
Mangrove Rehabilitation and Regeneration for Biodiversity Ranong Province, Thailand (Somjit Pongpasoeed) The Final Report

This project aims to develop an experiential education program involving the local community/estuarine ecosystem stakeholders in directly gathering knowledge and experience in surveying, identifying, propagating, planting, monitoring, and managing a mangrove ecosystem regeneration program located in Prapat Bay Estuary, Ranong Province, Thailand. The target community participated in environmental analyses. The project created a data base and worked to regenerate the degraded mangrove habitat with approximately 20 local compatible species of mangroves. **Annex 1 (attached file) shows the growth rate and Annex 2 (attached file) shows the growth chart** of the 20 species of mangrove identified as below :-

- | | |
|-----------------------------------|------------------------------------|
| 1. <i>Aegialitis rotundifolia</i> | 2. <i>Avicennia alba</i> |
| 3. <i>Avicennia officinalis</i> | 4. <i>Bruguiera cylindrical</i> |
| 5. <i>Bruguiera gymnorhiza</i> | 6. <i>Bruguiera parviflora</i> |
| 7. <i>Cerbera odollam</i> | 8. <i>Ceriops decandra</i> |
| 9. <i>Xylocarpus granatum</i> | 10. <i>Ceriops tagal</i> |
| 11. <i>Heritiera littoralis</i> | 12. <i>Lumnitzera littorea</i> |
| 13. <i>Nypa fruticans</i> | 14. <i>Rhizophora apiculata</i> |
| 15. <i>Rhizophora mucronata</i> | 16. <i>Pandanus odoratissimus</i> |
| 17. <i>Terminalia catappa</i> | 18. <i>Caesalpinia crista</i> |
| 19. <i>Sonneratia caseolaris</i> | 20. <i>Dolichandrone spathacea</i> |

The project goal is to create a living laboratory for local community and scientists to learn about the benefits of bio-diverse mangrove habitats. Further to this the mangrove regeneration undertaken by the project can serve as a model site for local officials working for different agencies/institutional and scientific community to assess and monitor mangrove habitat services. It is expected that the indigenous model adopted by the project will prove its worth through continued regeneration complimented by research.

Following are the demonstrated outputs of the project:-

1. A Living Laboratory in Prapat beach. The project successfully established a nursery for the 20 species of mangrove. The nursery site is located in the area where tidal water coming in and out resembling a natural habitat. The nursery has the facility to train people on soil preparation, seedling and collection, propagation and monitoring growth of the 20 species.

*Note:- The nursery place is quite difficult to walk in since the tidal water is coming in frequently. We plan to build Walk-way inside in the nursery in near future.

2. The Mangrove Terrace at KCLC. We have built the RSG project demonstration site at the KCLC for the community members/visitors who do not have time to walk in to the nursery site to learn about the mangrove species.

Annex 3 (attached file) shows the list of visitors visiting the project site to learn about mangrove at the Nursery and mangrove Terrace sites and have share their knowledge.

The project offered hands-on learning program for local school children (upper elementary through upper secondary) and community groups (young fisherfolk, and fish traders effected by the tsunami and overfishing). The activities increased stakeholders' awareness and direct practice of increasing and maintaining the biodiversity of the natural mangrove habitat and associated species adjacent to Laem Son National Park. The training participants had taken the following exercise:

- Survey specific mangrove areas in the buffer zone between agricultural/aquaculture zones and the adjacent Laem Son National Park. **(Annex 4: attached file)**
- Identify and create a data base of mangrove and associated species within the study site. **(Annex 5.1-5.5: attached file)**
- Plan and create a small mangrove seedling nursery and herbarium to regenerate native mangrove species
- Collect and propagate approximately 200 specimens of 20 mangrove associated species. The groups will collect seeds, raise, plant.
- Plant, directly, an ecologically appropriate diversity of mangroves to rehabilitate a specific degraded area.
- Attend professional development program conducted in collaboration with Laem Son National Park, Department of Marine Coastal Resources and Kasetsart University Coastal Marine Resource Research Station.

The project has been implemented for over a 12 month period and the KCLC has interest to build on the good work initiated by the project.

The project could successfully plant only six Mangrove species (*Ceriops decandra*, *Cerbera odollam*, *Ceriops tagal*, *Terminalia catappa*, *Rhizophora apiculata*, *Rhizophora mucronata*) in the degraded area due to their suitable growth length (height) until June 2009. Details of mangrove planting is provided in Annex 6 (attached file)

The rest of the Mangrove species that the project has planned to plant (based on its sufficient growth/height) in the degraded area are scheduled to be done as mentioned in the planting schedule in Annex 7 (attached file).

