local (National Institutional (Govs) because all activities (Program related coastal development is refer to local/National development plan.

16) The resources users are the target beneficiaries of a national ICM course because every developing project needs the sustainable utilization.

17) - Environment enforcement officers, staff of the coast guards  
   - National Parks Authority officers  
   - Staff of the Seychelles Fishing Authority  
   - Lecturers of the University teaching the Bachelor’s degree in Environmental Science  
   - Staff of the Ministry of Environment working in the Coastal unit as well as from other related Ministries  
   - Members of NGOs which are linked with marine and coastal management  
   - Personals from hotels which have an existing environment committee

18) Environment Development Professional (mid-careers) or early careers (Proactive) Age group (25-35)  
   - Coastal Environment Engineers

19) Forest Department
   Wildlife Department
   Coastal Department Authority
Fisheries Department  
Revenue Department  
Because they are involved in Coastal activities  

20) NGO, government agencies involvement in coastal area development.  
22) Both government and local NGO should be target participants, because they are mainly involved in the sectors.  
23) University students  
   Island council  
   Atoll council  
24) University students  
   Government environmental protection agents  
25) Policy maker or decision making because all activities will depend on how they make regulation or policy  
26) The target participants for all beneficiaries of national ICM course should be both government officials (in every sector they take part in making decision) NGO (because they are very hard work personnel and good communication with local community)  

6. Other considerations we should keep in mind when developing a national ICM course in your country.  

1) – Involving multidisciplinary faculty  
   - Lectures from eminent scholars of National and International repute.  
   - The partner institute should serve better if placed in a coastal state.  
2) ICM course should be separated to 2 courses  
   1. ICM certificate course target group (younger)  
   2. ICM training course, target group (older, high position, and not long time)  
3) - networking  
   - policy  
5) Communication  
6) Participants selection  
7) To involve all the stakeholders  
8) When ICM course will be develop in our country, I hope you will keep AIT format and scale up in the universities. It would made trainees have to learn by themselves. For not good English countries you should gave them documents before going to class. They need time to more understand in English.  
9) Brackish water related aquaculture activities in my country.  
10) Political support is very important in the implementation process/decision making; without their support any project cannot be implemented (like this): because the current approach of coastal zone is highly fragmented.  
11) Please consider the equality of the different races in the country.  
12) – Time management,  
   - Internet connectively for professional from other place  
   - Accommodation and per diem
13) There is a PCU (program Coordination Unit), a committee for ICM, mandated by (CZP: 2005) in Bangladesh. WARPO is doing the task of PCU. So, any national ICM course should be facilitated though PCU for better integrated approach.

15) – Local (National Policy)
   - Regulation/law in Indonesia
   - Networking/close relation to official

16) We need to approach the government when developing a national ICM course in my country.

17) To contact partners well in advance so that people can be released from the course.

18) – Background knowledge on country specific problems.
   - The need to keep focus of transboundary must give recommendation issue solution
   - Country experienced personal

19) Hold a workshop to get input of all stakeholders for etc.

20) – Improve, communication and build relationship between relevance stakeholder involve in coastal development
   - Working for improve natural resources and improve Environment
   - Working for improve socio-economic of local community.

23) The language barrier to do a program in local language of Maldives will be very difficult as we don’t have technical words in our language. It will be best to do the program in English.

24) 1. We can easy going to sustainable developing
    2. Mitigation to issues in coastal area then provide to the government

25) Local/national policy
   - Networking/close relation to official
   - Low enforcement

26) For the development of the national ICM course, it should be necessary to consider the government policy and also focus on social and cultural mechanism of the area.
Appendix IV  Student project reports
Group 1 Project report
Coral Reef Ecosystem Health at Racha Yai Island, Phuket, Thailand
Coral Reef Ecosystem Health on Racha Yai Island, Phuket, Thailand
1. **Project Summary:**

Coral reefs, covering an area of 0.45 km² and distributed along the coastline and offshore and relatively deeper waters are one of the most important natural resource in Racha Yai Island, due to the heavy dependency on this island for the coral reef related tourism. Stakeholder analyses shows there are 27 dive tour operators from Phuket and 7 from Racha Yai operate in these waters. The coral decline as evidenced in the recent years due to the climatic factors, mass tourism and allied developments may lead to repercussions in the returns on the investments made in this sector and loss of income and livelihoods for the associated community, which demands that the coral reef conservation and management a vital component in the sustainable development plans of the island. There is also a need for increased stakeholder participation as CSR Especially of the dive tour operators Large and small resort owners in Racha Yai, as agreed upon consensus in identifying critical coral habitats for conservation activities such as closed zones / MPAs and in sharing responsibilities for monitoring ecosystem health and small-scale restoration activities. As a component of the overall ICM strategy to maintaining the pristine environmental conditions in Racha Yai Island, this project aims to achieve the goal of healthy coral reef ecosystem by looking at the main objectives such as, conservation and protection of critical coral habitats and restoring degraded coral reef areas, while assuming that the intrinsic pressures such as mass tourism, sedimentation, waste-water management, solid waste management, and supply-chain activities are managed thorough other activities in the overall ICM strategy. The long-term objectives aimed are that the MPAs / closed zones are included in the official gazette, and there is increased coral cover, coral species diversity and associated faunal diversity as the spillover effect of closed zones / MPAs and due to coral restoration activities, and long-term coral reef conservation strategies developed. The would be coordinated by the Project Directorate (PMBC/MFF), and will be monitored by Project Steering Committee constituted by Phuket Provincial Government.

2. **Introduction**

Racha Island is located around 24 km south of Phuket province, in Thailand (Latitude 7.60488 °N, Longitude 98.37660 °E) (Fig. 1.). One of the most important marine habitats in Racha Yai Island is the coral reef, total area 0.45 km², distributed along the coastline and offshore areas in shallow and relatively deep waters. The abundant coral reef is distributed along Siam bay and Kone Kare bay and also in Ter bay. Coral reefs in this area are typically shallow 1-15 m depth (Jaroensutasinee et al., 2012). The superb scenery of the islands includes high hills with jutting cliffs surrounded by marvelous beaches. The islands has four big resorts: Raya Buri located...
in Siam bay, Ban Raya in Kone Kare bay and Raya resort in Patok Bay. There two main beaches are Siam Bay and Patok Bay, which have white powdery sands liked by sunbathers. Colorful coral gardens and the exceptionally clear waters make this a popular destination for day-trip divers, snorkeling and diving.

The climate is tropical with mean monthly temperatures that range between 25-30 °C. Note that large scale bleaching was observed at this site in 2009-2010 with some of the HOBO loggers recording water temperatures of up to 33 °C (Jaroensutasinee et al., 2012). This region is dominated by two monsoons. The southwest monsoon prevails during the months of May to October and is characterized by storms and heavy rainfall and a stirred up sea. The northeast monsoon prevails during the months of November to April and is characterized by calm waters and dry season.

Demand of Coastal tourism appears to be increasing and coastal resources are being explored in the recent years. The importance of conservation of coral reefs’ ecosystems in general, takes on an added dimension as it is main attraction for the growing tourism industry in Racha Yai Island. In the early 1980s, tourism started within the region, especially Phuket, experienced a rapid growth in tourism. Thai Government recognizes the Island as tourist destination during 1992. This caused problems however, as the rapidly growing tourism demand outpaced the growth of infrastructure development throughout the island. The tourism industry makes many demands on the environment, such as, pressure on the beaches, use of precious resources such as freshwater, without management policy, waste management, overcrowding beaches and diving, snorkeling areas. These impacts could reduce the desirability of Racha Yai Island as a tourist destination.

3. Field survey results

3.1. Stakeholder analysis

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Problems</th>
<th>Potential Interests</th>
<th>Potential Linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOURISM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Day trippers</td>
<td>- Potential conflicts with hotel resorts - overcrowding - Beach Pollution - Lack of access to hotel amenities - Lack of awareness</td>
<td>- Low ability to make change - Low Power and strengths - Can complain and write to media - Aspire to free access to amenities - Good collaboration with small business operators</td>
<td>- Link to conservation groups - Link to outside NGO - Link to media</td>
</tr>
<tr>
<td>2. Overnight bed stay tourist</td>
<td>- High cost Boat transfer/ equipment - Overcrowded dive &amp; snorkeling spots - Increased energy &amp; water cons - Lack of awareness - Costly/ Limited Room capacity</td>
<td>- Lower cost packages - Uncrowned snorkeling/dive spots - Potential conservation</td>
<td>- Linkage to small business - Tour operator - Link to hotel resort</td>
</tr>
<tr>
<td><strong>GOVERNANCE/ GOVERNMENT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Phuket Government</td>
<td>- Limited budget &amp; financial allocation - Lack of resources and man power, - Poor internal communications - Lack of ability to monitor and</td>
<td>- Power to make change, - Economic Gains from island and its resources, - Direct taxes from hotels &amp; tour</td>
<td>- Links to all stakeholders, - Links to community, - Link to scientific</td>
</tr>
<tr>
<td>2. Rawai Municipality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Island Police</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **4. Marine Police** | **enforce.** - Weak institutional arrangements and policy/regulations | **operators** 
- Formulate Policies and regulations, 
- aspire 
- Control and manage incoming tourism, 
- Provide budget allocations, 
- Acquire land for public good | community, 
- Links to outside NGO’s & Donor foundation, 
- Protocols, convention, regulation |
|---------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|

| **NGOs** | **1. NGOs (SEEK), Self Care Club**  
2. Rachai Yai Conservation Committee** | - No mandated authority 
- No power for enforcement, 
- Lack of guidelines and constitution 
- Inadequate support from Central Govt, 
- Shortage of man power and budget | - Sustainable tourism management with environmental conservation, 
- Improve RachaYai environment, 
- Improve co-management and 
- Coordination between stakeholders, facilitator, mediator, 
- Enhance enforcement, 
- Facilitate communication platforms, 
- Facilitate co-management, 
- Links to all stakeholders, 
- Links to community, 
- Link to scientific community, 
- Links to outside NGO’s & Donor foundation, 
- Protocols, |
| **SERVICE PROVIDERS** | **1. Small and Medium Resort owners**  
2. Small Business Man (shops/restaurants)  
3. Large resort owners** | - High operational cost for service provision 
- Poor Waste disposal and waste water management 
- Limited & costly power and energy supply, 
- Limited land for expansion, 
- Deforesting land/land clearance 
- Pollution issues 
- Poor waste water treatment | - Maximize economic gains from tourism boom, 
- Aspire to improve service provided to tourist, 
- Reduced operational cost for waste treatment, 
- Long-term sustainable tourism, 
- Improve environment, 
- Improve internal communication, 
- Potential for collaboration through self-care club, 
- Potential to raise environmental trust fund | - Larger hotel linked to politics and have power, 
- Linked to Phuket tour Operators, 
- Linked to international tourist agency, 
- Small resorts linked to medium hotels, 
- Media linked to international broadcasting co-operations |
3.2. Field survey findings,

Regulations/ legislation/ policy background/ government involvement

In Thailand, different agencies are responsible for coastal zones under their own mandates. The National Environmental Board is the main body to determine the National coastal resource and environment policy. The Pollution Control Department is the main responsible agency for marine environmental protection. Other agencies include: Department of Local Administration, Department of Fisheries, the Royal Forestry Department, the Marine Department, Department of Industrial Work, the Royal Navy, Department of Marine and Coastal Resources, and the Office of Natural Resources and Environmental Policy and Planning. Coordination takes place through the committees in which concerned agencies are members. At policy level, there is the National Environmental Board. At the planning and operational level, coordination is facilitated primarily through the Office of Natural Resources and Environmental Policy and Planning and the Pollution Control Department.

The following are the related local laws for coastal zone management.

i) The Navigation in Thai Waters Act, 1913
This Act prohibits any person to discard or cause rocks, gravel, silt, mud, detritus, things, solid waste, and sewage, in public watercourses such as rivers, canals, swamps, reservoirs, or lakes, which are used for navigation or public use.

ii) The Factory Act, 1992
The Factory Act empowers the Ministry of Industry to issue regulations imposing limits on the effluent discharge by a factory and restricting concentration levels of chemical and/or metal pollutants within defined parameters. If the authority finds out that any person engaging in a factory business:

iii) The Fishery Act, 1947
The objective of the Fisheries Act is to protect the water resources, which characterize as the fishing areas, it prohibits any person to throw away, discharge, or do anything, which results in the toxic substance (according to the Government Gazette) presents in the fishing area.

iv) The Petroleum Act, 1971
States that to prevent damage to property or other people; the concessionaires must apply the necessary precautions to prevent any petroleum, saltwater, drilling mud or other waste to contaminate natural groundwater or surrounding area.

v) The Environment (Protection) Act and rules
The Enhancement and Conservation of National Environmental Quality Act, 1992 the Act is the major legislation of environmental protection. It includes the establishment of water quality standards, effluent standards from point sources, pollution control area, as well as EIA process.

Related Policies on Marine Environment
a) The National Economic and Social Development Plan has some component on restoration of natural resources.
c) Master Plan on Marine and Coastal Resources Management initiated by Department of Marine and Coastal Resources.

International instruments, conventions, protocols and programs adopted and relevant to coastal and marine pollution, and the current status of their implementation in the country

i) Global Programme of Action for the Protection of Marine Environment from land-based Activities (GPA), 1995
Thailand has participated in GPA. However, the first time land-based activities have been investigated is in UNEP-GEF Project on “Reversing Environmental Degradation Trends in the South China and Gulf of Thailand”, However, there was little follow-up after the project was finished.

Thailand ratified the Convention on January 31, 2005 and already established the National Implementation Plan (NIP) of the Convention, as well as authorized Pollution Control Department as a National Focal Point.

Thailand agreed to be bound by its two annexes consisting of Annex I-the Prevention of Pollution by Oil, and Annex II-the Control of Pollution by Noxious Liquid Substances in Bulk since February 2, 2008. The Navigation in Thai Waters Act, 1913 was also amended to comply with MARPOL.

iv) The International Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (OPRC)
As a Party to the OPRC, Thailand has promulgated the Office of the Prime Minister’s Regulation on the Prevention and Combating of Oil Pollution, 1995, as well as joined the ASEAN-OSRAP (Oil Spill Response Action Plan) at regional level.
Thailand ratified the Basel Convention on November 24, 1997 and it became enforceable on February 22, 1998. The Hazardous Substance Act was amended in order to conform to the Convention.

Overview of sources of pollution
The quality of the two canals towards Siam Bay affected by land-based sources. The quality of seawater and sediment in the near shore zone in dry season (end of the year) is better than in wet season. The sediments and waste from this canals combined with the sea by storm and heavy rains in wet season. Most large resorts and all the small resorts discharge wastes into nearby waterways or reservoirs. The waste, however, will eventually reach the sea as part of loading by rivers.

Water sources
The main water source used in Koh Racha Yai Island (large resorts, small resorts and restaurants, other residents) is the ground water from the Dug well. In addition to that water reserved from the rain water harvesting pond is used by The Racha resort. The ground water is used mostly for washing and cooking purposes and bottled water is used for the drinking purposes. Some of the restaurants and even large resorts use ground water for even for drinking purposes after a simple purification process such as filtration, reverse osmosis and chlorination.

Solid waste management
All the resorts have a proper mechanism for separation of solid waste at their premises. Solid wastes are separated into plastics, glass, cans, and dry paper, and they are transported in to the Main land through a buyer already in the island or directly to the company. However it was observed that the disposal mechanism for glass, hazardous materials and organic waste is not properly managed. Hazardous materials such as used batteries (lithium batteries), CFL bulbs, electric items and AC machine parts etc, could be observed in most of the waste dumping sites. Organic waste is dumped at their, own dumping sites, sometimes may affect the water body downstream in the rainy season. High cost of transportation into the main land due to their heavy weight and the contaminants inside of these glass bottles are the constraints found in the disposal mechanism of glass. All three large resorts are having an incinerator to burn their wet waste such as wet tissues, paper waste and dried leaves. However there is no mechanism to examine whether these incinerators are up to the standard level (Low capacity than the waste generated).

Waste water treatment
Any of the small resorts do not practice any kind of waste water treatments/practices. The waste water from the kitchen is directly discharged in to the stream or canal nearby or through outlet canals in to the sea. All three large resorts discharge their waste water through a simple treatment process.
-Ban Raya resort do have a small waste water treatment system to treat the water from the kitchen, car wash, laundry and bathrooms. Sewage is disposed into the soakage pit and black water does not flow out of it.

-The Rach a large resort operates a waste water treatment system to treat waste water from kitchen, bathrooms, laundry, car wash and toilet pits. They use a retention pond to settle down sediments from the laundry and after the retention pond it is connected to the treatment system. The sediments of this pond are burnt. The only process they use in the treatment pond is aeration. After aeration the water is pumped out of it for gardening. Major limitation here is the capacity of the water treatment pond is lower than the amount of waste water generated at the hotel (240m³ water released every day to the 100m³ capacity waste treatment pond). During rainy seasons waste water overflows in to the nearby canal located at a lower elevation without physical aeration which may cause contamination of different kinds of pollutants in the stream water.

The main government agency responsible to pollution control is Pollution Control Department. This Department establishes the environmental quality standard and the effluent standard according to the Enhancement and Conservation of National Environmental Quality Act, 1992. However, the duty to enforce in most circumstances depends on other agencies, such as Department of Industrial Works – factory, Local Administration for local pollution problems or policeman for every pollution problems..

Carrying capacity
In ecological terms, the carrying capacity of an ecosystem is the size of the population that can be supported indefinitely upon the available resources and services of that ecosystem. Nijiamp (1977) developed the impact structure matrix combining environment elements and the range of possible impacts on these elements from the development of tourism to a certain level (Carrying capacity level). Matrix includes natural resource parameters, ecological indicators, and field studies. According to the structure matrix analysis it is evident that the man made environment carrying capacity exceeded the natural environment carrying capacity in Racha ya island (Increased extraction of ground water reduced the availability of ground water, ground water becoming saline in nature, increased sedimentation and pollution of natural water bodies and coastal zones) the natural resources become insufficient to meet these needs and indeed in this case, the threat of environment hazards appears imminent.

Energy sources
The only energy source for the island is gasoline. All of the resorts use generators for producing energy for all energy requirements. The average gasoline consumption in the island is 500,000 l per month. All the resorts unload gasoline at the closed by bay. However Ban Raya hotel is in a process to produce 40% of their energy use from solar energy in the future. Rayaburi hotel practices a number of energy saving good practices. They have planned to use solar energy to produce hot water in their newly constructed building with 24 rooms, but The Racha still does not have an idea of moving towards solar energy due to practical obstacles.

Tourism and culture impacts/leisure activity
Agriculture and fishing activity are due by the local people on the island after have the investment for tourism sector, all the traditional activity was stop fishing, farming and the local people move to live in the main land by sell their land to the investment for set up resort or tour activity. The tourism are interest the landscape view, snorkeling, scuba-diving activity around island. The resort also quick train the tourist before they go to snorkeling or diving in the sea but just give a brief how to use the equipment, what they do not do during their activity at the sea but it’s not effective for the natural resource protection from this activity, and the tourist also step on the coral, collect coral or other resource at the sea. The diving operator should provide more education on the environment, what is the negative activity on the coral ecosystem.

Infrastructure

It’s poor/no-zoning system for infrastructure in the island that they can build the resort on their land and convert the public road in to private purpose, the road that across their land’s properties. Some of the resort didn’t complete the EIA but they can build the resort. The resort has no effective management plan/system for waste from the resort, have no suitable sewage canal, and no treatment before let this to the sea.

Transportation

On island: The large and small resort use tractor, pick up car, and motorcycle for carrying the luggage, goods for all purpose use in the resort. They also use this all of this vehicle for transportation for the tourist activity, that tractor also transport diving tourist and equipment from hotel to the beach. Most of this vehicle use diesel that make pollution in the island by black smock and also cause the erosion at the beach.

On the sea: From the mainland to the island they use speedboat and long tail boat for transportation activity, normally use speedboat for tourism and the boat for goods and solid from the island to the mean land. They use barges for transport the construction materials but they have not good method for transfer this material to the island, and it’s also cause some problem that some material was unload to the sea.
3. Problem analysis

- No learning by doing
- Poor network management
- Poor communication
- No learning by doing
- Poor environmental awareness
- Coral degradation
- Coral bleaching
- Increased sediment deposit
- Inc. water temp
- Climate change
- Walking on corals
- Boat anchorage on
groundwater saline
- Loose tube wells
- Surface/groundwater/s oil contamination
- Increased C foot-print
- Increased water demand
- Increased sedimentation
- Inadequate GOV presence
- Increased ground water extract
- Increased ground clearances
- Unregulated tourism
- Increased overnight
- Increased day trippers
- Inadequate GOV presence
- Poorly involved municipality
- Poor governance
- Poor networking
- Public roads conversion to private
- Poor communication
- Poor co-management
- Stakeholder conflicts
3.4. Objective analysis

- Healthy coral reef
  - Increased diversity and fish stock
  - Regular monitoring of the coral reefs
  - Agreement of stakeholders
    - Deployment of mooring
    - Capacity building, workshops
    - Guidelines for snorkeling/diving
    - Establish trust fund
  - Sourcing alternate renewable energy
    - Reforestation through CSR
    - Agreed land use planning
      - Agreed consensus on zoning and resource use
      - Agreed integrated wastewater management plans
      - Agreed integrated solid waste management plan
    - Implement tourism Master plan (sustainable)
      - Regulated day-trippers
      - Regulated overnight
      - Carry capacity

- Ground water recharge
  - Decreased Groundwater salination
    - Decreased C footprint
  - Improved environmental quality for RachaYai island
    - Regular monitoring of ground water and water quality
3.4. Alternative analysis

<table>
<thead>
<tr>
<th></th>
<th>Strengthening network, Development of Forum, improving communication island council, trust funds, capacity building</th>
<th>Governance improved Carrying capacity assessed</th>
<th>Waste treatment and sedimentation</th>
<th>Sustainable Water supply</th>
<th>Addressing coral reef degradation And CSR</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Medium</td>
<td>Low-Medium</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Chance of success</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium-High</td>
<td>Medium-High</td>
<td>Medium-High</td>
<td>Medium-High</td>
</tr>
<tr>
<td>Benefit /Cost</td>
<td>High</td>
<td>high</td>
<td>High</td>
<td>High</td>
<td>Medium-High</td>
<td>High</td>
</tr>
<tr>
<td>Time horizon</td>
<td>Long</td>
<td>Medium-long</td>
<td>Medium</td>
<td>Short</td>
<td>Long</td>
<td>Short</td>
</tr>
<tr>
<td>Social /Env Risks</td>
<td>Small</td>
<td>Small</td>
<td>Some risks</td>
<td>Some risks</td>
<td>Low</td>
<td>low</td>
</tr>
</tbody>
</table>

3.5. Overall ICM strategy of the project and expected outcomes

As a component of the overall ICM strategy to maintaining the pristine environmental conditions in Racha Yai Island, this project aims to achieve healthy coral reef ecosystem by looking at conservation and protection of critical coral habitats and restoring degraded coral reef areas, while assuming that the intrinsic pressures such as mass tourism, sedimentation, waste-water management, solid waste management, and supply-chain activities are managed thorough other activities in the overall ICM strategy.
### 3.6. Project Logical Framework

<table>
<thead>
<tr>
<th>Narrative Summary</th>
<th>OVI</th>
<th>MOV</th>
<th>Assumption and risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong> Improved coral reef health and coastal ecosystems in Racha Yai Island.</td>
<td>– live coral cover to match ‘good’ (40-60% LC) state by 2017</td>
<td>- Baseline survey data and monitoring reports.</td>
<td>- Stakeholders’ willingness to adopt the project.</td>
</tr>
<tr>
<td></td>
<td>- Increase in recruitment of Acropora sp. at a rate of 20%</td>
<td>- Study reports on coral and associated species diversity</td>
<td>- water quality improved through waste water and waste management systems (e.g., less sedimentation)</td>
</tr>
<tr>
<td></td>
<td>- Diversity and evenness indices improved.</td>
<td>-Final reports</td>
<td>-sustainable tourism management plan</td>
</tr>
<tr>
<td></td>
<td>- Occurrence of indicator species</td>
<td>- Under water Video</td>
<td>- Natural calamities</td>
</tr>
<tr>
<td></td>
<td><strong>Purpose</strong></td>
<td>-Monitoring Photographs</td>
<td>-Boat grounding,</td>
</tr>
<tr>
<td></td>
<td>- Developed strategies to promote conservation by the end of 2014 (identifying stakeholders, awareness, framing guidelines for snorkeling and diving,)</td>
<td>- Monitoring Survey reports</td>
<td>-guidelines for loading and unloading of supplies</td>
</tr>
<tr>
<td></td>
<td>- Restoration plans in consultation with stakeholders ready by the end of 2014 (zoning, identifying critical habitats, species selection for transplantations, sites for transplantation)</td>
<td>- information from stakeholders</td>
<td>- Natural calamities-Boat grounding,</td>
</tr>
<tr>
<td></td>
<td>- 80% of dive operators are aware agree to protect the coral reef and involve themselves in monitoring.</td>
<td><strong>Assumption and risk</strong></td>
<td>-guidelines for loading and unloading of supplies</td>
</tr>
<tr>
<td></td>
<td>- Identified and agreed locations for closed zones by 2017.</td>
<td></td>
<td>- Stakeholders’ willingness to adopt the project.</td>
</tr>
<tr>
<td></td>
<td>- Small-scale transplantation activities planned and the stakeholders are agreed on sharing of activities</td>
<td></td>
<td>- water quality improved through waste water and waste management systems (e.g., less sedimentation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-sustainable tourism management plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Natural calamities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Boat grounding,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-guidelines for loading and unloading of supplies</td>
</tr>
<tr>
<td>Outputs</td>
<td>Activities</td>
<td>Inputs</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------</td>
<td>----------------------------------------</td>
<td></td>
</tr>
<tr>
<td>- Developing coral reef conservation strategies - Establishment of MPAs (closed zones) through stakeholder consultation and Coral reef resilience analyses (spillover effect) - Increased coral cover, coral species diversity and associated faunal diversity.</td>
<td>- Baseline Survey - zoning of coral reefs, - Training and project awareness programs - Establish Monitoring mechanisms through CSR - Small-scale coral transplantation activities through CSR - Policy making</td>
<td>Budget: Shared funding as part of CSR, and donors Human resources: Technical expertise (IUCN, BOBLME, PMBC, DMCR), divers, etc., Survey equipments and boats: Technical inputs: - Coral Reef Monitoring protocol</td>
<td></td>
</tr>
<tr>
<td>- consultations with stakeholders and consensus on taking up roles agreed by the end of 2014 - Zonation map for closed zones developed and legally approved by the end of 2015 - All the Bays have coral transplantation zones notified and works initiated by 2015 - improved fish stock, spill over</td>
<td>- 2 Awareness programs and consultations conducted for 80% of stakeholders within 2014. - Zonation map for MPA developed and legally approved by the end of 2015. - Employ the stakeholders in coral transplantation through volunteering activities.</td>
<td>- Reports – govt. dept., -legal documents -training reports -Photograph -Narrative Reports</td>
<td></td>
</tr>
<tr>
<td>- Logbook -survey report - other sources -Biodiversity assessment -ecosystem assessment</td>
<td></td>
<td>- Stakeholders’ willingness to adopt the project. - water quality improved through waste water and waste management systems (e.g., less sedimentation) -sustainable tourism management plan - Natural calamities -Boat grounding, -guidelines for loading and unloading of supplies</td>
<td></td>
</tr>
<tr>
<td>- Stakeholders agree the zoning scheme and signed a MOU. -Policy supports -Co-ordination among large and small resort owners</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Project Description

I. Rationale of the project:

Sustainable development plans require the vital component of managing the invaluable natural resources aiming at their long-term conservation and protection. Coral reefs of the Racha Yai Island form one such resource, the management of which needs critical planning in terms of the vulnerability of these ecosystems to large-scale natural/climatic events and the existing local pressures in this island such as mass tourism, sedimentation from faulty land-use patterns, nutrient loading due to insufficient waste water and solid waste management, and unguided loading and un-loading (supply-chain) activities. Two of these pressures, at the least, have been perceived as serious threats to coral decline here: coral bleaching (Phongsuwan, 2013; Jitkue et al., 2007) and impact of mass tourism as observed by occurrence of diseases in corals, correlated to areas which are heavily visited by tourists (Kenkel, 2008). Quantitative evidences of coral decline are available, which also point to the sedimentation at the runoff areas (Phongsuwan, 2013).

Stakeholder analysis carried out point out the heavy dependency of coral reef related tourism activities by the dive tour operators, large and small resort owners, and day tour operators: There are 27 dive operators who operate from Phuket and 7 from the island; and 4 large resorts and 3 smaller resorts situated in the island; Coral reef decline may cause unexpected repercussions on the returns from the heavy investments made, in addition to the loss of income, livelihood of the staff and allied entrepreneurs. This highlights the need for increased CSR of the stakeholders, especially the dive tour operators both from Phuket and the Racha Yai and large and small resort owners in Racha Yai, in the conservation and protection of coral reefs of the Racha Yai Island.

As a component of the overall ICM strategy to maintaining the pristine environmental conditions in Racha Yai Island, this project aims to achieve healthy coral reef ecosystem by looking at conservation and protection of critical coral habitats and restoring degraded coral reef areas, while assuming that the intrinsic pressures such as mass tourism, sedimentation, waste-water management, solid waste management, and supply-chain activities are managed thorough other activities in the overall ICM strategy.

The project involves stakeholder participation 1) as agreed upon consensus in identifying critical coral habitats for conservation activities such as closed zones / MPAs to act as reserves of biodiversity in case of natural calamities and extreme anthropogenic disturbances, and 2) as CSR in sharing responsibilities for monitoring ecosystem health and small-scale restoration activities.

II. Main Objective(s)/outcome(s):

2. Restoration of degraded coral reef areas

III. Immediate Objectives:

1. Establishment of MPAs (closed zones) through stakeholder consultation and Coral reef resilience analyses.
2. Developing guidelines for coral restoration activities
3. Shared responsibility and zones for small-scale coral restoration activities by the stakeholders
4. Coral restoration activities are initiated.

IV. Outputs:

1. MPAs / closed zones included in the official gazette.
2. Increased coral cover, coral species diversity and associated faunal diversity (spillover effect of closed zones / MPAs and due to coral restoration activities)

V. Activities:

The initial phase of the project of identifying critical coral habitats, involving a base-line survey (if necessary) will be carried out by the project directorate in consultation and agreed consensus among stakeholders.

1. Baseline Survey involving coral cover, species diversity, fish aggregating zones, reef geomorphology, brief resilience analysis (e.g., bleaching susceptibility) to identifying critical coral habitats
2. Zoning of coral reefs on consultation and agreed consensus of stakeholders
3. Training / capacity building and project awareness programs.
4. Establish Monitoring mechanisms through CSR
5. Small-scale coral transplantation activities (e.g., Obura and Visram, 2000; Lindahl, 2000) through CSR
6. Policy making for continued adherence to conservation and restoration activities.

VI. Time Frame:

<table>
<thead>
<tr>
<th>Activities</th>
<th>Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2013</td>
</tr>
<tr>
<td>1. Baseline survey*</td>
<td></td>
</tr>
<tr>
<td>2. Zoning of coral reefs / closed zones*</td>
<td></td>
</tr>
<tr>
<td>3. Capacity building and project awareness programs*</td>
<td></td>
</tr>
<tr>
<td>4. Establishment of monitoring mechanisms through CSR</td>
<td></td>
</tr>
<tr>
<td>5. Small-scale coral transplantation/restoration</td>
<td></td>
</tr>
<tr>
<td>6. Policy development</td>
<td></td>
</tr>
</tbody>
</table>

* To start after the southwest monsoon season
### 3. Target group and local community participation:

<table>
<thead>
<tr>
<th>Target group beneficiaries</th>
<th>Livelihood linkages / sustainable livelihood</th>
<th>Local participation</th>
<th>Gender Equality themes</th>
<th>Participation and communication strategy</th>
</tr>
</thead>
</table>
| Tourist                    | - Tourism is become large and develops, may be some tourist interested to invest money in this island. | - Contribute to awareness about coral, when do diving and snorkeling.  
- Care of environmental with donate for conservation. | - No gender equality themes | - Raise awareness through poster, leaflet and mass media  
- Cooperate with tour operator and resort |
|                            | - Many sites for diving and snorkeling.  
- Place for leisure and enjoy the beach and coral reefs. |                                                   |                         |                                           |
|                            | - Project will give an awareness for tour operator how to maintain the coral reefs and protect from the damage by diving and snorkeling activity.  
- Give more change to tour operator to contribute the sustainable healthy coral reefs. | - Contribute to raise the awareness of tourists about coral reef conservation & MPAs.  
- Involved in conservation program.  
- Contribute to give suggestion how to monitoring and maintaining the MPAs. | - No gender equality themes | - Invited in stakeholder meeting to coral reefs conservation  
- Conduct and created community among tour operators  
- Give recommendation, rule, guideline and policy to protect MPAs area |
|                            | - Attracting tourist to come  
- Diving and snorkeling site more interesting and plenty of fish there  
- Increasing the income  
- Many tourist come for diving and snorkeling  
- Develop many of tour agency and have training for awareness |                                                   |                         |                                           |
| Researcher                 | - Due to livelihood for research, so if problem could be solve, more research to develop | - In site research annually and periodically.  
- Make and publish monitoring report in MPAs area on Media mass or journals. | - No gender equality themes | - Meeting among government, interrelationship and interdependence sectors |
|                            | - More place to research and get a new knowledge from the problem. |                                                   |                         |                                           |
| Large resort               | - Worker will be increased and people have many diversity of livelihood. | - Hotel and large resort decreased the waste water pollution.  
- Contribute with CSR program for conservation of coral reefs and environment. | - No gender equality themes | - Invited in stakeholder meeting to coral reefs conservation  
- Strengthening community meeting among large and small resort |
| Small resort               | - Many tourist visited the island  
- Could increased number of room and become more develop. | - All the small resorts have integrated waste water treatment.  
- Contribute and involved in conservation program. | - No gender equality themes | - Invited in stakeholder meeting to coral reefs conservation  
- Strengthening community meeting among large and small resort |
<p>|                            | - More sustain and can maintain the small resort become more friendly |                                                   |                         |                                           |</p>
<table>
<thead>
<tr>
<th><strong>Local government</strong></th>
<th><strong>Local Business</strong></th>
<th><strong>Recreational fish/angler</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Economic develop</td>
<td>- Many tourist visited the island</td>
<td>- Fishes are abundance</td>
</tr>
<tr>
<td>- Increased amount of Tax</td>
<td>- More diversity of local business</td>
<td>- Recruitment of fish are increasing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- More sustainable because natural resources in good condition</td>
</tr>
<tr>
<td>- Could be decreased number of unemployment</td>
<td>- Have a chance to develop and get more benefit from tourist visited</td>
<td>- Reduce damage technique of fishing</td>
</tr>
<tr>
<td>- Make policy about conservation program and MPAs</td>
<td>- Decreased and separated the solid waste.</td>
<td>- Involved to protect the MPAs</td>
</tr>
<tr>
<td>- Monitoring, surveillances and stakeholder meeting periodically</td>
<td>- Decreased dumping site trough reduce, reuse and recycle.</td>
<td>- No gender equality themes</td>
</tr>
<tr>
<td>- Support with fund, budget and equipment.</td>
<td>- No gender equality themes</td>
<td>- Invited in stakeholder meeting to coral reefs conservation</td>
</tr>
<tr>
<td>- Meeting among government, interrelationship and interdependence sectors</td>
<td>- Created community among local business</td>
<td>- Created community among recreational fish/angler</td>
</tr>
</tbody>
</table>

4. **Project Management, Monitoring and Evaluation Management:**

   **I. Project Management/Implementation Arrangements:**

   Centrally, The Phuket Provincial Government will constitute a Project Steering Committee (PSC) for the project under the Chairmanship of Deputy Mayor of Phuket. The composition of the committee will be as follows-

   i. Deputy Mayor, Phuket Provincial Govt - Chairman
   ii. Representative, Rawai Municipality - Member
   iii. Representative, Self-Care Club, RachaYai - Member
   iv. Representative, MFF - Member
   v. Representative, Large resort Owners of Racha - Member
   vi. Representative, Dive operators of Racha - Member
   vii. Representative, Small resort owners of Racha - Member
   viii. Representative, Businessmen of Racha - Member
   ix. Representative, DMCR - Member
   x. Project Director (PMBC) - Member-Secretary

   The meeting of the committee will be held at least once a month and whenever necessary. The committee may co-opt one or more member, if necessary to conduct the project activity successfully. The functions of the committee are:

   1. To review the implementation progress and give policy decisions, if any problem emerged during execution of the project activities.
   2. To approve the annual work plan and budget of the project.
   3. To review the overall progress and achievement against work plan.
4. To provide policy guidelines and to recommend for taking necessary measures for smooth implementation of the project.

Then, PMBC & MFF will take the necessary steps for implementing the project.

II. Indicators:

   i. Survey – By PMBC officials
   iii. Recovery of degraded coral reef areas
   iv. Establishment of MPAs (closed zones) through stakeholder consultation and Coral reef resilience analyses

III. Methodology:

   Internal monitoring and evaluation of the project will be done at any time, during the project implementation and after six months.
**Project monitoring and evaluation plan:**

**Project Goal: Improved coral reef health and coastal ecosystems in RachaYai Island**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Quantifiable criteria for monitoring</th>
<th>Time Frame</th>
<th>Results achieved</th>
<th>Specific constraints</th>
<th>Observations/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Baseline survey</td>
<td>Area of sampling, number/quantity of sample collected, diversity &amp; recruitment pattern</td>
<td>2013</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Zoning of coral reefs / closed zones</td>
<td>Zonation maps for closed zones developed and legally approved by 2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Capacity building and project awareness programs</td>
<td>Number of persons contacted and motivated, Number of training/workshops conducted</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Establishment of monitoring mechanisms through CSR</td>
<td>Number of monitoring teams identified. Monitoring data</td>
<td>2015</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Small-scale transplantation activities</td>
<td>Identification of critical habitats, species selection for transplantations, sites for transplantation</td>
<td>2013</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Policy development</td>
<td>Recommendations for the policy development made</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**5. Continuation of project activities:**

Under the proposed project, the newly established MPAs will be a core part of the conservation and restoration zones. Therefore, after completion of the project, the project with all its assets and manpower will be transferred to the Ko Racha Island Management Committee and that will be run and managed by the funds of the donation of the maximum beneficiary of stakeholders of Racha Island, environmental endowments, trust funds etc.

To continue the benefits of the project, the service of the concerned skilled Researchers/technicians will be needed. This service will be provided by PMBC from already developed concerned skilled manpower during the project implementation period. After completion of the project, about 0.12 m. THB will be needed yearly for the salary and allowances of the proposed personnel which will be provided from the above funds. Project related important research will be continued through core research fund of PMBC.

The Racha Island Forum will run smoothly by contribution of its members and grants from various stakeholders like dive operators, resort owners restaurants owners, tourists etc.
## Budget:

**Detailed budget:** Improved coral reef health and coastal ecosystems in RachaYai Island

<table>
<thead>
<tr>
<th>No</th>
<th>Category &amp; Item of Expenditure</th>
<th>Unit</th>
<th>Unit Price (USD)</th>
<th>Quantity</th>
<th>Cost (USD)</th>
<th>Sub Total (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Objective - Conservation and Protection of critical coral habitats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Output# 1:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Activity 1.1: Zoning of coral reefs / closed zones</strong></td>
<td>90000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Baseline Survey &amp; zoning of coral reefs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Survey equipments :</td>
<td>40000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Underwater Camera</td>
<td>1</td>
<td>4000</td>
<td>1</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diving equipments</td>
<td>1</td>
<td>1800</td>
<td>10</td>
<td>18000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boat Rental</td>
<td>lump sum</td>
<td>......</td>
<td>......</td>
<td>14000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stationary</td>
<td>lump sum</td>
<td>......</td>
<td>......</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Miscellaneous (printing etc)</td>
<td>Lump sum</td>
<td>......</td>
<td>......</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Policy making &amp; Establishment of Monitoring mechanisms through CSR</td>
<td>50000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meet with resort owners, tour/dive operators etc.</td>
<td>lump</td>
<td>200</td>
<td>30</td>
<td>6000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- to form a forum for establishment of guidelines of diving/snorkeling and corals management costs</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>40000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Small-scale coral transplantation activities through CSR</td>
<td>lump</td>
<td>.</td>
<td>.</td>
<td>40000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restoration plans &amp; Establishment of MPAs (closed zones) through stakeholder consultation</td>
<td>4000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Activity 1.2: Developing coral reef conservation strategies &amp; awareness campaigning amongst the stakeholders</strong></td>
<td>41000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organise 3 meetings/workshops among the resort owners, dive operators/masters to raise awareness on coral reef conservation</td>
<td>3</td>
<td>1000</td>
<td>3</td>
<td>3000</td>
<td></td>
</tr>
<tr>
<td>Activity 1.2: Strengthening monitoring system by controlling tourists access to near shore reefs through employing monitoring personnel</td>
<td>2</td>
<td>500</td>
<td>12x3</td>
<td>18000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establishment of mooring buoys for boats</td>
<td>100</td>
<td>1000</td>
<td>20</td>
<td>20000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Activity 1.3: Capacity building and project awareness programs**

<table>
<thead>
<tr>
<th>Description</th>
<th>Training Type</th>
<th>Training Details</th>
<th>Training Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 training courses, and at least 5 hoteliers and all diving operators/dive masters participate</td>
<td>Lump sum</td>
<td>1500</td>
<td>3</td>
</tr>
<tr>
<td>2 training courses on conservation and restoration of corals with dive tour operators boat owners/ small businessmen/resort owners etc.</td>
<td>Lump sum</td>
<td>2500</td>
<td>2</td>
</tr>
<tr>
<td>Training at least for 10 guides from youth with emphasis on corals identification and ecosystem services of coral reefs</td>
<td>Person/day</td>
<td>250</td>
<td>10</td>
</tr>
</tbody>
</table>

**Total** | | | | **143000** |

### Project Personnel

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name/Position</th>
<th>Monthly rate (THB.)</th>
<th>Allowance</th>
<th>Total</th>
<th>Total for quarter</th>
<th>Total per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>a. Project Director:</td>
<td>Basic pay</td>
<td>To be borne by PMBC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>b. Assistant Director:</td>
<td></td>
<td>To be borne by Rawai Municipality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>c. Technical persons/Researchers:</td>
<td></td>
<td>To be borne by PMBC, SEEK &amp; MFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>d. Field Staffs:</td>
<td></td>
<td>To be borne by PMBC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Financing Plan (USD)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Funds from local Organization (Proposed Forum)</td>
<td>50000</td>
</tr>
<tr>
<td>2</td>
<td>Funds from Environmental endowment</td>
<td>10000</td>
</tr>
<tr>
<td>3</td>
<td>Funds from tourists (willingness to pay)</td>
<td>10000</td>
</tr>
<tr>
<td>4</td>
<td>Grants from Mangroves for the Future</td>
<td>50000</td>
</tr>
<tr>
<td>5</td>
<td>Selling of Communications &amp; knowledge products</td>
<td>3000</td>
</tr>
<tr>
<td>6</td>
<td>Funds from Central Govt.</td>
<td>20000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>143000</strong></td>
</tr>
</tbody>
</table>
References:
Group 2 Project report

Assessing the carrying capacity and agreeing on conservation and protection strategies in Koh Racha Yai Island-Phuket
Assessing the Carrying Capacity and agreeing on Conservation and Protection Strategies in Koh Racha Yai Island-Phuket

Team 2

Rifath Naeem

Sumudu Priyadarshika

Riana Handayani

M.Vijay

Sinat Hout

Certification Course on Integrated Coastal Management - 2013

Asian Institute of Technology- Thailand
Contents

1. Project Summary
2. Background
3. Stakeholder analysis
4. Field survey findings
5. Problem analysis
6. Objective analysis
7. Alternative Analysis
8. ICM strategy
9. Project Description
10. Target group beneficiary:
11. Project management and evaluation
12. Continuation of the project activities
13. Budget

Annex 1: Logical Framework
Annex 2: field report – Group 1
Annex 2: field report – Group 2
Annex 2: field report – Group 3
Annex 2: field report – Group 4
Annex 2 field report – Group 5
1. **Project Summary**

Koh Racha Yai Island is a popular site among divers due to the clear visibility (an average of 15 – 30 meters) all year round. Consisting mostly of hard coral sloping reefs with a flat bottom covered with white sand, the site is sheltered inside the bay and is thus free from strong currents. This combination makes diving Phuket Thailand Koh Racha Yai Island an ideal place for beginners and infrequent divers. There are also deeper reefs, which are suitable for more experienced divers. This makes Koh Racha Yai become a tourist destination. Since then, some problems relating to the coastal environment arise. The following are some problems found in the Koh Racha Yai Island:

- Mass tourism, mostly come from day-tripper tourist
- Waste management and pollution
- Poor governance
- Low enforcement
- Poor networking between the stakeholders
- Conflict of land use

The problems above can be solved by carrying capacity assessment and agreement on island conservation and protection strategies as well as land use agreement.

