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Floristic composition of the terrestrial coastal vegetation in Narathiwat, Peninsular Thailand

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ABSTRACT. A floristic study of the sandbars along the coast of Narathiwat was conducted from October 2001 – March 2003. One hundred and fifty-eight species of plants were recorded and are listed The occurrences and abundances of plant species in the study area are discussed. The plant list comprises 113 species of dicotyledonous plant; 32 species of monocotyledonous plant and 13 species of non-flowering vascular plant. A recommendation for urgent protection of remaining sandbar vegetation in Narathiwat is made.

INTRODUCTION

Narathiwat is among the southernmost provinces of Thailand, situated on the east coast of the Peninsula and the northern border of Malaysia. It is particularly interesting in terms of its flora and vegetation, since it is composed of both Thai (continental Southeast Asian) and Malesian elements. Moreover, there are various types of habitats, with differing types of vegetation, from seashore, swamp to montane forest. Owing to the fact that this region has large areas of peat swamp forest and moist evergreen forest (on or near hills), most former and current research focuses on these two major vegetation types. There are other types of vegetation in diverse habitats in the province, however, such as the sandbars along the seashore.

No information on the terrestrial vegetation along the seashore of Narathiwat, which forms a continuous gradient from the shore to other inland vegetation types, was available at the start of this study. Though the vegetation along the seashore may not be very important in economic terms, it is just as important in terms of the overall ecology of the vegetation in the region. Furthermore the deforestation rate along the seashore is extremely high, and all remaining fragments of natural vegetation fall outside reserves; they are not in any way protected. Thus, as in Thailand as a whole, the natural vegetation in Narathiwat has been very much depleted by human activities such as land development and agriculture but there are, nevertheless, some remnants of the natural vegetation left as isolated patches along the coast.

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This study of remnant vegetation along the coast helps to complete a picture of the flora of Narathiwat as a whole, and is important baseline biodiversity data for the plants of the area. The present paper will focus only on the floristic composition of the remnants of natural terrestrial vegetation on the coastal sandbars, both those next to the shoreline and those which are further inland. These relics of vegetation have been left as small isolated patches along the seashore in Narathiwat, which starts at Mueang Narathiwat district in the North, and continues south along the coast to Tak-bai district.

MATERIALS AND METHODS

Study area: Narathiwat province is located between latitude 5° 45′–6° 30′ N, longitude 101° 20′–102° 05′ E. The total area is about 2,797,144 rai. The south of Narathiwat borders on Malaysia being separated by the river Kolok. The Northern part is next to Sai Buri district in Pattani Province and Yala province is on its west border (Narathiwat Provincial office, 2001).

Climate: The climate of the area belongs in Köppen's Tropical Rain Forest (Af) type (GIVE A REFERENCE) with a mean temperature of 27.6 °C and average annual rainfall of 2,560 mm. The relative humidity ranges from 77% in the dry season to 83 % in the rainy season. The heaviest rainfall is in the months of November and December, these 2 months accounting for 50 % of the year's total (Narathiwat Provincial office, 2001).

Soil: The study was confined to the podzolised soil-sandbar type along the length of the Narathiwat coast (Land Development Department, 1975).

Methodology

1. Field survey

Exploring the remnant patches of natural vegetation along the seashore from Muang Narathiwat district in the north to Tak Bai district in the south; marking places suitable as research study sites.

2. Data collecting

2.1 Plant collecting

2.1.1 Plant specimens were collected at intervals (at least once a month from May 2001- February 2003) from all study sites for identification.

2.1.2 Plant collections were made with field notes of selected interesting species and these were correlated with their photographs.

