

## Report to RSPB

<b>Project Title:</b>	Tree nursery and replanting activities at Khao Nor Chuchi, Thailand
<b>Grant Amount:</b>	£5,000
<b>Donors:</b>	THE ROYAL SOCIETY FOR THE PROTECTION OF BIRDS
<b>Project Period:</b>	01 January 2013 - 30 August 2013
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### INTRODUCTION

The small forest patches of lowland tropical evergreen forest that remain around Khao Nor Chuchi (KNC) in Khao Pra Bang Kram Wildlife Sanctuary and in the adjacent Reserved Forest and Non-Hunting area of Khlong Thom District in Krabi, are probably the most significant remnants still surviving in Thailand. With less than 25 km<sup>2</sup>, remaining, this forest type is one of Thailand's most endangered wildlife habitats and is home to more than 300 bird species, including the last few remaining pairs of Gurney's Pitta in the country. However, most of the forest has now been replaced with rubber and oil palm plantations and the remaining forest exists as tiny isolated fragments.

Therefore, there is an urgent need to restore this forest and to create forest corridors through the plantations to expand wildlife habitat, prevent genetic isolation, and facilitate movement of seed-dispersing wildlife around the area. FORRU-CMU in association with RSPB, OBC, BCST and APE has been working to build local capacity to grow, plant and the indigenous forest tree species that comprise this forest type since 2003 and to facilitate implementation of forest restoration and the creation of wildlife corridors, sponsored by a variety of donors over the years. The work over the past 8 months was sponsored by the RSPB with additional support from a partnership between APE and Projects Abroad. This report, therefore, covers achievements over that time period (1/01/13 – 30/8/13).



The distinctive peak of Khao Nor Chuchi rising above one of the restoration plots.

### NURSERY

In 2004, FORRU-CMU worked with local officials and villagers to build a simple nursery on community land to carry out research on the propagation of local tree species and to produce trees for research trials and restoration plantings. RSPB and APE funding has allowed this nursery to continue to function over the past 6 months. The funding supported the salaries of 3 nursery workers, Taweesak, Anusit and Suchart, who produce around 20,000 trees of indigenous forest tree

species over the previous growing season. Their duties include seed collection, phenology monitoring (continued from the previous project), seedling propagation, care and monitoring of planted trees and provision of education events.

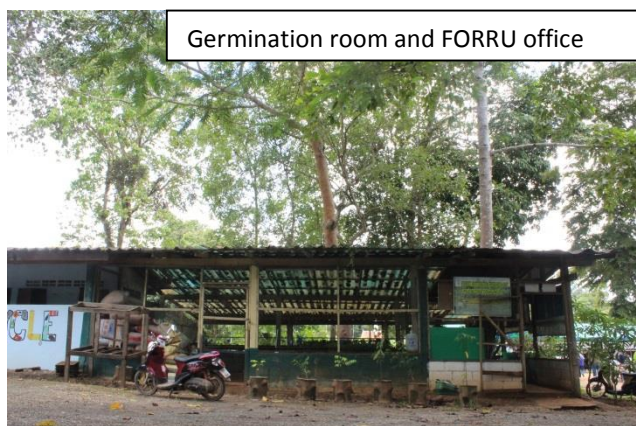
### Improvements to the nursery

The seedling standing down area was expanded to support production of the project target of 20,000 seedlings. A shelter of 3 x 4 m was built in March 2013 for preparing potting media. Concrete poles were used as main structure, topped with a metal roof. In addition, old wooden poles of the standing down area were replaced by concrete ones in July 2013, with kind support from Khun Suwat Suksiri, current chief of Thung Talay Wildlife Sanctuary. Further improvements are needed to the germination room/office area including i) repairs leaks in the roof ii) replace rotting wooden benches and iii) replace rusting wire netting.



### Tree production – species and numbers

At the nursery, propagation experiments (including seed germination and growing-on from wildlings) have now been carried out on 156 local forest tree species.