**Objectives**

The main goal of the project is to achieve the pristine environmental condition restored/maintained. By conducting the carrying capacity assessment and having agreement on island conservation and protection strategies as well as land use agreement with co-operation among all stakeholders in the island and Phuket.

**Activities**

Activities needed to be conducted in order to achieve the goal are as following:

- Baseline survey
- Resource use mapping
- Carrying capacity assessment
- Developing guidelines through stakeholder meetings/workshops

**Expected results**

The project activities above with the participation of all stakeholders are expected to going well so that sustainable management of coastal resources through informed decision making can be achieved.

**Success criteria for the projects**

Some of success criteria for the projects are as below:

- Improvement of overall environmental quality
  - Increased coral cover by 2017
  - Occurrence of indicator species
  - Ground water quality within standard limits
- Reduced conflicts
  - Decreased number of reported cases by 2017
- Increased tourist’s satisfaction by 2017
- Reduced carbon footprint
Koh Racha Yai island also known by local people as Raya Yai. In Thai, ‘yai’ means big. On the east side of the island, there are patok bay and siam bay (shallow bay) and on the west side, there are some small bays with little beaches. They are Lha Bay, Ter Bay and Kon Kare Bay.

Koh Racha Yai Island is located in the latitude 7° 36’ 22” N and longitude: 98° 19’ 05” E lying about 20kms south of Phuket. The island has gorgeous coral reefs and is teeming with life both marine and terrestrial.

The island also possess crystal clear waters and white sandy beaches. They are very popular with divers and snorkellers, with challenging dive sites for advanced divers as well as plenty for beginners and snorkellers. The main beach, on the island’s northwest coast, is Ao Tawan Tok (also known as Ao Bungallow), which is located in a u-shaped bay. The sand here is snow white and has the consistency of talcum powder. Due to those richness, koh racha yai island become tourist destination. The local activities, nowadays, relating to the tourism sectors.

The islands is mostly inhabited by muslim people. In the island, there is a community forum called "Racha Island Conservation and Self-Care Club". It is established in 1992. The activities of the clubs that being implemented are as following:

- Collecting garbage along the beach every year
- Having discussion in informal meeting

The club is built based on some situations, such as: illegal fishing (dynamite fishing and illegal fishing gear has been used). The club is initiated by enterpreneur (family restaurant owner). The membership in the club are mostly volunteer from some of stakeholders in the Racha Yai island. Since the club established, there is no regularly meeting. The meeting would only be there when there is big issues or emergency problems arise. For the financial support, the club collect the money from documentary team and the members of the club. At present, they have 50.000 bath in the bank.

The following are the rules and these are under the agreement of Racha Island and Phuket residents:

a. Anchoring along coral reef is prohibited
b. Jet ski, water ski, water scooter, sea walker, banana boat, parachute ski are prohibited
c. Any fishing activities are prohibited
d. Fire camping on beach area is prohibited
e. No littering and all must be responsible by each individual i.e. non-recycling packages, plastic bottles
f. Animal hunting is prohibited i.e. birds and bats
### 3. Stakeholder analysis

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Problems</th>
<th>Interests</th>
<th>Potentials</th>
<th>Linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small resorts</td>
<td>Conflicts of land use and resource use</td>
<td>Expecting for waste water treatment system</td>
<td>Willing to participate in the Self care club</td>
<td>Dive operators</td>
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<tr>
<td></td>
<td>Ground water pollution</td>
<td>A continuous and good source of fresh water</td>
<td>Willing to pay for a waste water treatment system</td>
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<td></td>
<td>Inadequate water from ground wells</td>
<td>Having a good networking among the stakeholders including the government</td>
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<td></td>
<td>Poor management of waste water</td>
<td>Expansion of the resorts</td>
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<td></td>
<td>Transportation cost of materials for expanding the resort capacity is high</td>
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<tr>
<td>Large resorts</td>
<td>Conflicts: land use, multiple resource use</td>
<td>Mass tourism</td>
<td>Power to make changing</td>
<td>Have capacity to do Public relation/ mass media,</td>
</tr>
<tr>
<td></td>
<td>Waste water management, inadequate treatment plants</td>
<td>Accesses to land use</td>
<td>Potential to contribute/ take lead role in conservation of Racha Yai island</td>
<td>Linkage to small business</td>
</tr>
<tr>
<td></td>
<td>Solid waste management</td>
<td>Improve the environmental quality standard</td>
<td></td>
<td>Linkage with the government, shareholders are powerful politicians</td>
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<td></td>
<td>Conflict of interest Mass tourism and coastal ecosystem</td>
<td>The relationship between large hotel with small hotel and small scale businesses in the Island are improvement</td>
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<td></td>
<td>Poor communication with the government</td>
<td>Regulation/law enforceable</td>
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<td></td>
<td>Unclear land, right use</td>
<td>The large resort can be use ground water properly</td>
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<td>Poor internal communication or coordination between other large hotels in the island</td>
<td>Good management of</td>
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<td></td>
<td>dependency on ground</td>
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<td>Day trippers</td>
<td>Potential conflicts with resorts</td>
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<td></td>
<td>Overcrowding mass tourism</td>
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<td>Beach pollution</td>
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<td></td>
<td>Lack of access to hotel amenities</td>
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<td>High cost boat transfer equipment</td>
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<td></td>
<td>Overcrowding dive and snorkeling sites</td>
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<td></td>
<td>Increased energy and water consumption</td>
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<td>Lack of education and awareness</td>
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<td>Costly/limited room capacity</td>
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<tr>
<th>Government</th>
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<td>Rawai municipality</td>
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<td>DMCR</td>
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| Powerless to interfere because of land ownership on the island |
| Lack of capacity |

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<tr>
<th>Policy and regulations</th>
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<th>Power to make changes</th>
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<tr>
<td>Financial capacity</td>
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| Link with all stakeholders |

| NGO |
| Self-care club |

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<tr>
<th>Conflicts with try divers</th>
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<tr>
<td>Lack of funds for the continuous operation of glass breaking machine</td>
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</table>

| Good cooperation and networking with new entrepreneurs, |
| Capable to take lead role in conservation of racha island |

<p>| Have capacity to do mass media, public campaign |</p>
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<th>SEEK</th>
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<tr>
<td>Poor communication and cooperation with new entrepreneurs</td>
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<tr>
<td>Poor cooperation with large resorts in environment conservation activities</td>
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<tr>
<td>Lack of power to enforce the club rules</td>
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### 4. Field survey findings

**Regulation/legislation/policy background/government involvement**

- The rules of Racha Island Conservation and Self-care Club and these are the under the agreement of Racha Island and Phuket residents, but does not have legitimation
- Lack of regulations and enforcement for diving & snorkelling activities
- There is a policy from government which is about to increase number of tourist coming to Thailand. The policy drives some resorts especially the big resort to promote and marketing widely outside Thailand. The big promotion and marketing of these resort has succeeded due to many tourists come to Thailand especially Phuket afterwards as well as Koh Racha Island. It approximately 1200 tourist as a day tripper visit the island.
- There is poor coordination between sectors (RAWAI Municipal council, Police, department of marine and coastal resources and pollution control department) and within government and private sectors (Large resorts, small resorts, restaurants and diving clubs)
- People do not really have a sense that the coastal belongs to them and they have a role to play for its management
- There is very little public participation in management and decision-making (Racha self care club, resorts, municipality and other sectors)
- There is poor relationship between stakeholders
- There is lack of government capacity to resolve land claims
- Too many policies and regulations exist but none of them enforced

**Resource use and conflicts**

- The new entrepreneurs who started move in racha Island in recent past are not abiding to the self-care club’s rule.
- Try divers operators mostly Koreans and Chinese from Phi phi Island recently moved in Racha yai island for try driving activities. According to Chairman Mr. Bang maad, they are not abiding the rules of self care club and in a way destroying the corals.

- After the leakage of cements from a big barge at Siam Bay the Self Care club suggested provincial government to unload the construction material at Ter Bay but due the conflict with private land owners for the transportation of the materials in their land it could not be solved. It was later decided that the low volume of the construction material will be transported by the smaller boats so that the misfortune of such leakage may not occur. But the Self Care Club feels that the smaller boats will also damage the coral reefs because of shallow water over there in Siam Bay.

- The club raised objection for the blockade of the streams by land fill for making way by the Raya Buri resort. According to chairman Mr. Bang Maad during every monsoon, the land filled area in the stream is washed away and heavy load of sedimentation enters the bay and thereby affecting the coral reefs.

- Poor communication/ co-operation between the dive operators Poor communication among the dive operators both on Racha Yai Island and Phuket main land is the root cause of overcrowding and other conflicts. Attempts were made in past to initiate dive forum in the past but was not successful because of no leadership. All the operators express a need of a dive forum where all the operators can discuss the issues and also carry out monitoring of the coral reefs.

Tourism and cultural impacts/leisure activities

- Lack of awareness and lack of proper information provided to the tourists
  It was noticed that tourist are not been giving the proper and right information about the corals and how they should behave when going for diving and snorkeling. Walking on the coral reefs and collecting shells and corals as a souvenir is common. Some of the tourist that was interviewed complained about collecting shells and corals from the reef. The language barrier between the dive masters and tourists, lack of information boards were identified as reasoning for this problem.

- Lack of safety measures for the dive/snorkelling tourists.
  Safety measures for the tourists who take part in dive and snorkelling activities were very poor. Abounded and rusted out life guard post were found on the beach. Neither life buoys nor life guards were seen. During the interviews, one tourist mentions that he got injured during snorkelling and the dive operator had no first aid kit.

- The mass tourism has caused some problems in the island, as the following :
  - Increasing of sun-bathing area
  - Increasing of tour operators
  - Increasing of speed boats
  - Increasing of water consumption
  - Increasing of local business
  - Diving and snorkelling activities

- Previously, mostly tourist came from western, they are more concern about the
environment. Nowadays, most tourist come from China, Korea and Russia, they are low awareness about the environment. This changing behaviour caused some impacts to the coast environment, as the following:

- Increasing of solid waste and waste water
- Destruction of coral reef, due to the tourist during the snorkelling activities, they are walking on the coral reefs
- Coastal environment degradation

Environmental pollution

- The tourists were increased such as increased day tripper, increased boat transfer, sea water pollution from main land, increased pollution in Racha Yai Island from oil spill, and engine fuel
- Increased pollution in Island due to increased water waste, solid waste and inadequate the waste water treatment facilities of the hotels.
- The sediment was increased due to deforestation and land clearance in the island.
- Increased Sediment build up in small creek lead to the sea and affected to coral reef.
- NO boat operator Licenses and poor monitor about environment impact
- Uncontrolled the tourism plan such as lack of EIA for development, increase water and energy consumption for operation the resort, Increase using underground waters, lack of government pressure to the Racha Yai Island on environmental quality management
- Any of the small resorts do not practice any kind of waste water treatments/practices. The waste water from the kitchen is directly discharged in to the stream or canal nearby or through outlet canals in to the sea.
- All three large resorts discharge their waste water through a simple treatment process.
5. Problem analysis

- Coral bleaching
- Inc water temp
- Climate change

- Coral degradation

- Inc water temp

- Increased sediment deposit on corals
- Poor env awareness
- No learning by doing activities

- Good comanagement
- Poor networking
- Poor communication

- Boat anchorage on corals
- Walking on corals

- Stakeholder conflicts
- Public roads conversion to private
- Increased day trippers

- Surface/groundwater/soil contamination
- Increased overnight stay

- Increased energy demand
- Oil pollution on land

- Increased poorly planned resorts/restaurants/businesses

- Increased ground clearances
- Increased sedimentation
- Increased water demand

- Increased ground water extract
- Increased wastewater

- Increased solid waste

- Decreased aesthetics

- Increased C foot-print

- Increased energy demand

- Increased poorly planned resorts/restaurants/businesses

- Unregulated tourism planning

- Increased energy demand

- Increased sedimentation

- Increased ground clearances

- Increased water demand

- Increased wastewater

- Increased solid waste

- Increased poorly planned resorts/restaurants/businesses

- Unregulated tourism planning

- Increased energy demand

- Increased sedimentation

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- Increased ground clearances

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- Increased ground clearances

- Increased water demand

- Increased wastewater

- Increased solid waste

- Increased poorly planned resorts/restaurants/businesses

- Unregulated tourism planning

- Increased energy demand

- Increased sedimentation

- Increased ground clearances

- Increased water demand

- Increased wastewater

- Increased solid waste

- Increased poorly planned resorts/restaurants/businesses

- Unregulated tourism planning

- Increased energy demand
6. Objective analysis

- Improved environmental quality for Racha Yai island
- Improved aesthetics
- Regulated overnight stay
- Decrease sediment deposit on corals
- Decreased C footprint
- Implement tourism Master plan (sustainable development)

- Regular monitoring of ground water and water quality
- Agreed integrated waste water management plans
- Agree integrated waste management plan

- Regular monitoring of the coral reefs
- Regular monitoring of the coral reefs
- Decreased Groundwater salination

- Coral bleaching
- Inc water temp
- Climate change

- Sourcing alternate renewable energy
- Alternate water resources (rainwater harvest, desalination)

- Ground water recharge
- Constructed wetland

- Deployed Mooring buoys
- Capacity building, workshops

- Agreed land use planning
- Agreed consensus on zoning and resource use

- Regulated day trippers
- Carrying capacity assessment

- Green fin campaign
- Ecosystem based adaptation

- Coral bleaching
- Increased diversity and fish stock

- Capacity building workshops
- Build island council

- Agreed MoU? ToP?
- Regular monitoring of ground water and water quality

- Build island council
- Establish trust fund

- Carry capacity for communicating

- Empower self-care club
- Strengthening network

- Facilitated by 3rd party agreed consensus to public road
- Improved governance

- Multi-disciplinary outpost
- Strengthen and empower community

- Stabilizing network
- Promote joint activities

- Agreed consensus on zoning and resource use
- Agreement of stakeholders on development

- Reforestation through CSR
- Implement tourism Master plan (sustainable development)

- Increased diversity and fish stock
- Regular monitoring of the coral reefs
- Healthy coral reef

- Coral bleaching
- Inc water temp
- Climate change
### 7. Alternative Analysis

<table>
<thead>
<tr>
<th></th>
<th>Island council/trust funds established/BC Capacity developed</th>
<th>Waste water/solid waste/sedimentation reduced</th>
<th>Coral reef health improved</th>
<th>Governance improved/Carrying capacity assessed</th>
<th>CSR programmes developed</th>
<th>Sustainable water supply ensured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
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<td>Chance of success</td>
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<td>Medium-high</td>
<td>Medium-High</td>
<td>Medium-High</td>
<td>Medium-High</td>
<td>Medium-High</td>
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<td>Benefit/cost</td>
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<td>High</td>
<td>Medium-High</td>
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<td>Time Horizon</td>
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<td>medium</td>
<td>Long</td>
<td>Medium</td>
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<td>Social/Env Risk</td>
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<td>Some risks</td>
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### 8. ICM strategy

- Stakeholder analysis
- Resources use map
- Carrying capacity
- Problem analysis
- Agreed zoning and resource use maps
- Plans/guidelines/regulations
  - Land use plan
  - Water use plan
  - Power use plan
  - Dive/snorkelling regulations
Project Description

Racha Yai Island is facing numerous of environmental problems which rose mainly from rapid and unplanned development tourism industry. Ground water contamination, land pollution because of waste dumps, land clearing, degradation of coral reefs and other natural resource was observed from our field visit to the island.

The main objective of this project is the return Racha Yai Island to its pristine environmental condition by sustainable management of coastal resources through informed decision making. To achieve this there have to be some important decisions and changes in recourse used, these decisions should be acceptable for the stakeholders, without the consensus of the all stakeholders problems in Racha Yai Island cannot be solved. There are three main actives in this project. Zoning and resources use mapping, assessing the carrying capacity of the island for current and future activities in the island and using the outcomes from these two activities in stakeholder consultation to develop much needed regulations and guidelines. To ensure that all stakeholders will agree to an outcome of a management plan, decisions and changes in resource use will be made in an integrated manner, where all stakeholders will have a saying. All the stakeholders that were identified in stakeholder analysis will be involved in these meetings.

At end of project following outcomes/objectives will be achieved:

- Agreed zoned and resource use maps. Decreasing pressure on natural recourses, allowing them to restore to their pristine condition.
- Reduction in conflicts among stakeholders.
- Water use plans which will promote sustainable and efficient water use in island, hence decreasing the demand on aquifer.
- Energy use plan which will promote use of renewable energy reduces dependency on fossil fuel hence reducing the carbon foot-print.
- Waste management plan will reduce the pollution and increase aesthetic.
- Regulation for diving and snorkeling, which will give protection to tourists, dive/snorkeling operators and the coral reefs

<table>
<thead>
<tr>
<th>Activities</th>
<th>Outputs</th>
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<tbody>
<tr>
<td>Preliminary assessment</td>
<td>Initial environment report</td>
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<tr>
<td></td>
<td>• used for preparation for the baseline survey</td>
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<tr>
<td>Baseline survey</td>
<td>Survey report</td>
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<tr>
<td></td>
<td>• Baseline data for ecological and socio economic aspects of the island.</td>
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<td></td>
<td>• Preliminary maps that will be used in spatial planning</td>
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<td></td>
<td>• Preliminary indicators for the carrying capacity assessments.</td>
</tr>
<tr>
<td>Zoning and resource uses mapping ( using Coastal and Marine Spatial Planning tools)</td>
<td>Resource use maps</td>
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<tr>
<td></td>
<td>• Used in zonation</td>
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<td>• Identify all the resources on the island for carrying capacity survey.</td>
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<tr>
<td>Carrying capacity assessment ( Framework guidelines for assessing carrying capacity, FAO )</td>
<td>Carrying capacity assessment report</td>
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<td>• Physical carrying capacity</td>
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<td>• Social carrying capacity</td>
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<td>• Ecological carrying capacity</td>
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<tr>
<td>Zone the area according to its use and carrying capacity and develop specific management plans for each zone, with Stakeholder consultations</td>
<td>• Agreed recourse uses and zoned maps</td>
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<tr>
<td></td>
<td>• Water use plan</td>
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<td></td>
<td>• Energy use plan</td>
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<td></td>
<td>• Dive and snorkeling regulations</td>
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### Activities

<table>
<thead>
<tr>
<th>Activities</th>
<th>2013</th>
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<th>2016</th>
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<td>Preliminary assessment</td>
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<td>Preliminary survey trip to the Racha yai</td>
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<td>meeting with stakeholder on the island</td>
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<td>meeting with stakeholder in Phuket</td>
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<td>Baseline survey</td>
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<td>Multidisciplinary team going to Racha Yai island for the survey</td>
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<td>Resource uses mapping</td>
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<td>Accruing of maps</td>
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<td>Developing the interaction matrix</td>
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<tr>
<td>Revision of the maps based on the matrix and identification of the current and future uses</td>
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<td>Ground truth/validation</td>
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<td>Developing the use activity guide</td>
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<td>Stakeholder consultation</td>
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<td>Policy adaptation</td>
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<tr>
<td>Carrying capacity assessment (Framework guidelines for assessing carrying capacity, FAO)</td>
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<tr>
<td>Define the carrying capacity that needs to be established for the study area</td>
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<td>Consider the type of tourism existing or being planned from the following contexts:</td>
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<tr>
<td>List the objectives of the area:</td>
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<tr>
<td>Establish criteria that affect capacity:</td>
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<tr>
<td>Establish thresholds or tolerable levels of use that can act as management guidelines</td>
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<tr>
<td>Assess the carrying capacity of the area</td>
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<tr>
<td>(a) Physical carrying capacity</td>
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<tr>
<td>(b) Social carrying capacity</td>
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<td>(c) Ecological carrying capacity</td>
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<tr>
<td>Zone the area according to its use and carrying capacity and develop specific management plans for each zone, with Stakeholder consultation</td>
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<tr>
<td>Zoning map</td>
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<tr>
<td>Water use plan</td>
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<tr>
<td>Energy use plan</td>
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<tr>
<td>Land use plan</td>
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<td></td>
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<tr>
<td>Established dive and snorkeling regulation</td>
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</tbody>
</table>
10. **Target group beneficiary:**

The project will work direct and indirect with main target group in the Racha Yai Island, including small scale businessmen, fishermen, dive and snorkeling operators and small and large tourist's hotels. The local communities will be involved in planning and implementation of the project. Sustainable management of coastal resources can only be achieved informed decision making.

Community of Racha yai island will directly be involved in baseline survey, carrying capacity assessment, developing the resources use map and take part in stakeholder consultations.

**The sustainable livelihood after the project runtime:**

By stakeholder participation in the project planning process give the sense of ownership, which will encourage participation in the project activities and follow through.

Since all form of livelihood on the island directly or indirectly depend on tourism, sustaining tourism in Racha Yai Island ensure the livelihood of the business communities in the island. Using the island resources as per agreed management plans, regulations in a sustainable way will improve the overall environmental quality of the island. Moreover encouraging people to participate in the local regular meeting and encouraging people and relevant stakeholders to participate in the local planning process and monitor the implementation of their activities. Involving all the stakeholders to improving the situation of natural resources and socio-economic will build communication and cooperation among the stakeholders in future projects. These also establish much needed forums to discuss different issues/problems that may arise.

**Gender equality:**

Gender equality is importantly for sustainable use and accesses to coastal resources and protects the local culture. Women and men will be provided with equal opportunities to generate benefit from working with economic development such as souvenir selling, small business, working in large and small hotel also getting opportunities in decision making, developing local law and regulation enforcement to promote the properly use the coastal resources and environmental protection in Racha Yai Island.

**Participation and communication strategy:**

The communication and networking between all stakeholders and civil society will be promoted to monitor about resources use and environmental quality in the Island, built the internal relationship and reduce conflicts among stakeholders. Communication and networking give opportunity to establish co-management of natural recourse Additionally, the law and regulation enforcement also improve through participation and close communication from relevant stakeholders in Racha Yai Island.
11. Project management and evaluation

**Racha Yai Environment Coordinate Committee**

<table>
<thead>
<tr>
<th>Government Sector</th>
<th>Private Sector</th>
<th>NGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PMBC and DMCR Club</td>
<td>2. Rep. Tour guide</td>
<td>2. SEEK</td>
</tr>
<tr>
<td>5. Marine Department Phuket</td>
<td></td>
<td></td>
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<tr>
<td>6. Chief of Rawai Sub district</td>
<td></td>
<td></td>
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<tr>
<td>7. Rawai Municipality</td>
<td></td>
<td></td>
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<tr>
<td>8. Chief of Rawai village</td>
<td></td>
<td></td>
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<tr>
<td>9. Phuket Fishery Association</td>
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</tbody>
</table>

**Management of project**

Racha Yai Environment Coordinate Committee and Self-care Club will manage the project. Already established and strengthened by Team 4.

SEEK can Co-ordinate within the committee during project implementation

I. Indicators: What are the indicators for monitoring and evaluation of the project activities by your organization (these should be directly derived from the expected results/outputs)

Restoration of pristine environmental condition can only be achieved within a supportive legislative and regulatory framework. National legislation may be inconsistent, or executive orders contravene one another. It is also achieved directly through management activities which reduce pressure on biodiversity. The capability or capacity of the institution through which management operates, and effectiveness of the management which is carried out, will clearly affect restoration of pristine environment. Following are the indicators identified for monitoring and evaluation of the project activities.
Draft guidelines/regulations: Dive and snorkeling regulation, Energy use plan
Waste management plan, Land use plan, Regulation on maintaining unloading materials

Assessment report: Baseline survey, resource use mapping, Carrying capacity assessment

MOU: Agreed resource use map, land use map and the zoning map

Carrying capacity report: Water consumption (Ground water and rain water),
Solid waste & waste water, Unloading materials, Corals, Sandy beaches

Energy

Water use plan: guidelines/regulation
Energy use plan: guidelines/regulation
Waste management plan: Refer Team
Land use plan: guidelines/regulation
Regulation on maintaining Unloading materials: Regulation

II. Methodology: How and when will the internal monitoring and evaluation take place?

Internal and external audits every year.

Interim evaluations, to review progress and to anticipate likely effects of the project, are carried out during the project implementation period. (Steering)

Mid-term and terminal evaluations carried out jointly at mid-term and at the end of the project by the government and the MFF

Impact evaluations, measuring direct and indirect project impacts, normally undertaken independent body (Steering committee with MFF) during and after 2018.
12. Phasing out and continuation of the project

Assessment of carrying capacity
Assessing the carrying capacity of Racha Yai island is to be completed within the first two years of the project and it is a first time activity. In order to assess the carrying capacity, a detailed baseline survey will be conducted followed by a series of surveys. After the carrying capacity is assessed, a detailed zonation plan, resource use plans and management plans be prepared.

Continuation of the project activities
The project activities will be implemented by the Racha Yai Environment Coordinating committee in cooperation with the empowered self care club. Project activities of this project will be completed by end of 2018. The main activities of this project will be completed by end of 2016. After 2016, the committee will mainly focus on consensus building among the stakeholders. However monitoring of the project activities and adapting the policies and regulations related to the project activities will be continued till end of 2018 by the committee.

After building the consensus among the stakeholders, the project will be gradually handed over to the Racha Yai Conservation and self care club as the main local stakeholder established and strengthened within the island. It will be backed up by the Racha Yai environment committee.

And also the project proposes to establish a trust fund within the island in order to sustain the financial part of the management plans (Refer team 4). This ensures the sustainable funding for the conservation activities of the project. Even though the trust fund is maintained under the Racha Yai Environment Committee, Self care club is able to use this money for the continuation of the conservation activities related to the ICM strategy. Enforcement of the newly agreed rules and regulations will be carried out by the environment committee in coordination with the Self care club.
## 13. Budget

<table>
<thead>
<tr>
<th>Main Activity</th>
<th>Sub Activity</th>
<th>Budget for</th>
<th>Budget ($7,000,000)</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline survey</strong></td>
<td>Preliminary assessment through stakeholder meetings and field visits</td>
<td>Human resources (project proponents, stakeholders - (Gov,: NGO: Private))</td>
<td>$3,000.00</td>
<td>$5,000.00</td>
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<tr>
<td></td>
<td>Accommodation and food for the external team</td>
<td>$6,000.00</td>
<td>$6,000.00</td>
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<tr>
<td></td>
<td>Travelling &amp; transportation</td>
<td>$2,000.00</td>
<td>$2,000.00</td>
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<tr>
<td></td>
<td>Baseline survey through field surveys, observations, discussions, and other physical means</td>
<td>Human resources (multidisciplinary expertise hiring)</td>
<td>$100,000.00</td>
<td>$60,000.00</td>
<td>$40,000.00</td>
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<tr>
<td></td>
<td>Equipment purchasing and hiring</td>
<td>$50,000.00</td>
<td>$30,000.00</td>
<td>$20,000.00</td>
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<tr>
<td></td>
<td>Service hiring from the companies/organizations</td>
<td>$50,000.00</td>
<td>$20,000.00</td>
<td>$30,000.00</td>
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<tr>
<td></td>
<td>Accommodation and food</td>
<td>$25,000.00</td>
<td>$15,000.00</td>
<td>$10,000.00</td>
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<tr>
<td></td>
<td>Travelling &amp; Transport</td>
<td>$10,000.00</td>
<td>$6,000.00</td>
<td>$4,000.00</td>
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<tr>
<td></td>
<td>Resource mapping</td>
<td>Purchasing software</td>
<td>$10,000.00</td>
<td>$10,000.00</td>
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<td></td>
<td></td>
<td>Hiring the human resources/expertise for GIS mapping</td>
<td>$10,000.00</td>
<td>$5,000.00</td>
<td>$5,000.00</td>
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<td></td>
<td></td>
<td>Field verification through stakeholder meetings</td>
<td>$2,000.00</td>
<td>$2,000.00</td>
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<tr>
<td></td>
<td>Assessing the carrying capacity of the island and the surrounding coastal environment</td>
<td>Establishing thresholds / tolerable levels for Physical carrying capacity, Ecological carrying capacity</td>
<td>$100,000.00</td>
<td>$60,000.00</td>
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<td></td>
<td></td>
<td>Periodical data gathering for 1 year and confirmation through field surveys</td>
<td>$100,000.00</td>
<td>$40,000.00</td>
<td>$60,000.00</td>
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<td></td>
<td></td>
<td>Equipment hiring</td>
<td>$25,000.00</td>
<td>$10,000.00</td>
<td>$15,000.00</td>
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<tr>
<td></td>
<td></td>
<td>Human resource hiring</td>
<td>$25,000.00</td>
<td>$10,000.00</td>
<td>$15,000.00</td>
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<tr>
<td></td>
<td>Zoning the area according to its use and carrying capacity</td>
<td>Zoning the area</td>
<td>$10,000.00</td>
<td>$5,000.00</td>
<td>$5,000.00</td>
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<td></td>
<td></td>
<td>Coming to consensus for zoning the area through stakeholders meetings</td>
<td>$5,000.00</td>
<td>$2,000.00</td>
<td>$2,000.00</td>
<td>$1,000.00</td>
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<td></td>
<td></td>
<td>Demarcating the zones by physical means</td>
<td>$50,000.00</td>
<td>$30,000.00</td>
<td>$20,000.00</td>
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<tr>
<td></td>
<td>Developing specific resource use plans for the island</td>
<td>Develop separate resource use plans for water, energy and land</td>
<td>$15,000.00</td>
<td>$10,000.00</td>
<td>$3,000.00</td>
<td>$2,000.00</td>
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<td></td>
<td>Making the guidelines for resource use and adapting the regulations</td>
<td>Developing management plans for each zone through hiring expertise</td>
<td>$10,000.00</td>
<td>$5,000.00</td>
<td>$5,000.00</td>
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<tr>
<td></td>
<td></td>
<td>Establishing guidelines for resource use through stakeholder meetings</td>
<td>$5,000.00</td>
<td>$3,000.00</td>
<td>$2,000.00</td>
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<tr>
<td></td>
<td></td>
<td>Making the regulations related to zoning, resource use plans and policy adaptation</td>
<td>$20,000.00</td>
<td>$10,000.00</td>
<td>$5,000.00</td>
<td>$3,000.00</td>
<td>$2,000.00</td>
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<td></td>
<td><strong>Total</strong></td>
<td>FROM</td>
<td>MFF $500,000</td>
<td>Trust Fund $35,000</td>
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</table>
### Narrative summary
(Objectives and Activities)

<table>
<thead>
<tr>
<th>Goal (Impact)</th>
<th>Objectively verifiable indicators (OVI)</th>
<th>Mean of verification (MOV)</th>
<th>Assumption an Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pristine environmental condition restored/maintained</td>
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</table>

### Purpose (Outcome)
Sustainable management of coastal resources through informed decision making

- Improvement of overall environmental quality:
  - Coral cover 70% by 2017
  - Occurrence of indicator species
  - Ground water quality within standard limits
- Reduced conflicts
  - Number of reported cases decreased 80% by 2017

- Monitoring report
- ICM plan will be followed
- Political will
- Stakeholder’s willingness to participate and contribute
<table>
<thead>
<tr>
<th>Output 1: Completed Baseline survey</th>
<th>Baseline survey report by June 2014</th>
<th>Survey report</th>
<th>Reliable data</th>
</tr>
</thead>
</table>

**Output 2:**

- Assessed carrying capacity
  - Water consumption (Ground water and rain water)
  - Energy
  - Solid waste & waste water
  - Unloading materials
  - Corals
  - Sandy beaches
  - Bays

<table>
<thead>
<tr>
<th></th>
<th>Carrying capacity report completed by Dec 2014</th>
<th>Carrying capacity report</th>
<th>Reliable data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water use plan by Dec 2015</td>
<td>Water use plan</td>
<td>All stakeholders will agree to the plan</td>
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<tr>
<td></td>
<td>Energy use plan by Dec 2015</td>
<td>Energy use plan</td>
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<tr>
<td></td>
<td>Waste management plan by Dec 2018</td>
<td>Waste management plan</td>
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<tr>
<td></td>
<td>Land use plan by Dec 2018</td>
<td>Land use plan</td>
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<tr>
<td></td>
<td>Regulation on maintaining unloading materials be established by June 2014</td>
<td>Regulation on maintaining unloading materials</td>
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</tbody>
</table>
### Output 3:
**Protected tourists and coastal resources**
- Increased coastal biodiversity by 40% - 60% by 2020
  - Coral cover and species diversity
  - Indicator species
- Established dive and snorkeling regulation by Dec 2015
- Dive and snorkeling regulation
- Monitoring report
- Monitoring is carried out as per schedule

### Output 4:
**Completed zoning and resource use mapping**
- Zoning and resource use map and land use map be ready by Dec 2015
- Established dive and snorkeling regulation by Dec 2015
- Zoning and resources use map
- Reliable data

### Output 5:
**Agreed consensus on zoning, resource use and land use**
- Agreed resource use map, land use map and the zoning map by Dec 2018
- MOU
- All stakeholders will agree on the zoning map

### Activities
- **Baseline survey**
- **resource use mapping**
- **Carrying capacity assessment**
- **Developing guidelines through Stakeholder meetings/workshops**
  - Preliminary assessment done by June 2013
  - Assessment report
  - All stakeholders participate and cooperate
<table>
<thead>
<tr>
<th>Event Type</th>
<th>Event Description</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal meetings</td>
<td></td>
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<tr>
<td>Workshops to develop regulations and guidelines</td>
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<tr>
<td>Stakeholder consultation to validate the resource use map</td>
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<tr>
<td>Draft guidelines/regulations be ready by June 2015</td>
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</tr>
</tbody>
</table>

**Inputs**
- Budget
- Human resource
- Survey equipment and boat
- Other resource
Annex 2 Group Reports
Field survey results

Group 1 (M.Vijay): Activities/ views of Conservation and Self-care club of Racha Yai Island/ farmers

The marine environment around Phuket Island was damaged due to increasing in large number of tourist activities. In order to protect the Racha Yai island from such environmental damage the local people started self-care club during 1992 to preserve the marine environment in the island. The club made six rules for environment preservation in 1999 for tourist to follow in Racha yai Island and get approved from provincial government in Phuket. The rules have no binding with laws. The following are the rules and these are the under the agreement of Racha Island and Phuket residents.

a. Anchoring along coral reef is prohibited
b. Jet ski, water ski, water scooter, sea walker, banana boat, parachute ski are prohibited
c. Any fishing activities are prohibited
d. Fire camping on beach area is prohibited
e. No littering and all must be responsible by each individual i.e. non-recycling packages, plastic bottles
f. Animal hunting is prohibited i.e. birds and bats

- Club collected 100,000 bhat from different local entrepreneur to establish of glass bottle crushing machine for the disposable of waste glass bottles.
- Club in collaboration with provincial government created artificial reef at Ter Bay by sinking 2 wooden and 1 steel boats and elephant statue.
- Raising the issue to provincial government for the implement of management plan to conserve natural resources.

Conflicts and issues

- The provincial government officials do not have any interest to resolve the problems of Racha island. During the field survey the situation regarding water treatment, garbage disposal and maintenance of the area is not quite well in most of the resorts and other surrounding area of the island. According to Bang Maad chairman of the Self Care Club and Danai Poocharoen, member of Self Care Club that they are from time to time submitting different proposals for the improvement of the situation over Island and to resolve the problems but due consideration is not responded by the provincial government of Phuket

- The new entrepreneurs who started move in racha Island in recent past are not abiding to the self-care club’s rule.

- Try divers operators mostly Koreans and Chinese from Phi phi Island recently moved in Racha yai island for try driving activities. According to Chairman Mr. Bang maad, they are not abiding the rules of self care club and in a way destroying the corals.

- After the leakage of cements from a big barge at Siam Bay the Self Care club suggested provincial government to unload the construction material at Ter Bay but due the conflict with private land owners for the transportation of the materials in their land it could not be solved. It was later decided that the low volume of the construction material will be transported by the smaller boats so that the misfortune of such leakage may not occur. But the Self Care Club feels that the smaller boats will also damage the coral reefs because of shallow water over there in Siam Bay.
The club raised objection for the blockade of the streams by land fill for making way by the Raya Buri resort. According to chairman Mr. Bang Maad during every monsoon, the land filled area in the stream is washed away and heavy load of sedimentation enters the bay and thereby affecting the coral reefs.

Suggestion:

- Empowerment of Self-care club
- Restructure of Self-care Club
- Increase networking among different stakeholder

Activities/ views of Conservation and Self-care club of Racha Yai Island/ farmers

Self care Club

What is the Goal/mission of the Self-care club? For What Purpose it was established?

How are they funded for various conservation activities?

What are the natural resources in the Island?

What are the activities carried out for conservation of natural resources in the island?

(i) Coral Reef
(ii) Fishing
(iii) Sandy Beach

What is the role in their society?

What is the affiliation with the Government?

Whether the Self-care club is based at Racha Island or having main branch at Phuket?

Is there any community representative in the club?

Is there any conflict with other sectors?

Do you have any plan to resolve the conflict between the sectors?

What are the issues/ problems/barriers you have for conservation?

What are the main problems, in your community related to environment?

Do you think it is important to conserve and protect the natural resources?

Whether they have willingness to adopt ICM plan?

What are the future plans? How they are funded?
**Farmers**

What is your view on conservation and protection of natural resources?

Types of farming activities carryout eg Aquaculture, Agriculture

What are diseases you have in crops?

Do you use pesticides and fertilizers for the crops?

If yes, what type of pesticides and fertilizers?

Do you have any guidelines for using pesticides and fertilizers?

What tools use for agriculture purpose?

Any network among farmers

What is the role of women in farming? Age range?

Any subsidy from government or anywhere?

Do they have any alternative income?

How do they market the products? And it’s local or tourists or any other place?

Do you have any conflicts between other sectors?

Where they get water for crops?

How many crops per year?

What irrigation system they have?
Groups 2(Rifath Naeem): Tourists/ scuba diving/ snorkeling tour operations and fishers – activities and views

The main attraction in Racha Yai island is snorkelling and scuba diving. Racha Yai is famous for its crystal clear waters and beautiful corals reefs. There is an increasing number of tourists visiting the island for snorkelling and diving. Diving and snorkelling activities around the Racha Yai island is been carried out by dive operators in the island and also dive operators based in Phuket main land.

Main purpose of the survey was to get an idea about the diving and snorkelling activities around the island. Information was collected by conducting interviews with the dive operators present on the island and interviews with tourist. (Questioner’s used in the survey is attached in the annex of this report)

Major findings from the survey:

1. Lack of regulations and enforcement for diving & snorkelling activities.
   It was made to our attention that most of the problems in diving and snorkelling activities around the island are because of weak regulation and enforcement. Pollution, boat anchoring, overcrowding and physical damage to corals by walking on corals and collecting corals by the tourists were identified as major problems due to weak regulations and enforcement.
   Some of the operators have adopted diving gridlines from PADI and Green fin guidelines, but effectiveness of these guidelines have not been assessed. Some fishing activities are done around the island. Racha Yai is famous for big game fishing. We also saw some spearfishing done inside the bay among other tourist. There is no monitoring or any control in fishing activities done around the island.

2. Lack of awareness and lack of proper information provided to the tourists
   It was noticed that tourist are not been giving the proper and right information about the corals and how they should behave when going for diving and snorkeling. Walking on the coral reefs and collecting shells and corals as a souvenir is common. Some of the tourist that was interviewed complained about collecting shells and corals from the reef. The language barrier between the dive masters and tourists, lack of information boards were identified as reasoning for this problem.

3. Poor communication/ co-operation between the dive operators
   Poor communication among the dive operators both on Racha Yai Island and Phuket main land is the root cause of overcrowding and other conflicts. Attempts were made in past to initiate dive forum in the past but was not successful because of no leadership. All the operators express a need of a dive forum where all the operators can discuss the issues and also carry out monitoring of the coral reefs.