2.1.3 Specimen processing followed the directions specified in "The Herbarium Handbook" (Bridson and Foreman, 1998).

3. Flora analysis

3.1 All plant collections were identified as far as possible with the available taxonomic literature at PSU.

3.2 Specimens with a doubtful identification were compared with named ones from herbaria PSU and BKF.

3.3 All voucher specimens have been deposited at PSU and BKF.

RESULTS

Twelve study sites were marked within the remnants of natural vegetation on sandbars as follow:

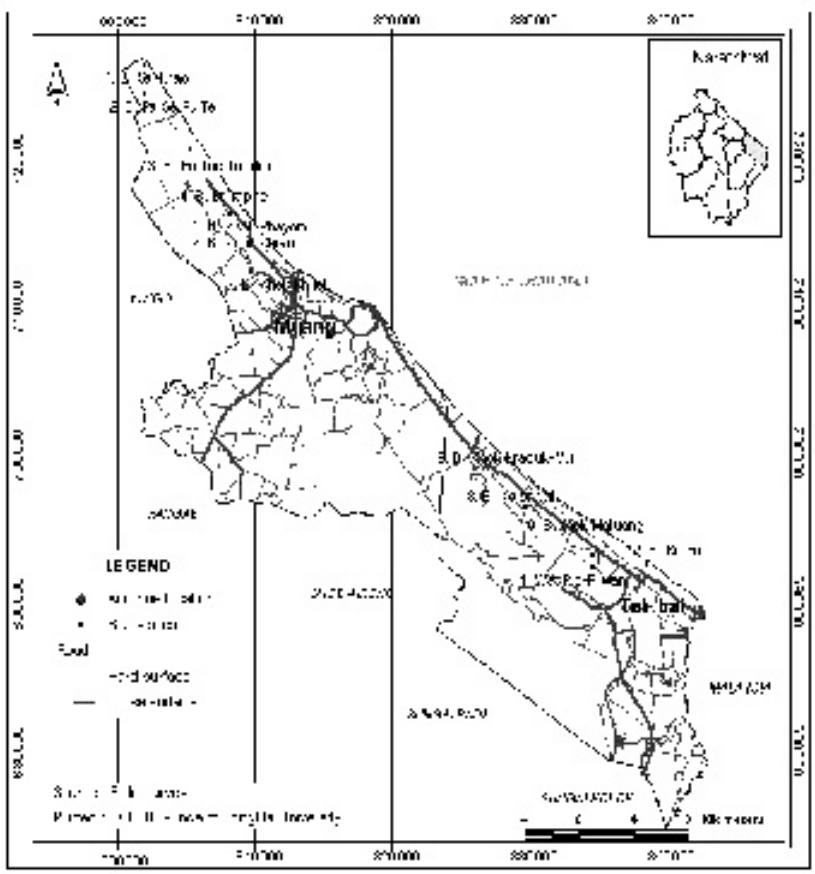

Figure 1. Map of Narathiwat province showing the 12 study sites.

Study 1: Ban Sai Khao
Study 2: Ban Pa Se Pu Te
Study 3: Ban Hu Tae Thu Wo
Study 4: Ban Bu Ra Pae
Study 5: Ban Khok Phayom
Study 6: Ban Khok Khain
Study 7: Ban Khok Khilek
Study 8: Ban Ko Sawat
Study 9: Ban Khok Kraduk Mu
Study 10: Ban Khok Mafueang
Study 11: Wat Pip Phliwan
Study 12: Ban Ko Yao

The study and collection of vascular plants on sandbars along the coast in Narathiwat was undertaken between October 2001 and March 2003. One hundred and fifty-eight species of vascular plant were recorded, belonging to 65 families and 132 genera. Of these 113 species are dicotyledons; 32 are monocotyledons and 13 are non-flowering vascular plants (tables 1–6).

Table 1. List of dicotyledons occurring on coastal sandbars in Narathiwat[1]