Over the past year, the nursery has produced a total of 19,710 seedlings of 57 tree species. A total of 6,226 seedlings were dispatched for 5 planting events (corridor planting, enrichment planting, plantings at Thai Rut and Chang Perng School, and Nam Tok Ron) (Table 1), and 7,965 seedlings were distributed to local organizations for their own tree-planting projects (Table 2). Currently, 5,520 seedlings are left over in the nursery, which will be delivered to local



farmers by the end of rainy season in October (Table 3). In addition, 2,489 seedlings are under production for next year's planting events and are half grown in the nursery (Table 4).

All seedlings are germinated from locally collected seeds or from wildlings dug up from the forest (which would die due to completion if not removed). Seeds are germinated in the germination room and transferred to 9 x 2 ½ " plastic bags when the 2<sup>nd</sup> or 3<sup>rd</sup> leaf pairs have expanded and transferred to the standing down area. Media is local soil mixed with rice husk and coconut husk (2:1:1), added with organic compost.







Specimens of young seedlings are now also being collected from the nursery, to act as a reference collection for support of surveys of natural forest regeneration in the future. All specimens are lodged at the CMU herbarium. CMU continues to provide taxonomic support for naming of new plant materials. Whilst under production, germination and dormancy data are collected weekly and a sample of seedlings separated for seedling growth trials. This information is used to improve and streamline the nursery production process in the future.

All data are accumulated into a database for easy scanning of species production profiles. The database has been distributed to the local authorities and villagers so that all information generated by the nursery is freely available to the community.

The screenshot displays a web-based database interface for 'Alstonia macrophylla Wallich ex G. Don'. The interface includes a header with the species name in Thai and English, and a navigation menu with tabs for Description, Picture, Seed collection, Germination, Seeding Growth in the nursery, Seeding Growth in the field, Phenology, and Drawing picture.

The main content area shows a table of data for 'K032' (รหัส) and 'Apocynaceae' (วงศ์). The table has columns for 'S no', 'Year', 'Treats', 'Average RC', 'SD RCD', 'Average l', 'SD height', 'Average cr', 'SD cro', 'Average', 'SD RGR', 'Average', 'SD RGR of', 'Planted', 'Survived', and 'Percentage'. The data is organized by 'Rai' (ไร่) and includes a 'Total' row.

Below the table, there are two phenology charts: 'Reproductive phenology' and 'Leafing phenology'. The 'Reproductive phenology' chart shows a bar graph of reproductive activity over time, with a peak in late 2006. The 'Leafing phenology' chart shows a bar graph of leafing activity over time, with a peak in late 2006. Both charts include a legend for 'Alstonia macrophylla Wallich ex G. Don' and '8 trees total'.

At the bottom of the interface, there is a 'Phenology excel file:' link with a download icon.

**Table 1 - List of seedling species in 2013 planted for habitat restoration.**

Scientific name	Number of seedlings				
	Corridor planting	Enrichment planting	Thai Rut School	Chang Perng School	Nam Tok Ron
<i>Alstonia macrophylla</i>		50	50	50	
<i>Antidesma montanum</i>	30				
<i>Aquilaria malaccensis</i>			30		
<i>Archidendron jiringa</i>	230	50	30	20	
<i>Artocarpus dadah</i>	50				
<i>Balakata baccata</i>	50				
<i>Callerya atropurpurea</i>	50	20	50		10
<i>Calophyllum soulattri</i>	80	50			
<i>Carallia brachtiata</i>	50				
<i>Castanopsis schefferiana</i>	80	20	20		10
<i>Chionanthus ramiflorus</i>	80	30			
<i>Cinnamomum iners</i>	50	100	30		10
<i>Clausena excavata</i>	30				
<i>Dillenia indica</i>	130				
<i>Dipterocarpus dyeri</i>	80				
<i>Dipterocarpus kerrii</i>	50	20	20		10
<i>Dipterocarpus sp.</i>	130	20	20		10
<i>Elateriospermum tapos</i>	80	30	20	10	
<i>Eugenia cerasiformis</i>	100	50			
<i>Eugenia grandis</i>	80	100		50	
<i>Eugenia sp.</i>	230				
<i>Ficus benjamina</i>	230	100		50	
<i>Garcinia hombroniana</i>	50			20	
<i>Hopea avellanea</i>	130				10
<i>Hopea odorata</i>	230	50	50	20	10
<i>Hydnocarpus anthelminthica</i>	30	20			
<i>Intsia bijuga</i>	100	50	20		10
<i>Irvingia malayana</i>	30				
<i>Lepisanthes rubiginosa</i>	50	50			
<i>Litsea grandis</i>		50	20		
<i>Magnolia sp.</i>	60	30	20	10	
<i>Mesua ferrea</i>	50	30	30	20	10
<i>Mezzettia curtisii</i>	30	20			
<i>Mimusops elengi</i>	30			20	
<i>Palaquium obovatum</i>	80				
<i>Parkia timoriana</i>	100	30			
<i>Pometia pinnata</i>	180	47			
<i>Pouteria obovata</i>	80	20			
<i>Radermachera pinnata</i>	30	34			
<i>Sandoricum koetjape</i>	230	50			
<i>Saraca indica</i>	30				
<i>Scaphium macropodum</i>	180	50	50	10	10
<i>Scolopia spinosa</i>	30				
<i>Shorea roxburghii</i>	200	100	50		
<i>Sindora siamensis</i>	80				
<i>Terminalia bellirica</i>	50				
<i>Terminalia sp1</i>	50	20			
<i>Terminalia sp2</i>			15	20	10
<b>Total</b>	<b>4,000</b>	<b>1,291</b>	<b>525</b>	<b>300</b>	<b>110</b>

