

Result

Only one patch of (more or less) natural coastal heath forest had been found at Ban Ta-ling-chan, Chana district. This was to be selected as a study area for vegetation study. The selected study area is about 0.5 km in length (the site along the shore line), 1.5 km in width and covers about 0.75 km²

Soil type of the study area

The soil type at the study area is podzols (spodozol). In general, podzols of the tropical Far East could be in the place where the annual rain-fall exceed 2000 mm (Whitmore, 1985). Podzols could be divided in layers i.e., a dark gray sandy A horizon which may have a raw humus in undisturbed sites; a bleached E horizon under A horizon; a very dark or strongly colored B horizon under E horizon enriched in colloidal organic matter or inorganic matter and sesquioxides (humus-iron podzol) (Burnham in Whitmore, 1985).

Climate² in the study area

Songkhla is subjected to a tropical monsoon climate characterized by a distinct dry season from January to September with rainfall less than 300 mm per month for those 9 months and a high rainfall, affected by the north-easterly wind, from October to December. Rainfall average is about 500-1000 mm per month for those three months (fig.2). The average annual total rainfall is up to 2000 mm (fig.3) The average temperature all year round is about 28 C. (fig.4)

fig. 1 Mean monthly relative humidity of Songkhla province in the Years 1997 and 1998 (measured at 1 km from sea shore).

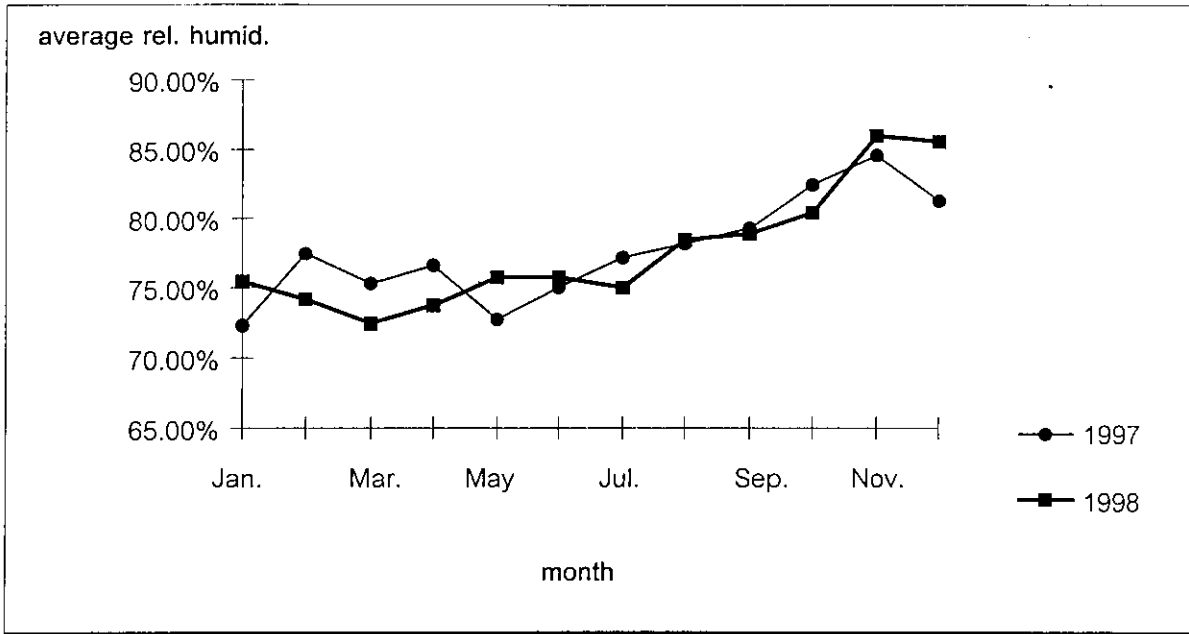
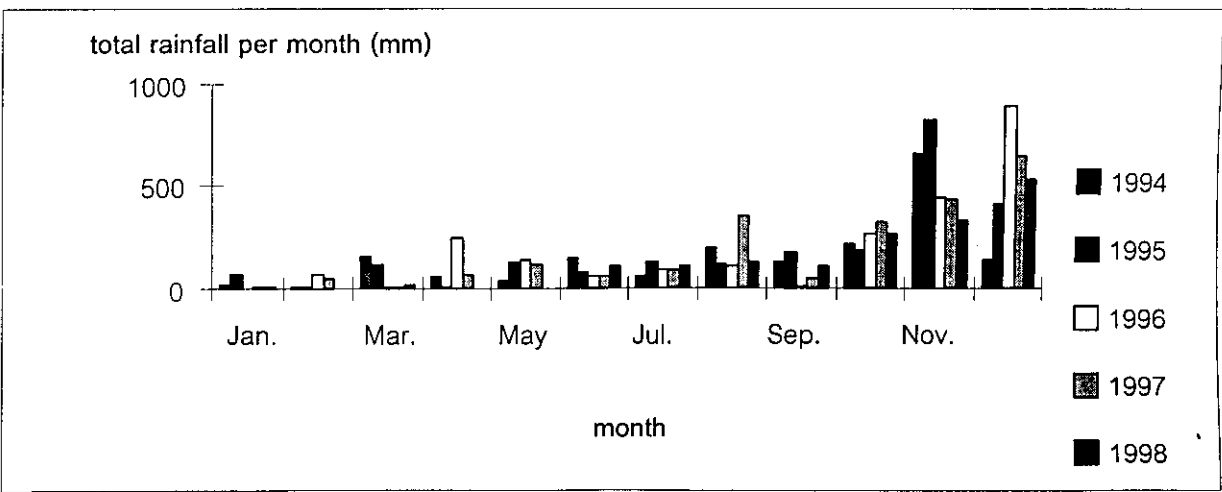