Family	**Species**	**Vernacular**	**Habit**	**Vouch.**[2]
Amaranthaceae	*Achyranthes aspera* L.	Phan ngu	Herb	*Ch.Laongpol* 211
Anacardiaceae	*Buchanania arborescens* (Blume) Blume	Cha muang	Tree	*Ch.Laongpol* 90
	Semecarpus curtisii King	Rak pa	Tree	*Ch.Laongpol* 95
Ancistrocladaceae	*Ancistrocladus tectorius* (Lour.) Merr.	Lin kwang	Climber	*Ch.Laongpol* 177
Annonaceae	*Desmos cochinchinensis* Lour.	Sa lao	Climber	*Ch.Laongpol* 32, 57
	Desmos dasymachala (Blume) Saff.	–	Climber	*Ch.Laongpol* 100, 391
	Fissistigma sp.	–	Climber	*Ch.Laongpol* 402, 403
	Uvaria grandiflora Roxb. ex Hornem	Yan nom khwai	Climber	–
Apocynaceae	*Cerbera odollam* Gaertn.	Tin pet thale	Tree	–
	Alstonia macrophylla Wall. ex G.Don	Thungfa	Tree	*Ch.Laongpol* 183, 204
	Alyxia reinwardtii Blume	Chalut	Small shrub	*Ch.Laongpol* 48
Asclepiadaceae	*Dischidia major* (Vahl) Merr.	Chuk rohini	Climber	*Ch.Laongpol* 140
	Hoya diversifolia Blume (plate 1, F)	Lin khwai	Climber	–
	Hoya parasitica (Roxb.) Wall. ex Traill	Nom phi chit	Climber	*Ch.Laongpol* 125
	Tylophora flexuosa R.Br.	Cha muk pla lot	Climber	–
Asclepiadaceae	*Tylophora indica* (Burm.f.) Merr.	Khan thu li	Climbe	*Ch.Laongpol* 61
	Cynanchum ovalifolium Wight	–	Climber	*Ch.Laongpol* 144

[1]Voucher specimens deposited at BKF & PSU.

[2]No voucher is available for many plant species due to incomplete collections (without flowers or fruits) or damage during transportation or during processing. (In such case, photographs were used for reference).

Table 1. (continued)

Family	Species	Vernacular	Habit	Vouch.[2]
Bignoniaceae	*Stereospermum fimbriatum* (Wall. ex G. Don) A.DC.	–	Tree	–
Celastraceae	*Euonymus cochinchinensis* Pierre	Kra chap nok	Tree	*Ch.Laongpol* 76, 86, 215, 331
	Pleurostylia opposita (Wall.) Alston	Daeng hin	Shrub	*Ch.Laongpol* 68, 77, 81, 228
Celastraceae	*Salacia chinensis* L.	Kam phaeng chet chan	Shrub	*Ch.Laongpol* 151
Combretaceae	*Terminalia catappa* L.	Hu kwang	Tree	*Ch.Laongpol* 30
Convolvulaceae	*Ipomoea pes-caprae* (L.) R.Br.	Phak bung thale	Creeping Herb	*Ch.Laongpol* 23
	Ipomoea imperati (Vahl) Griseb (plate 1, E)	Phak bung thale khao	Creeping Herb	*Ch.Laongpol* 405
	Merremia hirta (L.) Merr.	Chingcho	Creeping Herb	–
Crypteroniaceae	*Crypteronia paniculata* Blume	Kra thong loi	Tree	*Ch.Laongpol* 154
Dilleniaceae	*Dillenia ovata* Wall. ex Hook.f. & Thomson	San bai lek	Tree	*Ch.Laongpol* 198
	Tetracera indica (Christm. & Panz.) Merr.	Thao ora khon	Climber	*Ch. Laongpol* 161, 132
	Tetracera loureiri (Finet & Gagnep.) Pierre ex Craib	Rot su khon	Climber	–
Dipterocarpaceae	*Dipterocarpus chartaceus* Symington	Yang wat	Tree	–
	Hopea odorata Roxb.	Ta khian thong	Tree	–
Dipterocarpaceae	*Shorea roxburghii* G.Don	Phayom	Tree	*Ch.Laongpol* 182
	Vatica harmandiana Pierre	Sadao pak	Tree	*Ch.Laongpol* 5, 166, 190, 406
Ebenaceae	*Diospyros ferrea* (Willd.) Bakh.	Lambit	Shrub	*Ch.Laongpol* 72, 165, 383
Elaeocarpaceae	*Elaeocarpus robustus* Roxb.	Sathon rok	Tree	*Ch.Laongpol* 155
	Elaeocarpus griffithii (Wight) A.Gray	To sai	Shrub	–
Ericaceae	*Vaccinium bracteatum* Thunb.	Thing thuat	Shrub	*Ch.Laongpol* 11, 102
Euphorbiaceae	*Breynia racemosa* (Blume) Müll.Arg.	Kang pla	Shrub	–
	Chaetocarpus castanocarpus (Roxb.) Thwaites	Samphao	Shrubby Tree	*Ch.Laongpol* 38, 141