**Table 2 - List of local organizations receiving seedlings from the project**

Type of organization	Number of organization	Number of seedlings
1. Sub-district Administrative Organization	1	200
2. Village community	1	100
3. Power Plant Company	1	2,000
4. Wildlife Sanctuary	1	4,045
5. Infantry Battalion no.1	1	200
6. Villagers (individuals)	4	1,420
	Total	7,965

### Providing nursery materials to the local conservation group

The project also provided nursery materials to the local conservation group over the past 8 months. Plastic bags (2½ x 9 inch) and chemical fertilizer (16-0-0) were donated to members of the local conservation group, to encourage them to learn practically how to produce native tree species.

### Administration of the tree production facility and reporting

Every month, the FORRU-Krabi nursery staff write a standard nursery report, listing all nursery and field activities, as well as educational events and include a memory card of photos from the project camera. The tree numbers and species in the nursery are updated and trees donated to other projects recorded. These records are mailed to CMU for checking. So far, the nursery staff completed all monthly reports on time. Information in the reports were then checked during onsite visits by FORRU-CMU staff (3 times since January).



**Table 3 - List of seedlings species in the nursery (ready for distribution by end rainy season 2013)**

Scientific name	Family	Number of seedlings
<i>Alstonia angustiloba</i>	Apocynaceae	30
<i>Alstonia macrophylla</i>	Apocynaceae	72
<i>Aquilaria malaccensis</i>	Thymelaeaceae	266
<i>Archidendron jiringa</i>	Leguminosae, Mimosoideae	125
<i>Artocarpus dadah</i>	Moraceae	47
<i>Azadirachta indica</i>	Meliaceae	30
<i>Balakata baccata</i>	Euphorbiaceae	91
<i>Callerya atropurpurea</i>	Leguminosae, Papilionoideae	62
<i>Carallia brachtiata</i>	Rhizophoraceae	60
<i>Cassia fistula</i>	Leguminosae, Caesalpinioideae	100
<i>Castanopsis schefferiana</i>	Fagaceae	140
<i>Chionanthus ramiflorus</i>	Oleaceae	105
<i>Cinnamomum iners</i>	Lauraceae	84
<i>Cinnamomum sp.</i>	Lauraceae	14
<i>Cryptocarya sp.</i>	Lauraceae	64
<i>Dillenia indica</i>	Dilleniaceae	36
<i>Dipterocarpus dyeri</i>	Dipterocarpaceae	20
<i>Elateriospermum tapos</i>	Euphorbiaceae	28
<i>Ficus benjamina</i>	Moraceae	43
<i>Ficus benjamina</i>	Moraceae	206
<i>Hopea odorata</i>	Dipterocarpaceae	50
<i>Hopea sp.</i>	Dipterocarpaceae	48
<i>Intsia bijuga</i>	Leguminosae Caesalpinioideae	187
<i>Irvingia malayana</i>	Irvingiaceae	32
<i>Lepisanthes rubiginosa</i>	Sapindaceae	136
<i>Macaranga tanarius</i>	Euphorbiaceae	27
<i>Magnolia champaca</i>	Magnoliaceae	22
<i>Mesua ferrea</i>	Guttiferae	360
<i>Mezzettia curtisii</i>	Annonaceae	41
<i>Mimusops elengi</i>	Sapotaceae	40
<i>Parkia timoriana</i>	Leguminosae, Mimosoideae	244
<i>Pometia pinnata</i>	Sapindaceae	182
<i>Pouteria obovata</i>	Sapotaceae	18
<i>Radermachera pinnata</i>	Bignoniaceae	84
<i>Sandoricum koetjape</i>	Meliaceae	312
<i>Scaphium macropodum</i>	Sterculiaceae	429
<i>Schima wallichii</i>	Theaceae	120
<i>Shorea roxburghii</i>	Dipterocarpaceae	1,420
<i>Sindora siamensis</i>	Leguminosae Caesalpinio	60
<i>Terminalia sp2</i>	Combretaceae	85
<b>Total</b>		<b>5,520</b>