3. Lack of safety measures for the dive/snorkelling tourists.
   Safety measures for the tourists who take part in dive and snorkelling activities were very poor. Abounded and rusted out life guard post were found on the beach. Neither life buoys nor life guards were seen. During the interviews, one tourist mentions that he got injured during snorkelling and the dive operator had no first aid kit.

Recommendations
1. Study on carrying capacity to control the access to dive sites
   - e.g. a fixed nos. of dives at a given dive site at a given time.

2. More information regarding coral reefs or good practice to the tourists by the tour operators - Bill boards
   - Video clips
   - Pamphlets
   - Briefings in their own languages

3. Establishing forum consisting of dive operators
4. Establishing small MPAs/NTZ

5. Small-scale coral transplantation activities (local dive operations)
   - based on guidelines from PMBC

6. Diversification of tourist activities
   - Nature traits
   - forest camping etc

7. Discussions points to be included in the meeting which will be held on 15 March, 2013
   - Snorkelling/diving regulations
   - Propose the formation of Forum
   - carrying capacity assessment

**For Group -II**

**Tourists/Scuba Diving/Snorkeling tour operations and Fishers-activities and views:**

**A. Tourists/Scuba Diving/Snorkeling tour operations**

1. Name/Owners Name/Company Name (Govt./private):

2. Address/location:

3. Total No. of Staffs/employee:

4. Total nos. tour operators in Ko Racha yai:

5. Licensed/Registered/not and Mention the name of monitoring authority:

6. List of the facilities which they provided to tourists:

7. Approximate nos. tourists visited/day in Ko Racha Yai Island:

8. App. annually visited tourists (at least 5 years data):

9. Fees/costs of each operations:

10. List of using instruments of diving/snorkeling/others

11. Functions/services of those instruments:

12. Have any guidelines of tourists:

13. Provision of instructor/guide facilities:

14. Total nos. guides who are trained/expert:

15. Have enough life supporting facilities (List and nos. of Life jackects/rescue team/first aid etc):

16. Per day and Annual income of each tour operators:
17. Income increases/decreases? & Benefit sharing system:

18. Which amount they paid as licensing & taxes/others in each day/month/year to the authority:

19. Any other alternate income sources:

20. Any thinking about alternate tour operations:

21. Existing Govt. rules & regulations for tour operations:

22. Any other Govt. assistances/financial supports to the tour operators:

23. These types tour operations are eco-friendly/not:

24. Effect of tour operations to the other livelihood activities (fishers/other) and local community:

25. Any Conflicts to other livelihood activities/ to the local authorities:

26. Effects in coastal resources (water/coral reefs/seagrass/other):

27. Stresses/Major threats/Challenges to coastal environments of these activities and how to solve these:

28. Waste water management system:

29. Total energy consumption & sources:

30. Without scuba/snorkeling list of other activities:

31. What responsibilities they possess (social/financial/benefit sharing/others to the local community):

32. Role of local authorities and their opinions:

33. Have any tour operators committee/ associations (if any- Total nos & list, registered/not ):

34 What is the rules/regulations exist in associations:

35. Tourists opinions (at least 10-20 persons both male/female and also maintain age groups):
Fishers

1. Name of Fishers:

2. Main livelihood:

3. Education and other personal Information:

4. Any Alternative livelihood:

5. Annual/monthly income and it is increasing/decreasing:

6. Total nos. fishers/fishing boat owners/staffs/gear owners:

7. How many boats operated in a day?

8. How far they go for fishing and what is the avg. depth:

9. Maintain any log sheet if maintain then take CPUE data per boat(day/month/year):

10. What is the design of the boat(mechanized/non-mechanized):

11. Various facilities of fishing boat(icing/preserving/lifesaving)

12. Which Preservation technique applies on boat?

13. How long they pass in each fishing operation/trip?

14. Any concept about fish stocks?

15. List the types of gear and functions:

16. List the fish species and their amount(if possible):

17. Favorable fishing location/Some suitable locations(Longitude/latitude and depth):

18. Existing rules and regulations:

19. Having the facility of modern fishing technology:

20. Nos. of Licensed/Registered boats and their annual payment system(fees/taxes/other) to the authority:

21. Fishers are trained/self-trained/any idea of ICM (from which they trained)

22. Any fishers associations/committees? If any (Name, Nos. of members, regulations activities:)


23. Landing/depot facilities in the landing centers and existing marketing channels:

24. Presence of middlemen in existing marketing channel (if any, the total nos. of middlemen)

25. Existing fish price is satisfactory/not:

26. What is the benefit sharing system:

27. Any conflicts with tourism or other sector:

28. Impacts/Effects on coastal environments (use of any destructive fishing method)

29. By catch disposal/Waste disposal/waste management system of fishing vessel?

30. If water polluted by oil spilling of fishing boats then what measures they taken:

31. Cost of Fuel/energy and source of energy:

32. Any Govt./NGO support and financial support:

33. Any regulation which affects fishing/fishers livelihood:

34. Possess any responsibility (social/financial/benefit sharing)

35. Some other communities opinions (tourism/other livelihoods)
Group 3 (Sinat HUOT): Role and management of large tourist resorts (Baan Raya, Raya Buri and The Racha resorts)  
On environmental quality management

Problems Identification:

Environmental management problems:
- The tourists were increased such as increased day tripper, increased boat transfer, sea water pollution from main land, increased pollution in Racha Yai Island from oil spill, and engine fuel
- Increased pollution in Island due to increased water waste, solid waste and inadequate the waste water treatment facilities of the hotels.
- The sediment was increased due to deforestation and land clearance in the island.
- Increased Sediment build up in small creek lead to the sea and affected to coral reef.
- NO boat operator Licenses and poor monitor about environment impact
- Uncontrolled the tourism plan such as lack of EIA for development, increase water and energy consumption for operation the resort, Increase using underground waters, lack of government pressure to the Racha Yai Island on environmental quality management

Governance problems:
- The Rawai municipality visited and checked the waste from the big resort that requires them has to waste management plan, and they also have waste water treatment.
- No EIA before build the resort, but they can build the resort on the island without follow this.
- They have the policy to increase the number of tourisms that it can make high pressure on the coastal ecosystem and environment.
- It have around 10 family in the island that cannot set up as commune in the island that lead the weak/poor communication or control from the government.
- Poor coordination from the government for the resort.
- Poor cooperation between resort owner and with the government that cause poor law enforcement, waste management.
- Negative impact to the coral by tourism activity, transportation for building equipment, erosion, high sedimentation, waste water flow directly to the sea without filter.
- Reduce the population in the island, and the agriculture activity was abandoned.
- Use much underground water for using
- The resort willing to protect the ecosystem but not facilitate from the government and need to increase their capacity on waste management.

Prioritizes of the Issues:
- Mass tourism (Waste management and Pollution/ Conservation and Natural resources Protection)
- Governance, Communication and networking, Education and Awareness

Recommendation:
Environmental Management:
- Quotas for tourism to tour operators and monitoring
- Organize Campaign with All Stakeholders for aware about environmental advantages, Pollution, and how to protect the natural resources in the Island
Increasing sign Boards for educate all stakeholders about Waste management
Improved regulation and integrated waste management system
Need for complete assessment of solid and waste generated on the island
Officers from the pollution control unit should monitor the impacts of waste on the island

Governance:
- All relevant stakeholders must clear policies and regulations
- Adequate monitoring on environmental quality and pollution on the Island
- Maintain the environmental quality standards on the island
- Environmental regular audit from Phuket government and Rawai musicality
- Water Quality assessment & Monitoring frequently
- Limit and regulate ground water extraction
- The Phuket province and Rawai municipality should promote rain water harvesting and alternative water resources.
- The resort owner, local people, self-care club and other stakeholders should work together for setting up internal regulation relating to environmental quality management.
- Improving communication and collaboration between Phuket government and Rawai municipality with big resort, small resort, small business, self-care club, and local people to take care about environmental protection and impact of environmental pollution.
- Improving internal communication between large resorts with other large resort, and large resort with small resort and also self-care club and local fishermen, each resort should organize regular meeting for solve the problem happened to each other.
- Educating the resort staffs and other people to reduce energy consumption, water conservation, and raising awareness on environmental protection and take care about environmental quality.
- The resort should build their own management plan and add Cooperate Social Responsibility (CSR) green purchase in to account such as: we can collect money from each room for eco-environment, for example 30-35 baht per room for expanse to eco-environment activities.
- The hotel should consider about environmental standard and operate it in the hotel through outsources, develop green policies in the island and each resort should respect it, lead to hotel can monitor its shelves on environmental quality and also use it as marketing promotion.
- The resort should promote more activities inland for tourists for reducing activities in the beach and sea.

Communication and networking/Education and awareness:
- Government led facilitation (Divers Forum)
- Empowering the self-care club
- Active stakeholders to act as catalysts
- Implement best practices sharing
- Invite TV crews to documentaries
- Regular activities initiated by self-care club to promote environment
  For example: Tree plantation, coral reef cleaning from plastic waste
- Regular trainings and capacity building on coral health and environmental protection
- Publish leaflets, posters, brochures on environment pollution, protection and rehabilitation in the island

Strategy – A way forward
- Participatory mechanism is promoted
- Platforms and forums for cooperation and collaboration (island + Phuket)
- A dedicated conservation project run by the self-care club with the involvement of divers and local scientists
- Implement Integrated waste management system for all resorts/local business on the Island
- Ecosystem based management through constructed wetlands and drip irrigation
- Zoning of the area and establishing MPAs
Energy efficient systems to be promoted through phased approach such as Solar Panels and solar pumps

**Questionnaire for Group Three**

**Role and management of the large resort on environmental quality management**

Background information of Large Tourist resorts:

<table>
<thead>
<tr>
<th>Name</th>
<th>owner</th>
<th>Year established</th>
<th>No. room</th>
<th>No. staff</th>
<th>Avg. no. tourist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Racha</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Male:</td>
<td>Peak season</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Female:</td>
<td>Normal season</td>
</tr>
<tr>
<td>Rayaburi</td>
<td></td>
<td></td>
<td></td>
<td>Local:</td>
<td>yearly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Expat:</td>
<td></td>
</tr>
<tr>
<td>Ban Raya</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Population of Racha Yai:  ------------
   Male: ……
   Female: ………
   Youth: ………
   Senior citizens ………

2. Criteria for distinguishing small scale resort and large scale resort

<table>
<thead>
<tr>
<th>Large resorts</th>
<th>Small resorts</th>
</tr>
</thead>
</table>

What are the different Occupations of the Resort:

<table>
<thead>
<tr>
<th>occupation</th>
<th>Salary</th>
<th>Occupation</th>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers</td>
<td></td>
<td>Gardeners/landscape</td>
<td></td>
</tr>
<tr>
<td>Chambermaids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chefs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiters and waitresses</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
What are the different service offered by the resort:

………………………………………………………………………………………………………….
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Does the resort has a calendar of activity for the year?
………………………………………………………………………………………………………….
………………………………………………………………………………………………………….

What are the different Promotion materials
………………………………………………………………………………………………………….
………………………………………………………………………………………………………….

1.1. The legal support which the resort have:

Licenses: ……………………………………………………………………………………………

Rules & Regulation: ………………………………………………………………………………

Resort Policies: ……………………………………………………………………………………

How is the implementation of law/ regulation/policies enforcement and monitored?
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

1.2. Stakeholders involvement with the running of large resort:
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

Environmental Management of the resort:

Does the resort have a Waste water management plan? Yes ☐ No ☐
How is the water treated? Who’s involved?

Volume of water used per day: .......... How many kilowatts of energy used per day: ............

How much waste is generated per day in average: ..............

How the resort dispose its wastes: ....................

What are the different types of waste generated by the resort?

Any possible sources of pollution by the resort (fresh water quality, streams, ground water, coral reefs):

Is the resort visited by Environmental Health officers?  Yes □ No □ Frequency? __________

What do they check when they visit?

1.1. What is the major impacts from the tourist resort:

Livelihood of the local resident:

1. ...........................................................................................................

2. ...........................................................................................................

3. ...........................................................................................................

4. ...........................................................................................................

Marine resources:

1. ...........................................................................................................

2. ...........................................................................................................

3. ...........................................................................................................

4. ...........................................................................................................?
1.2. How good/bad are the Cooperation between Municipality / local government/Private sector & NGOs?

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…………………………………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………………………………

Are there any conflicts between:

Resources and Resource user (hoteliers):
…………………………………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………………………………

Local fisherman with resort owner:
…………………………………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………………………………

Provincial government with local community:
…………………………………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………………………………

Resort owner with resort owner:
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…………………………………………………………………………………………………………………………………………………………………………………………

Tourist with local resident:
…………………………………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………………………………

Local government with resort owner
…………………………………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………………………………

…………………………………………………………………………………………………………………………………………………………………………………………?

Other conflict:
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1.3. Positive points remarkable:

- Map location
- Land ownership

Note:

2. Tourist feedback questionnaire
3. Chart of result

What components need to present?
GROUP 4(Riana): Small tourist resorts / Local business/ local government/ police

Findings:

1. There is a policy from government which is about to increase number of tourist coming to Thailand. The policy drives some resorts especially the big resort to promote and marketing widely outside Thailand. The big promotion and marketing of these resort has succeeded due to many tourists come to Thailand especially Phuket afterwards as well as Koh Racha Island. It approximately 1200 tourist as a day tripper visit the island.

2. The mass tourism has caused some problems in the island, as the following:
   - Increasing of sun-bathing area
   - Increasing of tour operators
   - Increasing of speed boats
   - Increasing of water consumption
   - Increasing of local business
   - Diving and snorkelling activities

3. Previously, mostly tourist came from western, they are more concern about the environment. Nowadays, most tourist come from China, Korea and Russia, they are low awareness about the environment. This changing behaviour caused some impacts to the coast environment, as the following:
   - Increasing of solid waste and waste water
   - Destruction of coral reef, due to the tourist during the snorkelling activities, they are walking on the coral reefs
   - Coastal environment degradation

4. There is not representative from government (no representative from rawai municipality). Only one policeman stand by in the island and it is not enough for monitoring the whole island.

5. Actually, the government has already body, but not working well. There are some regulations developed, but the implementation is not going well (low enforcement).

6. Due to the low enforcement, it caused some problems, for example: conflict of land use between stakeholders.

7. In the island, there is a community forum called "Racha Island Conservation and Self-Care Club". It is established in 1992. The activities of the clubs that being implemented are as following:
   - Collecting garbage along the beach every year
   - Having discussion in informal meeting
   The club is built based on some situations, such as: illegal fishing (dynamite fishing and illegal fishing gear has been used). The club is initiated by entrepreneur (family restaurant owner). The memberships in the club are mostly volunteer from some of stakeholders in the Racha Yai island. Since the club established, there is no regularly meeting. The meeting would only be there when there are big issues or emergency problems arise. For the financial support, the club collect the money from documentary team and the members of the club. At present, they have 50,000 bath in the bank.

   The needs of the club for achieving long term goal are as following:
   - Need someone from other stakeholders (government, scientist, etc) to dedicate himself in order to achieve
8. In the past, people on Phuket island came to utilize land on Racha Yai island as coconut plantation, paddy field and set up their community. During that time, some backpacker tourists visited this island and local people could gain some income from selling their local products to the tourists. Racha Yai island has high potential to develop as economic benefit, some of investors came to convince local people to sell their land to them. Most of local people sold their land without land title then local people moved out from the island to main Phuket island. Outsider as a new comer and have more power with their money to construct all of facilities for supporting their tourism activities.

9. After the large resorts on Racha Yai Island promoted their tourist attraction as marketing to the public, many tourists come to visit Racha Yai island every year increasingly. The needs of extend capacity of accommodation and employment are highly. More migrant employees are increasing especially from Burma.

10. At this present, most of people on the island are originally from outside Racha Yai Island and they are less feeling attachment with the island that they live and gain benefit for their livelihood. Poor concern on coastal and marine resources has been appeared by destructing of coral reefs (walking on the coral reef), solid waste scatter on the beach.

Among the four resorts, only two which have solid waste treatment, they are Bungalow Raya Resort and Raya Father.

**Question for Small tourist resorts / Local business/ local government/ police**

1. **Small Tourist Resorts:**

   1. Background of the resort
      a. Establishment year
      b.
   2. Management of resort
      a. Who managing / owner
         i. Insider / outsider
      b. How many staffs
         i. How many local people
         ii. Non local people
         iii. Age of staff
         iv. Gender balance?
         v. Type of work by age and gender
         vi.
      c. If there any network between the small resorts
      d. How much the income during a month?
      e. Financial access for improving the resort
         i. Bank
         ii. Others
      f. Support from local government
         i. Promotion
         ii.
      g. Future plans to improve the resort

i.

h. Pollution control management
   i. Any pollution control / treatment of the resort
   i. Participation in the decision making with local government
j. Do you have any problem relating to management, tourist, local government regulation, large resorts, local community

3. Tourism
   a. How many tourist come to this island in months, in the years?
      i. High season =
      ii. Low season =
   b. Are there any trends that number of tourism increasing year by year?
   c. Available data on number of tourists (make trend later)
   d. Proportion of tourist’s countries
      i. Domestic
      ii. Non-domestic
   e. Facilities for the tourists
      i. Tourist attraction
      ii. Tourist activities (guidelines availability)
         1. Scuba diving
         2. Snorkeling
         3. Fishing
         4. Kayaking
   f. Regulation for tourist

g.

4. How to separating category of scale small resort and large resort.
   a. Definition of small scale
   b. Comparing to the tourism division in the local government

2. Local business

   • Kind of local business
     a. How many / what kinds
     b. How many person should be include for being employee
     c. Age range / gender of employee
   • Marketing
     a. Supplier
     b. Market
     c. Consumers
   • Financial
     a. Income per months
     b. Alternative livelihood during low season
     c. Cost and expenses
     d.
   • Future plans for improving the business
• Networking  
  a. Other local business  
  b. Tour operators  
  c. Local government  
  d. Local community  

• Support from local government, other sources  
  a. Financial access  
  b. Regulations  

• Problem  
  a. Do you have any problem relating to management, tourism, local government regulation, large resorts, local community, other local business  

3. LOCAL GOVERNMENT (of Racha Yai Island)  
  • DMCR research station No.5  
  • Andaman sea fisheries research and development center  
  • Police  
  • TAO (Tambon <sub-district> Administrative Organization)  
  • Health care center  

1. Services for all stakeholders  
   a. Regulation  
   b. Facilitate of communication to the stakeholders  
   c. Enforcement of laws and regulations  
   d. Monitoring including police  
   e. Programs for development of the island; tourism, agriculture, fisheries, etc.  
   f.  

2. Do you have any  
3. When did the peak of visiting tourist reached?  
4. How about the trend of number visiting tourist, it is increase or decrease?  
5. Why did the number of tourism become increase or decrease?  
6. Who is managed the policy for small resort tourist?  
7. How about the satisfaction level from the tourist?  
8. What is the problem often occurred in small tourist resorts?  
9. How to managed the pollutant coming from small resort tourist?  
10. Are there any changes to local culture/ traditional way of life?  
   11. How many small resorts in this island?
Guideline Questionnaire for GROUP 4: Small tourist resorts / Local business / Local government / police

**Research Question:** (Information data should be collected)

<table>
<thead>
<tr>
<th>Issues / Categories</th>
<th>Small Tourist Resorts</th>
<th>Local Business</th>
<th>Local Government / Police</th>
<th>Methods</th>
</tr>
</thead>
</table>
| 1. Background Data  | • Background of the resorts  
                      • Establishment year  |                |                           | • Semi-structure  
                      • Timeline  
                      • Seasonal calendar |
| 2. Resource use     | •                                                                  |                |                           |                  |
| 3. Conflicts        | • Do you have any problem relating to management, tourist, local government regulation, large resorts, local community  | • Problem  
                      • a. Do you have any problem relating to management, tourism, local government regulation, large resorts, local community, other local business | • Problem analysis  
                      • Stakeholder analysis  |                  |
| 4. Cultural impacts | •                                                                  |                |                           |                  |
| 5. Carrying capacity| •                                                                  |                |                           |                  |
| 6. Coastal pollution| • Pollution control management  
                      • a. Any pollution control / treatment of the resort  |                |                           |                  |
<table>
<thead>
<tr>
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<th>Small Tourist Resorts</th>
<th>Local Business</th>
<th>Local Government / Police</th>
<th>Methods</th>
</tr>
</thead>
</table>
| 7. Infrastructure development | • Facilities for the tourists  
   a. Tourist attraction  
   b. Tourist activities (guidelines availability)  
   1. Scuba diving  
   2. Snorkeling  
   3. Fishing  
   4. Kayaking | • Kind of local business  
   a. How many / what kinds  
   b. How many person should be include for being employee  
   c. Age range / gender of employee  
• Future plans for improving the business | | |
| 8. Transportation | • | | | |
| 9. Leisure activities | • | | | |
| 10. Energy consumption | • | | | |
| 11. Management Strategy | • | • Marketing  
   a. Supplier  
   b. Market  
   c. Consumers  
• Financial  
   a. Income per months  
   b. Alternative livelihood during low season  
   c. Cost and expenses  
• Support from | | | |
<table>
<thead>
<tr>
<th>Issues / Categories</th>
<th>Small Tourist Resorts</th>
<th>Local Business</th>
<th>Local Government / Police</th>
<th>Methods</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>local government, other sources</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Financial access</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>b. Regulations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Network &amp; Collaboration</td>
<td>•</td>
<td>• Networking</td>
<td>a. Other local business</td>
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<tr>
<td></td>
<td></td>
<td>b. Tour operators</td>
<td></td>
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<td></td>
<td></td>
<td>c. Local government</td>
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<td>d. Local community</td>
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</tbody>
</table>
Methodology:

1. Water quality testing
   Selected sampling locations from:
   - Surface water (natural streams, ponds/reservoirs, canals)
   - Ground water (shallow wells)
   - Waste water treatment plants

   Parameters tested:
   - Temperature
   - Dissolved Oxygen
   - Salinity
   - pH

2. Other data/information gathered through
   Key informant interviews (small and large resorts, recyclable materials collection center)
   Field observations
   Available literature

Sampling locations
1- Raya father shallow well water
2- The Racha rain water harvesting pond
3- The Racha Water pumping station
4- River, Close to Rayaburi resort (near the bridge)
5- Siam river mouth
6- Northern side stream mouth at Siam bay
7- Northern side stream, after the dam
8- Land side from the dam
9- Big reservoir
10- Ban Raya treated waste water from their treatment plant
11- Close to The Racha dumping site
12- Downstream of waste dumping site
13- Rayaburi shallow well water

Results and Discussion

1. Results of Water sample testing

<table>
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<td>6.68</td>
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<td>yellowish</td>
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</tr>
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<tr>
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</table>

**Water quality testing by Group 5**

1. **WATER SOURCES**
The main water source used in Koh Racha Yai Island (large resorts, small resorts and restaurants, other residents) is the ground water from the Dug well. In addition to that water reserved from the rain water harvesting pond is used by The Racha resort. The ground water is used mostly for washing and cooking purposes and bottled water is used for the drinking purposes. Some of the restaurants and even large resorts use ground water for even for drinking purposes after a simple purification process such as filtration, reverse osmosis and chlorination.
2. ENERGY SOURCES

The only energy source for the island is gasoline. All of the resorts use generators for producing energy for all energy requirements. The average gasoline consumption in the island is 500,000 l per month. All the resorts unload gasoline at the closed by bay. However Ban Raya hotel is in a process to produce 40% of their energy use from solar energy in the future. Rayaburi hotel practices a number of energy saving good practices. They have planned to use solar energy to produce hot water in their newly constructed building with 24 rooms. But The Racha still does not have an idea of moving towards solar energy due to practical obstacles.

3. SOLID WASTE MANAGEMENT

All the resorts have a proper mechanism for separation of solid waste at their premises. Solid wastes are separated into plastics, glass, cans, and dry paper, and they are transported in to the Main land through a buyer already in the island or directly to the company. However it was observed that the disposal mechanism for glass, hazardous materials and organic waste is not properly managed. Hazardous materials such as used batteries, CFL bulbs, electric items, AC machine parts etc. could be observed in most of the waste dumping sites. Organic waste is dumped at their own dumping sites, sometimes may affect the water body downstream in the rainy season. High cost of transportation into the main land due to their heavy weight and the contaminants inside of these glass bottles are the constraints found in the disposal mechanism of glass.

All three large resorts are having an incinerator to burn their wet waste such as wet tissues. However there is no mechanism to examine whether these incinerators are up to the standard level.
4. WASTE WATER TREATMENT

a). Any of the small resorts do not practice any kind of waste water treatments/practices. The waste water from the kitchen is directly discharged in to the stream or canal nearby or through outlet canals in to the sea.

b). All three large resorts discharge their waste water through a simple treatment process.

- Ban Raya resort do have a small waste water treatment system to treat the water from the kitchen, car wash, laundry and bathrooms. Sewage is disposed into the soakage pit and black water does not flow out of it.

- The Racha large resort operates a waste water treatment system to treat waste water from kitchen, bathrooms, laundry, car wash and toilet pits. They use a retention pond to settle down sediments from the laundry and after the retention pond it is connected to the treatment system. The sediments of this pond are burnt. The only process they use in the treatment pond is aeration. After aeration the water is pumped out of it for gardening. Major limitation here is the capacity of the water treatment pond is lower than the amount of waste water generated at the hotel (240m$^3$ water released every day to the 100m$^3$ capacity waste treatment pond). During rainy seasons waste water overflows in to the nearby canal located at a lower elevation without physical aeration which may cause contamination of different kinds of pollutants in the stream water.
Land based issues identified

- Poor catchment management impacts negatively on the coastal environment and valley systems. Large quantities of sediments could be resulted in Siam bay along the coast at rainy times
- Inadequate Solid waste and waste water treatment systems

Issues related to governance

- There is poor coordination between sectors (RAWAI Municipal council, Police, department of marine and coastal resources and pollution control department) and within government and private sectors (Large resorts, small resorts, restaurants and diving clubs)
- People do not really have a sense that the coastal belongs to them and they have a role to play for its management
- There is very little public participation in management and decision-making (Racha self care club, resorts, municipality and other sectors)
- There is poor relationship between stakeholders
- There is lack of government capacity to resolve land claims
- Too many policies and regulations exist but none of them enforced

RECOMMENDATIONS

- There is a need to maintain the natural exchange of sediments between land and ocean
- Existing laws and regulations need to be enforced with regard to waste management
- Design and location of rain water harvesting systems, bio gas plants and waste treatment plants take account for careful management of natural resources and waste water management
- The important role of different stakeholders in pollution control needs to be recognized in the formal planning and management of coast.
SUMMARY
There is an increasing demand for water resources due to increasing number of tourist nowadays, but the available resources are limited. Ground water is still used for drinking, washing and cooking purposes but surface water is not used for any type of use due to severe pollution. There is a risk of salt water intrusion in to ground water due to high amount of extraction of ground water by the users.

Sediment particles from the deforested and slopy areas of the island can cause for accumulation of sediments in the coral colonies in Siam bay.

Solid waste and waste water disposal system in the island is not adequate enough for the running the existing system smoothly and sustainably. Eutrophication problems could be arised due to high amounts of N and P discharged into the water bodies resulting hypoxic/Anoxic conditions that can negatively affect the physical characteristics of water uch as color and quality (reef Management Company 2012). Care full management and consideration need to be taken as much as possible to secure the existing resources for the future generations.

Annex 1: Data gathered from Small resorts

Location visited – Raya father, Rays garden, Rays bungalow restaurant and Raya dive village

Raya father – Raya father is one of the small resort do not practice any kind of waste management practices, they use only ground water for cooking and washing purposes without any treatment activities, the out let of the waste water directly opened up in to the valley which directly connected with the sea. The stagnant water showed black colour in appearance with mud smell.

Raya village
Raya village is one of the eco-friendly cottage style residences in Rachia Island it contains more than 20 rooms, ground water used for the washing and cooking purpose, waste water conveyed in to the small canal nearby; which finally opened in to the sea. Ground water showed higher amount of salinity and the water colour seems to be slight yellow. More than 5 opened wells to acquire ground water, this water also used for the gardening purposes as well. Among observed small resorts this showed higher amount of ground water usage.

Raya bungalow restaurant
This restaurant situated near by batok bay close to the sea, they replied that they using open dumping site for organic wastes, separation and selling of plastic bottles and cans to the main land and pumping the waste water to the
The waste water from the kitchen directly opened in to the sea; there are more than 5-6 outlets of waste water pipes conveyed in to the sea.

Annex 2: Data gathered from large resorts

1. The Racha large resort
   - Number of rooms-85 (only ground floor is available)
   - 4 share holders; 2 from Singapore and 2 from Thailand
   - Total no of staff: 243 (40% women, 60% men)
   - There are 3 shorter seasons for high season: From Nov.-December first week, Nov.12 – Jan.10, Jan 11-April; most of the time fully occupied
   - Low season(Off season): May – October- not fully occupied, 70-80 tourists per day
   - The hotel staff clean the beach every morning, litter comes with the sea currents
   - The hotel allow public access to the beach
   - The Thai Owners have a good connection with the Higher level government
   - The hotel is going for a new waste management mechanism in near future, already handed over to a separate company
   - Water sources: bottle water for drinking
     - Other uses + drinking: from Ground water- extraction 250 m3 / day, 6 shallow wells, 1 rain water harvesting pond (100m x 43 m x 7 m), - 1 deep well- not working due to absence of water there, 1 wide shallow well
     - Water purification before use - use carbon and sand (4 tanks of 50 m3)- add chlorine – high tank
   - Solid waste management: separation of waste 2 types- dry and wet,
     - Dry – paper, plastic, glass- separated waste - every Monday, Wednesday, Friday – taking to the main land
     - Wet – wet waste from the rooms- incineration (capacity of burning- 80 kg/hour, do not use fuel, 1000 C, cost 1.2 million)
       - Kitchen waste- dumping at the dumping site
     - Deploy 2 persons for waste separation, collection and cleaning
   - Waste water-240 m3 / day
     - 4 ways of waste water generation
       - From staff resident building-52 m3
       - Main building-28 m3
       - Bar and shops-34 m3
- Laundry m3 – retention pond for the laundry
- Toilet waste water (black water) and laundry – 126 m3

- Capacity of the treatment plant-100 m3
- Treatment plant – the only process is oxidation, no chemical use, reuse for gardening, sometimes overflows to the nearby canal in rainy seasons

Energy use – 85 000 l/month gasoline - 90% for generators, (DIESEL), 3 generators (500 kwh x 2, 1000 kwh x 1)

Pay tax to the Rawai Municipality- 4000 B/year; they are ware that the waste management is a duty of the municipality

2. Ban Raya Hotel

- The first resort in the island, medium scale resort,
- Tax for Rawai Municipality for constructions- 2000 B / year, should pay 1500 B additionally if waste management done through the municipality
- High season- from Nov- April, 100% occupied, 50-60% off season from may –Oct
- Solid waste management-
  - Separation of waste into –glass, plastic, paper, cans (responsibility of the room making person), at the kitchen-working people of the kitchen responsible for this)
    - Plastic and paper and cans- take to the main land
    - Glass- crush and send to Ban Mard to construct roads
  - Wet waste – burning, dumping – (through observations)

Waste water from kitchen and bathrooms – discharge to Siam Bay through a primary treatment plant (grease and oil trap), 2 km long from the hotel

  Oil and grease trapping- add Effective Microorganisms (EM)- use waste organic waste and sugar for making the EM culture, these Microorganisms are used to consume oil and grease in the waste water, remove the flocculent from the tank and burn.

Water resources- 50-60 m³/day

- Ground water for use in rooms and for drinking
- Drinking water - through a purification process
- for other uses- directly use

Energy use – 5 generators, ( 135 KWh x 2, 200 KWh x 2, 50 KWh x 1)

  Cost for fuel-500,000-600,000 B/month

  Future plans- 40 % energy from solar, incinerator for burning tree leaves

No inspection of water quality by the government institutions, a research team come every 6 months for the university nearby to check water quality

Every morning staff clean the beach, 100 B fine from the staff member who is responsible for room cleaning if he/she forgot to switch off lights of off the taps.
3. **Rayaburi Resort**
No of rooms: old building-26 , new building- 24

Green concept at this hotel-
- Cleaning of rooms – not daily basis, in every two days( Monday, Wednesday, etc)
- Power cutoff – after 10.00 pm in the night and 10 mins power cut at 10.00 am and 5.00 pm in guest rooms
- Verbal information to save energy to guests
- Beach cleaning every morning – by staff
- Waste bins- not in the beach, close to the beach at their premises

Solid waste management
- Waste separation- at rooms and the kitchen
- Plastic, glass, paper, cans – send to mainland
- Wet waste ( from rooms and kitchen) – incineration
  - A part of organic waste - used for EM culture
  - A part for of organic waste – for fertilizer

Could not observe the waste treatment plant, but according to the management of the resort they have a primary treatment plant that use oil and grease trapping using EM.

4. **Plastic and Can collection centre**
Collect plastics and beer cans – 20 kg/day
Total generation in the island nearly- cans-250-300kg/day, plastics- 100kg
Polythene – burning
Fuel cost for one bat trip to carry to the main land- 1500 B, only 150 kg of plastics or 300 kg of cans
Group 5 Questionnaire  (Solid waste and waste water management)

Policies and regulations related to waste management

1. What are the regulations available for waste water management in the coastal regions?
2. What are the regulations available for solid waste management in the other region?
3. What are the regulations available for waste water management in the other regions?
4. What is the normal role of the local municipality with respect to waste disposal in the country and in the island?
5. Is monitoring done by the government/ or self monitoring waste water treatment systems?

Waste disposal/management mechanism in the tourist hotels/resorts

6. How do the large hotels dispose solid waste?
7. How do the large hotels discharge waste water? Directly to sea or after a treatment system?
8. Do they separate solid waste in the room/hotels? Plastics/ glass/ organic/metal etc
9. Do they adapt 3R concept?
10. Are there any compost plants/biogas plants/or buyers?
11. Are there any effects for other industries by any kind of waste of hotels or resorts?
12. What are the challenges for waste management in hotels/resorts?
   Land/man power/ technical/gov. involvement
13. If so, what are the precautionary measures taken?
14. What are the possibilities for expansion of future plans?
15. What are the environmental friendly activities done by the hotels?
16. How do the small hotels dispose solid waste?
17. How do the small hotels discharge waste water? To where?
18. How many large hotels, small resorts, and houses are there in the island?
19. How many tourists are coming to these hotels daily?
20. What is the charge for local tourists and foreign tourists?
21. Are there own waste management mechanism available for the hotels or resorts?
22. If yes, how does it operate?
23. What is the capacity of it? enough or not?
24. Is it energy consuming or not? If energy is consumed, consumption?
25. Are there separate systems for black water(toilets) treatment and grey water(kitchen and bathrooms) treatment?
26. Cost of establishing the system (capital expenditure)?
27. Cost of running the system per hour/day? Is monitoring done by the government/ or self monitoring waste water treatment systems?

Solid and waste water management at household level

28. How do you dispose household solid waste?
29. How do you discharge kitchen waste water? To where? Do you use them for the home gardens or for any other use?
30. What is the present mechanism of waste management?
31. What are the types of toilets available? Sanitary/ water sealed/ pit/no etc.
32. Types of toilet pits at household level? The method of sewage disposal? Septic tank/pit
33. How they discharge it?

Agricultural activities

34. Areas under cultivation?
35. Types of crops grown?
36. Do they use fertilizer and pesticides for crops?
37. What is the method of disposing pesticide bottles?
38. If yes, the quantity applies per crop per season?
39. Are there any streams or drains in the island?
40. The topography of the island (available)? (Or the topomap)

**Water quality and waste dumping sites**
41. Activities near to the steams/canals? Water quality measurement.
42. Water quality measurement at the locations where streams and canals connect with the sea.
43. If there are any land fill sites where are they located?
44. Are there any water bodies located close to these land fill sites?
45. What is the technology used in land fill?
46. Did any water quality problem report related to land fills?
47. Is there any social problem arise regarding the land fill sites like public protests?
48. Are there any researches done regarding the waste management problems in the island?
49. Maximum / average/minimum rain fall data. When and amount?
50. Depth, width and length of streams and canals?
51. Reported occurrence of algal blooms?
52. How do fishers deal with by catch and fish waste?

**Field survey/community**
53. Previous environmental status before 10 or 15 years from the local community/gov.
54. What is the view about waste disposal system in the island?
55. What are the sources of drinking water?
56. Any water purification plant is there in the island?
57. What are the sources of water for domestic uses? For toilet use/ bathing/ washing etc.
Group 3 Project report

Integrated Coastal Zone Management – A proactive, stakeholder led strategy to tackle an undeniable threat: The RACHAI CASE STUDY
Integrated Coastal Zone Management – A proactive, stakeholder led Strategy to tackle an undeniable threat: The RACHAI CASE STUDY

Report Contents:

- IZCM course @ AIT- A Practical approach to dealing with IZCM for South East Asia
- Project Summary
- Introduction
- Rational for Tools used and adopted Methodology
- Field Survey results
- Identification-Prioritization of the core elements
- Project Formulation – “As a proactive, stakeholder led strategy to tackle an undeniable threat”
- Target Group & Local Community Participation
- Project Management, Monitoring & Evaluation Management
- Project Sustainability & Financial Flow
  A: Problem Tree Analysis
  B: Proposed Project time line
  C: Objective Tree Analysis
  D: Logical Framework Analysis
  E: Proposed Project Map
  F: Proposed Project Management Team

Integrated Coastal Zone Management - AIT Thailand

Project Team:
Mr. N. Senarate
Mr. Manosh
Mr. Tint
Mrs. Poonsiri
Mr. Hussan

1/27/2013
The ICZM course was initiated on the 21st January 2013 by dual financing from MMF and BOBLME with teaching done at AIT Institute in Thailand. This Post graduate certificate course saw the participation of 11 countries from SE Asia including Seychelles. The main aims was to target practitioners in the coastal and related multidisciplinary professionals, to come together in understanding Integrated approaches to managing people and our coastal zones.

Through a tightly packed course which entailed both class room lecturing and on field visits, such concepts of sustainable co-management, stakeholder lead approaches and other interesting tools such as RRA, LFA and DPSIR models were incorporated into teaching the fundamentals of this very proactive and useful concept. As a final exercise to test theoretical knowledge learnt a practical hand on field visit was organized where by direct application of the tools and methodologies were tested in Rachai Yai Island. The report below is a synopsis of the ICZM strategy developed for the continued sustainable development and environmental protection of the island.

1.0 Project Summary

This practical course is aimed at integrating the theoretical concepts of ICZM learnt during class room session couple with a practical on the field exercise. The chosen study site is the beautiful small island located around 20 km out of Phuket. The main aim of this project is to allow for practical application of the many tools and mechanisms (RRA, DPSIR, Situational Analysis, Stakeholder Analysis, Problems Trees, Alternate Analysis and LFA’s) in drafting a holistic ICZM strategy for the island in question. The objective and outputs are to rapidly analyze the many existing environmental degradation, resource overlaps, stake holder conflicts, and the increasing influx of mass tourism, all of which threaten the pristine terrestrial and near shore assets of Rachai Yai Island.

To further facilitate group endeavor the class was split in to 5 teams with a representative of each team belonging to specific group researching specific sector of the island. At the end of these activities it is expected that each team formulate an ICZM strategy for the sustainable tourism development and biodiversity conservation of Racha Yai island.

For the successful implementation of the project it is expected that some key assumptions details further below come to fruition;

- Availability of budget from MFF
- That rapid assessment couple with data analysis technique will obtain of fare assessment of existing situation
- That the Thai political framework and stakeholder communication will be proactively facilitated by third party mediator
- That the proposed recommendation a stakeholder lead for the people, by the people and of the people
2.0 Introduction

The Racha island belonging to the Phuket province is located around 20 km south of the Chalong Bay at coordinate north 07 35.04, east 98 22.481. The size of the island is roughly 3000 rai and 5 seasonal stream flowing from central hill side to the West and Northern parts of the island. It is easily reached by 30 minutes speed boat which drops visitors to one of the two beautiful bays (Siam bay and Batock bay). On the island one may discover sandy white beaches fringed with near shore coral reefs and crystal clear waters. The inland topography is composed of a central plateau (formerly used for rice cultivation) which lead to steady rising mountain hills of 279 m providing the much needed water catchment for this islands. The hills sides remain unchartered forest area with typical forest canopy cover and 3 pashed statigraphy. There is roughly 60% untouched forest cover with remaining 40% being occupied by tourism socioeconomic activities. The hillside toward the south east sector is steep. There is no wildlife rather, some sorts of avis animal found in that Racha island including some reptile animals, butterflies and bird species. In the near shore region, there is a coral reef cover of 225 Sq km with 280 species entailing 18 families and 71 genera with reef associated 1000 fish species and benthos (Starfish, sea urchins, clams). The south east aspect is composed of steep granite topography with three central valleys.

Fig 1.0: Resource Map developed by Team 3
The initial to current day socio economic activities are illustrated below.

People from Chalong bay area visit island for harvesting of fish and forest products during non monsoon period.

Government of Phuket steped in to regulate resource management and arrested illegal fishing practitioners. Mamru outbreak was common but Thai red corss controlled mosquito outbreaks.

By 1967 more settlement occured and with a lack of government instution they agreed on mutual user right. Wide use of dynamite fishing negavtely impacted the corals.

With influence of local business man from Phuket the Ban raya Tourist resort was developed.

The onset of troism development tecnocred with the implementation of raya tourist resorts and 2 other resorts. Local community switched to tourism absorbed livelihoods.

The conflict between local stakeholders started with the construction of the raya buii resort where one barge dumped construction material onto the artificial reef during monsoon swell due to disobedience of multis agreements for landing area.

The emergence of international pattern from singapore coupled with local powerful business man resulted in the develempnt of the The Racha Resort. This was shadowed by the 2004 tsunami.


3.0 Rational for Tools used and adopted Methodology

The following justification is applied to enable the reader to gather the main tools and methodology adopted and shall be used to rationalise our choices under the given working parameters and constraints and challenges faced during both the site visit and the successive data gathering and post analysis work.

The main aim of this project as prior described was to attempt to understand the existing situation on the island (situational analysis) through the deployment of a rapid rural assessment tool (questionnaires, primary, secondary sources as well as interviews and background data...
gathering). This allowed the team to gather as much data and develop a holistic concept of the many symptoms and emerging issues as stated by stakeholders (local community, large and smaller scale resorts, business man and tour operator and island tourist).