Table 1. (continued)

Family	Species	Vernacular	Habit	Vouch.[2]
	Euphorbia atoto G.Forst	Nam nom ratchasi thale	Herb	–
	Glochidion rubrum Blume	Kradum phi	Shrubby Tree	*Ch.Laongpol* 8
Fagaceae	*Lithocarpus wallichianus* (Lindl. ex Hance) Rehder	Ko mu	Tree	*Ch.Laongpol* 66, 47
Gentianaceae	*Fagraea fragrans* Roxb.	Kan krao	Tree	*Ch.Laongpol* 189
Guttifereae	*Calophyllum inophyllum* L.	Kra thing	Tree	*Ch.Laongpol* 58
	Calophyllum pisiferum Planch. & Triana	–	Tree	–
	Garcinia cowa Roxb. ex DC.	Cha muang	Tree	*Ch.Laongpol* 197
	Garcinia hombroniana Pierre	Wa	Tree	*Ch.Laongpol* 174
Labiatae	*Gmelina philippensis* Cham.	Song maeo	Climber	*Ch.Laongpol* 35, 101, 203
	Premna obtusifolia R.Br.	Cha lueat	Climber	*Ch.Laongpol* 24, 60
	Vitex pinnata L.	Tin nok	Tree	*Ch.Laongpol* 64
	Vitex rotundifolia L.f.	Khon thi so thale	Herb	*Ch.Laongpol* 404
Lauraceae	*Neolitsea zeylanica* (Nees) Merr.	Ian	Tree	*Ch.Laongpol* 136, 137
	Litsea sp.	–	Tree	*Ch.Laongpol* 82
	Phoebe sp.	–	Shrub	–
	Cinnamomum sp.	–	Tree	–
Leguminosae-Papilionoideae	*Abrus precatorius* L.	Ma klam ta nu	Climber	*Ch.Laongpol* 21
	Canavalia rosea (Sw.) DC.	Thua khla	Herb	–
	Crotalaria elliptica Roxb.	–	Herb	*Ch.Laongpol* 69, 148
Leguminosae-Mimosoideae	*Entada* sp.	–	Climber	–
Loranthaceae	*Dendrophthoe pentandra* (L.) Miq.	Kafak ma muang	Parasitic Shrub	*Ch.Laongpol* 46
	Helixanthera cylindrica (Jack) Danser	Kafak samet	Parasitic Shrub	–
	Helixanthera parasitica Lour.	Kafak ko	Parasitic Shrub	–

Table 1. (continued)