**Table 4 - List of half-grown seedlings species in the nursery (for planting in 2014)**

Scientific name	Family	Number of seedlings
<i>Calophyllum soulattri</i>	Guttiferae	240
<i>Diospyros venosa</i>	Ebenaceae	72
<i>Eriobotrya bengalensis</i>	Rosaceae	210
<i>Eugenia cumini</i>	Mrytaceae	1,330
<i>Garcinia merguensis</i>	Guttiferae	238
<i>Nageia wallichiana</i>	Podocarpaceae	308
<i>Scleropyrum pentandrum</i>	Santalaceae	91
<b>Total</b>		<b>2,489</b>

## PLANTING

### Organization of restoration plantings for 2013

In March 2013, an informal meeting was carried out between FORRU-Krabi local staff and the Khao Nor Chuchi Lowland Forest Conservation Corps (the reserved forest guards, under the leadership Reserved Forest Chief, Kuhn Somprat) to discuss establishing a nature trail 1.5 km in length to go along with a proposed nature education centre. A plan for enrichment planting along the trail was formulated.



FORRU staff visited farmers to find out where to establish corridor planting areas.

Following on from the forest corridor project, designed during the previous project, a field survey was carried out in April 2013 together with local land users (oil palm and rubber plantation owners), to identify plots to be planted to extend the corridor. The collaborative survey identified 4 plots (about 2 rai, calculated from Google Earth) connecting natural forest patches through rubber/oil plantations with corridor sections planted last year (2012). A GPS receiver was used to mark the GPS locations of all plot boundaries.





In addition, an experiment on direct seeding was carried out at the base of Khao Nor Chuchi, to test new species and suitable sowing distances.

As part of FORRU's collaborative activities with APE and Projects Abroad, the FORRU-Krabi team contacted two local schools (Ban Chang Perng and Thai Rut Wittaya Schools) in June and July respectively, to organize 2 planting events for enrichment planting for biodiversity enhancement around the school grounds.

In August, we worked with the Khao Nor Chuchi Wildlife Sanctuary, to organize a special planting event (in front of Nam Tok Ron), for the Inland Revenue Department according to their CSR policy.

Furthermore, villagers from Lamthap District and members of local conservation club (Klong Thom Nuey Sub-district, Klong Thom District) contacted us to discuss about planting native tree species, to create more potential corridors and also to increase valuable timber resources in their lands.

### Implementation of planting

Corridor planting was implemented on 27<sup>th</sup> May 2013. The Khao Nor Chuchi Lowland Forest Conservation Corps, Wildlife Sanctuary staff, local government officials, staff and students of Ban Chang Perng and Ban Klong Thom Nuey Schools, the Department of Probation (Krabi), village committee members and Projects Abroad volunteers were all valuable participants. FORRU-CMU was represented by Dr Panitnard Tunjai. The corridor was planted with a total of 4,000 seedlings (44 species). The four land users, who agreed to plant native tree species among their oil palm and rubber plantations, were Suwit Muadmuang, Jare Sinsawat, Werasak Sripeng and Somchok Pandang. Lunches were partly supported by a local business, the Morakot Resort.