In the second year, the project plans to Map changes in the species within this community mangrove forest to monitor changes in the habitat's biodiversity and then monitor seedlings and in degraded areas buffering the national park to increase biodiversity.

The outcomes of the first year of the project are:-

1. Increased stakeholders' awareness on the overall benefit of Mangrove ecosystem.
2. All the stakeholders understand and participated more in the Mangrove Biodiversity activities.
3. Coastal community behaves responsibly to mangrove ecosystem i.e. reduction in cutting of the Mangrove forest, replanting more species of Mangrove in degraded areas.
4. A Living Laboratory to share and learn in RSG project.
5. Disseminating knowledge on Mangrove best practices to coastal communities in Andaman Coast, Thailand.
6. Improved knowledge of coastal community, government officials and professional development leading to healthy Mangrove ecosystem.

Annex 1

Mangrove	Growth Rate of Mangrove 20 species													
20 species	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Average growth/mth	Suitable growth(height) for Planting
1. <i>Aegialitis rotundifolia</i>	Nursery Construction, Survey	Soil Preparation	Seed Collect/Propagate	Seedling	2.76 cm	5.50 cm	9.11 cm	12.70 cm	16.29 cm	19.88 cm	22.75 cm	25.55 cm	2.76 cm	50cm
2. <i>Avicennia alba</i>	Nursery Construction, Survey	Soil Preparation	Seed Collect/Propagate	Seedling	3.59 cm	7.18 cm.	10.77 cm	14.36 cm	17.95 cm	21.54 cm	25.13 cm	28.72 cm	3.59 cm	30cm
3. <i>Avicennia officinalis</i>	Nursery Construction, Survey	Soil Preparation	Seed Collect/Propagate	Seedling	3.38 cm	3.38 cm	6.76 cm	10.14 cm	13.52 cm	16.90 cm	20.28 cm	23.66 cm	3.38 cm	30cm
4. <i>Bruguiera cylindrical</i>	Nursery Construction, Survey	Soil Preparation	Seed Collect/Propagate	Seedling	3.42 cm.	6.84 cm	10.26 cm	13.68 cm	17.10 cm	20.52 cm	23.94 cm	27.36 cm	3.42 cm	30cm
5. <i>Bruguiera gymnorrhiza</i>	Nursery Construction, Survey	Soil Preparation			Seed Collect/Propagate	Seedling	2.23 cm	4.46 cm	6.69 cm	8.92 cm	11.15 cm	13.38 cm	2.23 cm	40cm
6. <i>Bruguiera parviflora</i>	Nursery Construction, Survey	Soil Preparation		Seed Collect/Propagate	Seedling	3.26 cm	6.52 cm	9.78 cm	13.04 cm	16.30 cm	19.56 cm	22.82 cm	3.26 cm	30cm
7. <i>Cerbera odollam</i>	Nursery Construction, Survey	Soil Prep./Seed Prop.,Seedling	2.87 cm.	5.74 cm.	8.61 cm.	12.48 cm	16.35 cm	20.02 cm	23.09 cm	25.96 cm	28.83 cm	31.70 cm	2.87 cm	20cm
8. <i>Ceriops decandra</i>	Nursery Construction, Survey	Soil Prep./Seed Prop.,Seedling	3.48 cm.	7.96 cm.	12.44 cm.	16.92 cm.	21.40 cm	26.88 cm	30.09 cm	33.84 cm	36.43 cm	39.00 cm	3.48 cm	30cm
9. <i>Xylocarpus granatum</i>	Nursery Construction, Survey	Soil Preparation		Seed Collect/Propagate	Seedling	2.35 cm.	4.70 cm.	7.05 cm	9.40 cm	11.75 cm	14.10 cm	16.45 cm	2.35 cm	35cm
10. <i>Ceriops tagal</i>	Nursery Construction, Survey	Soil Prep./Seed Prop.,Seedling	4.35 cm.	11.70 cm.	20.55 cm.	29.95 cm.	34.75 cm.	39.10 cm	44.75 cm	49.80 cm	52.25 cm	55.20 cm	3.35 cm	30cm
11. <i>Heritiera littoralis</i>	Nursery Construction, Survey	Soil Preparation				Seed Collect/Propagate	Seedling	2.16 cm	4.32 cm	6.48 cm	8.64 cm	15.12 cm	2.16 cm	50cm