fig. 2 Mean monthly rainfall of Songkhla province from 1994 to 1998 (measured at 1 km from sea shore).



² Data from Meteorology Stations at Mueng district, Songkhla , Department of Meteorology, Ministry of Science

Fig. 3 Annual rainfall of Songkhla province from 1991-1998 (measured at 1 km from sea shore).

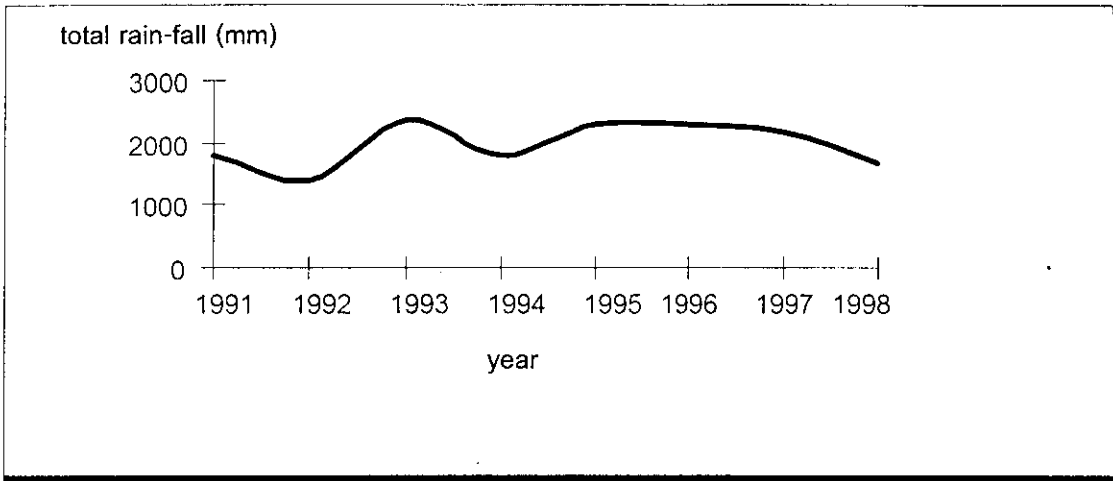
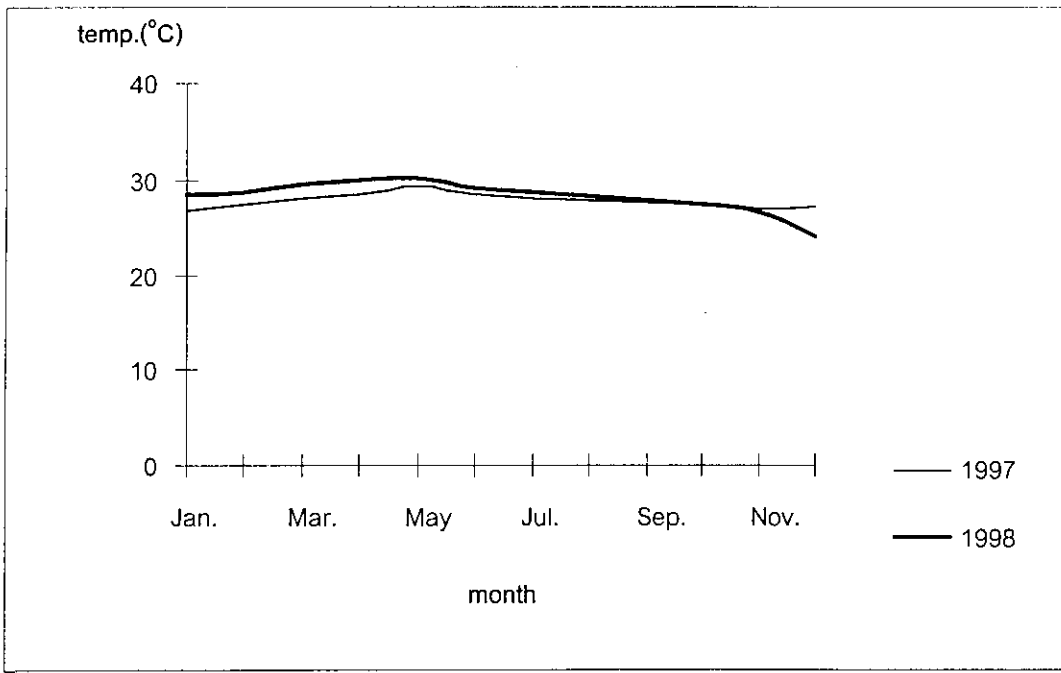
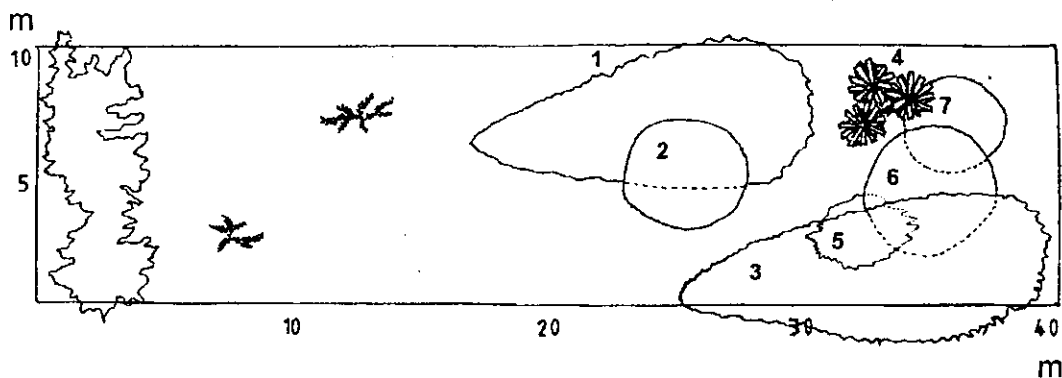
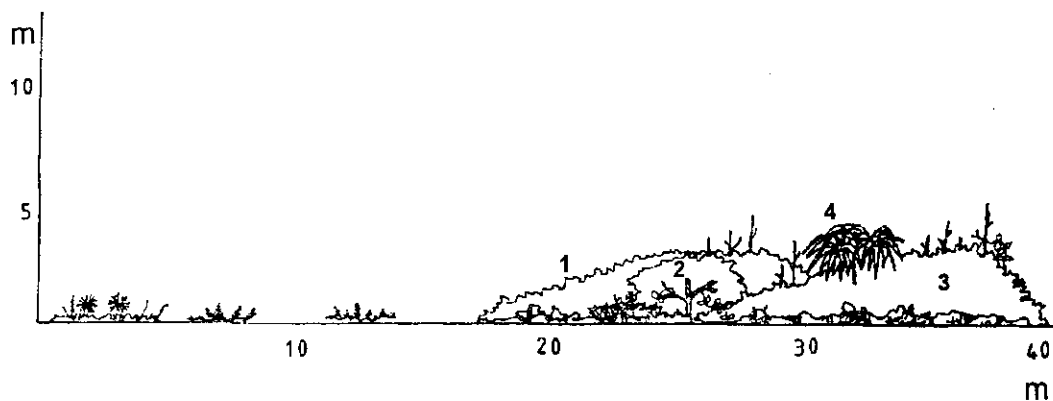