From this step a stake holder analysis was conducted to asses each stakeholder groups problems, their interests and potential ability to change the negative state of the situation.

This was closely followed by a problem tree analysis which was considered apt as this would then allow us to sort out the symptoms and face value issues with the cause and effect loops to zoom into the main root problem, which if left unresolved would not allow a successful ICZM strategy which is stakeholder lead and participatory.

This problem tree was then converted to an objective tree which allowed us converts the existing problems and symptoms and issues to a positive and change enabling activity/output. The objective tree also has a dual use in that it allowed us to categorise the main groups of core projects (do-able activities that would result in maximum change of state) thus allowing us to categorize and group potential solutions.

This was then followed with Alternative analysis which considered in due respect and weight each potential solution and allocated a weight for the potential cost, success, benefit, time horizon and risk of each solution. This then allowed us to prioritize the most high change solution which would bring about the most significant change towards enabling our overall goal of an integrated ICZM strategy for Rachia Island.

Having prioritized our main problem and attempted solution, we then organised our main elements into a LFA, which allowed us to conceptually allocate Activities that would lead to Outputs that would in turn contribute to our purpose and main goal. As this is a proposed project a timeline was deemed necessary and a financial budget that would further justify and rationalise the due outputs to seek funding from the donor agencies for possible implementation of he conceptual strategy.
4.0 Field Survey and Data Gathering

The field survey was conducted on the 19th Jan for 3 days. Here the team members were split into 5 groups with each group having a specific target analysis ranging from Waster water pollution, Tourism and Large resorts, Tour Operators, Scuba and diving, Activities of Self care club, small scale resort and business man. The field survey consisted of interviews with the local people running these economic activities and the island leader. Though these interviews the gathered data gave an insight in the areas and underlying issues were found and are briefly summarized below and expanded in the individual reports tabulated for as of referencing.

- Mass tourism being both an economic gain but an environmental hazard
- Pollution in terms of waste water, solid waste and sedimentation are causing negative impacts to livelihoods and biodiversity of the islands
- Coral cover drastically affected by years of dynamite fishing
- Tour operator and boat mooring further accentuated the problem coupled with uneducated tourist who walk on the reef
- Inadequate waste treatment by larger resorts with no waste treatment by small scale resorts
- Increasing use of energy by diesel operated generators with slow move toward renewable energy
- Low to no co-management and internal networking between stakeholders and resorts but all are willing if government steps into facilitate
- Lack of rules, policy, and island agreed guidelines and community consensus on do and don’t’s.
- Increased water wells drying up and reduced groundwater and increased saline intrusion
- Inadequate medical facilities and safety issues for tourist and divers/snorkelers
- Reduced power and mandate to the self care club thus inefficient
- Many fuel consuming tractors sued for transportation when electric care could be incorporated
- Ad-hoc planning and lack for regulation for buildings and no EIA for such activities
<table>
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<tr>
<th>Positive Outcomes</th>
<th>Problem /Issue Identified</th>
<th>Grouping/Categorization</th>
<th>Recommendations/Strategies</th>
<th>Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Try divers from Phi phi island is not obeying the rules of self-care club.</td>
<td>Policies, regulation and governance</td>
<td>To make shorter training course of diving and the tour operator must be participated compulsory in this way we can prevent tri diving from Chinese and Korean tour association.</td>
<td>All resorts willing to participate in the training program</td>
<td></td>
</tr>
<tr>
<td>Lack of funding for operating the glass bottle crushing machine and engagement of labours for its operation.</td>
<td>Hotel, resort, boat and restaurant owner should be persuaded to help funding of the conservation resource maintaining process.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Government officials do not have any interest to resolve the problems of Racha island.</td>
<td>Governance</td>
<td>To held environmental conservation program including of a schedule of event are participate in local people, migrant worker turned up to enjoy clean-up function.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The new entrepreneurs who started move in Racha Island in recent past are not abiding to the self care club’s rule.</td>
<td>Networking Communication</td>
<td>Should be strengthening the Self Care Club. Need to submit the central government to form more powerful management and administration body.</td>
<td>Ready to increase the coordination mechanism</td>
<td></td>
</tr>
<tr>
<td>Transportation and unloading of construction material in Siam bay which has good shallow coral reef.</td>
<td></td>
<td>To issue law enforcement to protect oil pollution from fuel dumping discharge and solid waste are thrown away into the sea, it Can be sedimentation and water pollution.</td>
<td>All stake holders are agree to fallow existing policies and regulations</td>
<td></td>
</tr>
<tr>
<td>Unloading of construction material in Terre bay the conflict between resort owner and private land owners.</td>
<td>Networking Communication</td>
<td>Government and along with all the stakeholders should be involved in body to operate the activities</td>
<td>All stake holders are agree to fallow existing policies and regulations</td>
<td></td>
</tr>
<tr>
<td>Positive Out comes</td>
<td>Problem /Issue Identified</td>
<td>Grouping/Categorization</td>
<td>Recommendations/Strategies</td>
<td>Assumptions</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Willing to communicate and cooperation</td>
<td>Poor communication / Co – Operation between the dive operators</td>
<td>Communication/ Networking</td>
<td>Should be input workshops and awareness programme to dive operators</td>
<td>All dive operators willing to be cooperate</td>
</tr>
<tr>
<td>Tourist optimize day trips</td>
<td>Increased day trip tourist in the season.</td>
<td>Over carrying capacity</td>
<td>Environmental friendly tourism regulations should be setup.</td>
<td>All stake holders will be agree to implement eco-friendly tourism</td>
</tr>
<tr>
<td>Goal of tourist safety</td>
<td>Lack of safety measure for the dive/ snorkelling tourist</td>
<td>Lack of awareness</td>
<td>Tourist safety measures should be encourage by local government</td>
<td>Tourist safety measures will established by the local government.</td>
</tr>
<tr>
<td>Clean level</td>
<td>Insufficient waste management.</td>
<td>Environmental pollution</td>
<td>Establish proper waste management systems.</td>
<td>All are agree to establish proper water treatment systems</td>
</tr>
<tr>
<td>Improved law Regulations and enforcement</td>
<td>Many policies and regulation were exist but no enforcement</td>
<td>Poor governances</td>
<td>Should involvement of the enforcement of the island.</td>
<td>All stake holders will agree to fallow existing policies and regulations</td>
</tr>
<tr>
<td>Improved law Regulations and enforcement</td>
<td>Lack of regulations and enforcements for diving and snorkelling activities</td>
<td>Poor governances</td>
<td>Should be input proper regulations and enforcement</td>
<td>All divers and snorkelers will accept new regulations.</td>
</tr>
<tr>
<td>Accepted knowledge and proper information</td>
<td>Lack of awareness and lack of proper information provided for the tourists.</td>
<td>Lack of awareness</td>
<td>Established on awareness and proper information programmes for tourists.</td>
<td>All tourist will be improved knowledge on environment</td>
</tr>
<tr>
<td>Blockade of water streams while constructing the resort for the way</td>
<td>Blockade of water streams while constructing the resort for the way</td>
<td>Blockade of water streams while constructing the resort for the way</td>
<td>Need to create the central government to form more powerful management and administration body.</td>
<td>Need to create the central government to form more powerful management and administration body.</td>
</tr>
<tr>
<td>Problem /Issue Identified</td>
<td>Grouping/Categorization</td>
<td>Recommendations/Strategies</td>
<td>Assumptions</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------</td>
<td>----------------------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>Marine and day tripper associated works /Inc truism</td>
<td>Communication</td>
<td>Already embedded on a waste management strategy a out sources (Contract)</td>
<td>All stake holders will be agree to implement eco-friendly tourism</td>
<td></td>
</tr>
<tr>
<td>Collaboration with other resorts/ Internal communication poor</td>
<td>Waste Management</td>
<td>Shows some willingness towards co-management if facilitated by Government</td>
<td>Assumed that co-management principles will sink in the future</td>
<td></td>
</tr>
<tr>
<td>Spillover of waste treatments during rainy season.</td>
<td>Policies and regulations and governances</td>
<td></td>
<td>They are willing to be more proactive in insuring tourist education is raised about environmental issues</td>
<td></td>
</tr>
<tr>
<td>Deforestation to build rain water harvesting pond and its impact to sedimentation</td>
<td>Networking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rules and regulations for Konkre bay permitted activities are displayed yet staff of hotel are seen feeding fish</td>
<td>Inadequate waste water treatments</td>
<td>Already purchased an incinerator in still in Phuket port</td>
<td>They willing to develop proper waste management system</td>
<td></td>
</tr>
<tr>
<td>Guest from snorkeling and snorkeling shops blatantly walk over coral during low tide.</td>
<td>Lack of environmental teaching for tourists.</td>
<td>Already embarked on solar power to reduces by 40% consumption target</td>
<td>They are willing to co-operate to enhance the quality of the environment in the island.</td>
<td></td>
</tr>
<tr>
<td>Lots of bigger boats mooring in coral reef not using the back stern but forward stern</td>
<td>Poor networking and internal communication between resorts.</td>
<td></td>
<td>They re willing to invest in renewable energy to further reduce the target consumptions</td>
<td></td>
</tr>
<tr>
<td>Mechanism in place to reduce</td>
<td></td>
<td> </td>
<td>They are willing to be more proactive in insuring tourist education is raised about</td>
<td></td>
</tr>
<tr>
<td>Resource consumptions (fine the staff for leaving water open, air-condition used)</td>
<td>No laundry, outsource from Phuket to reduce water consumption and chemical use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| No Chemical Fertilize in gardening
Reduces incoming plastic waste by buying only raw product not the packing
Selective human resources footprint is less
Five generators operated different times for save energy | environmental issues |

| **Raya Buri**
Detail SOP for every division within the hotel
Every morning beach clean
Five bins provide beach for day trips.
Generators turn off for 10 minutes in every 5 hours.
Use key cards to minimize energy
Do waste sorting and use incinerators | Inadequate waste disposal system
Environmental standard auditing were not done.
Hesitate to move to renewable energy due to capital coast.
No environmental certification
No displaying of guideline for the tourist. | Inadequate waste water treatments
Lack of Co-management and stakeholder buy in joint activities |
| Should be establishing a proper waste treatment system
Encourage alternative power sources | They willing to develop proper waste management system
They willing to co-operate to enhance the quality of the environment in the island |
<table>
<thead>
<tr>
<th>Positive Out comes</th>
<th>Problem /Issue Identified</th>
<th>Grouping/Categorization</th>
<th>Recommendations/Strategies</th>
<th>Assumptions</th>
</tr>
</thead>
</table>
| Small business holders willing to improve the environmental quality of the coastal area. | -Lack of proper tourism policy  
- increasing tourist  
- conflict for lands  
- Poor low enforcement  
- lack of awareness  
- destruction of coral reef  
- increasing water consumption  
- increasing of solid waste  
- increasing of migratory workers | Lack of networking/Lack of awareness/ Poor governances | To make shorter training course of diving and the tour operator must be participated compulsory in this way we can prevent try diving from Chinese and Korean tour association. | All resorts willing to participate in the training program |
<table>
<thead>
<tr>
<th>Positive Out comes</th>
<th>Problem /Issue Identified</th>
<th>Grouping/Categorization</th>
<th>Recommendations/Strategies</th>
<th>Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large resorts already started some sort of waste water treatment plants in there hotels premises</td>
<td>inadequate solid waste and waste water management among all small and large resort was identified</td>
<td>Ground water pollution/ Soil pollution</td>
<td>Implement integrated waste management system for all large and small scale resorts</td>
<td>All large resort willing to improve their waste management systems.</td>
</tr>
<tr>
<td></td>
<td>Lack of ground water and salt water intrusion effect was identified</td>
<td>Ground water Reduction</td>
<td>Encourage alternative water sources (Rain water harvesting/ Desalinization plants)</td>
<td>All are willing to use alternative water sources</td>
</tr>
<tr>
<td></td>
<td>Affected of large amount of sediments and nutrients was identified in streams.</td>
<td>Affected to the coral ecosystem in near shows</td>
<td>Ecosystem based approach. Improve the catchment areas by replanting and ground covering. Planting mangrove species both side of streams.</td>
<td>Catchments will be develop by tree planting</td>
</tr>
<tr>
<td></td>
<td>The hotel owners need to strengthen the self-care club and work together regarding the environment issues.</td>
<td>Poor coordination between all sectors was identified</td>
<td>Poor networking.</td>
<td>Should be strengthening the Self Care Club</td>
</tr>
<tr>
<td></td>
<td>The Island committee willing to make proper enforcement in the island</td>
<td>Poor governances</td>
<td>Government should be involved</td>
<td>Willing to increase the coordination</td>
</tr>
<tr>
<td></td>
<td>The large hotels willing to implement green projects</td>
<td>High amount of fossil fuel use for the energy production (nearly 400000 l/Month) Only The Use 85000 l per month</td>
<td>Air pollution</td>
<td>Should encourage the use of energy saving equipment(LED bulbs, Solar water heaters, Solar Pumps)</td>
</tr>
<tr>
<td>location</td>
<td>Temperature</td>
<td>Salinity</td>
<td>DO</td>
<td>pH</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>----------</td>
<td>-----</td>
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</tr>
<tr>
<td>1</td>
<td>30.6</td>
<td>10</td>
<td>03.80</td>
<td>6.68</td>
</tr>
<tr>
<td>2</td>
<td>30.0</td>
<td>0</td>
<td>06.52</td>
<td>8.06</td>
</tr>
<tr>
<td>3</td>
<td>30.2</td>
<td>0</td>
<td>07.42</td>
<td>6.69</td>
</tr>
<tr>
<td>4</td>
<td>29.5</td>
<td>6</td>
<td>12.65</td>
<td>8.75</td>
</tr>
<tr>
<td>5</td>
<td>31.6</td>
<td>23</td>
<td>07.56</td>
<td>8.26</td>
</tr>
<tr>
<td>6</td>
<td>31.2</td>
<td>26</td>
<td>12.50</td>
<td>8.91</td>
</tr>
<tr>
<td>7</td>
<td>31.2</td>
<td>30</td>
<td>04.74</td>
<td>7.81</td>
</tr>
<tr>
<td>8</td>
<td>27.3</td>
<td>0</td>
<td>01.72</td>
<td>7.59</td>
</tr>
<tr>
<td>9</td>
<td>32.1</td>
<td>0</td>
<td>09.50</td>
<td>8.51</td>
</tr>
<tr>
<td>10</td>
<td>28.4</td>
<td>0</td>
<td>01.80</td>
<td>6.43</td>
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<tr>
<td>11</td>
<td>29.7</td>
<td>0</td>
<td>00.40</td>
<td>7.62</td>
</tr>
<tr>
<td>12</td>
<td>29.5</td>
<td>0</td>
<td>01.05</td>
<td>7.81</td>
</tr>
<tr>
<td>13</td>
<td>29.9</td>
<td>5</td>
<td>13.00</td>
<td>7.90</td>
</tr>
</tbody>
</table>

**Table: 1.0: Variable data collection**

**Graph 1.0: PH, DO representations**

1- Raya father shallow well water
2- The Racha rain water harvesting pond
3- The Racha Water pumping station
4- River, Close to Rayaburi resort (near the bridge)
5- Siam river mouth
6- Northern side stream mouth at Siam bay
7- Northern side stream, after the dam
8- Land side from the dam
9- Big reservoir
10- Ban Raya treated waste water from their treatment plant
11- Close to dump site
12- Downstream of waste dump site
13- Racha Buri Well Water
With the gathered data from different groups it was then possible to get in-depth Stakeholder analysis which allowed us to see the linkages between stakeholder groups, their problems and their potential to effect change. The findings are tabulated below for ease of reference.

### Stakeholder Analysis

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Problem</th>
<th>Potential interest</th>
<th>potential linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tourism</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day trippers</td>
<td>Potential conflicts with hotel resorts</td>
<td>Low ability to make change</td>
<td></td>
</tr>
<tr>
<td></td>
<td>overcrowding n mass tourism</td>
<td>Low Power and Strengths</td>
<td>link to conservation groups</td>
</tr>
<tr>
<td></td>
<td>Beach Pollution</td>
<td>Low Power and Strengths</td>
<td>link to Outside NGO</td>
</tr>
<tr>
<td></td>
<td>Lack of access to hotel amenities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>lack of education/awareness</td>
<td>Good collaboration with small business operators</td>
<td>link to media</td>
</tr>
<tr>
<td>overnight bed stay tourist</td>
<td>High Cost Boat transfer/equipment</td>
<td>Lower cost packages</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overcrowded dive n snorkeling spots</td>
<td>Un-crowded snorkeling/dive spots</td>
<td></td>
</tr>
<tr>
<td></td>
<td>increased energy &amp; water cons</td>
<td>potential conservation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lack of education/awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Costly/ Limited Room capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Governance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phuket Government</td>
<td>Budget &amp; Financial resource lacks, Lack of resources and man power, internal communications are very poor, lack of ability to monitor and enforce, weak institutional arrangements and policy/regulations</td>
<td>Power to make change, Economic Gains from island and its resources, direct taxes from hotels, tour operators Formulate Policies and regulations, aspire Control and manage incoming tourism, provide budgetary allocations, acquire land for public good,</td>
<td></td>
</tr>
<tr>
<td>Rawai Municipality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Island Police</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine Police</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NGO (SEEK, Self Care Club)</td>
<td>No mandated authority, reduced power for enforcement, lack of guidelines and constitution, reduced support from mainland Government, reduced man power and budget allocations</td>
<td>sustainable tourism management with environmental conservation, improve Rachai environment, improve co-management and coordination between stakeholders, facilitator, mediator, enhance enforcement, facilitate communication platforms, facilitate co-management,</td>
<td></td>
</tr>
<tr>
<td>Rachai Yai Conservation Committee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Providers</td>
<td>Small and Medium Resort Operator</td>
<td>Small Business Man (shops/restaurant)</td>
<td>Large hotel resorts</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------</td>
<td>--------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td></td>
<td>Operational cost for service provision is very high, waste disposal and waste water management problems, Power and energy supply limited and high cost, limited land for expansion, deforesting land, land clearing, need to maintain face amidst pollution issues, No to inadequate waste water treatment</td>
<td>Maximize economic gains from tourism boom, Aspire to improve service provided to tourist, reduced operational cost for waste treatment, long-term sustainable tourism, improve environment, improve internal communication, potential for collaboration though self care club, potential to raise environmental trust fund</td>
<td></td>
</tr>
</tbody>
</table>
From the analysis of the problems faced and challenges and with a more holistic understanding of the problems, their linkages and the thinking frame of the Thai community it was now possible to develop the detailed problem tree which leads the reader from the root problem to the cause and effect up to the symptoms that are currently being seen as emerging threats, this allowed us to formulate logical analysis of the core issues that need specific attention in order to resolve the problem. This problem tree also allows one to convert this to a positive based solution oriented Objective Tree as depicted below:

Fig 5.0: Problem tree Developed in class

Fig 6.0: Objective tree developed in class
In the next step of the procedure the team resorted to the below detailed Alternative analysis which allowed us to further assess the identified solutions depicted above in the Objective tree as highlighted circles each entailing specific target area being:

- Improvement of Governance
- Strengthening Co-management and networking
- Improving Solid/Waste water and sedimentation problems
- Addressing Coral Reef health
- Addressing alternative sustainable water resource management
- Addressing CSR potential

<table>
<thead>
<tr>
<th>Alternative Analysis table</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Improving Governance/Carrying capacity Assessed</td>
</tr>
<tr>
<td>COST</td>
</tr>
<tr>
<td>Chance of Success</td>
</tr>
<tr>
<td>Benefit/cost</td>
</tr>
<tr>
<td>Time Horizon</td>
</tr>
<tr>
<td>Social Env Risk</td>
</tr>
<tr>
<td>Overall Prioritization</td>
</tr>
</tbody>
</table>

Table 2.0: Alternative Analysis

The ranking allowed us to choose a solution that was having best chance of success with maximum benefit and reduced time horizon. This is highlighted in red.
Finally the culmination of these tools is the production of a Logical Framework Analysis which allows the reader to appreciate the coordinated and chronological activities, and inputs, the proposed outcomes with their indicators and means of assessment, which then contribute to the overall goals and strategy for Rachai Yai Island.

<table>
<thead>
<tr>
<th>Logical Frame Work &amp; Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project title &amp; Summary</strong></td>
</tr>
<tr>
<td><strong>Goal:</strong></td>
</tr>
<tr>
<td><strong>Objectively Verifiable Indicators (OVI)</strong></td>
</tr>
<tr>
<td><strong>Means of Verification (MOV)</strong></td>
</tr>
<tr>
<td><strong>Assumptions/risk</strong></td>
</tr>
<tr>
<td><strong>Purpose:</strong></td>
</tr>
<tr>
<td><strong>Surface water quality improved due to reduced eutrophication in channels by 2017</strong></td>
</tr>
<tr>
<td><strong>solid scatter around island totally abolished and central collection centre functioning by 2015</strong></td>
</tr>
<tr>
<td><strong>synopsis of Tourist based feedback on island aesthetics quality from visual observations to be above fair status by 2020</strong></td>
</tr>
<tr>
<td><strong>No observation of dump stock piles, Receipts and money leveraged from shipment back to Rawai municipality</strong></td>
</tr>
<tr>
<td><strong>Co-Management and Stakeholder participation in adopting proposed plans are well received and accepted</strong></td>
</tr>
<tr>
<td><strong>Measures placed to reduce incoming Waste and waste material to Rachai Yai Island is policed and enforced by required agencies</strong></td>
</tr>
<tr>
<td><strong>Re-use, Reduce and Recycle concept is integrated into public, local and tourist awareness before entering onto tour boats and upon leaving Rachai island</strong></td>
</tr>
<tr>
<td>Output 1: <strong>Triple Filtering hybrid Constructed Wetlands developed in</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Ground water quality in dug wells to have less than 10 ppm salinity, DO levels around 8 for all dug wells in monitoring zone by 2020</td>
</tr>
<tr>
<td>(TFHCW ) built in 3 locations by 2017 with ground water quality having reached class B status by 2020</td>
</tr>
<tr>
<td>Connected underground networks for effluent from 80% resorts to central capture pond by 2018</td>
</tr>
<tr>
<td>Assessed aquifer recharging in selected test bore holes to 30% original capacity by 2020</td>
</tr>
</tbody>
</table>

**Output 2: Sheet piled Jetty for Barge implemented with Concrete Slip way @ Terbay**

Concrete Slip leading into near shore jetty edge for 15 m built by 2019 with winch and traction pulleys for pulling up landed cargo on jetty

Ter bay Sheet piled Jetty of 15 m length implemented by 2018 with inner lagoon and outer sea lane dredged to -5 AMSL by 2020

Payment receipt for Contractor, Photographs, Media briefings, Government meeting minutes discussions, signed MOU

Design drawings, Quantity surveying sum, Contract, bidding documents, Media briefings, photographs, payment receipts and final certification report briefings, Government minutes of meetings

Local Stakeholders and island council shall use the jetty with respect for regulations, loading hours, boat draft size and proximity of landing and shall adopt a strict control on enforcing the regulations therein

**Output 3: Centralized solid waste Deposition**

by 2015 dedicated centralized storage area acquired, infrastructure built and waste sorting Bays implemented for capacity of 1000 Cub /annum

Monitoring reports, Land donation and deed handover documentation, MOU, Stakeholder consensus signatories

That the facilitated workshops on co-management and opening stakeholder communication shall yield adequate land
<table>
<thead>
<tr>
<th>Output 4: De-centralized Open Pit Composting area developed for large resorts Organic waste</th>
<th>Centre Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Compaction machine purchased by 2015 and shipment of crushed cubes to start by 2016</td>
<td>Tendered and Contract Awarded to outsourced waste collection company by 2015 with start of shipment to Rawai Municipality on weekly basis from 2016</td>
</tr>
<tr>
<td>Payment receipts for build infrastructures, final certification report area in central location for the construction of the centralized solid waste storage centre and that its continued operations shall be sustained by well trained local people</td>
<td></td>
</tr>
<tr>
<td>Each large resort has a functional and operational composting Open pit of min dimensions 5<em>5</em>5 m by 2014</td>
<td></td>
</tr>
<tr>
<td>Receipts of fertilizer purchased from outside mainland reduced by 70% in 2020</td>
<td></td>
</tr>
<tr>
<td>It is expected that through co-management and awareness raising on eco issues and the 3 R's large resorts shall openly adopt and enhance the organic waste recycling for agriculture and gardening use</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output 5: Preliminary data sourcing Base Survey reports produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>By early 2014 the multiple findings are triangulated and Validated by Council and Adopted by Racha Yai Committee by end of 2014</td>
</tr>
<tr>
<td>Topography, bathymetry and land use maps developed and scaled to context by 2015</td>
</tr>
<tr>
<td>Geo-technical and soil analysis data published and verified through outside expert by 2015</td>
</tr>
<tr>
<td>All reports from different surveys published and validated, Validation workshop photographs, media and scientific publishing, payment receipts</td>
</tr>
<tr>
<td>It is assumed that the contracting companies shall use the latest in file equipment to allow for accurate and representative data gathering which shall provide accurate situational analysis required for the base elements being surveyed and that these shall be done in cost effective and time efficient manner</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Output 6: Participatory Mechanisms developed and Co-management council adopted</th>
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<tbody>
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<td>10 member Council with fair representation of stakeholder groups from DMCR, hotels, Small resorts, Tour operators, Phuket Local Government established by 2015</td>
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<td>80% of stakeholders agree to adopted council and have voted for common neutral leader by 2015</td>
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<td>It is assumed that through facilitated approach and third party mediation the local stakeholders awareness of the need to co-manage and integrate their approaches to sustainable tourism and environmental protection shall yield positive results in the formation of island council and promote greater flexibility and understanding when it comes to centralized and shared processing</td>
</tr>
<tr>
<td>general body meeting held in quarterly frequency through the year starting by 2015 with adequate minutes and documentation of agreements</td>
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<thead>
<tr>
<th>Activities:</th>
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<tr>
<td>Inputs</td>
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5.0 Project Formulation and Explanation

The need for an integrated Coastal zone Management strategy for Rachai is self supporting in that anyone can clearly see the undeniable threats this beautiful island faces admits the increased tourism from Phuket. Moreover with the intention of local government to raise tourism figure form 8 million to 12 million in the next 4 years the cumulative impacts of this political move will directly impact the island. To dat, more than 1500 tourist visit this tiny island in one day. These include the day trippers and overnight bed stayers. As a result of it’s 30 odd minute distance form mainland and the lack of a strong local community (10 households ) the local government is unable to give even village status to this island and thus not worthy of investing in waste management systems, electricity of other amenities such as clinics and schools. Thus the island is controlled by powerful private investors. Therein leads to the multitude of problems clearly seen and these include

- Pristine environmental conditions being undermined due to Mass tourism and associated waste.
- Lack of governance and networking, leading to reduced co-management and stakeholder grouping.
- Inadequate to near none present wastewater & solid, sedimentation management.
- Poor environmental awareness among tourist and tour operator leading to overcrowding, boat pollution and fin damage to coral and biodiversity reduction.

As such a coordinated, stakeholder lead Integrated Coastal Management Strategy is much needed for the continued sustainable tourism while ensuring the recovery and conservation of the environmental resources of this island.

**Main Objective(s)/outcome(s): the long-term target that the project will contribute to**

The overall vision for Rachai island is: “Sustainable Tourism & Biodiversity Protection Through Stakeholder Lead integrated Coastal zone Management Strategy ”

The subsequent goal of our project is the “Restoration and continued sustainable conservation of the Pristine Environmental conditions of Rachai island’

These two long term targets will ensure that the project outcomes contribute to both the ecological and biodiversity side of matters while ensuring sustainable tourism and continued economic gains for the predominant business orientated economy. As such this ‘hand in glove’ mechanism is developed that synergizes the need for conservation and economic gains thus ensuring that both local stakeholders, tourist and local government (our powerful stakeholders ) remain satisfied and that their cooperation and willingness( buy in) is achieved without which our proposal will only remain on dusty government shelf’s.

**Immediate Objectives: The objectives that the projects can achieve in its duration.**

The immediate objectives or purpose of the project is split into two very clear schools of thought. These are:

- Overall Environmental Quality of Racha yai Island improved
- Enhanced Governance and stakeholder Networking

As the project is orientated along the route of Waste water and solid waste /sedimentation management the immediate and emerging outcome shall be the direct improvement to the island environmental quality through a collation of project activities that shall look to centralize the waste water treatments that are currently being done at sectorial and individualistic levels, and develop centralized solid waste storage with removal and shipment to mainland for return on investment through recycling products.

However as clearly indicated during the one stakeholder meeting held during validation on the island, none of this can come to fruition without due attention given to the people management, crumbling barriers to networking and communication and embedding a concept of co-management within the key players, such that their eco awareness is raised to a level that allows them to see that joint activities have a greater trade
off in terms of cost effectiveness while ensuring that communal agreements and ownership is gained. As such another immediate objective is the enhancement of governance and networking within the business and local government representatives for the island communities.

Outputs: The expected outputs of each planned activity

For the purpose of a logical implementation of this project the direct outputs have been developed which will ensure collaborative input towards our pre-identified main goal and vision for the island and its community. These are categorized into three main areas further highlighted below;

**Fig 7.0: Project Outputs Categorized**

### Immediate Project Outcomes

#### Initial situational Base Line Data Gathering
- Preliminary data sourcing Base Survey reports produced

#### Strengthen the Governance and Networking @ Stakeholder level
- Participatory Mechanisms developed and Co-management council adopted

#### Waster water, Solid Waste and Sedimentation Solutions
- Centralized solid waste Deposition Centre Developed
- Sheet piled Jetty for Barge implemented with Concrete Slip way @ Terbay
- De-centralized Open Pit Composting area developed for large resorts Organic waste
- Triple Filtering hybrid Constructed Wetlands developed

**Activities: The activities that will help to achieve the objectives**

The main categories of outputs have been further subdivided into achievable time bound and financially viable activities which are converging to three main schools of thoughts. From the onset the need for accurate and proper situational data from scientific baseline surveys was deemed as high importance as our interventions are both hard engineering but we also realize that without the people management concept these remain lofty drams and as such must investment has been done for the enhancement of networking among the stakeholder.

Finally a dedicated section of this project shall be the actual tendering and contract awarding for transparency in financial dealings. Here the activities are mainly geared toward the actual outsourcing and consultancy for the proposed hard engraining solutions such as the built centralize storage are and Jetty and the softer eco- system based approach of the Constructed Wetlands and water prettification Effluent treatment and ground water recharge.
These are further diagrammatically displayed below:

**Activities proposed**

- **Initial situational Base Line Data Gathering**
  - Topography Mapping conducted with 2 m contour spacing accuracy
  - Rapid Geo-technical soil analysis for proposed Constructed Wetlands Locations
  - Near shore 20 m multi sonar beam Bathymetry Survey for Ter, La and Konkre bays
  - Benthos and Sea Current survey for Jetty site
  - Water quality Assessment Map and Ground water Level Mapping for selected locations on central plateau
  - Land Use Mapping stakeholder driven

- **Strengthen the Governance and Networking @ Stakeholder level**
  - Seek contracted to initiate stakeholder workshops and communication platforms
  - Capacity building and training of local labor force for operational use of the Compaction machine
  - Island council/ consensus cooperative elected and adopted
  - Technical Working group for familiarization for operational background of Constructed Wetland

- **Waster water, Solid Waste and Sedimentation Solutions**
  - Construction of Centralized Solid Waste Storage Warehouse
  - Purchase waste Compaction Machine for communal use
  - Design Works and Quantity Surveying for Proposed Sheet Piled Jetty
  - Implementation of Designed Jetty @ Ter Bay
  - Contracting a Constructed Wetland expert for technical design of proposed wetlands
  - Tender and award of Contract for CWT
  - Prepare TOR for project implementation of Constructed wetlands and validate
  - Groundwork’s for implementation of CWT

---

**Fig 8.0: Project Activities Categorized**
To further logically organize our activities under the three main subheading we have devised the below detailed Gantt chart which depicts clearly the intended project progress with internal check flags for the time bound monitoring.
### 6.0 Target Groups and Local Community Participation

**6.0 Target group and local community participation:**

I. Target group beneficiaries, that would be benefitting from the expected results; highlight the livelihood benefits

Given the nature of the project being oriented towards a very core need for the entire community being the management of waste an solid with added use of sedimentation management the team feel that the following target groups are essentially distributed by being:

- Core or direct beneficiaries with immediate benefits to both improved livelihood as well as better living environment
- Peripheral groups that stand to benefit in the near to medium term with cumulative benefits such as added value, aesthetics and improved experiences
- Long terms beneficiaries in the sense that once operational and underway the long term benefits will have numerous and tangible results to these groups

The linkages to livelihood are seen though numerous feedbacks monetary loops which inject capital back to local community such as the taxes and fees from the waste compaction and sales, the salary and wages paid to those operating the wetlands and machinery and finally in terms of un-tangible services and goods provided by a restored ecosystem and vibrant biodiversity.

As for the stakeholder involvement and participation one can clearly seen that this project is lead for the people by the people and of the people. This participatory mechanism is embedded into the core project outputs and thus ensures that stakeholder buy in and vested interest are captured from the very start by the stakeholder platforms, networking and communication building that NGO and other organization will be doing.

This is an equal opportunity project which looks to hire both make and female with unbiased reasons. There are ample opportunities for both man and women to be involved in the process and to profit for the economic retunes. To note that the ECHO tech company is in itself gender balanced with a powerful female leader as our CEO.

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**Fig 9.0: Target Beneficiaries**
How will the project be managed (institutional structure, other organizations involved?) If other organizations are involved, describe the responsibility of each partner and how they will work together to achieve the project objectives.

To enable this multidisciplinary project to be managed and handled the team has decided to form a institutional system composed of key players to oversee componential elements of the project thereby spreading the work load, risk and allowing for in-situ monitoring and evaluation of the project progress. The Newly formed ECO –Tech environmental solution service provider has been diagrammatically displayed with detailed TOR for each worker. It is assumed that the monitoring and evaluation is embedded in step by step phase where information accuracy, data relevancy, time bound issues and finical data are checked at each level before reaching the Managing Directors level. Note also that specific activity related and output related monitoring and indicators used and expected time frame for their evaluation are given in more detail in the attached LFA.
Fig 10.0 : Project Management Team
In order to achieve post project success the Echo-Tech company proposes the following diagrammatical methodology for sustained and continued project operations after the team exit the main project framework.

### Project Continuation and Exits Strategy

**Continued operation of the Solid Waste Center**
- Solid waste sales-Shipment Payments
- Tourist landing fees and Tax - fuel and Salary of labour force
- ETF support infrastructure maintenance

**Continued Operation of the Constructed Wetlands**
- Partial CSR for incoming effluent
- Maintenance of operational costs
- Future Eco Village developed around the wetlands - pond desilting, filter, biotic changes etc.
- ETF support

**Continued Operation of the Jetty**
- Maintenance and service facilities taken over by DMCR & Govt
- ETF support 5 year desilting and deepening of sea lanes

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**Fig 11.0: Project Sustainability**

As clearly depicted, the main tier of our project being that of the solid waste centre and its operations, the ongoing operation of the constructed wetlands and the service maintenance of the jetty shall be fully self-sufficient after the exit.

Moreover by encouraging the formation of the island council and Environmental trust fund, a proportion of the fees and taxes delivered to it by incoming tourism, landing fees, tour operator contributions on arrival, the Guest based Bed night fees and other CSR events hosted by larger resort, should all be transparently audited to good use in ensuring the continued services offered by our engineered and ecosystem based solutions.
References used and Wider Reading Material


Annex A: Problem Tree Analysis

Increased Carbon Footprint

Increased Solid waste Accumulation on Island

Increased energy Demand for Large Resorts

Increased Water Demand

Increased Sediment Accumulation

Increased Sediment run off

Increased Yoke Wells Drying up

Increased Waste water effluent produced

Increased Deforestation and Land Clearing

Increased in poorly planned Resorts/restaurants/small businesses

Increased day trippers to Rachai Yai from Phuket

Increased Overnight Bed Tourists

Increased Sediment deposition on Coral reefs creating blanketing effect

Increased Tube Wells Drying up

Increased Tube Wells Drying up

Increased Sediment run off

Increased in poorly planned Resorts/restaurants/small businesses

Increased in poorly planned Resorts/restaurants/small businesses

Increased Water Demand

Increased Deforestation and Land Clearing

Increased in poorly planned Resorts/restaurants/small businesses

Increased Sediment run off

Increased Yoke Wells Drying up

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Increased Deforestation and Land Clearing

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Increased in poorly planned Resorts/restaurants/small businesses

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Increased Sediment run off

Increased Yoke Wells Drying up

Increased Water Demand

Increased Deforestation and Land Clearing

Increased in poorly planned Resorts/restaurants/small businesses

Increased Sediment run off
### Annex D : Logical Framework Analysis

#### Project title & Summary

**Sustainable Tourism & Biodiversity Protection Through Stakeholder Lead integrated Coastal zone Management Strategy for a Better Rachai Yai Island**

<table>
<thead>
<tr>
<th>Goal: Restoration of Pristine Environmental Conditions</th>
<th>Objectively Verifiable Indicators (OVI)</th>
<th>Means of Verification (MOV)</th>
<th>Assumptions/risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal:</strong></td>
<td>Increased Biodiversity for Coral recovery of 50% by 2020, a forestation of 20% of identified plots by 2020, Aesthetics of island improved to Fair Status by tourism feedback in 2018, Groundwater quality to meet Thai Government Standards by 2020,</td>
<td>Coral Survey and resilience assessment published, Tour operator reef health monitoring report, photographs</td>
<td>Co-management &amp; Networking works and is adopted well by stakeholders and Phuket Political will is achieved for facilitation</td>
</tr>
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<table>
<thead>
<tr>
<th>Purpose: Overall Environmental Quality of Rachai Yai Island improved</th>
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<tbody>
<tr>
<td><strong>Purpose:</strong> Surface water quality improved due to reduced eutrophication in channels by 2017</td>
<td>Photographs compiled over a year, filed report and test data graphically displayed</td>
<td>No observation of dump stock piles, Receipts and money leveraged from shipment back to Rawai municipality</td>
<td>Co-Management and Stakeholder participation in adopting proposed plans are well received and accepted</td>
</tr>
</tbody>
</table>

- Solid scatter around island **totally abolished** and central collection centre **functioning by 2015**