Corridor planting plot 2013, we got support from many local organizations.



On June 12<sup>th</sup> and 17<sup>th</sup> tree seedlings were planted at Thai Rut Wittaya and Ban Chang Perng Schools respectively to increase biodiversity and create nature study facilities for the students. The schools managed their own site preparation and will take care of tree maintenance.



Enrichment planting at Chang Perng and Thai Rut Wittaya School with APE and Projects Abroad



The enrichment planting event along the nature trail at at Sam Yak Klong Ta Dan was largely implemented on June 17<sup>th</sup> by APE, who helped with shifting seedlings and equipment to the sites and brought in a foreign volunteer organization (Projects Abroad), which not only provided labour, but also donated money for fertilizer and other materials. A total of 1,291 seedlings were planted along the trail, to enrich biodiversity in the reserved forest area.

CSR planting event with the Inland Revenue Department



The site panted by the Inland Revenue Department, as part of their CSR policy, was prepared by FORRU-Krabi staff with mechanical weeders August 10<sup>th</sup> and the planting event proceeded on August 13<sup>th</sup>. Weeding and fertilizing are scheduled at the end of August.

In addition, a direct seeding experiment was set up on 28<sup>th</sup> May 2013 to test the efficiency of the method to establish saplings of 10 species of native forest trees at the base of Khao Nor Chuchi (the Na Khao Nor site). The experiment was designed to determine the optimal spacing between direct seeding points. Seeds were sown in bamboo tubes, which both protected the seeds, preventing their movement due to rain, which facilitated accurate germination monitoring. The bamboo tubes are, of course, biodegradable and break down long before they could constrict tree trunk expansion. The tubes were spread out at different densities: 70, 100 and 130 cm apart with two replicates for each treatment and seeds sown inside the tubes. Germination is being checked every 2 weeks and will continue for 6 weeks or until no more seed germinate.



#### **Maintenance of previously planted sites**

Due to limited budget, maintenance operations on planted trees (weeding and fertilizer application) were only applied once during the rainy season on 22/3/13 to the 2012 plot and on 30/5/13 to the 2011 plot.

#### **Monitoring data collection and analysis of previously planted sites**

All corridor plots were monitored in June 2013. Seedlings planted in the 2013 plot showed moderate survival 2 weeks after planting (62%), their average root collar diameter, height and crown width were 5.07



mm, 41.33 cm and 21.51 cm respectively. Along the stream, under the shade of rubber and oil palm trees, *Callerya atropurpurea* created the biggest crown width (33.71 cm) with 80% survival. However, lack of rain during the week following planting caused >50% mortality of 4 species: *Eugenia grandis*, *Hopea odorata*, *Irvingia malayana* and *Mimusops elengi*. Growth performances of all species planted this year are presented in Table 6.