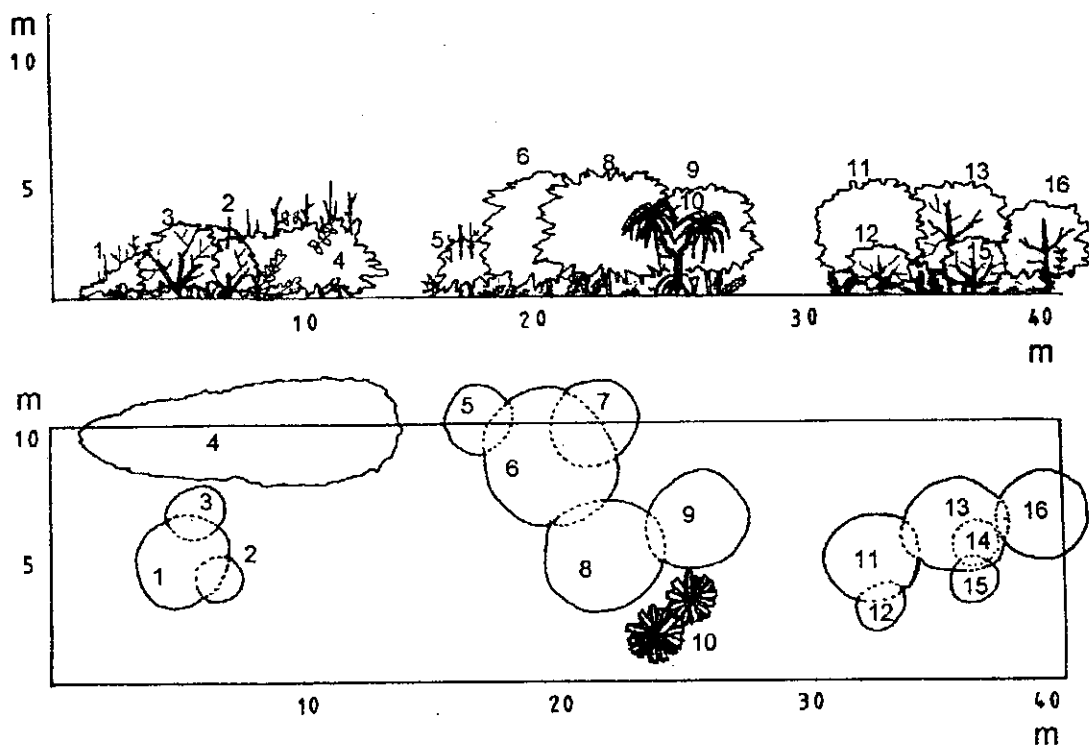
fig. 4 Mean monthly temperature of Songkhla province in the years 1997 and 1998 (measured at 1 km from sea shore).