- Synopsis of Tourist based feedback on island aesthetics quality from visual observations to be above **fair status by 2020**
<table>
<thead>
<tr>
<th>Output 1:</th>
<th><strong>Triple Filtering hybrid Constructed Wetlands developed in</strong></th>
<th>Field Monitoring reports and Turbidity graph for bays over one year</th>
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<tr>
<td></td>
<td>coastal near shore water quality to have turbidity reduction by 70% in 2020</td>
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<td>ground water quality in dug wells to have less than 10 ppm salinity, DO levels around 8 for all dug wells in monitoring zone by 2020</td>
<td>Field report and monitoring data with graph for salinity reduction at surface and dug wells</td>
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<td>(TFHCW) built in 3 locations by 2017 with ground water quality having reached class B status by 2020</td>
<td>Photographs, Audit report, Financial payments receipts, singed contract, final certification report</td>
</tr>
<tr>
<td></td>
<td>Connected underground networks for effluent from 80% resorts to central capture pond by 2018</td>
<td>Photographs of Buried pipes being laid, Effluent incoming volumes at Collection pond , monitoring and filed reports, final certification, payment receipts for contractor</td>
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<tr>
<td></td>
<td>Assessed aquifer recharging in selected test bore holes to 30% original capacity by 2020</td>
<td>Field Monitoring reports, test data graphically displayed</td>
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<td>The Co-management and stakeholder agreements will yield adequate donated land for the implementation of said constructed wetlands</td>
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<td>That sufficient solar pumps can be provided tax free with Buried pipe networks to larger resorts to upstream pump their semi treated effluent to the basin A of Constructed wetland</td>
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<td>Construction company shall have neat finish and biotic development will take root sufficiently quickly to allow for nutrient uptake and filtration, including trees, reeds fishes</td>
</tr>
<tr>
<td>Output 2:</td>
<td><strong>Sheet piled Jetty for Barge implemented with Concrete Slip way @ Terbay</strong></td>
<td>Payment receipt for Contractor, Photographs, Media briefings, Government meeting minutes discussions, singed MOU</td>
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<tr>
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<td>Concrete Slip leading into near shore jetty edge for 15 m built by 2019 with winch and traction pulleys for pulling up landed cargo on jetty</td>
<td>Contracting company winning the design award has eco-based awareness due to specificity and ecological fragility of the island and design with nature rather than mass concrete designs</td>
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<td>Ter bay Sheet piled Jetty of 15 m length implemented by 2018 with inner lagoon and outer sea lane dredged to -5 AMSL by 2020</td>
<td>Design drawings, Quantity surveying sum, Contract, bidding documents, Media briefings, photographs, payment receipts and final certification report briefings, Government minutes of meetings</td>
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<td>Local Stakeholders and island council shall use the jetty with respect for regulations, loading hours, boat draft size and proximity of landing and shall adopt a strict control on enforcing the regulations therein</td>
</tr>
<tr>
<td>Output 3:</td>
<td><strong>Centralized solid waste Deposition</strong></td>
<td>Monitoring reports, Land donation and deed handover documentation, MOU, Stakeholder consensus signatories,</td>
</tr>
<tr>
<td></td>
<td>by 2015, dedicated centralized storage area acquired, infrastructure built and waste sorting Bays implemented for capacity of 1000 Cub /annum</td>
<td>That the facilitated workshops on co-management and opening stakeholder communication shall yield adequate land</td>
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<tr>
<td>Output 4:</td>
<td>Centre Developed</td>
<td>Waste Compaction machine purchased by 2015 and shipment of crushed cubes to start by 2016</td>
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<td>Tendered and Contract Awarded to outsourced waste collection company by 2015 with start of shipment to Rawai Municipality on weekly basis from 2016</td>
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<td>Payment receipts for build infrastructures, final certification report</td>
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<td>area in central location for the construction of the centralized solid waste storage centre and that its continued operations shall be sustained by well trained local people</td>
</tr>
<tr>
<td>Output 5:</td>
<td>De-centralized Open Pit Composting area developed for large resorts Organic waste</td>
<td>Each large resort has a functional and operational composting Open pit of min dimensions 5<em>5</em>5 m by 2014</td>
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<td>Receipts of fertilizer purchased from outside mainland reduced by 70% in 2020</td>
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<td>It is expected that through co-management and awareness raising on eco issues and the 3 R’s large resorts shall openly adopt and enhance the organic waste recycling for agriculture and gardening use</td>
</tr>
<tr>
<td>Output 6:</td>
<td>Preliminary data sourcing Base Survey reports produced</td>
<td>By early 2014 the multiple findings are triangulated and Validated by Council and Adopted by Racha Yai Committee by end of 2014</td>
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<tr>
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<td>Topography, bathymetry and land use maps developed and scaled to context by 2015</td>
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<td>Geo-technical and soil analysis data published and verified through outside expert by 2015</td>
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<td>It is assumed that through facilitated approach and third party mediation the local stakeholders awareness of the need to co-manage and integrate their approaches to sustainable tourism and environmental protection shall yield positive results in the formation of island council and promote greater flexibility and understanding when it comes to centralized and shared processing</td>
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<td>Activities:</td>
<td>Inputs</td>
<td>Activity Time Frame</td>
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</tr>
<tr>
<td><strong>1</strong> Topography Mapping conducted with 5 m contour spacing accuracy for Racha Yai Island</td>
<td>Land Surveyor and Total station Equipment inclusive of GDPS, GIS data, Ortho photos</td>
<td>1 month</td>
</tr>
<tr>
<td><strong>2</strong> Land use Mapping Developed through Stakeholder participation</td>
<td>Stakeholder and Council Involve with SEEK facilitators and GIS data</td>
<td>2 weeks</td>
</tr>
<tr>
<td><strong>3</strong> Rapid Geo-technical soil analysis for proposed Constructed Wetlands Locations</td>
<td>Hydraulic Drill Bores, Sieving test, compressive, compaction Tests, porosity, percolation rate.</td>
<td>2 months</td>
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<td>Qualified Geo technical and risk assessment company with 4 people (Geologist, Hazard Engineer, soil Tester and Bore Operator)</td>
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<tr>
<td><strong>4</strong> Water quality Assessment Map and Ground water Level Mapping developed for key channels, wetlands and dug wells in central plateau</td>
<td>DO meter, PH meter, Salinity Meter, Multi meter, Water testing kits, Trace element Equipment...Qualified Technician and Voluntary assistant with Laboratory Specialist</td>
<td>1 month</td>
</tr>
<tr>
<td><strong>5</strong> Near shore 20 m multi sonar beam Bathymetry Survey coupled with sea current analysis and Benthos Survey in Ter Bay, Lar Bay and Konkre Bay</td>
<td>Multi Sonar Beam Responder, boat and Fuel expenditure, Underwater Current meters, Test Sedimentation Plume Spread, Two personnel</td>
<td>2 months</td>
</tr>
<tr>
<td><strong>6</strong> Stakeholder communication &amp; Networking Forum initiated, Seek contracted to initiate stakeholder workshops and communication platforms</td>
<td>SEEK contracted to conduct Workshops and working groups to demystify the internal conflict and open up information, communication</td>
<td>2 weeks</td>
</tr>
<tr>
<td><strong>7</strong> Island council/ consensus cooperative elected and adopted</td>
<td>10 member board elected with due representation and through facilitated working groups from SEEK</td>
<td>2 weeks</td>
</tr>
<tr>
<td><strong>8</strong> Contracting a Constructed Wetland expert for technical design of proposed wetlands</td>
<td>Tender Evaluation for judging concept proposal and first visit of consultants to island for rapid assessment for designing of concept proposal. 3 experts in water management, constructed wetland biotic aspect and land/Civil works and trenching pond design</td>
<td>2 months</td>
</tr>
<tr>
<td><strong>9</strong> Initiate technical Working group for familiarization for operational background of Constructed Wetland</td>
<td>SEEK in collaboration with Design Expert (2 ppl) to conduct training workshop on the running of physical and biological components of the constructed wetlands. Identified local Labour force and potential</td>
<td>1 week</td>
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<tr>
<td></td>
<td>Task Description</td>
<td>Responsible Parties</td>
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<td>-------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Prepare TOR for project implementation of Constructed wetlands and validate</td>
<td>high level expert and Government official from Committee to prepare TOR and detailed expectations so as to ensure coordinated project outcomes. This is to be facilitated by third neutral third party in a series of meetings</td>
</tr>
<tr>
<td>12</td>
<td>Tender and award of Contract for best bidder</td>
<td>Island Council with Phuket Committee agree on bidding Documentation and tender through selective international tendering to qualified professional companies and seek concept proposals. These are evaluated and best bidder granted contract with detailed specification and financial payment terms</td>
</tr>
<tr>
<td>13</td>
<td>Purchase waste Compaction Machine for communal use</td>
<td>Island Council and Phuket Committee agree on best compaction machinery for required volume of waste and apply for Government based load/CRS potential for sponsorship</td>
</tr>
<tr>
<td>14</td>
<td>Capacity building and training of local labour force for operational use of the machine</td>
<td>Company contacted for machine is required to provide training session to identified local personnel’s (2) for the safe and suitable use of the machine</td>
</tr>
<tr>
<td>15</td>
<td>Design Works and Quantity Surveying for Proposed Sheet Piled Jetty</td>
<td>Outsourced to Marina and Jetties Experts through selective international tendering with required Coastal Engineer and Coastal Hydraulics and Structural Engineer</td>
</tr>
<tr>
<td>16</td>
<td>Construction of Centralized Solid Waste Storage Warehouse</td>
<td>Civil Contactor company with Excavator, Concrete and aluminium roofing and steel I beams</td>
</tr>
<tr>
<td>16</td>
<td>Implementation of Designed Jetty @ Ter Bay</td>
<td>This will be sources as co-contribution from Government and Ports and Harbor authority of Phuket</td>
</tr>
</tbody>
</table>

**Project implementation Request**: 100900 USD

**Project Management Fees and Team Salaries**: 30000 + Contribution in Kind for Free work
Proposed Centralized Solid Waste Center

Proposed Set of Constructed Wetlands

Proposed Open Pit Composting

Proposed Piled Jetty for commercial use

Annex E: Project Map
Annex F: Project Management Team

1) Ensure Overall responsibility for all High level local and international liaison with key personnel affected and impacted an contributing to the project

2) Ensure overall time bound outputs are on track and that deliverables are met to required standard

3) Coordinates and ensure timely delivery of the subordinates in specialized working groups to ensure timely project progress

4) Analyze in detail project Gantt chart and prepare and modify according to delays and challenges faced during project life cycle

5) Hold and document progress meetings between internal working specialist and outside consultancy and contractors on progress

6) Prepare technical reports for higher level management and local government officials

7) prepare project cash flows, ensures no bottle necks in progress flow and allows flexibility vs risk assessment to each individual output

8) prepare current status report on ongoing project

9) prepares SMART indicators for Objective indicators and means of verification

10) Ensure management of outputs form the subordinates handling specific specialist areas in the project and synergizes resource deployment and cash flow for them

---

ECO-TECH

Managing Director of Project

Project Coordinator

Research and Data Gathering Specialist

Environmental Engineering/Service Procurement Specialist

Communications/Networking and Financing Specialist

---

1) Ensure Detailed Site selection and resource maps are developed

2) Coordinate the TOR for specialist consultancy works on base line data gathering

3) Ensure Timeline of proposed studies are met and key project deliverables achieved

4) Coordinate between key consultants as and when data gathering is being done

5) Facilitate local and indigenous knowledge transfer though stakeholder meetings to consultants

6) Ensure stakeholder lead validation of base line data and consensus adoption

7) Organize the information into centralized database for future works

8) Publish required resource maps

9) Provide detailed progress reports and final certification upon completion with payment details for financial auditor

---

1) Assess conceptual ideas for feasibility

2) Conduct Socio-economic and engineering assessment of proposed solutions

3) Estimate and quantify Resource requirements, in house financial needs and overall project design

4) Ensure detailed TOR developed for each outsourced contract and the due advertisement and tendering therein (Selective /open/ international bidding)

5) Chair Tender Evaluation and selection of Best Bidder for each proposed Engineering Activity

6) Formulate Contract and overseas signatory dn award

7) Ensure Timeline of proposed Engineering based studies are met and key project deliverables achieved

8) Coordinate between key Contractors as and when project filed work is being done

9) negotiate and assess any changes in quantities and excess variations

10) Provide detailed progress reports and final certification upon completion with payment details for financial auditor

---

1) Design and implement a feasible communication and Networking strategy specifically for project outcomes to be achieved

2) Conduct Socio-economic stakeholder Analysis of the needs and gaps of the target groups

3) Design the training and capacity building program for intended stakeholder strengthening activities

4) Ensure detailed TOR developed for each outsourced consultancy and the due advertisement and tendering therein (Selective /open/ international bidding)

5) Chair Tender Evaluation and selection of Best Bidder for each proposed “Communication and Networking Activity”

6) Formulate Contract and overseas signatory and award

7) Ensure Timeline of proposed “Communication & networking” based studies are met and key project deliverables achieved

8) Coordinate between key consultant as and when seminars, workshops and forums work is being done

9) coordinate and facilitate all validation and adopting mechanisms as required by the project team

10) Design a media and press release package for information dissemination

11) Provide detailed progress reports and final certification upon completion with payment to Financial Auditor
Group 4 Project report

Improving the environmental management at Racha Yai Island through informed decision making process and participatory approach
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

Group 4

Brenda Andimgnon
Jinda Petchkamnerd
Upal Wanniarchchi
Tun Yee
Umair Shahid
## Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

### Our environmental project at a glance

| Applicant Organisation | ICM students (Group 4) 
Asian Institute of Technology |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Contact person</td>
<td>Brenda Andimignon, Environment Education Officer</td>
</tr>
<tr>
<td>Environmental project</td>
<td>Improving the environmental management at Racha Yai island through informed decision making process and participatory approach</td>
</tr>
<tr>
<td>Longterm goal</td>
<td>Support and promote the governance reform and management changes needed to maintain the pristine environment of the Racha Yai Island and reduce the impact on marine ecosystems through informed decision making and sustainable management of tourism</td>
</tr>
</tbody>
</table>
| Objective               | a) Racha Yai environment coordinating committee established with representatives from different sectors (*Government, public, private, NGO*) 
 b) Developed education and awareness materials for sensitizing the different sectors on environmental issues 
 c) Self-care club empowered through capacity building 
 d) Establish a sustainable financing mechanism for environmental projects on Racha Yai Island 
 e) Transparent governance procedures developed |
| Concept                 | Create an environment allowing for credible informed decision making between the stakeholders of Racha Yai Island accompanied by profound participatory mechanism and government concerted forum for empowering and enabling a self-sustained committee to manage tourism and marine resources specifically coral reef and waste water management. |
| Project Region          | Racha Yai Island, Phuket Province, Andaman Sea, Indian Ocean |
1.0 Project Summary

Racha Yai is among the world's most appreciated and valuable tourist sites with coral reef cover along the East, North and North West bays of the island. However, with the increasing tourism and the recent government policy to increase the tourists from 8 million to 12 million in the following year, this popularity has taken a toll on limited resources available on and off the island. In this context, tourism and hotel business are developed in the pristine environment inviting mass tourism on the island. The increasing human pressure has brought about a large number of problems such as the insufficient and ineffective waste management (solid and sewerage), overcrowding of snorkelers and divers in the bays\(^1\) coupled with the boat anchorage and close docking to the shoreline attributing towards coral reef damage.

This project aims to bring about the changes that are necessary to bring about sustainable use of the island resources (such as coral reef, freshwater, land use and land-sea use) and reduce the impact of tourism on the island’s resources and ecosystems.

The main project tool is the stepwise approach towards sustainable management of the island, including the tackling of challenging issues such as waste water treatment and management, freshwater resource decline and governance reform. This process required strict, quick and effective management plans based on informed decision making and participatory approach, to reach consensus, agreement, build coalition of stakeholders under one umbrella for having continuous monitoring on the state of the environment including the coral cover and waste water treatment and groundwater/aquifer recharge. In order to achieve the intended leverage effect, we will support the self-care club and the Racha Yai Island conservation committee in

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\(^1\) Batok bay, Siam Bay, Ter Bay, Lah bay and Kun kaen bay

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Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

achieving the conditions likely to affect the island tourism in the long run as well as help correspond with research organizations and departments to undertake necessary steps towards the conservation and protection of island resources at the local and provincial level.

This strategy will encompass on building cohesion among the stakeholders, which will form the basis of a Racha Yai environment coordinating committee (formerly known as Racha Yai Conservation Committee), with great potential for scaling-up and contribute to the reform of management practices in the area. Further components of the project will include development of a trust fund (accountable and transparent in nature) and transparent governance decision making enabling to voice the opinion of the island committee. This will help mobilize participating key stakeholders (divers, tour operators) to push the overarching to action and help institutionalize responsible tourism. Moreover, the hard parts of the strategy will be taken up simultaneously which is further elaborated in the exit strategy. (Please see section 10, page 25)

2.0 Introduction

2.1 Project Site description:

The Racha Yai Island is some 12 Km south of Phuket, it is a 30-40 minute boat travel from Chalaon pier. Further to the south is the smaller sister island Racha Noi, popular among more experienced divers. Racha has always been famous for its crystal clear sea, white powder sand, snorkeling, diving and big fishing.

Racha Yai is a splendid site for tourism, with most arrivals onto a strip of fine white sand tucked deep into the long, U-shaped main bay, Batok Bay. The water here is clear and perfect for snorkeling though the bay gets quite busy with visiting boats in the afternoons, the other bay, Siam, is another beautiful spot for snorkelers in the north. This particular island water is highly productive and make it diverse with its coral reefs stretching along the bays to about 500 meters and beyond – but is also one of the most intensely populated (in terms of tourists) sites and has undergone coral bleaching events in recent past.

2.2 Geographical context:

The Racha island is divided into three regions: the mountain forest area, the flat area and sandy shore area. Moreover, Phuket island has been assumed by geologists to be once part of the mainland in the form of a cape sticking out into the Andaman Sea but millions of years later the cape was gradually eroded by natural forced and finally detached from the mainland.

2.2.1 Climate:

The climate is greatly influenced by monsoon circulating system. There are two seasons namely monsoon season and winter monsoon has sporadic rains. The monsoon season starts from May to mid-October, the winter monsoon from mid-October to May.
2.2.2 Population:

Total population in this island is about 60 and the hotel staff and migrant workers are about 500.

2.2.3 Ecology:

The area is rich in natural resources and is a hub of biodiversity. The area is home to many birds which come to roost in the area, along with them the area is enclosed with coral reefs that go along the island and are very diverse and gives life to plenty of marine life. The island is also a turtle nesting site (occasional) and quite recently Leatherback nesting site has been discovered.

There are very rare sightings of whales and dolphins, however in 2011 beaching of false killer whales on the island was documented.

The dominant species of corals around the island are, *Porites lutea, Heliopora acropora and coerulia avstera*, moreover there are 58 coral species found in Ko Racha Island that support apex predators².

2.2.4 Socio-economic characteristics:

The socio-economic characteristics of the island are dependent on the following interventions, moreover details are provided in field report of Ko Racha Yai by Mr. Tun Yee (Please see annex IV, page 34)

- Tourism Business
- Transport via speed boat i.e. boat operators
- Small cargo boat
- Cargo vessel
- Diving boat
- Transport car and automobile
- Restaurants
- Small business such as mini market, snorkeling gear, beach mats.

2.2.5 Map:

The map is annexed in this report. (Please see annex V, page 54)

2.2.6 Policy context:

There are laws and policies regulated under Phuket provincial authority, however law enforcement is conceived to be weak. There are regulations for conducting an environmental impact assessment (EIA), however it is confined to those resorts/hotels along the coast which have more than 80 rooms.

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² Sail fish, Marlin, wahoo, giant trevally, yellowfin tuna and mainly neritic tuna, dolphin fish, king mackerel and barracuda.
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

The area is also administered under law by police, however very little visibility on the project site has been observed.

It is also observed that under the law the government can do little as the land title is ‘private’ which cuts out the government from the equation thus resulting in no government presence on the island, especially no municipality role which indicates the lack of waste management capabilities.

2.2.7 Community context:

There is very little community presence on the island, however a brief background is provided in table 1 below. There are around 10 households and are under membership of a self-care club which is self-motivated.

Table 1: Background (history) of community presence and activities

<table>
<thead>
<tr>
<th>Period</th>
<th>Human Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947 onwards</td>
<td>People from the Chalong bay area visit to ko racha to harvest fish and forest products during the non-monsoon periods</td>
</tr>
<tr>
<td>1957 onwards</td>
<td>People move to the island temporary to do agricultural activities – mainly rice and coconut and also collect turtle eggs.</td>
</tr>
<tr>
<td>1972 onwards</td>
<td>Government starts its involvement in resources management and arrested illegal fishing practitioners. Malaria was widely spread but thai red cross started blood test as well as controlling malaria mosquitoes</td>
</tr>
<tr>
<td>1983 onwards</td>
<td>Raya tourist resort and 2 more resorts developed. Local people also start developing tourist accommodation facilities with a few rooms</td>
</tr>
<tr>
<td>1990 onwards</td>
<td>Local businessman from Phuket develop “Baan Raya” resort</td>
</tr>
<tr>
<td>2002</td>
<td>Singapore + thai businessman invested in the development of “Tha Racha Resort” 2004 tsunami came during the construction of this resort</td>
</tr>
<tr>
<td>2008</td>
<td>Raya buri resort development. The conflicts started to simmer during the construction period. Big barges used to deliver construction materials and one of the barges transported cement in a bad weather had to unload the content in to the sea; this affected coral reef area adversely. Community had a regulation that construction materials should be unloaded only at the east-end of the island away from the coral reef area but this was not followed by the construction company.</td>
</tr>
</tbody>
</table>

Source: Dr. Amararatne Yakupitiyage

3.0 Field survey results

The field survey results have been compiled by each member of the team who initially worked in different groups comprising of broad categories. Each member of the team has submitted their report and these have been annexed in this strategy. (Please see annex IV, pages 34 - 53)

The methodology used has been a rapid rural assessment which is fast and less time consuming as the focus of each group had a broad category to look at the findings and observations of each member of the team have been summarized in the table below:
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

Table 2: Summary of survey results

<table>
<thead>
<tr>
<th>Broad Category</th>
<th>Findings</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation/legislation</td>
<td>No such regulations have been identified that bind the island stakeholders or hold accountable</td>
<td>Due to the absence of government and policy the area is heavily exploited in an unsustainable manner</td>
</tr>
<tr>
<td>Resource use and conflicts</td>
<td>Resource use and conflicts include mostly with having to do with coral reef i.e. diving and snorkeling, road transport i.e. public use vs private use.</td>
<td>There are overlaps in resource uses with respect to overcrowding of the bays and the dive sites which leads to conflicts.</td>
</tr>
<tr>
<td>Tourism and cultural impacts</td>
<td>There are no cultural impacts that we have seen, but the impacts of tourism are evident. There is no assessment of the tourist numbers that the island can withstand.</td>
<td>There are two broad categories of tourists, a) responsible and b) not responsible. They need to be sensitized and aware of their environment</td>
</tr>
<tr>
<td>Carrying capacity</td>
<td>The carrying capacity of the island is thus far unknown.</td>
<td>In our observation the island has surpassed its carrying capacity and needs a lot of attention in order to sustain the environment and the tourism.</td>
</tr>
<tr>
<td>Coastal pollution</td>
<td>The pollution is at large, and the bays are heavily overcrowded with boats and tourists. The saline conditions exist in the inland areas as well and the pollution is posing a lot of problem.</td>
<td>A lot of solid and waste water is being discarded in the landfills which are unattended and the capacity of the waste treatment is very less.</td>
</tr>
<tr>
<td>Infrastructure development</td>
<td>With the influx of tourists coming in there are several construction being done to accommodate the number of tourists.</td>
<td>There is a lot of run off from the construction material in to the sea and results in extra sediment which is not good for the coral health.</td>
</tr>
<tr>
<td>Transportation</td>
<td>The transportation is done by boats which can be found easily by the tour operators which have contacts with the boat owners at chalaong pier.</td>
<td>At a daily basis around 50-60 boats are transferred to the island taking around 25-30 people on average.</td>
</tr>
<tr>
<td>Energy consumption</td>
<td>The energy consumption is quiet high, however mostly dependent on the generators which are</td>
<td>It is observed that the effort of transferring oil/diesel to the island is immense and it should</td>
</tr>
</tbody>
</table>
**Improving the environmental management at Racha Yai island through informed decision making process and participatory approach**

<table>
<thead>
<tr>
<th><strong>installed in each resort. This means that there is a high tendency of transferring diesel/oil via barges/boats to the island.</strong></th>
<th>be reduced by having alternate sources of energy i.e. renewable sources of energy deployed in the area to cater not all, but some energy consumption.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community involvement</strong></td>
<td>Community involvement is very little however has managed to impose a ban on the following: -hunting -collection of ghost crab -making fire -having jet-sky -spreading/leaving garbage</td>
</tr>
<tr>
<td>The community has a self-care club which has members from the hotels/resorts.</td>
<td>The self-care club has little visibility on the island and with the tourists, moreover it was revealed during the stakeholder meeting that very few member meetings are held.</td>
</tr>
<tr>
<td><strong>Level of awareness</strong></td>
<td>The level of awareness among the different stakeholders is found to be varying, in divers the awareness and importance of coral is there even they also mention that there should be a limit but believe more is always good for business, whereas the level of awareness in tourists from European countries is more than the ones belonging to other parts of the world reported the different hotels, divers.</td>
</tr>
<tr>
<td><strong>Natural Factors affecting environment</strong></td>
<td>Tsunami affected the island and the corals a great deal as reported by the residents of the island, as well as the 2010 coral bleaching incident.</td>
</tr>
<tr>
<td><strong>Hotel/resorts</strong></td>
<td>the hotels and resorts have a limited capacity of waste management system and have highlighted to increase the capacity and manage the waste accordingly.</td>
</tr>
</tbody>
</table>
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

3.1 Stakeholder analysis

The stakeholder analysis is the identification of our project key stakeholders, an assessment of their interests in the project and the ways in which these interests may affect a project either positively or negatively. In this particular case, we have developed the analysis while keeping the following in mind:

- Which individuals or organizations to include
- What roles they should play and at which stage
- Who to build and nurture relationships with
- Who to inform and consult about the project

The stakeholder analysis comprises of a certain set of problems which reflect in the problem tree, objective analysis, alternate analysis and the logical framework. These all will contribute to a common solution while taking the best possible route to meet our objectives. In this manner, we can derive from our analyses the driving forces for this project or a particular organization can also come as a response for managing the project. The detailed analysis is outlined in table 3 below:

Table 3: Stakeholder Analysis

<table>
<thead>
<tr>
<th>Stakeholder Analysis</th>
<th>Large Resort Owners</th>
<th>Small Resort Owners</th>
<th>Self-care Club</th>
<th>Dive centers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problems</strong></td>
<td>-waste management</td>
<td>-no waste water</td>
<td>-No constitution</td>
<td>-monitoring</td>
</tr>
<tr>
<td></td>
<td>-pressure on freshwater resources</td>
<td>treatment facility</td>
<td>-poor networking or communication</td>
<td>of snorkeling and scuba activities</td>
</tr>
<tr>
<td></td>
<td>-jerry can fuel transport</td>
<td>-lack of funds</td>
<td>-lack of visibility and mandate</td>
<td>-coral degradation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-lack of communication and networking</td>
<td></td>
<td>-overcrowding</td>
</tr>
<tr>
<td><strong>Interests</strong></td>
<td>-economic</td>
<td>-economic</td>
<td>-Education and awareness</td>
<td>-not give right information</td>
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<tr>
<td></td>
<td>-environment quality standard</td>
<td>-livelihood of staff</td>
<td>-protection and conservation of racha yai</td>
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<tr>
<td></td>
<td></td>
<td>-environment quality</td>
<td>Communication and networking</td>
<td></td>
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<tr>
<td><strong>Potential</strong></td>
<td>Can influence</td>
<td>Can influence</td>
<td>Can influence</td>
<td>Livelihood, economic, coral reef health</td>
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<td>directly with</td>
<td>directly and</td>
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<td></td>
<td>responsible tourism</td>
<td>indirectly</td>
<td>indirectly</td>
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<tr>
<td><strong>Linkages</strong></td>
<td>-Dependent on</td>
<td>-depends on</td>
<td>Depends on better communication and networking</td>
<td>Depend on better education and awareness to tourists</td>
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<tr>
<td></td>
<td>mutually agreed zones for tourism and sun bathing</td>
<td>cooperation from large resort owners for waste management system</td>
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<tr>
<td></td>
<td>-dependent on cooperation with other resorts to have an effective waste management system in place</td>
<td>-potential to have improved linkages with local government</td>
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</tbody>
</table>

8
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

| Stakeholder Analysis | Tour operators | Local community | Local Government (DMCR, Marine police, PMBC, Municipality, Marine dpt.) | Tourists | Local Business | Boat owners/operators
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<td><strong>Problems</strong></td>
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<td>- overcrowding</td>
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<tr>
<td>supplies</td>
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<tr>
<td>- high turnover</td>
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<td>- anchorage</td>
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<td>- proximity to the</td>
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<tr>
<td>shoreline</td>
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<tr>
<td>- overcrowding of</td>
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<tr>
<td>boats</td>
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<td></td>
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<tr>
<td>- oil spills</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Interests</strong></td>
<td>Livelihood,</td>
<td>Livelihood</td>
<td>- research and conservation of coral reefs - enforcement of laws to</td>
<td>Recreation</td>
<td>Livelihood</td>
<td>livelihood</td>
</tr>
<tr>
<td></td>
<td>economics</td>
<td></td>
<td>give good face to local government</td>
<td>Low ability to make change</td>
<td>and economic</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Low power and strength</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Clean and uncrowded beach</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Potential</strong></td>
<td>Direct by</td>
<td>Direct and</td>
<td>Direct</td>
<td>Direct and indirectly</td>
<td>Direct</td>
<td>Direct and indirect</td>
</tr>
<tr>
<td></td>
<td>having a quota on the number of tourists</td>
<td>indirectly</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Direct</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Linkages</strong></td>
<td>Cooperation</td>
<td>Cooperation and</td>
<td>Dependent on proactive working from here on to have monitoring</td>
<td>Dependent on how aware</td>
<td>Dependent on</td>
<td>Dependent on governance licence for operating and responsible and education awareness</td>
</tr>
<tr>
<td></td>
<td>of stakeholders and educational briefing can help sensitize tourists</td>
<td>membershi p with self-care club</td>
<td>system in place</td>
<td>they are of their environment and responsible</td>
<td>tourism for livelihood</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Depends on tourism for</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>livelihood</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2. Problem analysis

Please see annex I, page 26

3.3. Objective analysis

Please see annex II, page 27
3.4 Alternative Analysis

Table 4: Alternative analysis

<table>
<thead>
<tr>
<th>Improving communication &amp; Networking</th>
<th>Governance</th>
<th>Integrated waste management</th>
<th>Fresh water management</th>
<th>Coral Reef Health improved</th>
<th>CSR program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Medium</td>
<td>Low-Medium</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Chance of success</td>
<td>Medium</td>
<td>Medium-High</td>
<td>Medium-High</td>
<td>Medium-High</td>
<td>Medium-High</td>
</tr>
<tr>
<td>Cost/Benefit</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium-High</td>
<td>High</td>
</tr>
<tr>
<td>Time Horizon</td>
<td>Long</td>
<td>Medium-Long</td>
<td>Medium</td>
<td>Short-Medium</td>
<td>Long</td>
</tr>
<tr>
<td>Social/Env. Risks</td>
<td>Low</td>
<td>Low</td>
<td>Some risks</td>
<td>Some risks</td>
<td>Low</td>
</tr>
</tbody>
</table>

3.5 Logical Framework Analysis

Please see annex III, page 28

4.0 Footprint object

Tourism is one of the high pay off commodity in Thailand, bringing many cultures and populations together under one umbrella. Within the state of Thailand around 8 million tourists visit exotic destinations around the country and there is a government policy in place to up-scale the tourism from 8 million to 12 million in the following year i.e. 2013-2014. A large part of the tourism is now being confined to southern Thailand i.e. Phuket province and adjoining islands that provide refuge to tourists seeking peace, tranquility and recreation.

Inefficient tourism management and the high influx of visitors each year put pressure on the limited resources available. Many islands in and around Phuket lack the resources and capacities to tackle grave issues like waste water treatment and solid waste management along with conserving and protecting heritage and ecologically important sites such as coral reefs. This lack of understanding and ownership of the management decisions coupled with lack of government presence on private land hampers sustainable management.
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

The only way to bring about change in tourism or people management is cohesive projects/strategies based on an integrated participatory approach to build good will and understanding of the issues and for all stakeholders to have better coordination and networking.

4.1 Key players

The key players have been highlighted in the stakeholder analysis. The extent of playing a key role in this strategy is outlined in the following graph below. The graph has been developed on a scale of 0 – 5, where ‘o’ is the lowest contribution or potential and ‘5’ the highest contribution or potential stakeholder to enable change. The potential has been derived from the stakeholder analysis by looking at the following elements:

- Power
- Legitimacy
- Administrative capacity
- Outreach to population
- Scale of stake involved (e.g. hotels resorts are associated with livelihoods and economy)
- The capacity to change (e.g. divers conserve, protect and monitor corals i.e. association)

Graph 1: Key player potential to change

The above graph explains the potential of a particular stakeholder to undergo change and enable a sustainable management system in place at Racha Yai Island.

4.2 Theory of Change in the light of ICM

In essence: by informing tourists and reforming the government policy for having a cap on the tourists can be one of the strongest levers of change, similarly losing the face would add as a negative integer
and undermine the livelihoods of thousands of people across the country. Thus, the theory of change has to respect the people, their livelihoods and must ensure the safeguarding of their interest.

In this respect, an integrated coastal management approach seems necessary to build on in phases while tapping the resources and simultaneously and gradually putting a cap on resources. It is important to look at the drivers, pressure, state, impact and response indicators.

The main issues on the island have been identified partially in the survey findings and in detail in the problem tree. (Please see pages 7-8 and Annex I, page 26)

Communication and networking will be the project’s crucial component. It is coming into this state as a response whereas the drivers are they key players as outlined in graph 1 (please see page 10). It encourages responsible tourism through the informed decision process undertaken by the strong communication and networking within the stakeholders to develop a forum to voice their opinion and enable decision making for managing Racha Yai Island tourism in turn managing the marine ecosystem and the land use with improved planning by developing linkages with the government. This will require an inbuilt system in the island to continue to monitor and manage the resource uses. This added value act as an incentive for all stakeholders, as the forum comprising of stakeholders would allow facilitation from the government to revise policy reforms because economic success and political reforms often go alongside each other. However, it is important to mention that the successful management will require the stakeholders to make profound changes upon reaching consensus. These have been outlined in detail in the project description section in respective outputs.

4.3 Objectives and Milestones

The overarching goal is to “Maintain the pristine environment of the Racha Yai Island”. This will be done through a series of logical change depending on the communication and
networking for better governance integrated with governance, coral reef conservation, waste water management and rainwater harvesting strategies to be in place simultaneously. In this particular strategy the project team (AIT class of ICM, group 4) will undertake the following:

**Purpose**: Informed decision making processes for improved environmental management of Racha Yai Island

Table 5: Summary of Project objectives

<table>
<thead>
<tr>
<th>Project objectives</th>
<th>Activities</th>
</tr>
</thead>
</table>
| 1. Establish a recognized Environmental Coordinating Committee for effective communication and networking on Racha Yai Island | • Invite stakeholders to form an Environmental Coordinating Committee (ECC). We will ensure that all sectors have an opportunity to join if they are prepared to volunteer their time and effort.  
• Promote the ECC and assist in making its presence known to the general public and decision-makers. We will use the media, and also help the ECC to brand and market themselves through various strategies. |
| 2. Build capacity of the Environmental Coordinating Committee to ensure its continuation beyond the life of this project. | • Help the ECC develop and implement an action plan focused on current controversial issue such as environment conservation, hotel development, wetland encroachment, waste management, etc. This action plan will guide the work of the committee for the duration of the project and beyond and will focus on the core goal of stakeholders’ participation in environmental decision-making. |
| 3. Establish a Trust Fund which will provide mini-grants to support community-based projects on environment and governance | • Set up mechanisms for collection of money which will go into the Trust Fund  
• Set up guidelines for use of money in the Trust Fund  
• Establish a sub-committee from the ECC to manage the Trust Fund |
| 4. Empower Self-Care Club members to participate in community and national environmental decision-making | • Hold training sessions to help Self-Care Club members develop their skills in debate, public speaking, diplomacy and communications  
• Conduct visits with club members for them to meet, network, and dialogue with policymakers and decision makers.  
• Help the club organize national symposiums on environmental topic. This activity will help club members develop their skills in organizing participatory events to help other people express their views about environmental issues |
| 5. Increase public awareness of environmental issues, laws and policies and the right to participate in their development | • Conduct a survey to find out more about stakeholders environmental concerns and barriers to their participation in decision-making  
• Produce a reader-friendly guide book for the general public on environmental laws and relevant citizen rights and responsibilities regarding sustainable development and the environment in Racha Yai. This book will be distributed to all stakeholders, and promoted as a tool for improving environmental governance in Racha Yai. It will also serve as a key resource for the Environmental Coordinating Committee. |
4.3.1 What are the expected results of the project?

The key result for this project is the establishment of a recognized Environmental Coordinating Committee that can function as a focal point for all stakeholders in Racha Yai Island to participate actively in environmental decision-making. All of the objectives and activities of this project are designed to lead up to and strengthen the potential for this committee to be successfully established and become a permanent and credible body recognized by environmental policy and decision-makers as a major stakeholder group in sustainable development initiatives in Racha Yai Island. Also, we expect that this project will result in an increase in all stakeholders’ active participation in environmental debates and public meetings on the island but also nationally.

4.3.2 Project outputs and activities

4.3.2.1 Output 1  Racha Yai environment coordinating committee established with representatives from different sectors (Government, public, private, NGO)

The Racha Yai island is currently under the governance of Self-care club and has had success with banning hunting, collection of ghost crabs, making fire, the use of jet-sky and disposal of garbage, however not entirely with the waste management system. The self-care club is a separate entity with members from the island resorts and hotels. The self-care club presence on the island is vital, however it is sought to have an island council in place, which is a neutral party comprising of representatives of all those individuals highlighted in the stakeholder analysis as well as from Chalaong pier, Phuket to form the basis of Racha Yai environment coordinating committee. This committee will not be a repetition and cannot be considered as re-inventing the wheel. The committee will have clear guidelines, standard operating procedures and will devise roles and responsibilities in the committee with having a voted leader to undertake informed decisions and work closely with a third party to help develop linkages with the government, media and associations on the island. To achieve the above mentioned the following activities will be undertaken leading to output 2:

- Participatory mechanism established
- Identification and nomination of focal person from the different sectors
- Coordinating committee established by nominated personnel
- Roles and responsibilities identified and agreed upon
- A memorandum of understanding signed by the members of the committee
- The committee is registered with the government

Result Year 1 (August 2013): Participatory mechanism established with identification and nomination of focal person from different sectors.
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

| Result Year 1 (November 2013): | Racha Yai Island environment coordinating committee and executive committee established. |
| Result Year 1 (January 2014): | Standard operating procedures are developed and the committee is registered with the government. |

### 4.3.2.2 Output 2 Developed education and awareness materials for sensitizing the different sectors on environmental issues

Output 2 comprised of raising awareness and education among the stakeholders of Racha Yai Island. The concept is to facilitate learning through discussion platforms, through the direct and indirect linkages such as the diver association and divers briefing, as well as boat operators and tour operators providing basic education and awareness for tourists who come as day trippers to the island. Many of the tourists are not aware of the protocols of responsible tourism, it is important to run awareness campaigns with the involvement of the tourists. The activities are enlisted below:

- Develop leaflets and brochures on environment, conservation and sustainable water and energy use
- Dissemination of education and awareness material in hotels and resorts by communication members of the committee
- Develop calendar activities and sharing of information with the stakeholders
- Celebration of environment significant days
- Beach cleaning, nature carnivals and a set of awareness activities developed and initiated by the committee to enhance cooperation and understanding of the resources
- Prepare and initiate campaign on environmental issues and discussion on forums (established by the committee) for providing recommendations

| Result Year 1 (April 2013): | Leaflets on environment, water, energy are prepared, developed and printed for dissemination to all stakeholders. |
| Result Year 1 (March 2014): | 10 Environmental themes are adopted, plans developed, initiated and implemented with involvement of all stakeholders at Racha Yai Island. |
| Result Year 1 (March 2015): | 8 Tv spots conducted each on quarterly basis outreaching to populations in and off the island as a means of mass awareness campaign. |

### 4.3.2.3 Output 3 Self-care club empowered through capacity building

The self-care club is the face of Racha Yai Island however to-date the club has had little visibility on the island and has not made much impact on decision making or bringing together the different stakeholders in the area. There is a need to organize the self-care club and enable members to take active part in decision making and forming coalition. Most of the initiatives taken by the self-care club are also limited due to the fact that the club members have little capacity to tackle neither challenging issues nor the expertise to consider conservation initiatives as hard elements in the society for protection. In this context, our strategy emphasizes on empowering the self-care club which will in-turn
complement the environment coordinating committee for having informed decision system in place with the government. Following activities will be conducted:

- Need assessment for capacity building conducted
- Workshop on setting-up of constitution for the self-care club supported by the committee and facilitated by SEEK
- Increased membership through active members with designated roles and responsibilities
  Trainings organized by SEEK and DMCR for building capacity of the self-care club in environment management
- Exposure visit of self-care club for demonstrating effective management of environmental issues

<table>
<thead>
<tr>
<th>Result Year 1 (September 2013):</th>
<th>Need assessment for the capacity building will be conducted and aspects identified.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result Year 1 (December 2013):</td>
<td>3 workshops will be held for building the constitution of self-care club, in collaboration with Racha Yai environment coordinating committee and SEEK (3rd party).</td>
</tr>
<tr>
<td>Result Year 2 (June 2014):</td>
<td>5 trainings organized by DMCR and SEEK on environmental management will be conducted for building capacity in 5 broad categories i.e. Governance with respect to environment, Coral reef management, waste water management, rainwater harvest and communication and networking for integrated approach and informed decision making.</td>
</tr>
<tr>
<td>Result Year 2 (October 2014):</td>
<td>1 exposure visit organized for the self-care club by the Racha Yai environment coordinating committee as a demonstration on how effective informed decision making and participatory approaches are for conservation and protection.</td>
</tr>
</tbody>
</table>

4.3.2.4 Output 4 Establish a sustainable financing mechanism for environmental projects on Racha Yai Island

It is sought to have a sustainable financing mechanism established for the Racha Yai Island to conserve and to protect. The sustainable financing mechanism will be overarching to the ICM strategy and will correspond to several outputs and contribute in management of funds for several projects under the ICM group 1,2,3 and 5 i.e. governance, waste water, rain water harvest and coral reef assessment and recover. The following activities will be undertaken, moreover see figure 2 and 3 for the mechanism on page 16.

- Financial mechanism is developed with support of the committee
- Collaboration with government to invest percentage of collected tax
- Collaboration with the committee to invest percentage of collected tax from boat operators
- A conservation fee (percentage) is allocated and collected from diving and snorkeling activities
- Any environmental damage from tourist, boat operator, hotel/resort owner is fined and goes into trust fund
- Accountability and transparency of funds is ensured through sharing of financial reports with the committee on biannual basis.
The trust fund will be transparent and accountable as it will be overlooked by the self-care club, environment committee and financial reports will be presented to the government on biannual basis.
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

This will also be monitored through programme officers and finance officers and proper record keeping will be done for this purpose.

| Result Year 1 (March 2014): | A sustainable financial mechanism is developed jointly with stakeholders and shared with government. |
| Result Year 2 (March 2015): | 4 financial reports are shared with relevant stakeholders |

4.3.2.5 Output 5 Transparent governance procedures developed

In essence, the transparent governance procedures would enable informed decision making process vital, with the sharing of information from the committee and the stakeholders with the government on the trust fund established would allow a route to have better communication with the government. In this manner, the transparency can be kept for vital and important decisions that are to be made. This will be challenging, however can be achieved through persuading the governments with good will and good face. This can be done in the following ways, as per our strategy proposition:

- The committee and self-care club take part and are informed of government decisions and procedures
- Round table conference for disseminating and sharing of information by the committee and government officials
- Electronic and print media involved in activities and important decisions

| Result Year 1 (March 2014): | At least 2 round table conferences are held between the committee and the governments to reach some consensus. |
| Result Year 2 (March 2015): | 25% decisions that are made are informed by the government and the committee of Racha Yai Island |

4.3.2.6 Time Frame

The project is envisaged to start immediately after signing of the contract. A detailed timeline of activities has been provided below:
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

Table 4: Timeframe of activities

<table>
<thead>
<tr>
<th>Output</th>
<th>Activities</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish a recognized Environmental Coordinating Committee for</td>
<td>a) Participatory mechanism established</td>
<td>Mar-May 2013-Jun-Aug 2013</td>
</tr>
<tr>
<td>effective communication and networking on Racha Yai Island</td>
<td>b) Identification and nomination of focal person from the different sectors</td>
<td>Sep-Dec 2013-Dec-May 2014</td>
</tr>
<tr>
<td></td>
<td>c) Coordinating committee established by nominated personnel</td>
<td>Mar-May 2014</td>
</tr>
<tr>
<td></td>
<td>d) Roles and responsibilities identified and agreed upon</td>
<td>Jun-Aug 2014</td>
</tr>
<tr>
<td></td>
<td>e) A memorandum of understanding signed by the members of the committee</td>
<td>Sep-Nov 2014</td>
</tr>
<tr>
<td></td>
<td>f) The committee is registered with the government</td>
<td>Dec 2014-Feb 2015</td>
</tr>
<tr>
<td>Developed education and awareness materials for sensitizing the</td>
<td>a) Develop leaflets and brochures on environment, conservation and sustainable water and</td>
<td>Mar-May 2013-Jun-Aug 2013</td>
</tr>
<tr>
<td>different sectors on environmental issues</td>
<td>energy use</td>
<td>Sep-Dec 2013-Dec-May 2014</td>
</tr>
<tr>
<td></td>
<td>b) Dissemination of education and awareness material</td>
<td>Mar-May 2014</td>
</tr>
<tr>
<td><strong>Self-care club empowered through capacity building</strong></td>
<td><strong>a) Need assessment for capacity building conducted</strong></td>
<td><strong>b) Workshop on setting-up of constitution for the self-care club supported by the committee and facilitated by SEEK</strong></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td><strong>c) Develop calendar activities and sharing of information with the stakeholders</strong></td>
<td><strong>d) Celebration of environment significant days</strong></td>
</tr>
<tr>
<td></td>
<td><strong>e) Beach cleaning, nature carnivals and a set of awareness activities developed and initiated by the committee to enhance cooperation and understanding of the resources</strong></td>
<td><strong>f) Prepare and initiate campaign on environmental issues and discussion on forums (established by the committee) for providing recommendations</strong></td>
</tr>
</tbody>
</table>

**Improving the environmental management at Racha Yai island through informed decision making process and participatory approach**
**Establish a sustainable financing mechanism for environmental projects on Racha Yai Island**

| a) | Financial mechanism is developed with support of the committee |
| b) | Collaboration with government to invest percentage of collected tax |
| c) | Collaboration with the committee to invest percentage of collected tax from boat operators. |
| d) | A conservation fee (percentage) is allocated and collected from diving and snorkeling activities |
| e) | Any environmental damage from tourist, boat operator, hotel/resort owner is fined and goes into trust fund |

**c) Increased membership through active members with designated roles and responsibilities**

**d) Trainings organized by SEEK and DMCR for building capacity of the self-care club in environment management**

**e) Exposure visit of self-care club for demonstrating effective management of environmental issues**
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

- **Accountability and transparency of funds** is ensured through sharing of financial reports with the committee on biannual basis.
  - The committee and self-care club take part and are informed of government decisions and procedure.
  - Round table conference for disseminating and sharing of information by the committee and government officials.
  - Electronic and print media involved in activities and important decisions.