**Table 6 - Results of corridor planting in 2013 plot**

species	survive	%survival	Root collar diameter (mm)		Height (cm)		Crown width (cm)	
			Mean	SD	Mean	SD	Mean	SD
<i>Artocarpus dadah</i>	21	70.00	3.52	1.47	40.71	14.23	19.10	8.41
<i>Callerya atropurpurea</i>	24	80.00	6.67	2.53	41.92	16.68	33.71	16.03
<i>Calophyllum soulattri</i>	17	56.67	5.79	1.63	34.71	12.00	27.00	11.52
<i>Castanopsis schefferiana</i>	20	66.67	3.70	1.17	32.60	11.24	20.15	6.60
<i>Chionanthus ramiflorus</i>	23	76.67	5.39	1.44	50.17	15.95	25.30	12.98
<i>Clausena excavata</i>	21	70.00	3.48	0.93	37.71	11.90	18.05	6.99
<i>Dillenia indica</i>	18	60.00	6.44	1.82	24.61	5.36	29.33	12.48
<i>Dipterocarpus dyeri</i>	18	60.00	4.72	1.57	46.19	19.21	22.94	8.66
<i>Dipterocarpus kerrii</i>	12	40.00	4.77	1.60	34.75	8.18	17.83	9.46
<i>Dipterocarpus sp.</i>	20	66.67	7.75	6.09	29.65	6.32	26.20	10.71
<i>Elateriospermum tapos</i>	19	63.33	4.85	1.57	42.16	10.40	22.79	8.90
<i>Eugenia grandis</i>	13	43.33	4.68	2.09	50.09	21.04	20.18	11.20
<i>Eugenia sp.</i>	21	70.00	4.29	1.01	35.52	12.81	21.62	7.79
<i>Ficus benjamina</i>	22	73.33	7.05	2.21	62.77	19.06	28.36	12.53
<i>Hopea avellanea</i>	19	63.33	3.53	1.50	43.47	13.59	16.79	5.98
<i>Hopea odorata</i>	12	40.00	4.29	0.81	40.17	10.36	23.00	9.71
<i>Hydnocarpus anthelminithica</i>	23	76.67	5.17	1.56	47.22	12.47	27.39	10.08
<i>Irvingia malayana</i>	14	46.67	5.32	1.71	37.64	11.50	26.36	8.77
<i>Mezzettia curtisii</i>	20	66.67	7.60	1.82	68.00	19.33	20.50	4.62
<i>Mimusops elengi</i>	7	23.33	3.57	1.40	36.00	10.34	15.43	4.35
<i>Pometia pinnata</i>	18	60.00	3.83	1.04	29.44	5.65	21.11	7.83
<i>Pouteria obovata</i>	21	70.00	5.57	1.33	45.62	10.83	26.62	8.50
<i>Radermachera pinnata</i>	18	60.00	5.00	1.33	19.28	10.88	20.83	9.21
<i>Sandoricum koetjape</i>	17	56.67	4.41	1.18	40.65	11.82	21.94	11.40
<i>Saraca indica</i>	17	56.67	4.79	2.22	34.53	9.28	17.94	4.48
<i>Scaphium scaphigerum</i>	23	76.67	6.20	1.99	36.70	12.11	23.22	10.38
<i>Scolopia spinosa</i>	18	60.00	4.39	1.46	36.00	8.84	17.72	6.91
<i>Sindora siamensis</i>	19	63.33	3.26	0.93	33.84	9.36	15.32	7.48
<i>Terminalia sp.</i>	25	83.33	7.08	1.75	65.38	20.35	29.68	12.76

In addition, two previous corridor plots (2012 and 2011) were monitored at 1 and 2 years after planting. In plot 2012, only 2 species, *Cinnamomum iners* and *Eugenia oleina*, showed survival percentage higher than 50% one year after planting. The trees were growing slowly (Table 7) probably due to the dense shade cast by the rubber trees. In plot 2011, *Antidesma montanum* showed the best performance, not only at the end of 1<sup>st</sup> rainy season but also at 2 years after planting, it created the highest height (212.36 cm) and the biggest canopy (144.27 cm). Another



interesting species, *Palaquium obovatum* can create 114.67 cm crown width on average within 2 years (Table 8).