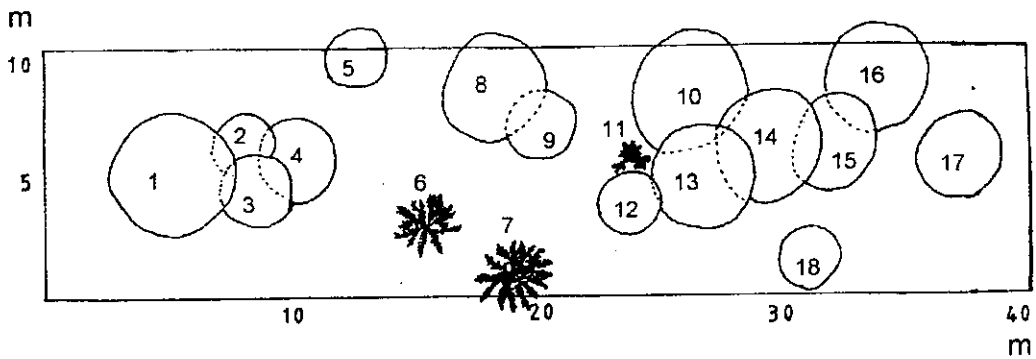
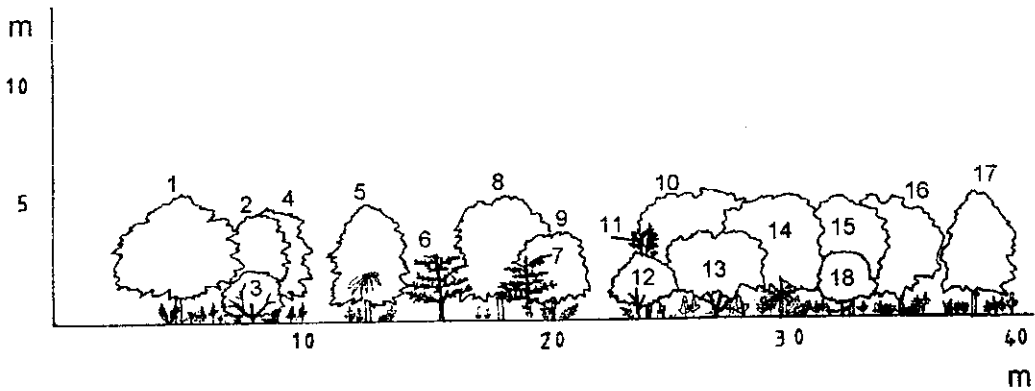
Plot 1

- 1 *Eugenia grandis* Wight
- 2 *Diospyros ferrea* var. *buxifolia* (Rottb.) Bakh.
- 3 *Vatica* sp.
- 4 *Pandanus odoratissimus* Linn.f.
- 5 *Ochna integerrima* Merr.
- 6 *Adinandra integerimma* T.Anders. ex Dyer