### 5.0 Target group and local community participation

#### 5.1 Who will specifically benefit from the project.

The **large and small resorts** as well as **small businesses** on Racha Yai will benefit from this project. They will be invited to attend workshops and other social networking events and apply for funding to support their own environmental projects such as rainwater harvesting. With a well-established network amongst the resort, they will be able to share good practices and work collaboratively in making Racha Yai a waste-free island through a mutually agreed integrated waste management strategy. Workshops on CSR will also help them better understand how they can work with other stakeholders to maintain a safe and clean island environment by investing in renewable energy and energy efficiency appliances, thus reducing the use of fuel oil as well as the number of boat trips to bring in fuel oil for electricity generation.

The **ten households** on Racha Yai will also benefit from the project because they too can tap into the funding mechanism to apply for funding to set up home industries as a means of livelihood but also to promote the local Thai culture. Capacity building workshops will be organized for them to acquire the necessary knowledge and skills to diversify their livelihood.

A large number of **tourist** visits Racha Yai Island and the success of this project will ensure that they keep enjoying the pristine environment and beauty of the island. The project will also help them to
better appreciate the environment by participating in conservation activities organized by the resorts. Readily available information at different points such as when boarding the boats at Phuket, on arriving at the resorts as well as in the resort rooms will allow them to reflect on the impacts that tourism have on the environment and thus adopt more environmentally friendly practices whilst enjoying the natural beauty of the island.

The government also will benefit from the project because by sitting on the Environmental Coordinating Committee of the Racha Yai Island, they will be able to monitor more closely the activities of the island and understand better the needs of the citizens living on that Island. This committee will also provide them with a more direct avenue for consulting and involving all stakeholders in the development of environmental policies and laws.

More specifically, members of the Self-Care club will benefit from specialized training to help them develop leadership and communication skills to participate more actively in environmental debates. They will thus be better equipped to initiate activities and do environmental projects on the island and become self sustaining as well as pro-active.

The dive centers will also benefit from the project as a forum will be established where they can discuss issues relating to coral reefs and activities related to coastal resources. Since they will be represented on the Environmental Coordinating Committee, these issues could be put forward and dealt with accordingly.

We will ensure that the coordinating committee as well as other forums is gender balanced, but recognize that this may be a challenge as there appears to be more men on the island than women.

### 5.2 How project contribute to sustainable livelihood

The project will contribute to sustainable livelihood in the sense that all stakeholders will be working together to ensure the safekeeping of the environment and if they are successful in maintaining the pristine condition of the Racha Yai Island, they will achieve sustainable livelihood because tourist will keep coming to the island. However, they also need to have a good sustainable tourism strategy which will allow the resorts to adopt more environmentally friendly practices and a good integrated waste management plan to avoid any possibility of pollution which can deter the tourist from coming to the island. The tourism strategy should dictate the maximum number of tourist that should visit the island at any given time so as to avoid overcrowding and pressures on natural resources.

The creation of zones and MPAs will ensure the recovery and conservation of the coral reefs. An increase in coral cover can also bring about an increase in fish stocks, thus fishermen could fish in the designated areas for livelihood (for own consumption and to sell to resorts & restaurants on the island).

### 5.3 Project partners

<table>
<thead>
<tr>
<th>PARTNERS</th>
<th>ROLES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIT Team 4</td>
<td>Project coordination and management of</td>
<td>Project will help achieve platform for</td>
</tr>
</tbody>
</table>
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

<table>
<thead>
<tr>
<th></th>
<th>funds, lead agency for setting up Env. Coordinating Committee</th>
<th>communication and networking for decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Resorts</td>
<td>Support and provision of snacks and drinks as well as venue for meeting, workshops and activities relating specifically to rights and responsibilities of stakeholders vis a vis the environment</td>
<td>Project will allow them to embark on CSR initiatives and come up with a sustainable tourism strategy.</td>
</tr>
<tr>
<td>SEEK</td>
<td>Assistance with training workshops and production of educational materials, also with setting up the Diving center forum and networking with environment decision-makers</td>
<td>Project will help SEEK get more exposure. Project will also allow SEEK to help community members get more involved in environmental governance</td>
</tr>
<tr>
<td>SELF-CARE Club</td>
<td>Assist with communication with different stakeholders, organize &amp; coordinate activities to commemorate environment theme days.</td>
<td>Social activities will help boost the confidence of club members and attract more members to the club. Education and awareness of environmental issues will thus be enhanced.</td>
</tr>
<tr>
<td>Municipality</td>
<td>Environmental monitoring, legislations, collection of taxes &amp; fine,</td>
<td>More visibility &amp; transparency Goodwill of the community</td>
</tr>
</tbody>
</table>

**Communication Strategy**

<table>
<thead>
<tr>
<th>Target audience</th>
<th>Communication material</th>
<th>Message</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>All stakeholders</td>
<td>Invitation letter</td>
<td>Creation of an ECC for Racha Yai Island</td>
<td>End of March 2013</td>
</tr>
<tr>
<td>Tourist</td>
<td>Information booklet</td>
<td>Sustainable tourism practices</td>
<td>Ready by the peak season 2013</td>
</tr>
<tr>
<td>General public</td>
<td>News paper articles, TV spots, TV &amp; radio programs</td>
<td>The importance of communication in environmental management</td>
<td>Start in April and ongoing</td>
</tr>
<tr>
<td>Self-Care Club</td>
<td>Capacity building workshop</td>
<td>Empowerment for greater participation in</td>
<td>Beginning of April 2013</td>
</tr>
</tbody>
</table>
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

<table>
<thead>
<tr>
<th>Municipality/government</th>
<th>Phone calls and letters</th>
<th>Government participation in ECC</th>
<th>End of March 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Press conference</td>
<td>The ECC and its role in ensuring Environmental sustainability of Racha Yai Island</td>
<td>December 2013</td>
</tr>
</tbody>
</table>

6.0 Project Management, Monitoring and Evaluation

The project will be managed by Team four as follows:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Person responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications</td>
<td>Brenda Andimignon &amp; Jinda</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Mr. Vanni</td>
</tr>
<tr>
<td>Progress report &amp; Final Report</td>
<td>Umair Shahid</td>
</tr>
<tr>
<td>Managing of Project money &amp; writing of Financial report</td>
<td>Mr. Tun Yee</td>
</tr>
<tr>
<td>Project implementation</td>
<td>Project team &amp; partners</td>
</tr>
</tbody>
</table>

Project monitoring and evaluation

Use the action plan for monitoring of activities and use of project money

Quarterly evaluation
7.0 Plan to Ensure Community Participation and Gender balance

The whole project is designed to contribute to ensuring greater community participation in environmental decision-making, therefore we aim to involve as many people as possible along the way. The project will be monitored by a project steering committee which will comprise of AIT Team 4 members, SEEK board members, partner organizations and representative of the Rawai Municipality. The committee will have a balance of genders.

The project itself will involve all stakeholders on Racha Yai Island as well as those on Phuket. The project will be introduced to stakeholders in a public meeting during the first week of April 2013. All stakeholders will be aware, from the beginning, of the project objectives, and where and how they can get involved and benefit from the funding to promote greater participation in environmental governance. Organizations who benefit from the funding mechanism will submit photos and project reports to the coordinating committee to facilitate monitoring. During committee meetings we will obtain feedback from stakeholders on the various project activities and thus gain their contributions to project monitoring.

Once the Environmental Coordinating Committee is up and running, they will be closely involved in the implementation of activities as well as project monitoring, using their action plan as a basis for evaluation in addition to the project work plan. They will work in close collaboration with the steering committee and eventually take over the role of monitoring environmental management and environmental decision-making on Racha Yai Island.
8. How do you plan to ensure sustainability to the project goal?

**Financial sustainability:** Once the Environmental Coordinating Committee is up and running with the basic resources provided by this project, it will not require a lot of funding support to be sustainable. Similarly, the resources developed through the project will enable the committee to mainstream the idea of environmental decision-making into our everyday way of doing things and we will not need much additional funding to maintain the momentum. We have included several project activities focused on networking with partners who might provide financial support for the committee after the life of the project. Hopefully, the Trust fund will be successfully set up and thus will be able to provide funding for environmental projects. Additionally, committee members assisted by SEEK board members will seek out grant opportunities locally and internationally and apply for funding support.

**Institutional sustainability:** The Environmental Coordinating Committee will be a well established organization which hopefully will be up and running by June 2013. Much of what it will do would be done on a volunteer basis, with in-kind support from local partners and some grant funding. Since this project seeks to help stakeholders be more pro-active in terms of influencing public policy and others in their communities regarding environmental issues, committee members will carry on doing this as part of their normal work. Project partners will provide institutional support needed beyond the life of the project to keep the Environmental Coordinating Committee going.

**Policy sustainability:** The project seeks to set in place a new structure to open the lines of communication between stakeholders and environmental decision-makers. This new structure will be sustainable because we are focusing on the establishment of a permanent Environmental Coordinating Committee, and providing ongoing support to keep this forum going after the life of the project. We are also planning to implement several activities to promote the committee and make it well known to the general public and to decision-makers.

9. Challenges

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Strategies for overcoming challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting committed stakeholders to join the Environmental Coordinating Committee</td>
<td>Advertise widely to draw from as large a pool of stakeholders as possible. Select members based on proven record of past involvement in environmental initiatives. Ensure Environmental Coordinating Committee has high profile status, trustworthy and are respected by the society.</td>
</tr>
<tr>
<td>Committee not taken seriously by decision-makers and the community</td>
<td>Keep committee associated with an organization which is taken seriously by all until it is eventually recognized as an independent group. Prepare committee members to take on their role, help them develop the skills to interact productively and diplomatically with decision makers and the public.</td>
</tr>
<tr>
<td>Securing additional funding for the Environmental Coordinating Committee</td>
<td>Ask all committee members to search for funding opportunities. Have a clear action plan with detailed costs. Organise meeting with project partners and potential funders to showcase committee</td>
</tr>
</tbody>
</table>
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>continue existing achievements and seek funding.</td>
<td></td>
</tr>
<tr>
<td>Delays in production of the educational materials</td>
<td>Hire a sub-contractor to take the lead on publications.</td>
</tr>
<tr>
<td>Project activities cost more than foreseen in budget</td>
<td>Seek additional funding from supporting partners such as the large resorts.</td>
</tr>
</tbody>
</table>

10. Exit Strategy

The project has very clear and crisp objectives to look into in the 2 years that the project has. This project will empower the self-care club and develop the Racha Yai Environment coordinating committee which will be responsible for delegating important matters within the island and off the island with the government. It will also have a self-sustainable financial mechanism, built on a trust fund which will act as a reservoir for running projects simultaneously and in the time of need.

It is envisaged that the project will empower the island council and will help in developing strong connection with the government. This project will then be taken up by the Racha Yai Environment coordinating committee which will work with group/team 2 on the governance side which will help take up slightly different mandate, however the committee and the self-care club will be self-sufficient and will aid in several outputs of group 1, 2, 3 and 5 by providing support during the baseline surveys, carrying capacity assessment, in waste water and solid waste management plans as well as in rainwater harvesting by getting all the stakeholders together.

11. Budget:

The Budget is attached in an excel sheet with this document.
Annex I

Problem tree

Improving the environmental management at Racha Yai island through informed decision making process and participatory approach
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

Annex II

Objective Analysis

- Improved environment quality
  - Good water quality
  - Fresh water & ground water decontaminated and replenished
  - No Pollution
  - No Seepages
  - Soil decontaminated
  - Proper disposal of Heavy metal & toxic waste
  - Improved solid waste management
  - Bins installed in strategic areas
  - Agreed integrated waste management strategies
  - Increasing demand on Fresh Water resources
  - Increased Water & ground water decontaminated and replenished
  - Improved pollution management
  - Improved water & ground water decontaminated and replenished
  - Improved solid waste management
  - Bins installed in strategic areas
  - Agreed integrated waste management strategies
  - Good water quality

- Coral bleaching
  - Coral reef restoration
  - Reduced Sedimentation
  - Improved water decontaminated and replenished
  - Improved solid waste management
  - Bins installed in strategic areas
  - Agreed integrated waste management strategies

- Increased sea water temperature
  - Sea based activities regulated
  - Anchorage done in demarked area
  - Boats proximity to shore regulated
  - Walking on corals stopped

- Climate change
  - Govt. Policy to increase tourism
  - Proper organization of supplies
  - Improved of ed. & awareness
  - Municipality functions more visible
  - Good water quality

- Coral reef restoration
  - Reforestat
  - Eco-system based constructions
  - Loading and unloading done using jetty

- Improved governance
  - Improved environment quality
  - Good water quality
  - Improved governance
  - Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

- Establish Forum for communication
  - Improved governance
  - Securing public land & public safety
  - Improved governance
  - Improved water decontaminated and replenished
  - Improved solid waste management
  - Bins installed in strategic areas
  - Agreed integrated waste management strategies
  - Good water quality

- Improved water decontaminated and replenished
  - Improved solid waste management
  - Bins installed in strategic areas
  - Agreed integrated waste management strategies
  - Good water quality

- Improved solid waste management
  - Bins installed in strategic areas
  - Agreed integrated waste management strategies
  - Good water quality

- Good water quality
  - Improved solid waste management
  - Bins installed in strategic areas
  - Agreed integrated waste management strategies

- Improved environment quality
  - Improved solid waste management
  - Bins installed in strategic areas
  - Agreed integrated waste management strategies
  - Good water quality

- Improved water decontaminated and replenished
  - Improved solid waste management
  - Bins installed in strategic areas
  - Agreed integrated waste management strategies
  - Good water quality
Annex III

Logical Framework Analysis

<table>
<thead>
<tr>
<th>Goal</th>
<th><strong>Maintain the pristine environment of the Racha Yai Island</strong></th>
<th>OVI</th>
<th>MoVs</th>
<th>Assumptions and Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Informed decision making processes for improved environmental management of Racha Yai Island</td>
<td>30% reduction in overlap of resource use by end 2014 90% stakeholder participation in decision making process by end 2014 1 agreement signed between the stakeholders by end 2013 Registration of the committee with the government by early 2014</td>
<td>Minutes of meetings, photos, vehicle logbooks, attendance sheets, copy of agreement, registration certificate of the committee</td>
<td>People are willing to participate Proximity of the stakeholders</td>
</tr>
</tbody>
</table>

| **Output 1** | Racha Yai environment coordinating committee established with representatives from different sectors (Government, public, private, NGO) | 1st stakeholder meeting by 1st week of March 2013 Meetings are held on quarterly basis Committee established as well as executive committee by November 2013 SOP for committee established by January 2014 Committee is registered with the government by January 2014 | Minutes of meeting, photos, stakeholder meeting report, stakeholder analysis, SOP, member list of committee and executive committee | Committee is established and functioning well |
| Output 2 | Developed education and awareness materials for sensitizing the different sectors on environmental issues | 10 leaflets on water and energy conservation developed by end of April 2013 500 copies of leaflets distributed to all resorts and households by end June 2013 At least 10 environmental theme days celebrated per year (such as WWD, WED, CUW, Earth Hour, Earth Day BDD, Ozone Day, etc.) Tv spots for environmental education on quarterly basis | Leaflets, activity plans, activity outlines, event calendar, photos, event reports, financial report, news clippings | Stakeholders are aware, sensitize and ready to shift to sustainable resource use practices |
| --- | --- | --- | --- |
| Output 3 | Self-care club empowered through capacity building | Need assessment conducted by end September 2013 3 workshops conducted for building constitution of self-care club by end December 2013 5 trainings organized by DMCR and SEEK on environment management by June 2014 1 exposure visit organized for the self-care club by the committee by end October 2014 | Need assessment report, workshop agenda, attendance sheet, report, photos, consultants, partner collaboration, exposure visit report, event reports, news clippings, press release | All members of self-care club are aware of their roles and responsibilities DMCR and SEEK are ready to provide support to the self-care club |
| Output 4 | Establish a sustainable financing mechanism for environmental projects on Racha Yai Island | Financial mechanism is developed and accepted by the committee by March 2014 5% of waste tax is invested into environment trust fund | Financial reports, photos, tax, receipts of transfer of funds from waste tax, boat operator and fine/penalties from | Financial mechanism is developed and functioning well |
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

<table>
<thead>
<tr>
<th>Output 5</th>
<th>Transparent governance procedures developed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5% of boat landing on the island is invested into trust fund</td>
</tr>
<tr>
<td></td>
<td>100% funds from fine/penalties are invested in conservation and trust funds</td>
</tr>
<tr>
<td></td>
<td>2 financial reports are shared with government and committee biannually</td>
</tr>
<tr>
<td></td>
<td>environmental damages</td>
</tr>
<tr>
<td></td>
<td>25% consensus with government by the self-care club and committee by end year 1 of project</td>
</tr>
<tr>
<td></td>
<td>50% consensus with government by self-care club and committee by mid year 2 of project</td>
</tr>
<tr>
<td></td>
<td>75% consensus and involvement of government procedures and decisions of the self-care club and committee on the island by end year 2</td>
</tr>
<tr>
<td></td>
<td>Minutes of meeting, reports, photos, attendance sheets, vehicle log books, meeting outlines, agenda, news clippings, press releases</td>
</tr>
<tr>
<td></td>
<td>The government is willing to take the self-care club and committee on board for informed decision making</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activities 1</th>
<th>g) Participatory mechanism established</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>h) Identification and nomination of focal person from the different sectors</td>
</tr>
<tr>
<td></td>
<td>i) Coordinating committee established by nominated personnel</td>
</tr>
<tr>
<td></td>
<td>j) Roles and</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

| Responsibilities identified and agreed upon |
| k) A memorandum of understanding signed by the members of the committee |
| l) The committee is registered with the government |

**Activities 2**

| g) Develop leaflets and brochures on environment, conservation and sustainable water and energy use |
| h) Dissemination of education and awareness material in hotels and resorts by communication members of the committee |
| i) Develop calendar activities and sharing of information with the stakeholders |
| j) Celebration of environment significant days |
| k) Beach cleaning, nature carnivals and a set of awareness activities developed and initiated by the committee to enhance cooperation and understanding of the resources |
| l) Prepare and initiate campaign on environmental issues and discussion on forums (established |
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

<table>
<thead>
<tr>
<th>Activities</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>f) Need assessment for capacity building conducted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>g) Workshop on setting-up of constitution for the self-care club supported by the committee and facilitated by SEEK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>h) Increased membership through active members with designated roles and responsibilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i) Trainings organized by SEEK and DMCR for building capacity of the self-care club in environment management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>j) Exposure visit of self-care club for demonstrating effective management of environmental issues</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>g) Financial mechanism is developed with support of the committee</td>
<td></td>
</tr>
<tr>
<td></td>
<td>h) Collaboration with government to invest percentage of collected tax</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i) Collaboration with the committee to invest percentage of collected tax from boat operators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>j) A conservation fee (percentage) is allocated and</td>
<td></td>
</tr>
</tbody>
</table>
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

<table>
<thead>
<tr>
<th>Activities 5</th>
<th>Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>d) The committee and self-care club take part and are informed of government decisions and procedures</td>
<td>Budget</td>
</tr>
<tr>
<td>e) Round table conference for disseminating and sharing of information by the committee and government officials</td>
<td>Work plan</td>
</tr>
<tr>
<td>f) Electronic and print media involved in activities and important decisions</td>
<td>Human Resources</td>
</tr>
</tbody>
</table>

- k) Any environmental damage from tourist, boat operator, hotel/resort owner is fined and goes into trust fund
- l) Accountability and transparency of funds is ensured through sharing of financial reports with the committee on biannual basis.
Annex IV

Conservation and Self-Care Club

Group 1 report prepared by Mr. Tun Yee

Introduction

The planet earth is an irreplaceable home to all plants and animals. It is interrelationship of air, water, soil, plants, animals and microbe. The people continuous to do as treating the earth as it had an endless capacity to recover. The peoples have accepted the blessing of the earth. In the peoples relentless follow of economic and development. The people should consider first that the loss of environmental resources is already quite spread. The 50% of the world tropical and temperate forest, 50% of wet land and 30% of mangroves are already gone. 75% of marine fishes are over fishes. The Sea grass Coral reefs are also decreased. Many spices are disappearing.

After starting industrial economic, the co2 has been pushed and the Global warming and climate change are started. Even some biggest rivers cannot reach the ocean in dry season. Many percentage of world population were increase rapidly in year 2000. The environmental concern was very important. Now a day the people must try to put collaboration ahead of confrontation. The Global warming and Climate change is the challenge of today. So, all peoples must be the participation of environmental management. The coastal and marine ecosystem is more seriously important because it can support the people’s livelihood and endure the Global Warming and Climate change. It can also prevented the rising wave and wind by like a Nargic cyclone ad Tsunami. Having a change of studying the ICM courses and in the field work of the coastal business in Phuket, we have more awareness and knowledge of the value of coastal ecosystem. After this training, if we have any problem of coastal management in each country

We can be encountering to solve the problem. Some countries are very advance of aquaculture and some countries are very rich of vacant land in coastal area. So we can make join-venture of aquaculture business among members of BOBLME.

History of background

The Phuket province is located in southern Thailand. It is surrounded by Thai sea and the Bay of Bangle. Total area is approximately 3000 sq-km. The most developing business is Tourism, which related with boat transport business, restaurant, small scale hotel and diving operator. The sandy beach, transparent sea water, coral reef and sea turtle are attracted by tourists.

Resources use

Tourism, Recreation and urbanization

As far as I know my experiences, most people even the government authorize persons do not have the awareness toward the crucial situation of the coastal area. Whenever a beautiful sight-seeing was found at the beach, they have the idea to develop it into an area of Tourist attraction by building hotels
and other recreation center as a mean of extending tourism. But they are ignorant of other factors which can have several effect on the conservation of coastal resources. Also they do not know the value of coastal and marine ecosystem. After the year 2000, the investors from many countries have interested to come to a start of making investment in hotel and tourism, restaurants and living apartments in coastal area. The most peoples who come to the beach is to enjoy amusement and recreation. They usually do not have the awareness of discipline and a high sense of responsibility which is a fundamental requirement for the conservation of environmental and coastal resources. As a consequent, heap of plastic bags, wastes and pollution goods are thrown away to the beach and coastal water, resulting in spoiling the sea shore and destruct of the coastal and marine ecosystem. The hotel and tourism business located at the beach cannot put under control, the consequences such as decrease in coastal resources, change of ecosystem, global warming and Climate change are uncounted. More over natural disasters will occur very often and the lives of many peoples will also be lost.

**Background of tourism business in Ko Racha Island**

Regarding the tourism and hotel business are developed in coastal area, most of investor followed to establish urban development project. This is consist of housing project, municipal project, restaurant and shopping center. Urban development and human pressure in coastal area can be worse effect the ecosystem because of the nutrients from waste, wastewater and sewage are responsible for a huge amount components of the nutrients which cause marine polluted water. If waste water, sewage, plastic bag with treatment and clean up system is poor, Input of nutrients and pathogens from sewage to the marine and coastal environment can reduce the health of aquatic animals, Sea grass and Coral reefs. Like a shellfish culture in coastal water, since sewage and waste contain pathogens bacteria which can contaminate shellfish and passed on to the consumer, the disease can be transmitted. The management and supervision committee need to issue the law and regulation of the municipal sewage, waste and pollution water treatment system and to put clean up system. The coastal management and supervision committee should organize the owners of hotel and tourism, restaurants, and shopping center to participate in development and protect in coastal area.

Reference: Tim Dempster and Sanchez- Jerez Coastal Space Management

**Recommendation**

- The owners of hotel, restaurants, shopping centers and the peoples should also give greater attention and measure to be taken inside their compound and all kind of waste should be disposed of systematically. Depositing of them into sea or around the beach must also be avoided
- To establish clean-up organization and the teacher, student, local people, several tourist, local visitor and stakeholder need to participate in this movement.
- To share the awareness and knowledge of clean up, waste and polluted water treatment system to the owners of the businessman’s.
- Every effort should be made to acquire tourist attention by showing them the traditional culture and cottage industrials of the fishing village near the beach. In this way, the home stay
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

system can be development in this area and the local people have a chance to get not only gain knowledge and experience, but also earn more income.

- To teach the clean-up system inside the village and to build a supplying flower garden at the center of the village.
- To designate protective area to save coral reef and fish habitat, it can be sustainable utilization resources.

Transportation

Among the main user of coastal water is shipping. It is commercial ship, recreational and defense ship. Numerous ship transport hazardous products, such as chemical and petrol products. The recreation boats and fishing boats are oil pollution from fuel oil dumping discharge and solid wastes and bottle are thrown away at sea. Which effect sedimentation and over nutrient in coastal water. When accidental spilling oil, which effect decrease of coastal resources and Biodiversity. For example, the brake up of oil tanker off Galician coast in Spain in 2002 caused 9 million Euro of lost mussel production in the year following the accident. Recreational sailing and boating activities also challenge for coastal water and space.

Background of transportation in this island

A total of 155 total boats have operated regularly in this island. The amounts included transportation speed boat, cargo boat, diving boat and large cargo boat. The island has not yet established boat community organization of the boat owner and their employees. If they can organize the community organization, they can control any conflict among the boat transportation.

(small cargo boats 45, diving boat 20, cargo ship 10, transportation boat 80)

Ref: the transportation service

Problem

- The solid waste and oil polluted water from transportation destroyed the coastal habitat, coral reef and aquatic animals. Which the costal resources are attracted by tourism and fishers.
- Aquatic animals and on land birds can be died if polluted are spread coastal water and deep sea area also the fishes and aquatic animal’s growth rate are decrease.

Recommendation

- To issue Nautical rule and regulation by government enforcement
- To persuade the boat owner and employees to support funding for conservation of polluted water
- To establish proper ship surveyor organization
- To share awareness and knowledge of coastal resources to the boat owner and employees
**Conservation of save Sea Turtle and endanger species**

Tourist and local visitors have been attracted by Sea Turtle and endanger species. They are very interesting for them to watch the female Turtle is producing the eggs at midnight. The Sea Turtle, they keep their eggs inside the sand. When the baby Turtles are hatched from the egg, the baby Sea Turtles have been nursed back at the nearby Turtle sanctuary are released into the sea. The local community should establish save Sea Turtle and endanger conservation group. In Phuket main island this group was opened in 2006, they released small Turtles very few month regarding the financial situation. In the last year, Many Turtle were caught in fishing net. Turtle sanctuary is take care of the Turtle Those was given treatment back to health before releasing to the sea. This group have a lot of Turtle are in the sanctuary and they are released into the sea. This organization could arrange to raise awareness and they are aiming for funding for every year. The organization help some welfare show in the beach to participate all peoples in this area. There are many endanger species including Sea Turtle, Dugong and Dolphin in need of constant help. The Phuket endanger species conservation group emphasize on the save, rescue, rehabilitates and take care of marine endanger species involving the local self care group. This endanger species are migrated and they had contact and MOU with the neighbor countries. It can scientist share finding. Regarding their conservation research, the cause of death are for the fisherman’s fishing net. The trawler boats and dynamite fishing are problem to save endanger species. The fisherman continuous to fish in MPZ area, it can kill or wound and decrease of endanger species.

**Problem**

Tourism and fishery are depended upon marine resources to get good income. This endanger species are related with marine ecosystem and it can effect global warming and climate change also decrease of livelihood. Regarding marine ecosystem, all are related to save sustainable of marine resources to increase coral reef. If There are no coral, marine habitat are also spoil, the tourism business also decrease.

**Recommendation**

- To establish Marine Protective Area
- To allowed certain fishing gear and fishing season
- To protect trawl net fishing and dynamite fishing
- The local community is educated to get awareness, how to save and rescue endanger spices
- To protect from some crazy peoples
- Government need to enforce environmental protective law
- The community EC member and government staff should be involved with local people including the employees and migrant workers to participate in save and take care of marine endanger species
- The member of conservation group are responded for their village and due to respect value of their life
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

- To held environmental conservation program include of a packed schedule of event are participated in local people, students, tourist and local visitors turned up to enjoy clean-up function.

Costal water pollution

In this area have tourism development, small scale tourism development and boat transportation development. Most of the peoples usually do not have a high sense of responsibility which is a fundamental requirement of environmental conservation. As a consequence, heap of plastic existence of pollution from the effect of solid waste. The creek flow to the coastal water carried and a huge amount of sedimentation deposited in to the sea. In this area, waste water treatment system is not proper. Tourism transportation boat and fishing boat are oil pollution from fuel dumping discharge and solid waste are thrown away into the sea. It can be effect sedimentation and over nutrient in coastal area.

Problem

- Spoiling of coral reef and decrease of habitats
- Decrease of marine ecosystem and natural resources

Recommendation

- 1. Previously the waste water treatment system was sufficient for the waste water generated from the resort later due to the expansion of new resorts the facility was not sufficient. Care club took initiative they submit the new proposal to enhance the capacity of water treatment capacity to Racha committee. Within 90 days Racha resort owner promised to enhance the waste water treatment facility.
- 2. They need to extend to construct the new proper and large waste water treatment machine which should be not individually.
- They should repair the wetland area in front of the Racha family restaurant. The waste from hotel laundry service release to this wetland. They need to do waste water treatment system by Biologically inside wetland by planting microalgae.

For example

Some EU countries, solid waste and co2 produces from chemical factories do microalgae cultural plantation to filter and clean again around the industry. Chemical waste and co2 which are emission from factory send to micro-algae plantation by pipe line system. The micro algae feeds solid waste and co2, and then produce Oxygen. If this project implement widely, Bio-diesel from micro algae can be emit widely. Therefore, it can reduce Oxygen emission and replace biodiesel instead and Bio- plastic bag.

Ref: Discussion of Dr Dr Otto Pulz, president of European micro algae association and Dr Min Thein, president of Myanmar micro algae association

As a second step, industry and tourism stakeholders should be persuade to help funding the environmental resource maintaining process. For instance, Toyota Company in Japan and Patronut
Company in Malaysia donate findings to establish forest reforestation plan in the region of many forest. Doing this way, reduce the deforestation and implement global warming and climate change by carbon reduction.

As an international organization organize the stakeholders and should establish PES foundation. PES foundation should be fully used in environmental conservation business. As my experience, if we get funding to make environmental conservation, it should be used in administration and staff charges can spend up to 40% and main business can used 60%. Therefore, when PEF funding supported, the main Environmental Conservation project should be used effectively.

**Solid waste treatment system**

The solid come from hotel, resort, restaurant, mini market, tourist and local people which include plastic bag, plastic bottle, waste and glass bottle. Many people including tourist, local visitor, the employee and local people do not have the awareness of discipline and a high sense of responsibility which is a fundamental requirement for the conservation of environmental and coastal resources. As a consequent, heap of plastic bags, wastes and pollution goods are thrown away to the beach and coastal water, resulting in spoiling the sea shore and destruct of the coastal and marine ecosystem.

**Problem**

Regarding the increase of tourist, the solid waste can be increase in this island. A huge amount of waste, plastic bag and bottle and glass bottle could not be clear clean-up. It can sedimentation at the coastal water resulting destruct of coral reef and marine habitat.

**Lack of funding for operating the glass bottle crushing machine and engagement of labors for its operation.**

The social development based at Phuket suggested the Care club to purchase a machine for crushing of glass bottles because earlier they used to dump the glass bottles in the well dug on the site. The association suggested and told them, this operation/action is not good for the environment; there a machine may be purchased to crush it. It was purchased in 100 thousand baths, the amount was arranged locally from local entrepreneurs. After installation of the machine, the operation was started but it could not be continued due to lack of funding to operate the machine and to engage the labors for it. The self-care club requested local government to assist to resolve the problem, but it was not resolved.

20th morning, the group went for triangulation of the fact and found that the machine is installed there on the site in non-working condition. However, heaps of the crushed glass bottles were found there.

2. **The Government officials do not have any interest to resolve the problems of Racha island.**

For the purpose of triangulation of the problems, we visited Ban Raya and other surrounding area of the island, and found that the situation regarding water treatment, garbage disposal and maintenance of the area is not quite well. It was also told by Bang Maad chairman of the Self Care Club and Danai Poocharoen, member of Self Care Club that they are submitting different proposals for the improvement of the situation over Island and to resolve the problems but due consideration is not responded by the provincial government of Phuket.
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

3. The new entrepreneurs who started move in Racha Island in recent past are not abiding to the self care club’s rule.

Mr. Bang Maad, new entrepreneurs like Racha, started the construction of new big resort around 2002 but due to pretsunami in 2004, the owner of Racha could not complete the resort and started again the resort in 2006 and also extended the cottages from 40 to around 100. The resort owner did not comply the rules of Self Care Club rules. The existing rules are not sufficient to have agreement for disposal of garbage and waste water.

Recommendation

- Lack of Government and Municipality assessment
- In this area, there is no municipality function which are fresh water supply project, waste water and sewage water treatment project also no waste clean-up project. If municipality assessment is better we can do environmental conservation and saving fresh water resource. I would like to suggest the structure of municipality and their movement are very weak.
- Structure of Municipal organization and Governance and their function
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

Power consumption

Lack of Government and Municipality assessment

In this area, there is no municipality function which are fresh water supply project, waste water and sewage water treatment project also no waste clean-up project. If municipality assessment is better We can do environmental conservation and saving fresh water resource. I would like to suggest the structure of municipality and their movement are as below.

To save Fresh water resource project

There are many mountain forest area. On 20th Feb, I went to the one of the mountain forest area near Ban Raya hotel. I found a valley inside the forest. If I can climb up to find more valley. In my experiment, there are no fresh water resources even the area is heavy rain area like a Racha island because many stone has at the 7 meter deep layer in this area. Fortunately, this area is near the mountain forest. Three valleys are inside the forest. We constructed three small dam to save the fresh water in heavy rain season. We connected this three pond by pipe line. The last pond is set up a water filtration system. If we can do this project we have no fresh water resource in future and also we can extend hotel and tourism development.

Problem

We discussed with the hotel owners and engineer about renewable energy and fresh water resources. They also know, the two resources are not enough to extend tourism business in future. But the problem is due to insufficient of investment money. The main problem is insufficient funding also the bank system is not advance.

Power consumption problem

This island has no electric power. Which is supplied by a big diesel generators. It can be effective noisy and air pollution. In case, they can use the electricity from renewable energy by solar system and wind mill system. In my experience, three household can use fan and TV by solar energy with 20 years warranty it cost 500 usd. After every 4 to 5 years the maintains cost is about 300 usd for new battery. In coastal area wind mill energy system is more cheaper and more effective comparing than the other area. In my country three small scale hotel are using the solar power which is available for small refrigerator and aircon.

Recommendation

Financing and banking assessment

The small scale hotel and resort and restaurant owner, they have not enough investment money to save fresh water resource, renewable energy power supply system and waste water treatment system. It is financial problem not to develop the banking system. In my experiment, the customer, If they can give the security assessment which is unmovable properties including the hotel and resort and restaurant etc, they have chance to borrow the loan without or with a few interest from project development fund of the bank.
The banking system

Securities of Unmovable properties

Business man or customer

Bank

Small tourism resort 60% of total securities assessment

Restaurant & minimarket

Boat owner

Service business

Loan

To save fresh Water resources

Renewable energy project

Waste water Treatment project

development
Conclusion: In fact, environmental marine resources coastal are should be kept as sustainable harvest of the sea for the benefit of local people living in the coastal area. In a word, natural coastal and marine resources should be conserved. On account of seeking their own advantage, the responsible person of the government some employee of the department are involved in corruption in cooperation with businessmen. Such a malpractice must be put under control in accordance with the law. If we neglect the degradation of marine and coastal resources, the entire coastal area will be ruined. At the same item, the existence of living creature on earth will be risk without being able to do business, to contribute to world foods requirement and protect against natural disasters.
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

Tourists/Snorkelers/divers/tour operators and boat operators

Group II

19 – 22 February 2013

Mr. Ehsanul Karim, Mr. Kazi Saidur Rehman, Mr. Rifhat Naeem, Mr. Rajkumar Rajan, Mr. Tin Wee, Mr. Umair Shahid

Rapid Rural Assessment

ICM Class – AIT 2013

Prepared by Umair Shahid ST 115036
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

Rationale

Group II comprising of 5 people set-out to probe the issues regarding tourism, snorkeling, diving, boat and tour operators and to see the amount of damage each does to the environment while looking at different possibilities to resolve them.

Group Organization

The group was organized upon reaching a consensus which was to built together a framework of question to look into possible aspects of the situation and devise a strategy which is efficient in terms of less time consumption and allowed the group to gather information in that particular time span. In this manner, the groups were sub-divided upon reaching the target site which allowed each sub-group to radically interview tourists, boat operators, tour operators, dive and snorkel operators at the same time.

The group consisted of expertise of coral reef experts and fisheries experts conducting snorkeling in effort to collect evidences of sedimentation and coral damage by boat anchorage, snorkeling fins and gleaning. The data was recorded and has been summarized in the following table, please see below:

Table: Summary of findings from the field survey

<table>
<thead>
<tr>
<th>S.No</th>
<th>Issues</th>
<th>Activities</th>
<th>Recommendations</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Lack of regulations and enforcement for diving and snorkeling activities</td>
<td>• Specific sites for dive/snorkeling activities&lt;br&gt;• Boat anchorage&lt;br&gt;• Overcrowding&lt;br&gt;• Pollution</td>
<td>Establishing small MPAs/NTZ&lt;br&gt;Zoning&lt;br&gt;Small-scale coral transportation activities (local dive operations)&lt;br&gt;Diversification of tourist activities</td>
<td>Acropora patches aggregating spots&lt;br&gt;based on guidelines from PMBC&lt;br&gt;Similar meetings such as 15 March 2013 proposed meeting</td>
</tr>
<tr>
<td>02</td>
<td>Lack of awareness and lack proper information provided to the tourists</td>
<td>• Physical damage of the corals e.g. bleaching&lt;br&gt;• Language barriers</td>
<td>More information regarding coral reefs or good practice to the tourists by the tour operators</td>
<td>Bill boards&lt;br&gt;Video clips&lt;br&gt;Pamphlets&lt;br&gt;Briefings in their own languages</td>
</tr>
<tr>
<td>03</td>
<td>Poor communication/co-operation between the dive operators</td>
<td>• Leads to conflicts</td>
<td>A divers forum to activate communication and improved networking</td>
<td>Similar meetings such as 15 March 2013 proposed meeting</td>
</tr>
<tr>
<td>04</td>
<td>Lack of forum to discuss issues</td>
<td></td>
<td>Establishing forum consisting of dive operators, dive masters, resort owners, tour guides etc.</td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>Insufficient waste management</td>
<td>• Very few garbage bins&lt;br&gt;• Only beaches are being cleaned</td>
<td>Integrated waste management system to be in place</td>
<td>Monitoring the amount of sedimentation aggravating on coral reefs</td>
</tr>
</tbody>
</table>
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

<table>
<thead>
<tr>
<th></th>
<th>Lack of safety measures for the dive/snorkeling tourists</th>
<th>Accidental cases</th>
<th>Coast guard deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
<td>Regulations and monitoring needed in near shore angling and fishing activities</td>
<td>Uncertain data</td>
<td>Precautionary principle</td>
</tr>
<tr>
<td>07</td>
<td>Carrying capacity of tourists is par the limit</td>
<td>Limiting resources, unsustainable exploitation</td>
<td>Study on carrying capacity to control the access to dive sites</td>
</tr>
</tbody>
</table>

Field survey results for Small Resorts/Local Businesses and Local Government/Police

Prepared by Jinda Petchkamnerd (Student ID 115106)

KOH RACHA YAI

Koh Racha Yai is 20km south of Phuket. The locals also know this island as Raya Yai. In Thai, ‘yai’ means big. Koh Racha Yai is moderately developed with a selection of bars and bungalow operations but the island is still a quiet location. The island is probably the closest that can be found to how the Phi Phi Islands were 20 years ago.

Koh Racha Yai has the beaches and accommodation. There are two fabulous beaches and a few other small bays with secluded beaches. The boats arrive at Patok bay. This is a stunning enclosed bay with inviting turquoise water. The bay contains many coral formations and provides good snorkelling. There are many varieties of fish and sea fauna to enjoy. There is lovely wide beach with powdery white sand. There is one major resort here set into the hillside. The Racha Resort is a luxurious 5-star hotel.

The boats come and go from Patok Bay all day. Speedboats shuttle visitors from Phuket. Even the fishing and dive boats often moor in the bay for lunch so their customers can enjoy the scenery and have a snorkel before resuming their activities.

There are 4 (four) small resorts in Koh Racha Island:

1. Raya Father and Restaurant
2. Raya Dive Village and Restaurant
3. Bungalow Raya Resort and Restaurant
4. Raya Garden

The first small resort in the island is Bungalow Raya Resort, Raya Garden, Raya Father and Raya Dive Village, respectively.

Findings:
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

1. There is a policy from government which is about to increase number of tourist coming to Thailand. The policy drives some resorts especially the big resort to promote and marketing widely outside Thailand. The big promotion and marketing of these resort has succeed due to many tourists come to Thailand especially Phuket afterwards as well as Koh Racha Island. It is approximately 1200 tourist per as day tripper visit the island.