12. <i>Lumitzera littorea</i>	Nursery Construction, Survey	Soil Preparation					Seed Collect/P ropagate	Seedling	2.42 cm	4.84 cm	7.26 cm	9.68 cm	2.42 cm	50cm	
13. <i>Nypa fruticans</i>	Nursery Construction, Survey	Soil Preparation					Seed Collect/P ropagate	Seedling	4.09 cm	8.18 cm	12.27 cm	16.36 cm	4.09 cm	20cm	
14 <i>.Rhizophora apiculata</i>	Nursery Construction, Survey	Soil Prep./Seed Prop.,Seedling	3.66 cm.	7.32 cm.	10.98 cm.	14.64 cm.	20.03 cm	22.96 cm	25.62 cm	29.28 cm	32.94 cm	36.65 cm	3.66 cm	20cm	
15. <i>Rhizophora mucronata</i>	Nursery Construction, Survey	Soil Prep./Seed Prop.,Seedling	3.16 cm.	6.32 cm.	9.48 cm.	12.64 cm.	15.08 cm.	18.96 cm	22.12 cm	25.28 cm	28.44 cm	32.33 cm	3.16 cm	20cm	
16. <i>Pandanus odoratissimus</i>	Nursery Construction, Survey	Soil Prep./Seed Prop.,Seedling	2.85 cm.	5.70 cm.	8.55 cm.	11.40 cm.	14.25 cm.	17.10 cm.	19.95 cm	22.80 cm	25.65 cm	28.65 cm	2.85 cm	30cm	
17. <i>Terminalia catappa</i>	Nursery Construction, Survey	Soil Prep./Seed Prop.,Seedling	5.80 cm.	11.60 cm.	17.40 cm.	23.20 cm.	29.00 cm.	34.80 cm	40.60 cm	46.40 cm	52.20 cm	57.20 cm	5.80 cm	20cm	
18 <i>.Caesalpinia crista</i>	Nursery Construction, Survey	Soil Preparation					Seed Collect/Pro pagate	Seedling	2.26 cm.	4.52 cm	6.78 cm	9.04 cm	11.30 cm	2.26 cm	50cm
19. <i>Sonneratia caseolaris</i>	Nursery Construction, Survey	Soil Preparation					Seed Collect/P ropagate	Seedling	2.55 cm	5.10 cm	7.65 cm	10.20 cm	2.55 cm	50cm	
20. <i>Dolichandron e spathacea</i>	Nursery Construction, Survey	Soil Preparation					Seed Collect/Pro pagate	Seedling	2.32 cm	4.64 cm	6.96 cm	9.28 cm	11.60 cm	2.32 cm	50cm

Annex 3

Visitors Statistic			
Date	Activities	Participants	Number
20-23 May-2008	Nursery Preparation	The UCLA students, USA	28
	Soil Preparation		
	Seeds collection		
14-15 Aug-08	Nursery Visit	The students from Birmingham University, England	10
	Soil Preparation		
	Seeds collection		
	Sightseeing at the replanting area		
12 Sep 08	Nursery Visit	Local women group of Suksamran district and young fisherfolk.	25
16-30 Sept 2008	Nursery Visit	The students from:-	25
	Seeds Collection	1. Phoo Kao Thong school	
		2. Baan Kamphuan school	
		3. Dome Thong school	
		4. Damrangsart school	
8 Oct 08	Nursery Visit	The teachers of Uttao kindergarten school brought their small kids	20
7 Nov 08	Mangrove Terrace Visit	The Elderly Club of Suksamran district	70
8-9 Nov-08	Nursery Visit	The master degree students from :-	10
	Seeds Collection	Asian Institute of Technology(AIT)	
	Boat Sightseeng		
25 Nov 08	Mangrove Terrace Visit	The researchers from:-	25