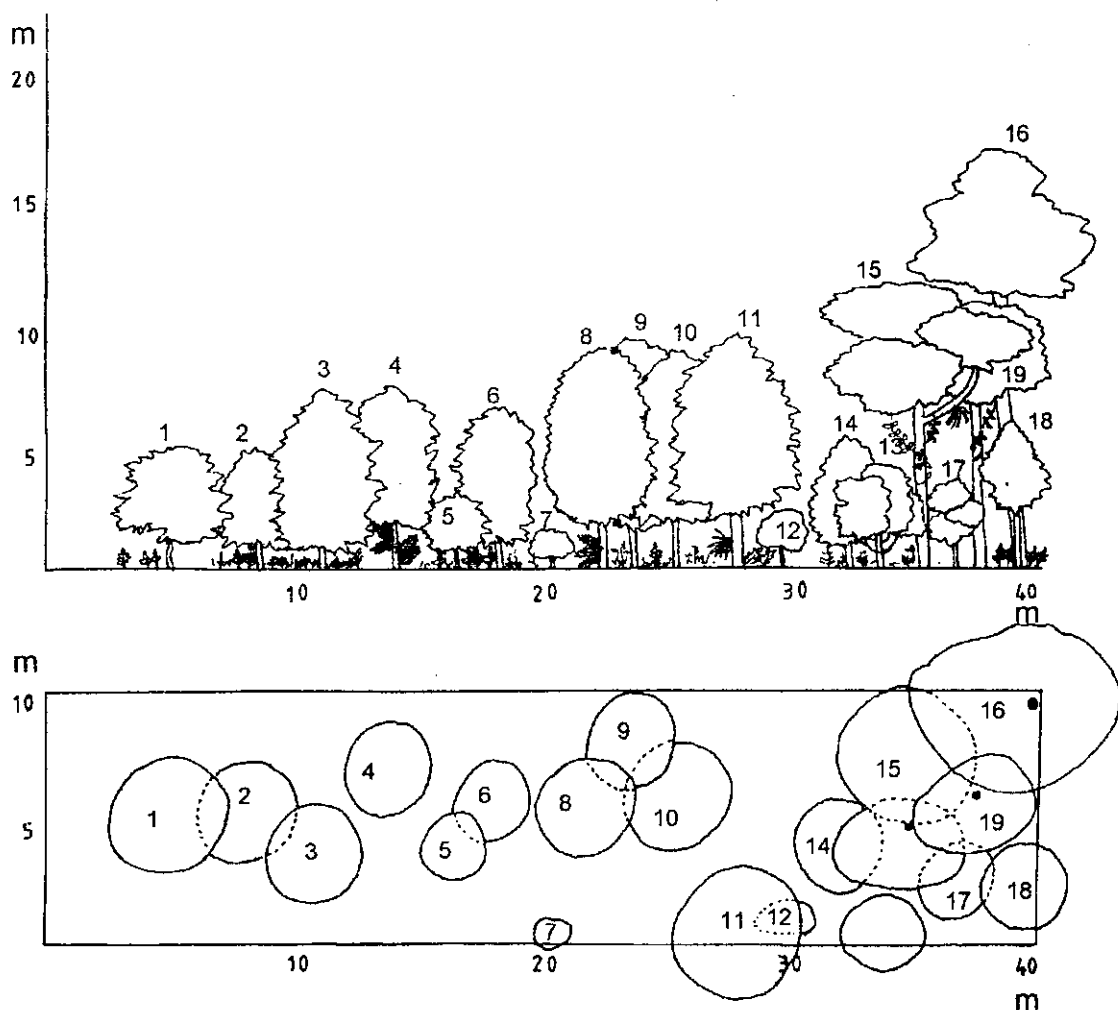
Plot2

- 1, 7 *Memecylon corticosum* Ridl.
- 2 *Adinandra integerimma* T. Anders ex Dyer
- 3 *Diospyros ferrea* Bakh. var *buxifolia* (Rottb.) Bakh.
- 4 *Eugenia grandis* Weight
- 5, 12 *Ochna integerimma* Merr.
- 6 *Eugenia spicata* Lamk.
- 8 *Eugenia longiflora* (Presl) F. Vill.
- 9 *Rapanea porteriana* Mez.
- 10 *Pandanus odoratissimus* Linn. f.
- 11 *Palaquim obovatum* Bakh. f.
- 13, 16 *Olea bracheata* (Lour.) Merr.
- 14 *Ixora javanica* DC.
- 15 *Calophyllum pulcherima* Wall.



Plot 3

- 1,8,10 *Eugenia spicata* Lamk.
 2 *Garcinia nervosa* Miq.
 3 *Ardisia crenata* Roxb.
 4 *Palaquim obovatum* Engler
 5, 13 *Egenia longiflora* (Presl) F.Vill.
 6, 7 *Randia dasycarpa* Bakh.f.
 9 *Rapanea porteriana* Mez.
 11 *Euerycoma longifolia* Jack
 12 *Buchnanan lucida* Bl.
 14,15,16 *Vatica* sp.
 17 *Pittosporum ferrugineum* Ait.
 18 *Calophyllum pulcherimum* Wall.



Plot 4

- 1 *Eugenia longiflora* (Presl) F.Vill.
- 2 *Garcinia vilersiana* Pierre
- 3, 4 *Olea bracheata* (Lour.) Merr.
- 5, 7 *Prismatomeris griffithii* Ridl.
- 6 *Pittosporum ferrugineum* Ait.
- 8,9,10,11 *Vatica* sp.
- 12 *Psychotria* sp.
- 13 *Calophyllum pulcherima* Wall.
- 14,18 *Garcinia merguensis* Wight
- 15,16,19 *Dipterocarpus chartaceus* Syming.
- 17 *Ardisia crenata* Roxb.

The Flora

Table 1 list of flowering plants found in the Heath Forest at Ban Ta-ling-chan, Chana district, Songkhla.