Family	Species	Vernacular	Habit	Vouch.[2]
Melastomataceae	*Melastoma cyanoides* Sm.	Mang re	Shrub	*Ch. Laongpol* 2, 176
	Melastoma malabathricum subsp. *malabathricum* L.	Khlong khleng	Shrub	*Ch.Laongpol* 157
	Melastoma sanguineum Sims	Mang khre chang	Shrub	–
	Memecylon edule Roxb.	Phlong mueat	Shrub	*Ch.Laongpol* 206
	Memecylon ovatum Sm.	Phlong kin luk	Shrub	*Ch.Laongpol* 22, 191
Myristicaceae	*Knema globularia* (Lam.) Warb.	Lueat raet	Tree	*Ch.Laongpol* 29, 152
Myrsinaceae	*Ardisia crenata* Sims	Ta kai bai kwang	Shrub	*Ch.Laongpol* 401
	Rapanea porteriana (A.DC.) Mez	Rang ka thae	Shrub	*Ch.Laongpol* 98
Myrtaceae	*Rhodomyrtus tomentosa* (Aiton) Hassk.	Phruat	Shrub	*Ch.Laongpol* 133
	Syzygium grande (Wight) Walp. (plate 1, D)	Mao	Tree	*Ch.Laongpol* 163, 168
	Syzygium gratum (Wight) S.N. Mitra	Samet chun	Shrub	*Ch. Laongpol* 6
	Syzygium zeylanicum (L.) DC.	Wa ling	Shrub	*Ch.Laongpol* 195
	Syzygium sp.	–	Tree	–
Ochnaceae	*Ochna integerrima* (Lour.) Merr.	Tan lueang	Shrub	*Ch.Laongpol* 63, 150, 172
Olacaceae	*Olax psittacorum* (Willd.) Vahl	Nam chai khrai	Climber	*Ch.Laongpol* 68, 170
Oleaceae	*Olea brachiata* (Lour.) Merr.	Ket san	Shrub	*Ch.Laongpol* 37, 40, 349, 353
	Jasminum scandens (Retz.) Vahl	Siao phi	Climber	*Ch.Laongpol* 84, 181
Opiliaceae	*Champereia manillana* (Blume) Merr.	Phak wan pa	Shrubby Tree	*Ch.Laongpol* 17
Passifloraceae	*Passiflora* sp.	–	Climber	–
Pittosporaceae	*Pittosporum ferrugineum* W.T. Aiton	Sum ton	Shrubby Tree	*Ch.Laongpol* 131, 149, 381
Rhizophoraceae	*Carallia brachiata* (Lour.) Merr.	Chiang phra nang ae	Tree	–
Rubiaceae	*Canthium* sp.	–	Shrub	–

Table 1. (continued)

Family	Species	Vernacular	Habit	Vouch.[2]
Rubiaceae	*Psydrax nitida* (Craib) K.M. Wong	Kapa	Shrubby Tree	*Ch.Laongpol* 387
	Catunaregam tomentosa (Blume ex DC.) Tirveng.	Ma khet	Shrub	*Ch.Laongpol* 52
	Chassalia chartacea Craib	Khem mai	Shrub	*Ch.Laongpol* 351
	Guettarda speciosa L.	Kongkang hu chang	Shrubby Tree	–
	Hedyotis sp.	–	Herb	–
	Hydnophytum formicarum Jack	Hua roi ru	Epiphytic Shrub	–
	Ixora javanica (Blume) DC.	Khem thong	Shrub	*Ch.Laongpol* 85
	Morinda elliptica Ridl.	Yo thuean	Shrub	*Ch.Laongpol* 167
	Oxyceros longiflora (Lam.) T. Yamaz.	Khao ngua phueak	Shrub	*Ch.Laongpol* 134
	Prismatomeris tetrandra (Roxb.) K.Schum. var. *tetrandra*	Ta lai	Shrub	–
	Psychotria sarmentosa Blume	Duk kai yan	Climber	*Ch.Laongpol* 59
	Tarenna wallichii (Hook.f.) Ridl.	Chan thana bai lek	Shrub	*Ch.Laongpol* 146
	Lucinaea morindae DC.	Yo yan	Climber	–
Rutaceae	*Acronychia pedunculata* (L.) Miq.	Ka uam	Tree	*Ch.Laongpol* 49, 358
	Atalantia monophylla (DC.) Correa	Manao phi	Shrubby Tree	–
	Euodia roxburghiana (Cham.) Benth. ex Hook.f.	Sam ngam	Shrubby Tree	–
	Micromelum minutum (G.Forst.) Wight & Arn.	Hatsa khun	Shrub	*Ch.Laongpol* 92
Sapindaceae	*Guioa pleuropteris* (Blume) Radlk.	Som ling	Shrub	*Ch.Laongpol* 36, 158
	Lepisanthes rubiginosa (Roxb.) Leenh.	Ma huat	Shrub	–
	Mischocarpus sundaicus Blume	Khao kwang	Tree	*Ch.Laongpol* 216
Sapotaceae	*Pouteria obovata* (R.Br.) Baehni	Nga sai	Shrub	*Ch.Laongpol* 25
Simaroubaceae	*Eurycoma longifolia* Jack	Pla lai phueak	Shrubby Tree	–

Table 1. (continued)