		Scotland, Australia, USA, Japan, India, Srilanka, Mienmar, Philippines, Vietnam, Indonesia and Thailand.	
6 Dec 08	Mangrove Terrace Visit	Local vendors in Kamphuan.	30
22 Dec 08	Mangrove Terrace Visit	The villagers from Tone Kloy(Moo6)	5
16 Jan 09	Mangrove Terrace Visit	The Agriculture Transfer Technology group of Suksamran	10
28 Jan 09	Mangrove Terrace Visit	The teachers and children from Village 2-Suksamran kindergarten	35
29 Jan 09	Mangrove Terrace Visit	The Police Department of Suksamran and the Volunteers the Traffic	50
3 Feb 09	Mangrove Terrace Visit	The instructors from faculty of Marine Science, Chulalongkorn University	5
11 Feb 09	Mangrove Terrace Visit	Suksamran volunteers from International Red Crescent and Red Cross Union incorporation	40
12 Feb 09	Mangrove Terrace Visit	The medical doctors from Ramathibodi hospital and Suksamran hospital	8
23 Feb 09	Mangrove Terrace Visit	Domethong school, Kuraburi, Pang Nga province	10
25 Feb 09	Mangrove Terrace Visit	The community network leaders of Suksamran	45
26 Feb 09	Mangrove Terrace Visit	The village volunteers for the public healthcare of Suksamran	30
27 Feb 09	Mangrove Terrace Visit	World Vision-Thailand and World Vision-Malaysia Foundation brought	15
9 Mar 09	Mangrove Terrace Visit	The board of Armanah Suksamran Credit Union Limited Thailand	12
11 Mar 09	Mangrove Terrace Visit	The students from Chumporn Business Administration School	8
12 Mar 09	Mangrove Terrace Visit	The Foundation for AIDS Rights Prevention Center group	20
17 Mar 09	Mangrove Terrace Visit	The Cultural Parliament of Suksamran	30
23 Mar 09	Mangrove Terrace Visit	The Foundation for AIDS Rights brought the youth aging between 12-15 years old,	70
24 Mar 09	Mangrove Terrace Visit	IUCN, the International Union for Conservation of Nature and the Mangrove For The Future Project brought the experts and the administrators from various organizations that work in the coastal resource areas from Srilanka,	17
3 Apr 09	Mangrove Terrace Visit	Women homeworkers of Suksamran visited	35
7 Apr 09	Mangrove Terrace Visit	The military force from unit 25 Baytong, Yala	7
30 Apr 09	Mangrove Terrace Visit	Professional Outreach Program for local officials and agencies, institutional and scientific participated in	25

		the Mangrove-RSG meeting at KCLC.	
	Mangrove-RSG meeting		
15 May 09	Mangrove Terrace Visit	The Women group of Village 7(Ban Haad Zai Kao)	12
29 May 09	Mangrove Terrace Visit	Professional Outreach Program for local officials and agencies, institutional and scientific participated in the Mangrove-RSG meeting at KCLC.	20
5 Jun 09	Mangrove Terrace Visit	IUCN Cambodia and WWF Thailand	17
9 Jun 09	Mangrove Terrace Visit	The member of Suksamran CULT cooperatives	45
22 Jun 09	Mangrove Terrace Visit	Human Resource Development and Public Hazard Prevention Volunteer Project according to the Ranong Development Strategy Plan incorporation with TAO Kamphuan and TAO Naka	50
25 Jun 09	Mangrove Terrace Visit	Council of Suksamran Cultural Affairs	25
26 Jun 09	Mangrove Terrace Visit	American Red Cross, Thailand Delegation, Ranong Office brought the Myanmar-alien volunteer in Baan Hart Zai Kao community	25
		Total	914

Annex 4

Mangrove 20 species	Stem/Type	Seed Shape	Seed Collecting month	Area Finding seeds
1 <i>Aegialitis rotundifolia</i>	tree shrub	Bean	June-July	Prapat beach
2. <i>Avicennia alba</i>	standing timber	Bean	May-June	Ban Tubnue
3. <i>Avicennia officinalis</i>	standing timber	Bean	May-June	Ban Tubnue
4. <i>Bruguiera cylindrical</i>	standing timber	Cylinder	June-August	Prapat beach
5. <i>Bruguiera gymnorrhiza</i>	standing timber	Cylinder	May-July	Bangkluyay Canal
6. <i>Bruguiera parviflora</i>	standing timber	Cylinder	June-August	Prapat beach
7. <i>Cerbera odollam</i>	standing timber	Round	May-July	Prapat beach
8. <i>Ceriops decandra</i>	standing timber	Cylinder	June-September	Prapat beach
9. <i>Xylocarpus granatum</i>	standing timber	Round	July-September	Bangkluyay Canal
10. <i>Ceriops tagal</i>	standing timber	Cylinder	June-September	Prapat beach
11. <i>Heritiera littoralis</i>	standing timber	Round	October-November	Suk Samran
12. <i>Lumnitzera littorea</i>	standing timber	Cylinder	May-August	Suk Samran
13. <i>Nypa fruticans</i>	Palm	Round	June-September	Ban Chaklee
14. <i>Rhizophora apiculata</i>	standing timber	Cylinder	May-July	Tah Klang
15. <i>Rhizophora mucronata</i>	standing timber	Cylinder	May-July	Tah Klang
16. <i>Pandanus odoratissimus</i>	standing timber	Round	May-July	Prapat beach
17. <i>Terminalia catappa</i>	standing timber	Round	May-November	Ban Kamphuan
18. <i>Caesalpinia crista</i>	Vine	Round	September-November	Suk Samran
19. <i>Sonneratia caseolaris</i>	standing timber	Round	October-February	Suk Samran
20. <i>Dolichandrone spathacea</i>	standing timber	Cylinder	July-September	Suk Samran