Family	Species	Vernacular	Habit
Anarcadiaceae	<i>Buchnanania lucida</i> Bl.	kee kra-taai	tree
Apocynaceae	<i>Cerbera</i>	teen ped saai	tree
Asclepiadaceae	<i>Dischidia rafflesiana</i> Wall.	chuk rohini	climber
Asclepiadaceae	<i>Hoya diversifolia</i> Bl.	yaan lin kwai	climber
Asclepiadaceae	<i>Hoya parasitica</i> Wall.	nom pichit	climber
Commelinaceae	<i>Commelina</i> sp.		Herb
Covolvulaceae	<i>Ipomoea pes-caprae</i> Linn.	pag bung thalay	climber
Cruciaceae	<i>Calophyllum pulcherima</i> Wall.		Tree
Cruciaceae	<i>Garcinia merguensis</i> Wight		tree
Cruciaceae	<i>Garcinia nervosa</i> Miq	maphuut pa	tree
Cruciaceae	<i>Garcinia vilersiana</i> Pierre	paawaa baiyai	tree
Dilleniaceae	<i>Tetracera indica</i> Merr.	yaan pot	climber
Dilleniaceae	<i>Tetracera loureiri</i> Pierre	rot sukhon	climber
Dipterocarpaceae	<i>Dipterocarpus chartaceus</i> Syming.	yang waad	tree
Dipterocarpaceae	<i>Vatica</i> sp.		Tree
Ebenaceae	<i>Diospyros ferrea</i> Bakh. var. <i>buxifolia</i> (Rottb.) Bakh.	Laam bid Thaa tha-lee	shrub
Euphorbiaceae	<i>Chaetocarpus castanocarpus</i> Thw.	khee non	shrub
Goodinaceae	<i>Scaevola taccada</i> Roxb.	raag thalay	shrubby tree
Liliaceae	<i>Dianella ensifolia</i> Red.	yaa nuu ton	herb
Memecylaceae	<i>Memecylon</i> sp.		Shrubby tree
Mrytaceae	<i>Eugenia grandis</i> Wight	maa mao	tree
Myrcinaceae	<i>Ardisia crenata</i> Roxb.	ta-ped ta-kai	shrub
Myrcinaceae	<i>Rapane porteriana</i> Mez.	Rang-ka-tae	tree
Myrtaceae	<i>Melaleuca leucadendra</i> var. <i>minor</i> Duthie	samet khao	tree
Myrtaceae	<i>Eugenia cymosa</i> Lamk.	daeng klong	tree
Ochnaceae	<i>Ochna integerrima</i> Merr.	kamlang chang saan	shrubby tree

Table 1 (continued)

Families	Species	Vernacular	Habit
Olabaceae	<i>Strombosia</i> sp.		Shrub
Oleaceae	<i>Olea maritima</i> Wall.	ket saan	tree
Orchidaceae	<i>Bulbophyllum</i> sp.		Orchid
Orchidaceae	<i>Cymbidium findlaysonianum</i> Lindl.	Ka-ree ka-ron	orchid
Orchidaceae	<i>Dendrobium secundum</i> Wall.	eung prang si fan	orchid
Orchidaceae	<i>Dendrobium crumenatum</i> Sw.	nok kraa yang	orchid
Orchidaceae	<i>Doritis pulcherima</i> Lindl.	maa wing	orchid
Pandaceae	<i>Pandanus odoratissimus</i> Linn f.	Panae	tree
Rubiaceae	<i>Psychotria sarmentosum</i> Bl.	duug kai yaan	climber
Rubiaceae	<i>Chassalia chartacea</i> Craib	yaai klang	shrub
Rubiaceae	<i>Chassalia curviflora</i> Thw.	khem phra raam	shrub
Rubiaceae	<i>Ixora javanica</i> DC.	Khem daeng	shrub
Rubiaceae	<i>Guettarda speciosa</i> Linn.	kong kang hu chang	tree
Rubiaceae	<i>Psychotria</i> sp.		Shrub
Rubiaceae	<i>Randia dasycarpa</i> Bakh.f.	naam khed	shrubby tree
Rubiaceae	<i>Hedyotis</i> sp.		Herb
Sapotaceae	<i>Palaquim obovatum</i> Engler	khanun nok	tree
Simaroubaceae	<i>Eurycoma longifolia</i> Jack	pla lai phoeg	tree
Theaceae	<i>Adinadra integerimma</i> T.Anders.ex Dyer	pikun paa	tree
Verbenaceae	<i>Vitex trifolia</i> var. <i>simplicifolia</i> Cham.	khon thiso thalay	herb
Viscaceae	<i>Viscum articulatum</i> Burm.f.	ka-faag teen-puu	parasite

Table 2 list of non-flowering plants found in the Heath Forest at Ban Ta-ling-chan, Chana district, Songkhla.