**Table 7 - Results of corridor planting in 2012 plot**

species	survive	%survival	Root collar diameter (mm)		Height (cm)		Crown width (cm)	
			Mean	SD	Mean	SD	Mean	SD
<i>Alstonia macrophylla</i>	9	26.47	11.72	4.88	88.33	38.52	42.78	16.08
<i>Cinnamomum iners</i>	18	52.94	11.61	4.10	98.33	46.42	51.72	28.92
<i>Cinnamomum porrectum</i>	0	0.00	na	na	na	na	na	na
<i>Clausena excavata</i>	6	17.65	3.80	1.17	42.00	18.80	26.17	11.21
<i>Eugenia cerasiformis</i>	7	20.59	5.29	0.95	42.71	11.34	24.29	3.95
<i>Eugenia oleina</i>	17	50.00	8.76	2.33	80.94	21.77	43.76	16.90
<i>Garcinia hombroniana</i>	15	44.12	7.13	2.17	51.60	19.79	28.27	11.04
<i>Garcinia merguensis</i>	4	11.76	4.88	1.03	42.25	22.95	33.75	14.10
<i>Hopea avellanea</i>	10	29.41	5.20	1.40	58.20	16.97	32.40	10.63
<i>Hopea odorata</i>	9	26.47	8.11	3.48	73.33	39.65	46.22	22.26
<i>Lepisanthes rubiginosa</i>	10	29.41	10.15	17.54	33.30	17.50	25.90	9.59
<i>Litsea grandis</i>	6	17.65	4.92	1.11	42.83	13.93	24.83	14.48
<i>Litsea salicifolia</i>	5	14.71	4.20	1.92	39.80	18.39	19.80	7.12
<i>Mesua ferrea</i>	1	2.94	7.00	na	48.00	na	27.00	na
<i>Morinda elliptica</i>	6	17.65	8.17	4.26	74.67	29.23	33.83	17.90
<i>Nephelium hypoleucum</i>	3	8.82	5.00	3.61	47.67	13.65	23.00	15.13
<i>Palaquium obovatum</i>	4	11.76	5.75	3.59	48.75	16.52	31.75	10.78
<i>Parkia timoriana</i>	11	32.35	12.36	5.82	85.73	60.83	44.09	22.64
<i>Radermachera pinnata</i>	1	2.94	9.00	na	32.00	na	22.00	na
<i>Saraca indica</i>	8	23.53	5.25	1.04	47.63	15.32	27.88	14.40
<i>Scaphium scaphigerum</i>	8	23.53	5.95	2.31	38.38	10.74	22.75	8.15
<i>Shorea roxburghii</i>	13	38.24	5.91	1.86	55.46	21.11	28.08	13.55
<i>Terminalia sp.</i>	7	20.59	9.29	4.82	103.71	45.27	47.86	18.10

**Table 8 - Results of corridor planting in 2011 plot**

species	survive	%survival	Root collar diameter (mm)		Height (cm)		Crown width (cm)	
			Mean	SD	Mean	SD	Mean	SD
<i>Aglaiia elacegnoidea</i>	1	3.33	5.00	na	51.00	na	30.00	na
<i>Antidesma montanum</i>	11	36.67	32.09	15.71	212.36	74.32	144.27	63.35
<i>Baccaurea ramiflora</i>	4	13.33	13.33	9.35	130.50	89.75	96.00	67.31
<i>Calophyllum soulattri</i>	8	26.67	13.69	5.55	123.63	62.70	60.38	36.99
<i>Cassia fistula</i>	8	26.67	9.13	9.08	70.63	75.71	60.75	46.17
<i>Elaeocarpus stipularis</i>	6	20.00	14.58	5.06	139.50	70.32	58.83	29.22
<i>Eugenia cumini</i>	0	0.00	na	na	na	na	na	na
<i>Garcinia cowa</i>	5	16.67	11.78	6.20	108.00	48.04	59.40	18.08
<i>Morinda elliptica</i>	11	36.67	43.14	51.75	137.64	72.40	77.00	34.07
<i>Palaquium obovatum</i>	3	10.00	22.17	8.25	179.67	32.13	114.67	9.24
<i>Sindora siamensis</i>	6	20.00	7.75	3.87	73.50	29.79	31.17	20.55

## Education and Training

Over the last 8 months (January - August 2013), we worked closely with APE and Projects Abroad (Table 9). Most activities were carried out at the FORRU-Krabi nursery; volunteers contributed their time to help with seed collection and nursery care. Occasionally, field work (weeding especially) on site requires large amounts of labour and we have had very good collaboration from APE and Projects Abroad. In addition, there were a few more events with other conservation groups (Table 10) on various education activities.