Annex 5

Mangrove Species that have already been planted in the degraded area

Date	Participants	Mangrove Species(at suitable height)	Units	No .of participants
November 23, 2008	Students from Furdoeen School and Dumrongsart School	<i>Ceriops tagal</i>	50	30
		<i>Terminalia catappa</i>	50	
December 5, 2008	Volunteers of Kamphuan Village	<i>Terminalia catappa</i>	100	30
		<i>Ceriops tagal</i>	50	
December 18, 2008	Dumrongsatvitaya High School students	<i>Rhizophora apiculata</i>	100	38
January 1, 2009	Local community members young fisherfolk, traders, and youth	<i>Cerbera odollan</i>	50	15
February 1, 2009	The teachers and students from Kamaluddinschool, Suksamran	<i>Rhizophora mucronata</i>	100	35
		<i>Ceriops decandra</i>	100	
March 31, 2009	Youth Camp students	<i>Rhizophora apiculata</i>	50	20
		Total	650	168

Annex 5

Mangrove 20 species	Height suitable	Growth Height	Average	Units of Replanted species	Plan to Replant month/year	Units of Planting
	for Planting	Jun-09	growth/mth			
1 <i>Aegialitis rotundifolia</i>	50cm	25.55 cm	2.76 cm		Feb-10	200
2. <i>Avicennia alba</i>	30cm	28.72 cm	3.59 cm		Aug-09	200
3. <i>Avicennia officinalis</i>	30cm	23.66 cm	3.38 cm		Sep-09	200
4. <i>Bruguiera cylindrica</i>	30cm	27.36 cm	3.42 cm		Aug-09	200
5. <i>Bruguiera gymnorrhiza</i>	40cm	13.38 cm	2.23 cm		Jul-10	200
6. <i>Bruguiera parviflora</i>	30cm	22.82 cm	3.26 cm		Sep-09	200
7. <i>Cerbera odollam</i>	20cm	31.70 cm	2.87 cm	50	Jul-09	150
8. <i>Ceriops decandra</i>	30cm	39.00 cm	3.48 cm	100	Jul-09	100
9. <i>Xylocarpus granatum</i>	35cm	16.45 cm	2.35 cm		Feb-10	200
10. <i>Ceriops tagal</i>	30cm	55.20 cm	3.35 cm	100	Jul-09	100
11. <i>Heritiera littoralis</i>	50cm	15.12 cm	2.16 cm		Sep-10	200
12. <i>Lumnitzera littorea</i>	50cm	9.68 cm	2.42 cm		Dec-10	200
13. <i>Nypa fruticans</i>	20cm	16.36 cm	4.09 cm		Aug-09	200
14. <i>Rhizophora apiculata</i>	20cm	36.65 cm	3.66 cm	150	Jul-09	50
15. <i>Rhizophora mucronata</i>	20cm	32.33 cm	3.16 cm	100	Jul-09	100
16. <i>Pandanus odoratissimus</i>	30cm	28.65 cm	2.85 cm		Aug-09	200
17. <i>Terminalia catappa</i>	20cm	57.20 cm	5.80 cm	150	Jul-09	50
18. <i>Caesalpinia crista</i>	50cm	13.56 cm	2.26 cm		Oct-10	200
19. <i>Sonneratia caseolaris</i>	50cm	10.20 cm	2.55 cm		Dec-10	200
20. <i>Dolichandrone spathacea</i>	50cm	11.60 cm	2.32 cm		Dec-10	200