Family	Species	Vernacular
Polypodiaceae	<i>Pyrrrosia nummularifolia</i> (Sw.) Ching	
Polypodiaceae	<i>Pyrrrosia adnascens</i> (Sw.) Ching	
Polypodiaceae	<i>Drynaria sparsisora</i> S.Morre	kraa tae tai mai
Polypodiaceae	<i>Polypodium</i> sp.	
Polypodiaceae	<i>Drymoglossum piloselloides</i> Presl	klet nakkaraat
Polypodiaceae	<i>Phymatodes</i> sp.	
Psilotaceae	<i>Psilotum nudum</i> Linn.	waai ta-noi
Schizaeaceae	<i>Schizaea dichotoma</i> Sw.	taan saan
Vittariaceae	<i>Vittaria elongata</i> Sw.	
Schizaeaceae	<i>Lygodium microphyllum</i> R.Br.	lipao yung
Schizaeaceae	<i>Lygodium salicifolium</i> Ridl.	lipao yai
Gnetaceae	<i>Gnetum tenuifolium</i> Ridl.	muei nok
Davaliaceae	<i>Davalia</i> sp.	naak kaa raat

Discussion and conclusions

The relics of the coastal heath forest of Ban Ta-ling-chan village, Cha-na district might be the last small patch of the natural coastal vegetation along the shore of Songkhla province. Almost all natural vegetation along the east coast of Songkhla had been already terminated.

Concerning the forest structure and the plant species composition, this coastal vegetation at Ban Ta-ling-chan, Cha-na district agrees well with the definition of the heath forest according to Congdon (1982) and Whitmore(1985). The former has more or less same characteristics as the latter, e.g. the canopies of trees are low, uniform and usually closed with no trace of layering; more trees with small leaves than in evergreen rain forest; many species have sclerophyllous leaves such as *Eugenia cymosa*, *Palaquium obovata*, *Rapanea porteriana*; the ground commonly has a bryophyte covered and stilt root commoner than buttressed trees; big woody climbers are rare, but slender, wiry, independent climbers are frequent such as *Hoya diversifolia*; epiphytes and photophytes are frequent and occur nearer the ground than in evergreen rain forest; myrmecophyte are frequently found such as *Dischidia rafflesiana*. However, parasite plants, such as *Viscum articulatum*, are also abundant. Though it fits more to the coastal heath forest of Congdon (1982), since the true heath forests are taller and contain more species than those found on Tarutao island (Congdon, 1982). However, concerning the physical environment of the study area, i.e. podzolized soil and a tropical monsoon climate with a distinct dry period, it resembles those of Congdon (1982) and Whitmore (1985).

Canopies of trees in the vegetation show some distinct characteristics. In the first plot, canopies of trees are very low, attach to the ground. When considering tress of the same species in the second and third plot, canopies of tress are higher accordingly. That might be effects of strong wind from the open sea that shaped the branching of tree species. In the last plot, which is the most remote one from the sea-shore, trees are much higher and different from the others (*Dipterocarpus chataceous* V.S. *Eugenia*, *Garcinia*, *Olea*). The forest structure is more or less different from the other plots i.e. high canopies; layering; epiphyts in canopies; big

liana (*Gnetum tenuifolium*) V.S. low canopies, sometimes attached to the ground; no trace of layering; epiphytes on ground; wiry climbers. That zone, where plot were laid, might be the beginning of the ecotone, which bordered this coastal heath forest and the dry ever-green forest in the former time? In any case, it is difficult to conclude at this stage without the vegetation history study.

As plants in the heath forest are growing in the drought environment, especially in dry season, many of them show distinct characteristics of "xerophytes" i.e. succulent stem; small and sclerophyllous leaves with pale color; spines on stem; thick cuticle and a lot of hairs, in order to resist the drought situation in a long dry season by drought tolerance (Kramer, 1983). The morphology and anatomy of plants in the coastal heath forest at Ban Ta-ling-chan are encouraged to study, therefore.

Coastal heath forests on mainland of the Peninsular Thailand supposed to be completely destroyed because of the urban development, industries (sea-food frozen factory etc.), agriculture (coconut and cashew-nut plantations etc.), Land management and tourism. A small patch of the coastal heath forest, left at Ban Ta-ling-chan, Chana district, which is very characteristic, is the last relics of such vegetation in Songkhla province. It is not possible to draw any \pm definite conclusion at this stage whether the relics of the coastal heath vegetation at Ban Ta-ling-chan is the original vegetation. Only when the details of vegetation history are available, then the picture of the status of this valuable relics would be much clearer.

It is, therefore, strongly encouraged that the studies and investigations are carried out in the future.