2. The mass tourism has caused some problems in the island, as follows :
   - Increase in sun-bathing area
   - Increase in tour operators
   - Increase of speed boats
   - Increase of water consumption
   - Increase of local business
   - Increase in diving and snorkelling activities

3. Previously, most tourist came from European countries, they are more concerned about the environment. Nowadays, most tourist come from China, Korea and Russia, they have low awareness about the environment. This changing behaviour is having some negative impacts to the coastal environment, as follows :
   - Increase in solid waste and waste water
   - Destruction of coral reef, due to snorkelling activities, tourists are walking on the coral reefs
   - Coastal environment degradation

4. There is no representative from government (no representative from rawai municipality). Only one policeman stand by in the island, and it is not enough for monitoring the whole island.

5. Actually, the government has an existing committee for the island but it’s not working well. There are some regulations developed, but the implementation is not going well (low enforcement).

6. Due to the low enforcement, it caused some problems, for example : conflict of land use between stakeholders.

7. In the island, there is a community forum called “Racha Island Conservation and Self-Care Club”. It is established in 1992. The activities of the clubs that are being implemented are as follows:
   - Collecting garbage along the beach every year
   - Having discussion in informal meetings

   The club is built based on some situations, such as: illegal fishing (dynamite fishing and illegal fishing gear has been used). The club was initiated by enterpreneur (family restaurant owner). The membership in the club are mostly volunteer from some of stakeholders in the Racha Yai island. Since the club established, there is no regular meeting. The meeting would only take place when big issues or emergency problems arise. For the financial support, the club collect the money from documentary team and the members of the club. At present, they have 50.000 bath in the bank.

   The needs of the club for achieving long term goal are as follows:
   - Need someone from other stakeholders (government, scientist, etc) to dedicate himself in order to achieve sustainable development
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

- Need strong components of the group/club
- Need step-back for re-arranging the plans

8. In the past, people on Phuket island came to utilize land on Racha Yai island as coconut plantation, paddy field and set up their community. During that time, some backpacker tourists visited this island and local people could gain some income from selling their local products to the tourists. Racha Yai island has high potential to develop as economic benefit, some of investors came to convince local people to sell their land to them. Most of local people sold their land without land title then local people moved out from the island to main Phuket island. Outsider as a new comer and have more power with their money to construct all of facilities for supporting their tourism activities.

9. After the large resorts on Racha Yai island promoted their tourist attraction as marketing to the public, many tourists come to visit Racha Yai island every year increasingly. The needs of extend capacity of accommodation and employment are highly. More migrant employees are increasing especially from Burma.

10. At this present, most of people on the island are originally from outside Racha Yai island and they are less feeling attachment with the island that they live and gain benefit for their livelihood. Poor concern on coastal and marine resources has been appeared by destructing of coral reefs (walking on the coral reef), solid waste scatter on the beach.

Group No. 05,

U.H. Wanniarachchi

Stu. No. 115044

Solid waste and waste water management in Koh Racha Yai Island

Methodology:

1. Water quality testing
   Selected sampling locations from:
   - Surface water (natural streams, ponds/reservoirs, canals)
   - Ground water (shallow wells)
   - Waste water treatment plants
   Parameters tested:
   - Temperature
   - Dissolved Oxygen
   - Salinity
   - pH

2. Other data/information gathered through
   Key informant interviews (small and large resorts, recyclable materials collection center)
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

Field observations

Available literature

Sampling locations
1. Raya father shallow well water
2. The Racha rain water harvesting pond
3. The Racha Water pumping station
4. River, Close to Rayaburi resort (near the bridge)
5. Siam river mouth
6. Northern side stream mouth at Siam bay
7. Northern side stream, after the dam
8. Land side from the dam
9. Big reservoir
10. Ban Raya treated waste water from their treatment plant
11. Close to The Racha dumping site
12. Downstream of waste dumping site
13. Rayaburi shallow well water

Results and Discussion
1. Results of Water sample testing

<table>
<thead>
<tr>
<th>location</th>
<th>Temperature</th>
<th>Salinity</th>
<th>DO</th>
<th>pH</th>
<th>Smell</th>
<th>Colour/appearance</th>
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<tr>
<td>1</td>
<td>30.6</td>
<td>10</td>
<td>03.80</td>
<td>6.68</td>
<td>Low smelly</td>
<td>yellowish</td>
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<tr>
<td>2</td>
<td>30.0</td>
<td>0</td>
<td>06.52</td>
<td>8.06</td>
<td>no</td>
<td>Low turbid</td>
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<tr>
<td>3</td>
<td>30.2</td>
<td>0</td>
<td>07.42</td>
<td>6.69</td>
<td>No</td>
<td>Low turbid</td>
</tr>
<tr>
<td>4</td>
<td>29.5</td>
<td>6</td>
<td>12.65</td>
<td>8.75</td>
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<td>Brownish yellow</td>
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<tr>
<td>5</td>
<td>31.6</td>
<td>23</td>
<td>07.56</td>
<td>8.26</td>
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<tr>
<td>6</td>
<td>31.2</td>
<td>26</td>
<td>12.50</td>
<td>8.91</td>
<td>bad</td>
<td>Greenish</td>
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<tr>
<td>7</td>
<td>31.2</td>
<td>30</td>
<td>04.74</td>
<td>7.81</td>
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<td>Brownish yellow</td>
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<tr>
<td>8</td>
<td>27.3</td>
<td>0</td>
<td>01.72</td>
<td>7.59</td>
<td>bad</td>
<td>Blackish</td>
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<tr>
<td>9</td>
<td>32.1</td>
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<td>09.50</td>
<td>8.51</td>
<td>Not good</td>
<td>Greenish</td>
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<tr>
<td>10</td>
<td>28.4</td>
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<td>01.80</td>
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</tr>
<tr>
<td>11</td>
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<td>00.40</td>
<td>7.62</td>
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<td>Blackish</td>
</tr>
<tr>
<td>12</td>
<td>29.5</td>
<td>0</td>
<td>01.05</td>
<td>7.81</td>
<td>bad</td>
<td>Blackish</td>
</tr>
<tr>
<td>13</td>
<td>29.9</td>
<td>5</td>
<td>13.00</td>
<td>7.90</td>
<td>No</td>
<td>Light Yellow</td>
</tr>
</tbody>
</table>
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

1. WATER SOURCES
The main water source used in Koh Racha Yai Island (large resorts, small resorts and restaurants, other residents) is the ground water from the Dug well. In addition to that water reserved from the rain water harvesting pond is used by The Racha resort. The ground water is used mostly for washing and cooking purposes and bottled water is used for the drinking purposes. Some of the restaurants and even large resorts use ground water for even for drinking purposes after a simple purification process such as filtration, reverse osmosis and chlorination.

The only energy source for the island is gasoline. All of the resorts use generators for producing energy for all energy requirements. The average gasoline consumption in the island is 500,000 l per month. All the resorts unload gasoline at the closed by bay. However Ban Raya hotel is in a process to produce 40% of their energy use from solar energy in the future. Rayaburi hotel practices a number of energy saving good practices. They have planned to use solar energy to produce hot water in their newly constructed building with 24 rooms. But The Racha still does not have an idea of moving towards solar energy due to practical obstacles.

3. SOLID WASTE MANAGEMENT
All the resorts have a proper mechanism for separation of solid waste at their premises. Solid wastes are separated into plastics, glass, cans, and dry paper, and they are transported in to the Main land through a
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

buyer already in the island or directly to the company. However it was observed that the disposal mechanism for glass, hazardous materials and organic waste is not properly managed. Hazardous materials such as used batteries, CFL bulbs, electric items, AC machine parts etc. could be observed in most of the waste dumping sites. Organic waste is dumped at their own dumping sites, sometimes may affect the water body downstream in the rainy season. High cost of transportation into the main land due to their heavy weight and the contaminants inside of these glass bottles are the constraints found in the disposal mechanism of glass.

All three large resorts are having an incinerator to burn their wet waste such as wet tissues. However there is no mechanism to examine whether these incinerators are up to the standard level.

4. WASTE WATER TREATMENT
a). Any of the small resorts do not practice any kind of waste water treatments/practices.
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

The waste water from the kitchen is directly discharged in to the stream or canal nearby or through outlet canals in to the sea.

Outlets of small resorts

b). All three large resorts discharge their waste water through a simple treatment process.
- Ban Raya resort do have a small waste water treatment system to treat the water from the kitchen, car wash, laundry and bathrooms. Sewage is disposed into the soakage pit and black water does not flow out of it.
- The Racha large resort operates a waste water treatment system to treat waste water from kitchen, bathrooms, laundry, car wash and toilet pits. They use a retention pond to settle down sediments from the laundry and after the retention pond it is connected to the treatment system. The sediments of this pond are burnt. The only process they use in the treatment pond is aeration. After aeration the water is pumped out of it for gardening. Major limitation here is the capacity of the water treatment pond is lower than the amount of waste water generated at the hotel (240m³ water released every day to the 100m³ capacity waste treatment pond). During rainy season waste water overflows in to the nearby canal located at a lower elevation without physical aeration which may cause contamination of different kinds of pollutants in the stream water treatment pond - Ban Raya

Land based issues identified
- Poor catchment management impacts negatively on the coastal environment and valley systems, Large quantities of sediments could be resulted in Siam bay along the coast at rainy times
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

- Inadequate Solid waste and waste water treatment systems

**Issues related to governance**

- There is poor coordination between sectors (RAWAI Municipal council, Police, department of marine and coastal resources and pollution control department) and within government and private sectors (Large resorts, small resorts, restaurants and diving clubs)
- People do not really have a sense that the coastal belongs to them and they have a role to play for its management
- There is very little public participation in management and decision-making (Racha self care club, resorts, municipality and other sectors)
- There is poor relationship between stakeholders
- There is lack of government capacity to resolve land claims
- Too many policies and regulations exist but none of them enforced

**RECOMMENDATIONS**

- There is a need to maintain the natural exchange of sediments between land and ocean
- Existing laws and regulations need to be enforced with regard to waste management
- Design and location of rain water harvesting systems, bio gas plants and waste treatment plants take account for careful management of natural resources and waste water management
- The important role of different stakeholders in pollution control needs to be recognized in the formal planning and management of coast.

**SUMMARY**

There is an increasing demand for water resources due to increasing number of tourist nowadays, but the available resources are limited. Ground water is still used for drinking, washing and cooking purposes but surface water is not used for any type of use due to severe pollution. There is a risk of salt water intrusion in to ground water due to high amount of extraction of ground water by the users. Sediment particles from the deforested and slopy areas of the island can cause for accumulation of sediments in the coral colonies in Siam bay.

Solid waste and waste water disposal system in the island is not adequate enough for the running the existing system smoothly and sustainably. Eutrophication problems could be arised due to high amounts of N and P discharged into the water bodies resulting hypoxic/Anoxic conditions that can negatively affect the physical characteristics of water such as color and quality (*reef Management Company 2012*). Care full management and consideration need to be taken as much as possible to secure the existing resources for the future generations.

**Field survey results for Large Resorts (Brenda Andimignon: ID 115090)**

There are three large resorts on Racha Yai Island, namely The Racha which is found at the Batok Bay, Ban Raya which is located in the Kon Kare Bay and Rayaburi found in the Siam Bay. The island is known for its natural beauty and is since long known for its excellent corals and marine life. However, because of increase tourism activities on the island, there are causes to worry about the sustainability of the island’s environmental management especially by the large resorts.

**The Racha**

The Racha is one of Thailand’s premier deluxe island hideaways. The resort features 85 luxurious villas and strives to be recognized as a leader in responsible and environmentally sustainable tourism. *“This five star resort treats its 234 staff as family and its guests as friends”*: says the Ag. General Manager
during an interview we had with him to know more about the Resort. He also stated that staff receives free accommodation and free electricity from the resort.

The resort was constructed in 2004 after the tsunami and is owned by two investors from Singapore and two others from Thailand; one said to be a very influential person with very good connections. The four share holders have signed a local contract for this hotel venture. The Racha is the only resort on Racha Yai Island with land title.

The Racha usually have 100% occupancy during the peak season which runs during the months of December and January and low occupancy during the months of May to October.

The more than 200 staff members work in different fields such as housekeeping, restaurant, gardening, maintenance, etc. The monthly salary staff salary ranges between 60,000 – 100,000 Baht; the highest salaries are received by those in management position. The purchasing department of the Resort is based in Phuket. It is to be noted that drinking water and all other provisions including food and beverages are purchased in Phuket and transported to Racha Rai Island by boat.

The Racha offers a wide range of leisure activities which are organized on weekly basis such as Batik Painting, Gel candle making, hiking/nature walks, sunset ATV safari tours, several water sports activities as well as soccer and tennis amongst others. The resort also organizes activities around key dates such as Valentine Day, Christmas and New Year. It also organizes wedding for those who want to exchange vows in Paradise.

The promotion and marketing of the resort is mostly done through adverts in yearly published magazines. The resort also has an XDD contract with internet and is greatly recommended in social media as well as word of mouth from visiting clients & returning guests as well as trip advisor.

**Environment Programs**

The Racha Resort aims to be at the forefront of ecological and environmentally respectful architecture and development. To achieve this, it has several programmes:

1. **Save our Trees:** For every tree that is cut, 2 trees are planted

2. **Ecologically Responsible architecture:** design to blend in with the exiting terrain of the land, ensure that buildings do not stick out like sore thumbs ruining the natural profile of the land, no cutting and filling of the land was allowed during the construction of the resort.

3. **Environmentally friendly designs:** double thick exterior walls to reduce load an airconditions, Water from airconditions used to fill foot bath outside villa, no fabric curtains to cut down on laundry, recover heat from generator for laundry, Energy saving lighting design, Use rope lights and low power energy saving lamps, Sewerage treatment system, Use ozone instead of chlorine in pools

4. **Environmental Initiatives:** daily beach cleaning by staff, Waste recycling program, Public toilets for day trippers, environmentally friendly Panton jetty for all to use.

5. **Our Environment:** Responsible to safeguard our environmental for our future generations and this responsibility Start today

**Water and energy**

The resort produces its own electricity from three generators; two 500KW/H generators and one 1000KW/H generator. The generators are not in use simultaneously. The smaller ones are used from
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

12pm to 6am and the bigger one provides electricity from 6am to 12pm. The resort uses 85,000 liters of Diesel per month not just for the generators but also for transports. The fuel is transported by boat from Phuket and is transferred ashore by using pipes. No incidents of spills have been recorded yet. One million Baht per year is invested in generating electricity. The resort has begun to reflect on the possibility of investing in solar energy but they are afraid that this venture might prove to be too costly for the resort.

The resort has a daily water consumption of 250m$^3$. It gets its fresh water from wells as well as from a rain water collecting pond. The resort uses carbon and sand for water purification before it is stored in four 50m$^3$ tanks where chlorine is added. This water is then used for almost everything. Staff quarters uses 52m$^3$ of water per day, 26m$^3$ is used for laundry daily and the beach shop uses 34m$^3$ of water per day. The main building of the resort has a daily drinking water consumption of 8.8m$^3$. Water in plastic bottles is also transported from Phuket to the island for drinking.

**Waste management**

The two main categories of waste generated by The Racha Resort are the dry wastes which includes paper, plastics, pet bottles, glass bottles and cans. These are recyclables and are taken to Phuket for recycling three times per week. The second category is the wet waste which includes organic waste and waste water. Organic waste was disposed in landfills initially but because of pollution problems, the resort has stopped this practice. Kitchen waste is now put in waste tanks and the fats are removed from the tank every 3 days. The water is then allowed to flow out of the tanks into the treatment pond. Some organic waste are used as fertilizers for garden through composting. Waste water and sewerage from bathrooms and toilets goes into septic tanks and the overflow goes into the treatment pond.

The resorts’ waste water treatment facility is not up to the required standard and the treatment pond is too small. During the rainy season, there was an overflow of waste water from the pond which caused pollution in public areas. The Resort was visited recently by the Vice Governor and other government officers because of this problem. The resort has been given a delay to come up with a plan to remedy the situation. The resort has thus hired a private company to work on a waste management plan for them. The waste company has advised the resort to have fish ponds so that left overs can be fed to the fish. The resort doesn’t have any waste reduction strategies at the moment or any internal policies with regards to waste management.

Besides dealing with their own waste, the resort also has to clean the beach daily which is heavily littered by day trippers. Some bins have been installed along the beach but are not properly used. The Chief Engineer of the Racha Resort, Mr. Thanya expressed that the Municipality should take charge of the waste management system on the Racha Yai Island since all businesses on the island pays tax for waste management. This idea is also shared by other resort owners and other business owners that we’ve talked to. The Racha pays up to 10,000 Baht per year as tax for waste management. Besides the Racha, other resorts have been notified by the Municipality to improve their waste management systems.

The resort has an incinerator with an 80kg/hour capacity for burning of certain waste such as dry leaves and tissues.

**CSR:** the owners of the resort invest in artificial coral reef.

The Acting General Manager as well as the Chief Engineer feels that the resort has good relationship with different stakeholders even if they are not working together. The willingness to work together is there but there’s a feeling of lack of facilitating skills. Nonetheless, the main interest of the hotel
remains profit making. As the biggest resort on the island The Racha has a key role to play in ensuring sustainable environmental management.

**Ban Raya Resort and Spa**

**Situation**

The resort is situated 2 minutes by walk to two lovely snorkeling & diving beaches (Ter Bay & Kon kare Bay) and 10 - 15 minutes to the two big white sandy beaches where the boats usually drop anchor. (Batok Bay & Siam Bay)

Ban Raya has 48 rooms situated in a beautiful tropical coconut garden. All the rooms are well-constructed and high standard of cleanliness. The Resort offers two types of rooms: 6 standard electric fan rooms and 32 superior air conditioned rooms, all the rooms have own bathroom, mosquito screen and balcony. None of the rooms are more than two minutes walk from the seafront (Kon kare Bay).

**Brief History**

The owner of the Resort, Mrs. Kritiya Sanguemkul is of Thai origin. Rachai Yai is her home island. She used to work in Phuket as a nutritionist and came over on the island for week-ends. She would bring along friends and introduce them to the island. The first house to be constructed on the island was her home in 1985. At that time the island was not developed so she had to bring in gas, water and built a toilet. In 1987, six bungalows were built for friends and relatives. The site where the Ban Raya resort is found was once a coconut plantation. Mrs. Kritiya Sanguemkul bought the land from the original landowner. She has no title deed but only the right to use the land. The resort stretches over 25 rai of land.

In 1992, the owner of the resort sat with government and agreed to take care of the coral reef in the Kon Kare Bay. So she decided to divert waste water disposal to Siam Bay. At that time there was no tourism development in Siam Bay.

In 1997, Mrs. Sanguemkul applied for a bank loan to construct 15 more rooms and in 2004 constructed a swimming pool worth 10 million Baht. The owner of the resort considers her resort to be a medium sized resort rather than a large resort and have no intention of expending the resort further.

**Seasons & occupancy**

Usually the low tourism season at Ban Raya is from May to October where the occupancy is around 10% to 20%. However, last year the percentage during this period went up to 60% occupancy. The high season starts in November and ends in May but the real peak season is during December and January where there’s 100% occupancy. The resort used to attract a lot of Scandinavians but the trend is changing and the resort is now receiving more Asian tourist.

**Staffing**

The resort has a total of 60 staff members on Rachai Yai Island (80% Burmese & 20% Thai) and 30 staff members, all Thai, on Phuket where the sales and purchasing department is found as well as audits and marketing. All resort laundry is done on the main island of Phuket by The Royal City. Daily occupations at the resort include front desk, transfers, gardening, housekeeping, restaurant, Information Technology,
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

engineering, spa, saloon, boutique and the dive center. Some staff plays duel role such as housekeeping and gardening. There is gender balance amongst the resort staff and the lowest salary is six thousand Baht with an annual commission of 3%. The medium salary is around 10,000 Baht and the highest salary is 50,000 Baht.

Laws and regulations

Since the resort is a medium size resort, there was no EIA recommendation for its construction. However, the owner states that the Rawai Municipality was involved during the construction stages. She says that the resort has a good enough relationship with the municipality, (50/50). The resort pays tax to government every year including 200,000 Baht of tax for waste management. The resort receives no regular visits from government officers.

Waste Management

The owner of Ban Raya is very conscious of the waste problem on Racha Yai island. She tries her very best to manage waste water and solid waste however, there’s still a lot of work to do. One of her strategies is limiting the amount of waste she brings to the island like peeling the shrimps in Phuket instead of on Racha Yai. The resort has a waste sorting policy. Paper, plastic and glass are sorted. The waste paper and plastic are shipped back to Phuket by the long tailed boat whereas the glass & pet bottles are crushed. The crushed glass is supposed to be used in road construction but for some unknown reasons it is still piled up on the island. Dry leaves are used for composting but when there’s too much, some are burnt. The compost is then used for gardening. No fertilizer is used for gardening, horse waste is used instead. The resort owner has bought an incinerator but it is not yet in operation. She claims that she doesn’t use any landfill for dumping of waste.

Organic waste are given to the monitor lizards, some are put in barrels to ferment for waste water treatment using EM. There is a collection pond for waste water coming from the kitchen and also from septic tanks.

Water quality testing was done recently around the island and it was concluded that the waste water treatment of Ban Raya restaurant is not well managed. Thick layer of oil and grease has negative impact on the water quality. Even if the waste water goes through treatment ponds, it still comes out as waste water with a high level of Coli forms. We visited the site and observed that the treatment pond is not well maintained and looks like it could collapse at any time. Already there are cracks and seepages. In one of the local newspaper, they even wrote that the oil trap tank does not operate properly and at times waste water is not treated before released into public canals.

Water and energy

Fresh water is collected from a total of 25 wells, 6 around the resort and 19 on other plots of land. The collected water is used for almost everything. For drinking purposes, the water is purified. An amount of 50m$^3$ – 70m$^3$ of water is used per day by the resort. The resort also collects rain water for watering the garden.

The resort is able to produce its own electricity from five generators; two with a 200KW/H capacity, two with 135KW/H capacity and another with a 50KW/H capacity. The generators are not in operation at the same time. The resort spends five to six thousand Baht on electricity per month. The resort owner has plans to invest in alternative renewable energy sources. She’s trying to secure a bank loan to buy solar cells which will provide 40% of energy use by the resort.

Education and awareness of resort guests.
Mrs. Sanguemkul believes that tourists coming in the resort already know about water and energy conservation. However, the resort staff has to talk to the guest about good and bad practices. Guests are advised not to change towels after single use and to keep taps close and to switch off lights and aircondition when they are not in their rooms. Signboards are put around the resort to remind guests about the Self-Care Club rules. Resort staff has to pay a fine of 100 Bath if taps are left open.

The operation of the dive shop was put on tender and the main criterion was that the person should have a marine biology background.

CSR

As corporate social responsibility, the resort helps in installing artificial coral reefs. It also provides set-up for laboratory for visiting researchers as well as university students who come every six months to test water quality and water treatment. The lab. was also used for organizing and developing a Tsunami early warning system. The resort receives feedback from the researchers and information can be used to improve certain practices around the resort.

Communication and networking

The resort communicates with other resorts only for business purposes.

Major impacts/factors affecting tourism/conflicts

- Use of poison and dynamite by sea gypsies
- Tourists feeding the fish
- High number of tourist in one area at the same time (500 tourist per day)
- Coral reef destruction by boat anchorage/snorkeling/diving

The resort owner does not worry about the increase in number of tourists coming to the island as long as there’s good waste management. She expressed that she’s got good relationship with the Self-Care club and is willing to work with other resorts for better environmental management of the island.

Rayaburi Resort

The Rayaburi resort is located at Siam Bay and has a 50 room capacity (26 rooms in the old building and 24 in the new building).

The resort currently employs 80 permanent staff of which 30% is of Thai origin and 70% from the Philippines. 70% of staff are females and 30% males. The Resort also has 20 part-time staff who comes to work during the peak season, when the resort has 100% occupancy and this happens during the months of October to April. The period May to September is considered as the low season where the occupancy level is only 40%. The resort receives more Asian guest than Europeans.

House-keeping

The 20 housekeeping staff are responsible for guest rooms. They also provide environmental education and awareness to guests arriving at the resort verbally.

Environmental management initiatives:

- Eco-friendly cleaning agents are used for housekeeping
- Laundry is put outside to dry naturally using sun and wind instead of electricity
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach

- Towels in rooms are change every other day and not daily
- Power cutoff – after 10.00 pm in the night and 10 mins power cut at 10.00 am and 5.00 pm in guest rooms
- Verbal information to save energy to guests
- Beach cleaning every morning – by staff
- Waste bins- not in the beach, close to the beach at their premises

Solid waste management

The Rayaburi resort generates the same types of waste as the other two resorts and it also has similar waste management mechanism. There’s sorting of waste at room level, kitchen level and around the resort. Plastics, glass, paper, cans are send to mainland Phuket for recycling. Toilet paper and dry leaves are incinerated. Organic waste collected is used for EM culture and for composting as well as fertilizer.

Waste water from rooms goes into septic tanks then to treatment ponds and finally flows in natural canals. Could not observe the waste treatment plant, but according to the management of the resort they have a primary treatment plant that traps oil and grease using EM.

Water and Energy

The hotel has its own mechanism to provide water and electricity for the smooth running of the resort. When guest checks in, they are briefed on water and energy conservation. There’s no sensor control yet in the resort however, the new building has energy saving bulbs and solar water heater.

The Resort is visited by the Province Governor and environmental officers only when there is a problem. There are no regular inspections by DMCR.

Environment complaints

There have been some environmental issues with regards to Rayaburi resort such as beach encroachment, construction on the beach, construction in public canal or filling of canal with soil and sand poaching (taking sand from the beach for resort use). The marine department is supposed to inspect the area and advise the resort to remedy the situation. Rayaburi is also criticized for its lack of communication and involvement in community activities.

The manager of sea sports at the resort however expressed the wish to work with other dive centers on the island to have sustainable practices for diving and snorkeling as well as for the promotion of education and awareness to tourist with regards to the importance of coral reefs and impact of human activities on this eco-system.
Annex V

Map of Racha Yai
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach
Improving the environmental management at Racha Yai island through informed decision making process and participatory approach
Group 5 Project report
Sustainable freshwater management
in Racha Yai Island
Sustainable Freshwater Management in Racha Yai Island

TEAM 5
1. Mr. Abdul Sattar Khatri
2. Mr. Pratya Youngpatana
3. Mr. Kazi Saidur Rahman
4. Mrs. Tu Thi Lan Huong
5. Mr. Yuliarko Sukardi
1. Project Summary ............................................................................................................................................. 1

2. Introduction .................................................................................................................................................. 2
   2.1 Site (project area) description .................................................................................................................. 2
   2.2 Geographical Characteristics .................................................................................................................. 2
   2.3 Climate .................................................................................................................................................... 2
   2.4 Ecological Characteristics ...................................................................................................................... 3
   2.5 Altitude ................................................................................................................................................... 4
   2.6 Socio – economic Aspect ......................................................................................................................... 4
   2.7 Conflicts and issues related to Racha Yai Island ...................................................................................... 4

3. Field Survey Results ..................................................................................................................................... 6
   3.1 Stakeholder analysis / Institutional analysis ............................................................................................. 6
   3.2 Field survey findings ............................................................................................................................... 8
   3.3 Problem analysis .................................................................................................................................... 15
   3.4 Objective analysis ................................................................................................................................... 16
   3.5 Alternative analysis ............................................................................................................................... 17
   3.6 Overall ICM strategy of the project and expected outcomes ................................................................. 18
   3.7 Project Logical Framework ...................................................................................................................... 18

4. Project Description ........................................................................................................................................ 19
   4.1 Rationale of the project .......................................................................................................................... 19
   4.2 Main objectives ...................................................................................................................................... 19
   4.3 Immediate objectives ............................................................................................................................. 19
   4.4 Expected outputs ................................................................................................................................... 20
   4.5 Activities ............................................................................................................................................... 20
       4.5.1 Roof-based RWH ......................................................................................................................... 20
       4.5.2 Afforestation ............................................................................................................................... 23
1. Project Summary

Decrease in water availability and quality are the two basic challenges in Racha Yai Island. These challenges have been further exacerbated by unplanned development of tourism activities. Higher water consumption rates result in over pumping from existing ground water resources, and consequently affect their long-term quality and thus their sustainability. Production of excessive wastewater and seawater intrusion has decreased the quality of the ground water resources.

The main objectives of this project are ensuring sustainable supply of potable water for drinking and general use and replenishment of the ground water to an optimal level. Solutions include mainly development of alternative/additional water sources as well as preservation of the existing ones. Rainwater harvesting system has been chosen as a good option to deal with such scarcity problems. This will reduce the demand on existing water sources and consequently, leads to groundwater recharge. The Rooftop RWH system will be implemented as pilot basis in two small resorts - Raya Father and Raya Garden. The harvested rainwater will be used for bathing, toilet flushing, garden watering, cleaning and laundry washing which activities do not require drinking water quality. As a supplement, planned forestation will be done in the damaged area. Additionally, awareness building among the water users will be carried out through seminar, workshops, training throughout the project period. It is expected that the project will play a vital role to decrease the extensive overexploitation of groundwater, reduce the demand of freshwater from the existing water sources, and gradually raise the aquifer table for sustainable utilization of groundwater.

A project Management team comprised of key stakeholders and external partners will be formed to manage, conduct, implement and coordinate the activities of this project. Monitoring and review of the project progress will be carried out throughout the project’s schedule lifetime. This will be arranged by IUCN/MFF in coordination with key stakeholders. The monitoring activities include assessment of project progress, effectiveness, impacts, replication, long-term sustainability; and lesson learnt. Active participation of all the stakeholders will prohibit incomplete construction of RWH system, insufficient and irregular maintenance which definitely leads to a success of the project. Successful completion of this project may leads to motivate the stakeholders to apply the same technique in other small resorts, restaurants, large resorts as well as local households with willing to build their own RWH system which will improve, in the long-run, the quality and sustainability of water resources in Racha yai Island.
2. Introduction

2.1 Site (project area) description

The site selected for this project is near Raya Garden and Raya Father (Two Resorts) on Ko Racha Yai Island. The area is on the foot hills of the island. It is flat, sandy and quite suitable slope for rain water harvest. This is pilot project for rain water harvest and construction of over head tanks in the resorts and households over there.

2.2 Geographical Characteristics

The Ko Racha-Yai Island is in Phuket Province. This Island is situated at 7 36 03.3 N and 98 22 10 30 E and at a altitude of 112 ft from sea level. The island is 20 kilometer away from Phuket. The speed boat takes 25-30 minutes from Phuket to reach to the island. It is very near to the Phuket Island. The area has white sand beaches, beautiful bay, small hills having vegetation over there. The area is rocky, sandy and beautiful habitat for conservation of biodiversity. It has sites with beautiful corals which are being used by divers. It has coconut plantation and also the rubber trees plantation.

2.3 Climate

The average temperature varies in between 25 Celsius to 28 celsius throughout the year. The average rainfall (precipitation) varies from 200mm to 300 mm.

![Temperature graph for Phuket](https://www.yr.no/place/Thailand/Phuket/Ko_Racha_Yai/statistic.html)
2.4 Ecological Characteristics

The area has small rocky hills having trees over there. The area has beautiful bays, coral sites, white sandy beaches, fishes, crabs, coconut plants, rubber plants, small and big resorts, local households, boatmen, large number of tourists.
2.5 Altitude

112 ft from sea level

2.6 Socio-Economic Aspect

In Thai Ko=island, Racha=king; yai=large. The brief history was narrated by Mr. Sarit Jondee, the Leader of Island ‘Conservation and Self-care Club who is now permanent resident of Ko Racha Yai Island. According to him, people from the Chalong bay area used to visit Ko Racha to harvest fish and forest products in the year 1947.

In 1957 people moved to the island temporarily to do agricultural activities-mainly rice and coconut and also to collect turtle eggs.

In 1972, Government started its involvement in resource management and arrested illegal fishing practitioners.

Fifty years ago the Malay sailors used to come for fishing to RachaYai Island and go away. Around 20 years back the sailors started the tourist activities in the Island. Local people were from Phuket and they do agriculture activities. Then local people started building Bungalows for Sailors. The first resort Ban Raya was built in 1985. They bought the land from local people. Around 30 to 40 households were there at that time in Racha Island. Local people were engaged in dynamite fishing. Thai Government recognizes the Island as tourist destination during 1992. Tourist found difficulty pronouncing the name Raya and the name was changed to Racha. Due to increasing in large number of tourist activities in near Phuket island the RachaYai island people saw the environment impacts and started self care club during 1992 to preserve the marine environment in the island. They made six rules for tourist to follow in Racha yai Island and submitted the rules to provincial government of Phuket. The rules are not law is informal code of conduct briefed below:

Formulation of Rules and regulations for environment preservation in 1999 and were got approved from provincial government. The following are the rules and these are the under the agreement of Racha Island and Phuket residents.

a. Anchoring along coral reef is prohibited
b. Jet ski, water ski, water scooter, sea walker, banana boat, parachute ski are prohibited
c. Any fishing activities are prohibited
d. Fire camping on beach area is prohibited
e. No littering
f. Animal hunting is prohibited i.e. birds and bats

2.7 Conflicts and issues related to Racha Yai Island.

a. Waste water disposal.
b. Non-compliance of the code of conduct framed by Self Care Club
c. Mass Tourism beyond carrying capacity.
d. Water Consumption
e. Energy Consumption
f. Lack of Governance
g. Un-awareness and lack of communication.
h. More commercialization of the Island.
i. Damage of the Forests
j. No Conservation of plan
k. Diving along the coral site by divers
l. Coral Health Issue
m. Sedimentation problem
n. Oil spill over water way.
o. Water Pollution.
p. Solid waste disposal
q. No communication in between stakeholders.
r. Large Number of development of infrastructure
s. Unloading of the construction material.

National policy of the state is to increase the tourists from 8 million to 12 million. This is also a conflict to resolve the problem. Government wants to earn money by increasing the number of tourists. In the island, there is not effective of the enforcement of law. It is due to the low priority for the island. The provincial government was not seen involved in the management and resolution of the issues. However, one Racha committee is there to resolve the problem but effective activities were seen. Whereas, community has threat regarding above issues and think that there is no enforcement of law by the government, no control over the more commercialization of the island, pristine environment has the threat to be destroyed due to mass tourism and due to above conflicts and issues. They are protesting but due to influential political persons backing to the large resort owners are not listened.
3. Field Survey Results

3.1 Stakeholder analysis / Institutional analysis

Stakeholder define as a person or groups or an organization (actors) affected by or have a vested interest in the problem Situation. Stakeholder analysis allows us to identify target group of stakeholders the project aim to assist at. We analyze stakeholder’s interests and power to influence (negatively or positively) to change the problem situation in the Ratcha Yai island as follows;

<table>
<thead>
<tr>
<th>No.</th>
<th>Key stakeholders</th>
<th>Problems</th>
<th>Interests / potential</th>
<th>Potential linkages</th>
</tr>
</thead>
</table>
| 1.  | Large and medium resort owners | • Poor waste water & solid waste treatment  
• Unutilized renewable energy  
• Unloading construction materials | • To earn money  
• To contribute in conservation of environment  
• To provide employment | All are interlinked |
| 2.  | Small scale resort owners (restaurants) and Local businesses | • Poor waste water & solid waste treatment  
• Over capacity  
• High cost of suppliers | • To earn money  
• To contribute in conservation of environment  
• To provide employment | All are interlinked |
| 3.  | Racha Yai island Conservation and self care club | • Poor power and enforcement  
• Lack of human resources, funding and technique | • To have coordination in between all stakeholders  
• To contribute in conservation of environment | All are interlinked |
| 4.  | tourist operators  
Scuba diving – snorkeling | • Degradation of coral reefs  
• Overlap in resources uses  
• Poor safety regulation  
• Enhancing water pollution and solid waste | • To earn money  
• To have more and more tourists  
• To use coastal and marine resources services  
• To guide the tourists | All are interlinked |
<table>
<thead>
<tr>
<th>No.</th>
<th>Key stakeholders</th>
<th>Problems</th>
<th>Interests / potential</th>
<th>Potential linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Tourists</td>
<td>• Lack of regulation for tourist activities management</td>
<td>• To use coastal and marine resources services</td>
<td>All are interlinked</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Day trippers increased</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Local community</td>
<td>• Land tenure</td>
<td>• To improve livelihood</td>
<td>All are interlinked</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Less public infrastructure</td>
<td>• To get benefit from tourism activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No welfare/support from local government</td>
<td>• To contribute in conservation of environment</td>
<td></td>
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</tr>
<tr>
<td>7.</td>
<td>Rawai municipality/Policemen</td>
<td>• Low enforcement of law</td>
<td>• To support national policy</td>
<td>All are interlinked</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• To resolve the conflict</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>• To implement the law</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>• To contribute in conservation of environment</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• To provide fund for conservation and development</td>
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</tr>
</tbody>
</table>
3.2 Field survey findings

Tourism, the main economic activity of the Racha Yai Island, is entirely dependent upon its ability to preserve the pristine environmental conditions. Land acquisition by private sector from local community. From 80 households, nowadays become less than 10 households. The islands used to have paddy field but not anymore, only buffalo farming. Tourism activities have displaced local communities.

As the numbers of tourist resorts and visitors grow, waste management (both solid waste and wastewater) has become problematic. It is said that there are some waste treatment facilities but as not effective as community wish – some wastewater is released to a small stream. Land clearance for tourist resort development has lead to soil erosion and sedimentation.

It is difficult to reduce number of tourists come to Ratcha Yai Islands due to target of National Plan to increase number of tourists from 8 million to 12 million a year.

3.2.1 Regulation / legislation / policy background / government involvement

More than 10 million tourists visited Thailand per year and have been increased for the next future, according to the government policy on tourism that attempt to promote Thailand as amazing and unseen places to global level.

Phuket Island is one of destination to visit as a relaxed and recreational place. Beautiful beach and sea as well as coral reef that they can stay enclose with it. According to Phuket provincial tourism policy to increase number of tourists from 8 million to 12 million, approximately 1,200 tourists visited Racha Yai Island as a day tripper per day. Racha Yai Island that is the most famous site for scuba diving and snorkeling to see coral and many kind of fishes.

Overcapacities to receive many tourists per day have occurred in the island. Accordingly, Racha Yai Island have been confronted with huge problem to the environment impacts such as increasing of garbage and solid waste, water consumption, waste water, accommodation, local business as well as tourism activities that have been affecting to the coral reef (try dive, sea walker, etc.)

There are a few government agencies that have authority and legislation on the island as follows,

**Rawai Municipality** is local government agency that has authority and responsibility to support and provide key infrastructure and facilities to local community. By the way, they have faced many constraints to organize such activities because of no community on the island; most of them moved several years ago. Insufficient officers, budget as well as low enforcement of law and regulation are current situation for them. Main roads and some area are belonging to private sector.

**Police station** is located in Racha Yai Island by supporting the land to settle the station from private sector. Security and life safety are required from local people, hotel & resort owners, local businesses as well as tourists. Only 2 policemen stay on this island.
**Racha Yai committee** is one the body that composed of representatives from government agencies and local people on Racha Yai Island. They formed themselves as a platform to work together for resolving the problem and conflict that have appeared among multiple uses of coastal and marine resources from relevant stakeholders. They have insufficient technical and financial support from the government.

**Racha Yai Island Conservation and Self-care Club** is formed as informal group whom have concerned about depletion of coastal and marine resources. They have organized a few activities such as informal meeting and discussion, sewage and garbage collecting on the beach as well as they established the regulation regarding to marine and coastal resources and established sign on the beach for warning tourists to practice in the right way.

### 3.2.2 Small Resort

There are 4 (four) small resorts in Racha Yai Island:

1) Bungalow Raya Resort and Restaurant  
2) Raya Garden  
3) Raya Father and Restaurant  
4) Raya Dive Village and Restaurant

The first small resort in the island is Bungalow Raya Resort, and then followed by Raya Garden, Raya Father and Raya Dive Village, respectively.

In the past, people on Phuket island came to utilize land on Racha Yai island as coconut plantation, paddy field and set up their community. During that time, some backpacker tourists visited this island and local people could gain some income from selling their local products to the tourists. Racha Yai island has high potential to develop as economic benefit, some of investors came to convince local people to sell their land to them. Most of local people sold their land without land title then local people moved out from the island to main Phuket island. Outsider as a new comer and have more power with their money to construct all of facilities for supporting their tourism activities.

After the large resorts on Racha Yai island promoted their tourist attraction as marketing to the public, many tourists come to visit Racha Yai island every year increasingly. The needs of extend capacity of accommodation and employment are highly. More migrant employees are increasing especially from Burma.

At this present, most of people on the island are originally from outside Racha Yai island and they are less feeling attachment with the island that they live and gain benefit for their livelihood. Poor concern on coastal and marine resources has been appeared by destructing of coral reefs (walking on the coral reef), solid waste scatter on the beach.

Among the four resorts, only two which have solid waste treatment, they are Bungalow Raya Resort and Raya Father.
3.2.3 Large resorts

Finding of three large resorts are described as follows:

*Ratcha Resort* established at 2004. It has 234 employees. No local people hired by the resort (they are already rich), usually they come from main island (Phuket). Ratcha island is the one who have certifitace land of tenure, others do not have.

Ratcha Resort has Environmental Impact Assessment (EIA) and water treatment, but in reality the system cannot treat the water 100%.

Resort doing beach cleaning every day. Motivate guest not to grab or take corals, and also invested in artificial reefs. They have plan to build solar energy to complement existing fuel fossil. 80 rooms or equal to 160 guest are available.

There are 2 category of waste treatment management in the resort. First is wet, where organic materials from the kitchen are dumped at land fill and treated using EM for use of fertilizer. Second is dry, where paper, plastics, and canned are separated and transported to the mainland. Incenenerator (80 kg/hour capacity) is also available for tissues burning.

Water consumption and gasoline use is about 250 km3/day and 85,000 liter/month respectively. There are 3 generators within 2 machines of 500 KWH capacity and 1 machine of 1,000 KWH capacity. The source of fresh water is comes from 5 m depth well extracted into 50 cubes to store the water. Through purification phase (active carbons and sands), the water goes to 4 tanks. By adding 10% of Chlorine, the waters are then pumped into high tank. From this point, the water divided into 2, first goes to the bathroom and kitchen washing, and second goes to reverse osmosis process for resort staff drinking and cooking or kitchen use (8.8 km3/day). More than 1 million bhat for gasoline to run generator produce electricity.