**Table 9 - Education events with APE and Projects Abroad**

No.	Date	Activities	Location	Number of participants
1	7 January 2013	Nursery care (weeding, fertilizing and potting)	FORRU nursery	21
2	4 February 2013	Seed collection and nursery care (weeding, fertilizing and potting)	FORRU nursery	11
3	11 February 2013	Preparing bamboo stakes for planting	FORRU nursery	11
4	18 February 2013	Nature games and activities	Klong Thom Nue School	15
5	25 February 2013	Building check-dams	Sam Yak Klong Ta Dan	17
6	1 April 2013	Teaching nursery works (e.g. potting technique, grading, seed germination and seed pre-treatment)	Aao Nam Mao nursery at Aau Pra-Nang Sub-district, Muang, Krabi	13
7	8 April 2013	Teaching nursery works	Aao Nam Mao nursery at Aau Pra-Nang Sub-district, Muang, Krabi	16
8	22 April 2013	Teaching nursery works	Aao Nam Mao nursery at Aau Pra-Nang Sub-district, Muang, Krabi	15
9	28 April 2013	Teaching nursery works	Aao Nam Mao nursery at Aau Pra-Nang Sub-district, Muang, Krabi	22
10	17 June 2013	Enrichment planting	Chang Perng School	25
11	24 June 2013	Site preparation for planting	Sam Yak Klong Ta Dan	25
12	1 July 2013	Weeding	FORRU nursery	20
13	8 July 2013	Seed collection, seed preparation and sowing	FORRU nursery	27
14	12 July 2013	Enrichment planting	Thai Rut Wittaya School	70
15	15 July 2013	Nursery care (weeding and fertilizing)	FORRU nursery	27
16	29 July 2013	Nursery maintenance (standing down area extension)	FORRU nursery	34

**Table 10 - Education activities with the other conservation groups**

No.	Date	Activities	Location	Number of participants
1	24 January 2013	Establish exhibition on FORRU activities	Bang Tiew School	500
2	28 March 2013	Teaching school kids about restoration	5 schools in Klong Thom Nue Sub-district	125

## Curriculum development

Under the Gurney's Pitta Project, a local schools curriculum "Gurney's Pitta and Nature" was developed mainly by BCST and its partners. The curriculum aims to i) establish systematically basic learning about Gurney's Pitta, ii) promote this subject at higher levels of education, iii) promote Gurney's Pitta as a flagship species for conservation and iv) raise awareness of local people on Gurney's Pitta conservation. The curriculum comprises 6 modules:-

- 1) Gurney's Pitta conservation
- 2) Habitat restoration by framework species method
- 3) Local plant genetic conservation
- 4) Establishing local conservation group for Gurney's Pitta and
- 5) Souvenir design and production.

In each academic year, the curriculum is run over 2 semesters (20 hours per semester). The first semester ran from June to September 2013 and the 2<sup>nd</sup> semester will run from November 2013 to February 2014. The class is scheduled on Friday for 5 schools (about 1 hour per school); 09:30-10:20 (Thai Rut Wittaya) 10:30-11:30 (Ban Chang Perng) 12:30-13:25 (Ban Klong Thom Nue) 13:35-14:25 (Ban Bang Kram) and 14:35-15:30 (Ban Bang Tiew).



## Jungle Rubber Project

Recently the idea of making rubber tree plantations more biodiversity friendly has been gaining ground among communities in S. Thailand - not only to diversify plantation growers' incomes but also to make rubber more environmentally acceptable.



Patches of native forest tree species within a rubber agroforestry system can perform as wildlife refuges and act as a source of seeds for future ecological restoration. Five of the local farmers around the KNC area have already planted native trees into their farms; Piyanut Wimonmuang, Sunan Tongchai, Sommas Jansongsang, Niyom Tepkua and Supee Pipitkul. Furthermore, 4 other rubber growers (Preecha Roshom, Anusit Konghor, Manas Roshom and Taweesak Panchoo) confirmed that they would like to diversify their plantations with native forest tree species.

We have therefore submitted a proposal to the Thai government for a full scale 'jungle rubber' project which would have a budget to continue support of the FORRU Krabi nursery in order to supply trees for extension of the jungle rubber project to the new rubber growers. The projects will also include surveys of biodiversity before and after planting native trees and will compare conventional rubber plantations with enriched plantations for changes in the soil, vegetation, rubber yield and rubber latex quality.