The waste water goes from kitchen are retained in the pond for fat removed (grease trap). This process will takes around 3 days. Afterward, the water goes to treatment tank and then flowed to oxydation ponds. Once this process completed, the treated water can be used for gardening purpose. However, during rainy season, heavy rain made oxydation ponds spill over and polluted public canal.

Clearing land forest for rain harvesting ponds in the steep hills is also causing sediment run off during rainy season. Trees and grasses are already planted to address this issue, but buffalos eat those plants.

1 million bhat has been invested by Ratcha resort as part of its CSR to build floating jetty. They charge Tour Operator/Boat owner 20 bhat for each boat’s engine a day who parked the boat in this jetty. 50% of the fund will be use for jetty maintenance and 50% remaining will be used for coral conservation activities through Self Care Club.

*Ban Raya Resort* established at 1987 in the area within 25 rai. In 1992, the resort made commitment with the government to have right on land use for a long life by paying tax every
year. The terms is the Resort has to maintain the surrounding environment. The resort is also conduct green concept already such as solid waste separation (glass, plastic, canned), limit the waste production (shrimp already peeled at the main land before coming to resort restaurant), construction of ponds for biological waste water treatment through Effective Microorganism.

Solid wastes are transported to the main island by long tail boat everyday. Crushing bottle into small particles are used for road construction. The resort has now 40 guest rooms, 6 ground water wells and 19 more wells at 2 plotted area. Use this water for bathing, washing, etc. Purification tanks are existed for drinking of resort employees while guest are still using bottled water bought from main island.

SOP on using water and energy wisely is already in place. The resort also provide land for University Laboratory building as part of its CSR. Feedback from the scientific resort is also implemented by the resort such as Tsunami early warning system and putting more EM in the treatment pond. Every morning activities is cleaning the beach. Incinerator is used for leaves burning.

*Raya Buri Resort* has 50 rooms, 24 rooms in the new building and 26 rooms in the old building. Green concept has been adapted by the resort such as no dryer but sun light used for drying to reduce energy consumption, no chemical use for laundry (chemical product used only in the main island), solar energy to produce hot water, and conduct waste water management, cleaning the beach every day, encourage tourists to abide Do and Don’ts regulation.

Waste water is filtered at water treatment ponds and tanks before released it to the canal. Separation of solid waste is conducted and piled up at the back of resort and then transported to the main land. Road construction leads to block the stream that flowing polluted water from land to sea through Siam bay, causing stagnant water and annoying population due to its bad smell.

Communication is well maintained between resorts, but in reality does not seem to do so, even no representative from Raya Buri at Self Care Club.

Large Resort Owner (Raya Buri) putting concrete wall on the beach to protect the beach cause natural erosion. This wall is remain in place.

There are unresolved issues on community access to the private roads (local people think the roads should be public roads).

Unloading construction material cause sedimentation run off problem in Siam Bay. Due to coral existence, the construction company move to unloading materials at Ter Bay. Due to problem with access road to construction site, conflict with private properties, again the construction company insist to unloading materials at Siam Bay.

3.2.4 Carrying capacity
Studying of carrying capacity has not been done in the island in term of carrying capacity. Expectations of the local community members are Tourist operators stay within the limits of island’s carrying capacity.

### 3.2.5 Waste water management

According to the field work on environmental monitoring in Racha Yai of February 2013, characteristics of some environmental parameters of Racha yai as follows:

<table>
<thead>
<tr>
<th>location</th>
<th>Temperature</th>
<th>Salinity</th>
<th>DO</th>
<th>pH</th>
<th>Smell</th>
<th>Colour/appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raya father shallow well water</td>
<td>30.6</td>
<td>10</td>
<td>03.80</td>
<td>6.68</td>
<td>Low smelly</td>
<td>yellowish</td>
</tr>
<tr>
<td>The Racha rain water harvesting pond</td>
<td>30.0</td>
<td>0</td>
<td>06.52</td>
<td>8.06</td>
<td>no</td>
<td>Low turbid</td>
</tr>
<tr>
<td>The Racha Water pumping station</td>
<td>30.2</td>
<td>0</td>
<td>07.42</td>
<td>6.69</td>
<td>No</td>
<td>Low turbid</td>
</tr>
<tr>
<td>River, Close to Rayaburi resort (near the bridge)</td>
<td>29.5</td>
<td>6</td>
<td>12.65</td>
<td>8.75</td>
<td>Bad smell</td>
<td>Brownish yellow</td>
</tr>
<tr>
<td>Siam river mouth</td>
<td>31.6</td>
<td>23</td>
<td>07.56</td>
<td>8.26</td>
<td>no</td>
<td>Brownish yellow</td>
</tr>
<tr>
<td>Northern side stream mouth at Siam bay</td>
<td>31.2</td>
<td>26</td>
<td>12.50</td>
<td>8.91</td>
<td>bad</td>
<td>Greenish</td>
</tr>
<tr>
<td>Northern side stream, after the dam</td>
<td>31.2</td>
<td>30</td>
<td>04.74</td>
<td>7.81</td>
<td>bad</td>
<td>Brownish yellow</td>
</tr>
<tr>
<td>Land side from the dam</td>
<td>27.3</td>
<td>0</td>
<td>01.72</td>
<td>7.59</td>
<td>bad</td>
<td>Blackish</td>
</tr>
<tr>
<td>Big reservoir</td>
<td>32.1</td>
<td>0</td>
<td>09.50</td>
<td>8.51</td>
<td>Not good</td>
<td>Greenish</td>
</tr>
<tr>
<td>Ban Raya treated waste water from their treatment plant</td>
<td>28.4</td>
<td>0</td>
<td>01.80</td>
<td>6.43</td>
<td>bad</td>
<td>Greyish</td>
</tr>
<tr>
<td>Close to dump site</td>
<td>29.7</td>
<td>0</td>
<td>00.40</td>
<td>7.62</td>
<td>bad</td>
<td>Blackish</td>
</tr>
<tr>
<td>Downstream of waste dump site</td>
<td>29.5</td>
<td>0</td>
<td>01.05</td>
<td>7.81</td>
<td>bad</td>
<td>Blackish</td>
</tr>
<tr>
<td>Raya buri</td>
<td>29.9</td>
<td>5</td>
<td>13.00</td>
<td>7.90</td>
<td>No</td>
<td>Light Yellow</td>
</tr>
</tbody>
</table>

**Use of Natural resource**

The main water source used in Rachaya Island is the ground water from the Dug well and the water reserved from the reservoir (Rain water harvesting system). The ground water and surface water used for the washing and cooking purposes. Bottled water used for the drinking purposes but some of the restaurants used the ground water for drinking purposes after the filtration and reverse osmosis.
All small resorts do not practice any kind of waste water treatments/practices. The waste water directly opened in to the stream or through outlet canals in to the sea. Few large resorts use waste water treatment units to treat the water from Kitchen waste, Sewage and Laundry waste after the series of process such sedimentation, purification (Chlorination) and physical action (Aeration). The treated water used for the gardening purposes.

Major limitation is the capacity of the water treatment pond is lower than the amount of water released. During rainy season waste water overflows in to the lower elevation without physical aeration which may cause contamination (240m³ water released every day to the 100m³ capacity waste treatment pond)

Some of the large resorts use open dumping sites to dispose their waste, but this is not up to the standard mark, all kind of waste are dumped including glass bottles, plastic bottles, paper, wet tissues and kitchen waste.

Small resorts
Location visited – Raya father, Rays garden, Rays bungalow restaurant and Raya dive village

Raya father – Raya father is one of the small resort do not practice any kind of waste management practices, they use only ground water for cooking and washing purposes without any treatment activities, the outlet of the waste water directly opened up in to the valley which directly connected with the sea. The stagnant water showed black colour in appearance with mud smell.

Raya village
Raya village is one of the eco-friendly cottage style residences in Racha Island it contains more than 20 rooms, ground water used for the washing and cooking purpose, waste water conveyed in to the small canal nearby; which finally opened in to the sea. Ground water showed higher amount of salinity and the water colour seems to be slight yellow. More than 5 opened wells to acquire ground water, this water also used for the gardening purposes as well. Among observed small resorts this showed higher amount of ground water usage.

Raya bungalow restaurant
This restaurant situated near by batok bay close to the sea, they replied that they using open dumping site for organic wastes, separation and selling of plastic bottles and cans to the main land and pumping the
waste water to the concrete pit in the upper mountain area, but the thing the team observed are entirely
different.

The waste from the kitchen directly opened in to the sea; there are more than 5-6 outlets of waste water
pipes conveyed in to the sea.

**Land based issues**
Large quantities of sediments result in Siam bay along the coast at rainy times
There is unsightly litter in an otherwise largely pristine area
Poor catchment management impacts negatively on the coastal environment and valley systems
The characteristics of coastal streams may be changed by excessive sedimentation
There is a need to maintain the natural exchange of sediments between land and ocean

3.2.6 **Transportation to/on the Racha Yai Island**

**Transportation to Racha Yai Island**

- Tourist can use speed boat from Tha Chalong (Phuket main land) to Racha Yai Island pier
- Racha Yai Island has 2 piers that use in different season. High season, during November to April, Batok bay (the Racha resort front beach) is used as a pier. In the other hand, low season, May to October, Ter Bay is used as a pier.

**Transportation on Racha Island**

- No public road and public bus/van (only van and bus that belong to each resorts)
- 2 large resorts are willing to provide road for other people to travel around the island. By the way, Routes are not good condition especially in raining season.
- Tourist can rent motorbike to travel around the island as well as walking is a good way to achieve healthy.
3.3 Problem analysis

The objective of problem analysis is to establish cause and effect loops. Some consideration are given for the following item prior to construct problem tree:

- Identify existing problems of the identified target group
- Do not concern with potential or future problems
- A problem is not the absence of a solution but existing negative stage
3.4 Objective analysis

Once problem tree constructed, Convert all elements in the problem tree into positive which is a desirable conditions as follows;

- Sustainable tourism and business opportunities for people
- Pristine environmental condition restored/maintained
- Coral health improved
- Sustainable freshwater supply ensured (groundwater use reduced)
- Integrated wastewater & solid waste management and sedimentation control developed
- Tourism Master Plan developed
- Agreement on island conservation and protection strategies and land use agreement reached
- Island trust fund developed
- Carrying capacity assessed
- Transparent governance of Rachaisland established
- Adequate GOV presence e.g. RM, PCR,
- Strengthened Sustainable tourism and business opportunities for people
3.5 Alternative analysis

Noted that following factors are need to be addressed during alternative analysis
- Identify different components/ pathways of the objective tree
- Select the problem pathways that are most important to be resolved
- Eliminate objectives that are pursued by other projects

<table>
<thead>
<tr>
<th>Island council/ trust funds established/ BC capacity developed</th>
<th>Governance improved/ carrying capacity assessed</th>
<th>Wastewater/solid waste/ sedimentation reduced</th>
<th>Sustainable water supply ensured</th>
<th>Coral reef health improved</th>
<th>CSR programs developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Medium</td>
<td>Low - Medium</td>
<td>High</td>
<td>Medium - High</td>
<td>Medium</td>
</tr>
<tr>
<td>Chance of success</td>
<td>Medium</td>
<td>Medium - High</td>
<td>Medium - High</td>
<td>High</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Benefit/ cost</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium - High</td>
</tr>
<tr>
<td>Time horizon</td>
<td>Long</td>
<td>Medium - long</td>
<td>Medium</td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>Social/ ENV Risks</td>
<td>Low</td>
<td>Low</td>
<td>Some risks</td>
<td>Some risks</td>
<td>Low</td>
</tr>
</tbody>
</table>
3.6 Overall ICM strategy of the project and expected outcomes

Team No. 5 decide to focus on Sustainable Water Supply Management in Ratcha Yai Island strategy and the expected outcomes are to ensure sustainable supply of potable general use and to Replenish of ground water to raise the ground water table of the Island.

3.7 Project Logical Framework

The Logical Framework Approach for Project Planning and Management is a tool to help strengthen project design, implementation, monitoring, evaluating and Managing research and development projects. The main features of the LFA are that it provides a structured way to identify research/development problems, to prioritize project objectives, and to evaluate achievement of the intended results. If use flexibly and creatively, it can also be used as a valuable project management tool. LFA can be found in appendix.
4. Project Description

4.1 Rationale of the project

Decrease in water availability and quality are the two basic problems in KO Racha Island. Scarcity of freshwater has been occurred due to relatively limited surface area and capacity to store water for use in the dry season, despite high precipitation rate in the Island. These challenges have been further exacerbated by unplanned development of tourism activities. Hotels and resorts are facing local water scarcity in peak season when water consumption is much higher. These result in over pumping from existing ground water resources, and consequently affect their long-term quality and thus their sustainability.

Unregulated tourism activities have also increased water resources pollution by producing excessive wastewater. Deforestation processes have also worsened the scarcity problem which resulted in freshwater importation from the mainland.

Seawater intrusion has also decreased the quality of the ground water resources. Extensive overexploitation of groundwater declined the water table which resulted in high salinity level in groundwater.

Solutions include mainly development of alternative/additional water resources as well as preservation of the existing ones. Rainwater harvesting systems can be a good option to deal with such scarcity problems. Rainwater is free of any chemicals and dissolved salts. Unlike well water, rainwater is naturally soft, and can be used for household purposes without the need for a water softener. Rainwater Harvesting (RWH) system is not the definitive answer to household water problems, but can help, to some extent, improve water provision, thereby reducing the demand on existing water sources. Additionally, the delayed release leads to replenishment of ground water level.

In this project, collecting rainwater from rainfall events will be done by roof-based technique. Roof-based rainwater harvesting includes collection of rainwater runoff from roof surfaces into storage tanks for direct use. These systems will be implemented as pilot basis where roof-top RWH systems will be introduced in two small resorts (Raya Father and Raya Garden).

4.2 Main objectives:

The long-term vision of this project is to achieve the following outcomes:

- To ensure sustainable supply of potable water for drinking and general use in the Island.
- To Replenish of ground water to raise the ground water table of the Island.

4.3 Immediate objectives:

The project will be done as a pilot-basis. So, the short-term objectives within the project period are:
• To achieve continuous freshwater supply in Raya garden and Raya father resorts for domestic purpose.
• To raise the ground water table in the project area
• Aforestation in specific locations
• Awareness raising

4.4 Expected Outputs:

• Roof-based tanks in Raya Garden and Raya Father resorts for Rainwater Harvesting
• Increase in the forest cover of the project area
• Awareness of Ownership

4.5 Activities

4.5.1 Roof-based RWH

Rainwater harvesting refers to collection and storage of rainwater aimed at conservation and efficient utilization of the limited water endowment. Rooftop rainwater harvesting at the household level is most commonly used for better quality of harvested rainwater for domestic purposes. It is beneficial as a household option as the water source is close to people and thus requires a minimum of energy to collect it. An added advantage is that users own, maintain and control their system without the need to rely on other community members.

In Racha Yai Island, rainwater harvesting systems will be installed in the existing resorts of Raya Father and Raya Garden as a pilot-basis. The harvested rainwater will be used for bathing, toilet flushing, garden watering, cleaning and laundry washing which activities do not require drinking water quality.

4.5.1.1. Components of a Rooftop RWH:

The Rooftop rainwater harvesting system will consist of four basic sub-systems:

i) A Collection surface (i.e roof)
ii) A Conveyance system (i.e gutter, pipes)
iii) A Storage system (i.e tank or cistern)
iv) A Delivery system (i.e pump)

Additional peripheral equipments like first flush systems and filtration equipment & settling chambers will be incorporated, if required.

i) A Catchment (Collection) surface:

The catchment surface is the surface which directly receives the rainfall and provides water to the system. For domestic rainwater harvesting, the most common surface for collection is the roof. Roofs are ideal as catchment areas as they easily collect large volumes of rainwater. The size of the roof catchment surface determines the quantity of the collected rainwater. There is
also a close connection to the quality of the water, since the major contamination of rainwater occurs after the contact with the catchment surface.

The amount and quality of rainwater collected from a roof catchment area also depends upon the rain intensity, roof surface area, type of roofing material and the surrounding environment. A roof made of reinforced cement concrete or galvanized corrugated iron will provide good quality of harvested rainwater.

ii) A Conveyance (Guttering) system:

The conveyance system is used to transfer the precipitation from the roof to the storage tank or to the cistern. Gutters are the channels usually fixed to the edge of the sloping roof and catch the water as it falls from the roof. Gutters are connected to drain pipes from the roof top to transport the rainwater to the storage tank. Gutters can be semi-circular or rectangular and ranging from the factory made polyvinyl chloride (PVC) type to homemade using bamboo or folded metal sheet. Materials suitable for the pipework include PVC, polyethylene (PE) or galvanized iron (GI).

Before water is stored in the storage tank/cistern, and prior to use, it should be filtered to remove particles, leaves and other debris. First flush systems which filter out the first rain and diverts it away from the storage tank should also be installed. This will remove the contaminants in rainwater which are highest in the first rain shower.

First flush system: A first flush device is an automatic valve that ensures the runoff from the first spell of rain is flushed out and does not enter the system. The first spell of rain carries a relatively large amount of pollutants like dust, bird droppings, leaves, dirt etc. from the air and roof surface. To prevent these pollutants from entering the storage tank, the first rainwater containing the debris will be diverted or flushed by the first flush device.

Filtration system: The filter is used to remove suspended pollutants from rainwater collected over roof. A filter unit is a chamber filled with filtering media such as fiber, coarse sand and gravel layers to remove debris and dirt from water before it enters the storage tank. Charcoal can be added for additional filtration of the suspended contaminants.

iii) A Storage system:

Storage tank or cistern is required to store harvested rainwater for use when needed, since rain does not always fall when it is required. Since the storage tank is generally the most expensive part of the system, it therefore requires careful design and construction. Special attention has to be turned on its design to provide optimal storage capacity while keeping the cost as low as possible. Moreover, the tank or cistern must be constructed in such a way that it is durable and watertight and the collected water does not become contaminated. Moreover, Storage tanks must be opaque to inhibit algal bloom and should be located near to the supply and demand points to reduce the distance water is conveyed. Storage tanks should also be kept closed to prevent the entry of insects and other animals.
Depending on the space available in the Raya Garden and Raya Father resorts, these tanks can be constructed above the ground, partly underground or underground. Construction of tanks above ground is preferable due to low cost. These tanks can be constructed of an inert material such as reinforce concrete, ferrocement, fiberglass or polyethylene.

The size of the storage tank needed for a particular application is mainly determined by the amount of water available for storage (a function of roof size and local average rainfall), the amount of water likely to be used (a function of occupancy and use purpose) and the projected length of time without rain (drought period).

iv) **A Delivery system:**

Delivery system is required to transport back the harvested water to the resorts for domestic use. This system usually requires a small pump, a pressure tank and a tap as delivery by means of simple gravity on site is not feasible.

4.5.1.2 **Design of a rooftop RWH system:**

The design of the rooftop RWH includes determining the required storage volume, and consequently the required size of the storage tank. The size of the storage tank is a function of the amount of water available for storage, the amount of water likely to be used and the projected length of drought period.

For the design of a rooftop RWH for domestic use in an individual resort, the following data will be required:

- Local rainfall data and weather patterns
- Size of roof collection surface
- User number and consumption rate
- Runoff coefficient (a commonly used efficiency value, varies between 0.5 to 0.9, which is the percentage of precipitation that appears as runoff after losses due to percolation and evaporation)
- Length of the drought period

There are several methods to calculate the largest storage requirement based on the consumption rates and occupancy number. These methods vary from simple demand side approach to more sophisticated modeling software.

A simple demand-supply method can give the idea of required storage volume and water harvesting potential as well.

**From Demand side:**

Considering a single bungalow of Raya Garden:

Consumption per capita per day, \( C = 20 \) litres

Number of users, \( n = 4 \)
So, annual consumption = C x n x 365 = 29200 litres

So, monthly consumption ≈ 2450 litres

Projected length of the drought period = 2 months

So storage requirement, T = 2450 x 2 = 4900 litres

This is a simple method to determine rough estimates of the tank size.

From Supply side:

As rainwater supply depends on the annual rainfall, roof surface and the runoff coefficient,

The volume of rainwater harvested = rainfall x roof area x runoff coefficient

Now, The roof surface area in a bungalow of Raya Garden = 50 m$^2$

The average annual rainfall = 800 mm (0.8 m)

Runoff coefficient = 0.8

So, volume of annual rainwater yielded = 0.8 x 50 x 0.8

= 32 m$^3$ ≈ 32,000 litres

So, it reveals that, this annual volume is slightly more than the annual drinking water requirement of 4 numbers of guests (i.e 29200 litres) in a bungalow of Raya Garden.

4.5.2 Afforestation

The assessment of water resources and their sustainable supply is a fundamental step in the planning of sustainable water supply in Small Island. Conventional water resources (e.g., surface water, groundwater, and rainwater) need to be thoroughly assessed and their use maximised before unconventional options (e.g., desalination and importation) are considered. Conjunctive use of rainwater catchments and shallow groundwater sources should always be considered in such assessments. Rainwater may be a suitable option for the most basic of needs, such as drinking and cooking, leaving the more saline water for other uses, such as bathing and washing.

In order to get more water supplies over period of time, rainwater catchments and shallow groundwater sources can be supported by afforestation, the establishment of tree crops by planting on land previously not used for tree. To maximize the quantity of fresh groundwater, it may be prudent to selectively clear vegetation, particularly coconut trees, to reduce transpiration. This selective coconut trees are also a source of food and drink (reducing drinking potable water), shade and materials for building, as well as other purposes.
4.5.3 Awareness Programs:

Community awareness programmes including water source protection; water storage and purification practices; washing and cleaning practices; use and maintenance of sanitation systems; reduce wastage; etc. are needed to encourage sustainable water use practices.

The technologies are simple to install and operate; local people can be easily trained to implement them. It is convenient in the sense that it provides water at the point of consumption, and family members and resort have full control of their own systems, which greatly reduces operation and maintenance problems. However the ability to adequately manage water resources is hindered by the lack of technical know-how and equipment, knowledge of freshwater sources, and inadequate monitoring of the quality and supply of fresh water resources. These can be addressed by capacity building in the field of technological as well as managerial solutions. Focus should be put on members of the communities with emphasis on the tourist sector (hotel owners, large and small resorts managers).

Water resources also should be regularly monitored for quantity and quality and necessary remedial action taken to prevent over-utilization or degradation. Waste reduction measures may include reducing water supply pressure to minimum levels, installing low-flow fixtures, and using water conserving devices. An active leak detection and repair program is also essential for both delivery systems and individual household systems, as many water supply systems often have substantial losses due to leaks.
### 4.6 Time-Frame

<table>
<thead>
<tr>
<th>Activities</th>
<th>Year - 2014</th>
<th>Year - 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan-Mar</td>
<td>Apr-Jun</td>
</tr>
<tr>
<td>Construction of 7 RWH tanks in Raya Garden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of 13 RWH tanks in Raya Father</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reforestation to support ground water capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissemination to increase awareness, seminar, training.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring and evaluation of water quality &amp; quantity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Target group and local community participation

5.1 Target group beneficiaries

At the end of the project, the following target groups will be benefitted from the outputs and outcome. Local Households, small resort owners, due to lesser use of ground water, the aquifer will be recharged and can be used by the stakeholders in future. Cost of water will be reduced to them.

5.2 Livelihood linkages

This project can contribute to the sustainable livelihood. Water is the important component for the life of human being. If the water supply is sustainable, the different activities on the island will continue. In a way local households, small resort owner, fishermen, tourists operators and all segment of the community living there will be able to continue their activities for their livelihood. Also the activity of the project will also provide livelihood to the local community.

5.3 Local participation

This aspect is very important for the project. First of all the local people participation is essential in the perspective of not pumping out the water for the retention of ground water level. Their awareness is very important. Every stakeholder will be made aware of the importance of ground water level and also they will be made aware about sustainable use of water in a way they use the alternative source of water by adopting the technique of rain water harvest and construction the overhead tanks to utilize the rain water. It is also necessary to make them aware about judicious use of water to avoid the water scarcity. For such awareness, women can play a vital role because of their important role in the society. If this segment of society is aware about the importance of this project, the problem of the scarcity of water and sustainable use water can be overcome. Sustainable water supply and development of water technique are only possible when there is judicious use of the water collected from different source of water.

As there is no direct disadvantage to the stakeholders but due to water availability at the door step and intensity of purchasing water from market reduces, the entrepreneurs who are involved in this may face low demand from the users in the island.

5.4 Gender equality themes

Sustainable water supply in this project shall be addressed as a tool to mobilize local participation and guide them practicing co-management and integrate coastal zone management rather than immediate objective of the project. Increased awareness of value of the sustainable water using to the living of the community, climate change impact and changed behavior cannot be achieved if vulnerable groups are ignored. Working directly with the target communities is central to addressing the problem where local people have had little or no voice in present government efforts in conserving marine resources and responding to climate change impact.

Women play a critical role in both coastal development economies and in efforts to conserve coastal resources but often face significant challenges to contribute to effective management. It has been noted that woman have important role in the sustainable water using. These growing
networks of women are introduced through social networking has been greatly encouraged in other regions. There are tourism related community groups which are mainly comprised of women (e.g. large resort, small resort, local business and labours...) and efforts will be made to ensure such groups are represented and involved at the stakeholder meetings and through project implementation.

The project will be mainstreaming gender and development approach in the coastal resources management and climate change adaptation. The project will involve women participate in all project activities, such as in all meetings, training courses and promotion, development and implementation of sustainable water supply plan.

5.5 Participation and communication strategy

This is participatory Project design. During planning process, the local community has been involved in the participatory planning and design of projects. The following tools have also been used for feedback.

Through public meeting for Stakeholder Analysis, Problem Analysis, Objective analysis
Through Brochures.
Through banners.
Through pamphlets
Through media like newspaper/radio/messages on mobile
Involving the local community in planning phase
6. Project Management, Monitoring and Evaluation

6.1 Project Management Organization

*TEAM 5* (ICM students) will be the lead partner to manage, conduct, implement and coordinate this project with relevant partners.

*MFF – IUCN* (Mangrove for the Future) will be the key donor to provide financial support as well as coordinate this project at the government provincial level and policy maker.

*AIT* (Asian Institute of Technology) will be the technical support for capacity building such as workshop, training and engineering construction of the rain water harvesting system and ponds.

*A Project Advisory Group* as same group with the Racha Yai Committee that will involve for coordinating between local government and local club on the island. They will support on policy and recommendation to implement this project as well as conducting a review workshop with project staff and working group every six month to monitor project progress and advice in project implementation.

*A Project Working Group* will be established that composed with key stakeholders from Phuket provincial level, academic institution, government organizations, private sectors as well as local people that formed as Racha Yai Island Conservation and Self-Care Club. They will involve in decision making, monitoring and evaluation of the project.

*Rawai Municipality* will be key partner from local government in Phuket island and Racha Yai island. It will response for permission to implement this project at Racha Yai island and will support technical especially coordinate between local government, private sectors as well as local community.

*Small and large resort owners* will be target group of this project to implement sustainable water supply by using Roof-based Rainwater Harvesting Tanks system as. They will provide a demonstrate site (2 small resorts).
6.2 Monitoring System

Monitoring mission to review project progress will be carried out 3 times through the project’s schedule lifetime. This will be arranged by IUCN/MFF in coordination with stakeholders. Purpose of this mission is to meet stakeholders and visit project sites; to assess project progress, effectiveness, impact, replication and long-term sustainability; and lesson learnt. Final evaluation of the project will be carrying out at least 1 month after actual completion of the project.
In addition to this other adaptive management tools such as regular SWOT (strengths, weaknesses, opportunities and threats) analysis will be applied from the project’s outset.

<table>
<thead>
<tr>
<th>Planning</th>
<th>Monitoring &amp; regular review</th>
<th>Evaluation</th>
<th>Audit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who?</strong></td>
<td>IUCN/MFF, AIT, Rawai Municipality All stakeholders</td>
<td>IUCN/MFF, AIT, Rawai Municipality Key stakeholders</td>
<td>Incorporates – external inputs</td>
</tr>
<tr>
<td><strong>When?</strong></td>
<td>Annually</td>
<td>The end of the first year, Monitoring per 6 months for second year for MFF</td>
<td>Mid-term, End- of project: 03 months after project ending (March 2017)</td>
</tr>
<tr>
<td><strong>Why?</strong></td>
<td>Project implementation</td>
<td>Check progress, take Learn broad lessons Provide assurance and remedial action, applicable to other accountability to update plans</td>
<td>Learn broad lessons Provide assurance and remedial action, applicable to other accountability to update plans programmers/ projects Provide recommendations Provide accountability</td>
</tr>
<tr>
<td><strong>Link to Log frame objective hierarchy</strong></td>
<td>Input, activities, assumptions</td>
<td>Inputs, activities, results</td>
<td>Results, purpose, overall Inputs, activities, objective (&amp; link back and results to relevance)</td>
</tr>
</tbody>
</table>
6.3 Indicators and Means of Verification

Timely completion and submission of all deliverables and practical implementation training activities during the first year of the project will ensure all stakeholders have all skills and awareness needed for the implementation. The implementation plan will be developed with SMART (specific, measurable, attainable, realistic and timely) goals in partnership with stakeholders and consultants. These will be assessed throughout the duration of the project in order to adapt management and procedures to changing conditions and situations.

By the end of 2015:

- 20 rainwater harvesting tanks are constructed by 2014;
- 2 small resorts; Raya Garden and Raya Father Resort are able to use 20% of freshwater from rainwater harvesting by 2014 and 50% by 2015
- 10% of forested cover is increased by 2015;
- support to build and implement the rain water harvesting plan
- Local communities understood how rain water harvesting
- Community (poor households) understood the relationship of rain water harvesting and their livelihoods.

Means of Verification:

- Reports
- Training documents.
- Publications
- Document on good practices

6.4 Reporting System

The Project Working Group will prepare quarterly and annual reports for submission to IUCN/MFF and send a copy to Rawai Municipality, Phuket government for information. These reports will outline achievements against work plan; constraints to meeting project objectives; expenditures and other relevant information such as staff movement. Other personnel such as consultants assigned to specific tasks will also be required to prepare relevant reports to document their results.

The reports include:

- Activity reports made by the project coordinators.
- Internal 6-month and annual reports (technical & financial) of the Project Working Group.
- 01 report of end-of-project external evaluation and lesson learned
6.5 Communication Strategy

The focal point for communication between local and provincial level will be the Project Coordinator. S/he and project staff will be responsible for coordinating the project activities and meetings between project partners and relevant stakeholders. They will also produce and disseminate for project report, progress reports, project output, financial reports and other related publication.

**Target audiences:** local community, Racha Yai Conservation and Self-care Club, Racha Yai Committee, small – medium resort owners, large resort owners, local business, tour operators, NGO officers, project officers and researchers.

**Communication objective:** to raise awareness of audiences on sustainable water supply and climate change, and sustainable economic development.

**Key messages:** improvement of water supply system and resilience livelihoods through local stakeholder actions.

**Media:** local radio, television, website, newspaper, Facebook page,

**Monitoring and evaluation:** six months report, progress report.

MFF will provide and support external communication with public who concern and interested this project. Website and monthly e-newsletters will be created by project staffs with assisting from MFF
7. Continuation of project activities

Sharing lesson learnt from the outcomes of the RWH in Raya Father and Raya Garden will be useful evaluation on continuation of the project. Successful experiences of the project will be very useful for stakeholders who involved and may apply to other small resorts, small restaurants, large resorts as well as local households on Racha Yai Island with willing to build their own RWH by using own budget. The trained local persons for Rainwater Harvesting system might become trainers for other projects.

But this project may become unsuccessful due to some constraints such as incomplete construction of the system, insufficient maintenances etc. If the project fails to achieve the expected outcomes, the needs for alternative sources of sustainable water supply should be assessed. Other alternatives such as construction of Rainwater harvesting ponds can be done in the foot of hills far behind from the proposed constructed wetland by Team 3. The cost of such alternative will be much higher than RWH tanks and the required lands are entirely privately owned.

Another expensive alternative like Desalination (e.g. RO - reverse osmosis) can be proposed for removing the excess salt and other minerals from ocean water in order to obtain freshwater. Desalination can provide a good solution to supply domestic water demands, but the high cost is a major limitation. It is considered as the last solution that should be only developed when more conventional water resources are exhausted and in any case cannot be a substitute to more economical long-term and less expensive water supply strategy, but rather a supplement. These, therefore, cannot be seen as the sole solution. Increasing water supply cannot be expected to solve water shortage problems; the more water is produces, the more is used. So, it is advisable to improve the utilization of the existing freshwater resources (e.g. reducing water wastage and pollution) before other options such as desalination is introduced, or at least in parallel to them.
## 8. Project Budget Plan

<table>
<thead>
<tr>
<th>Category and Item of Expenditure</th>
<th>Unit</th>
<th>Quantity</th>
<th>Unit Price (USD)</th>
<th>Cost</th>
<th>Sub total</th>
<th>MFF fund</th>
<th>local contribute</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output # 1: Roof-based tanks in Raya Garden and Raya father resorts for Rainwater Harvesting are constructed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activity # 1.1. Construction of rainfall harvesting tanks include filtration and purification</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation of Rainfall harvesting tank sets (20 sets include: tank, PVC pipe, pump and others)</td>
<td>set</td>
<td>20</td>
<td>3,000.00</td>
<td>60,000</td>
<td>6,000</td>
<td>54,000</td>
<td></td>
</tr>
<tr>
<td>Maintenance cost 3 sets x 3 times/2 years)</td>
<td>set/ 6 months</td>
<td>18</td>
<td>25.00</td>
<td>450</td>
<td>450</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance cost 3 sets x 3 times/2 years)</td>
<td>days</td>
<td>30</td>
<td>12.00</td>
<td>360</td>
<td></td>
<td></td>
<td>360</td>
</tr>
<tr>
<td>Travel cost (flight and car to/from airports) BKK - Phuket - Racha Yai for resource persons (4 persons)</td>
<td>trip</td>
<td>4</td>
<td>250.00</td>
<td>1,000</td>
<td>1,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per diem for resource persons (4 persons x 4 nights)</td>
<td>nights</td>
<td>16</td>
<td>100.00</td>
<td>1,600</td>
<td>1,600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing report</td>
<td>lump sum</td>
<td></td>
<td>500</td>
<td></td>
<td></td>
<td>500</td>
<td></td>
</tr>
<tr>
<td><strong>Activity # 1.2. Monitoring and evaluation rainwater harvesting tanks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel cost (flight and car to/from airports) BKK - Phuket - Racha Yai for resource persons (4 persons)</td>
<td>trip</td>
<td>12</td>
<td>250.00</td>
<td>3,000</td>
<td>3,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per diem for resource persons (4 persons x 4 nights x 3 times)</td>
<td>nights</td>
<td>48</td>
<td>100.00</td>
<td>4,800</td>
<td>4,800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing report (3 reports)</td>
<td>report</td>
<td>3</td>
<td>200.00</td>
<td>600</td>
<td></td>
<td>600</td>
<td></td>
</tr>
<tr>
<td><strong>Output # 2: Increase in the forest cover of the project area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activity # 2.1. Replanting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel cost (flight and car to/from airports) BKK - Phuket - Racha Yai for resource persons (4 persons)</td>
<td>trip</td>
<td>4</td>
<td>250.00</td>
<td>1,000</td>
<td>1,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per diem for resource persons (4 persons x 4 nights)</td>
<td>nights</td>
<td>16</td>
<td>100.00</td>
<td>1,600</td>
<td>1,600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perdiem for local labours (30 persons x 20 days)</td>
<td>person - days</td>
<td>600</td>
<td>12.00</td>
<td>7,200</td>
<td></td>
<td>7,200</td>
<td></td>
</tr>
<tr>
<td>Maintainance cost (2 persons x 24 month)</td>
<td>set/month</td>
<td>48</td>
<td>200.00</td>
<td>9,600</td>
<td></td>
<td>9,600</td>
<td></td>
</tr>
<tr>
<td>Collect Young trees</td>
<td>lump sum</td>
<td></td>
<td>2,000</td>
<td></td>
<td></td>
<td>2,000</td>
<td></td>
</tr>
</tbody>
</table>
### Activity # 2.2. Monitoring and evaluation reforestation

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Frequency</th>
<th>Per diem</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per diem for resource persons (4 persons x 4 nights x 4 times)</td>
<td></td>
<td></td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Writting report (3 reports)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

### Output 3: Awareness of ownership

#### Activity # 3.1. 02 community meeting and 02 training course (4 meeting and training course x 20 persons)

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Frequency</th>
<th>Per diem</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel cost (flight and car to/from airports) BKK - Phuket - Racha Yai for resource persons (4 persons)</td>
<td>trip</td>
<td>4</td>
<td>250.00</td>
<td>1,000</td>
</tr>
<tr>
<td>Per diem for resource persons (4 persons x 4 nights)</td>
<td></td>
<td></td>
<td>16</td>
<td>800</td>
</tr>
<tr>
<td>Allowance for participants (4 meetings x 20 persons/meeting)</td>
<td>person-days</td>
<td>80</td>
<td>15.00</td>
<td>1,200</td>
</tr>
<tr>
<td>Meeting room and equipment</td>
<td>room-days</td>
<td>16</td>
<td>100.00</td>
<td>1,600</td>
</tr>
<tr>
<td>Stationary</td>
<td></td>
<td></td>
<td></td>
<td>600</td>
</tr>
</tbody>
</table>

#### Activity # 3.2. Produce leaflet, poster, booklets guiding the sustainable rainwater harvesting and the value of ground water

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Frequency</th>
<th>Per diem</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant fee for produce contents of leaflet and poster (2 consultants x 4 days)</td>
<td>day</td>
<td>8</td>
<td>200</td>
<td>1,600</td>
</tr>
<tr>
<td>Consultant fee for produce contents of 2 booklets &quot;Guiding on sustainable rainwater harvesting&quot; and &quot;the value of ground water resources&quot; (2 consultants x 8 days)</td>
<td>day</td>
<td>16</td>
<td>200</td>
<td>3,200</td>
</tr>
<tr>
<td>Translate content of leaflet into English</td>
<td>lump sum</td>
<td></td>
<td></td>
<td>300</td>
</tr>
<tr>
<td>Leaflet design and print</td>
<td>copies</td>
<td>100</td>
<td>3</td>
<td>300</td>
</tr>
<tr>
<td>Poster design and print</td>
<td>copies</td>
<td>100</td>
<td>6</td>
<td>600</td>
</tr>
<tr>
<td>Booklet design and print</td>
<td>copies</td>
<td>200</td>
<td>8</td>
<td>1,600</td>
</tr>
<tr>
<td>Fee for sending posters to relevant organizations</td>
<td></td>
<td></td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

#### Activity # 3.3. Project Management

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Frequency</th>
<th>Per diem</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project management unit</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Human resources</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Project director</td>
<td>person</td>
<td>24</td>
<td>1000</td>
<td>24,000</td>
</tr>
<tr>
<td>Accountant cum Admin</td>
<td>person</td>
<td>24</td>
<td>600</td>
<td>14,400</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------</td>
<td>----</td>
<td>-----</td>
<td>--------</td>
</tr>
<tr>
<td><strong>Office building</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office rental</td>
<td>year</td>
<td>2</td>
<td>3000</td>
<td>6,000</td>
</tr>
<tr>
<td>Utility, Maintainance</td>
<td>year</td>
<td>2</td>
<td>1000</td>
<td>2,000</td>
</tr>
<tr>
<td>Consumable and office supplies</td>
<td>year</td>
<td>2</td>
<td>2000</td>
<td>4,000</td>
</tr>
<tr>
<td>Reporting</td>
<td>year</td>
<td>2</td>
<td>2500</td>
<td>5,000</td>
</tr>
<tr>
<td><strong>Audit</strong></td>
<td>pax</td>
<td>1</td>
<td>1000</td>
<td>10,000</td>
</tr>
<tr>
<td><strong>Total budget</strong></td>
<td></td>
<td></td>
<td></td>
<td>180,410</td>
</tr>
</tbody>
</table>
## ANNEX 1: Project Logical Framework

<table>
<thead>
<tr>
<th>Narrative Summary (Sustainable Freshwater Management)</th>
<th>Objectively Verifiable Indicators (OVI)</th>
<th>Mean of Verification (MOV)</th>
<th>Assumptions and Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal (Impact)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pristine environmental conditions in the island is restored</td>
<td></td>
<td></td>
<td>Stakeholder will cooperate, political leaders will support, government will provide sustainable financing, all stakeholders will be having consensus among themselves for water use.</td>
</tr>
<tr>
<td><strong>Purpose (outcome)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable supply of potable water for drinking and general use is ensured</td>
<td>20% of freshwater will be used from rainwater harvesting by 2014 and 50% by 2015</td>
<td>Official Reports, Census report</td>
<td></td>
</tr>
<tr>
<td>- Ground water level is retained for regulated water supply</td>
<td>ground water table raised up to 1 m by 2015 Quality of ground water is increased by 2015</td>
<td>Official Reports, Census report, Field survey result</td>
<td></td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Tanks for rainfall harvesting are constructed</td>
<td>20 rainwater harvesting tanks are constructed by 2015</td>
<td>Official Reports</td>
<td></td>
</tr>
<tr>
<td>- Forested area is increased</td>
<td>10% of forested cover is increased by 2015</td>
<td>Official Reports, Field survey report</td>
<td></td>
</tr>
<tr>
<td>- Awareness of judicious use of water is increased</td>
<td>80% of island's population will be actively participated by 2015</td>
<td>Training documents, Publications, and Documentary of Good Practises</td>
<td></td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Construction of 7 no’s rainwater harvesting tanks in Raya Garden</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Construction of 13 no’s rainwater harvesting tanks in Raya Father</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Reforestation to support ground water capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Dissemination to increase awareness by seminar, workshop, training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Monitoring and evaluation of water quality and quantity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand are working together through the Bay of Bengal Large Marine Ecosystem (BOBLME) Project and to lay the foundations for a coordinated programme of action designed to improve the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries.

The Food and Agriculture Organization (FAO) is the implementing agency for the BOBLME Project.

The Project is funded principally by the Global Environment Facility (GEF), Norway, the Swedish International Development Cooperation Agency, the FAO, and the National Oceanic and Atmospheric Administration of the USA.

For more information, please visit www.boblme.org