Family	Species	Vernacular	Habit	Vouch.[2]
Stilaginaceae	*Antidesma ghaesembilla* Gaertn.	Mao khai pla	Shrub	–
Theaceae	*Schima wallichii* (DC.) Korth.	Mangtan	Tree	*Ch.Laongpol* 147, 212
Thymelaeaceae	*Wikstroemia ridleyi* Gamble	Po fan	Shrub	*Ch.Laongpol* 34
Tiliaceae	*Microcos tomentosa* Sm.	Phlapphla	Tree	*Ch.Laongpol* 31
	Triumfetta grandidens Hance	Po yan	Herb	*Ch.Laongpol* 385
Viscaceae	*Viscum articulatum* Burm.f.	Kafak tin pu	Parasitic	*Ch.Laongpol* 45
Vitaceae	*Tetrastigma mutabile* (Blume) Planch.	A ngun pa	Climber	*Ch.Laongpol* 33

Table 2. List of monocotyledons occurring on coastal sandbars in Narathiwat.

Family	Species	Vernacular	Habit	Vouch.[2]
Amaryllidaceae	*Crinum northianum* Baker (plate 1, B)	Phlueng le	Herb	*Ch.Laongpol* 91
Araceae	*Amorphophallus* sp.	–	Herb	–
Commelinaceae	*Cyanotis* sp.	–	Herb	–
Cyperaceae	*Cyperus trialatus* (Boeck.) Kern	Ya sam liam	Herb	–
	Fimbristylis leptoclada Benth.	Kok thing chai	Herb	–
	Fimbristylis sp.1	–	Herb	–
	Fimbristylis sp.2	–	Herb	–
	Remirea maritima Aubl.	Kok mari	Herb	–
	Rhynchospora rubra (Lour.) Makino	Ya hua dang	Herb	–
	Scleria levis Retz.	Ya sam khom	Herb	–
	Scleria poaeformis Retz.	Prue	Herb	–
Dioscoreaceae	*Dioscorea* sp.	–	Climber	–
Liliaceae	*Dianella ensifolia* (L.) DC.	Ya nu ton	Herb	*Ch.Laongpol* 42
Orchidaceae	*Bromheadia finlaysoniana* (Lindl.) Rchb.f.	Kluai mai din	Terrestrial Orchid	*Ch. Laongpol* 5

Table 2. (continued)

Family	Species	Vernacular	Habit	Vouch.[2]
Orchidaceae	*Bulbophyllum planibulbe* (Ridl.) Ridl.	–	Epiphytic Orchid	*Ch.Laongpol* 53
	Bulbophyllum vaginatum (Lindl.) Rchb.f.	Singto nuat yao	Epiphytic Orchid	*Ch.Laongpol* 194
	Cymbidium findlaysonianum Lindl.	Kare karon pak pet	Epiphytic Orchid	*Ch.Laongpol* 199
	Dendrobium crumenatum Sw.	Wai tamoi	Epiphytic Orchid	–
	Dendrobium secundum (Blume) Lindl. (plate 1, C)	Ueang praeng si fan	Epiphytic Orchid	*Ch.Laongpol* 185
	Doritis pulcherrima Lindl.	Ma wing	Terrestrial Orchid	*Ch.Laongpol* 180
	Luisia zollingeri Rchb.f.	Ngu khiao noi	Epiphytic Orchid	*Ch.Laongpol* 213
	Micropera pallida (Roxb.) Lindl.	Ueang ma laeng po thong	Epiphytic Orchid	*Ch.Laongpol* 54
	Vanilla aphylla Blume	Thao ngu khiao	Creeping Orchid	*Ch.Laongpol* 395
Palmae	*Licuala spinosa* Thunb.	Ka pho	Palm	–
	Oncosperma tigillarium (Jack) Ridl.	Lao chaon	Palm	–
Pandanaceae	*Pandanus odoratissimus* L.f.	Lam chiak	Shrubby Tree	–
Poaceae	*Chrysopogon orientalis* A.Camus	Ya phung chu	Grass	–
	Eragrostis cilianensis (All.) Vignolo- Lutati	–	Grass	–
	Eremochloa ciliaris (L.) Merr.	–	Grass	–
	Eriachne pallescens R.Br.	Ya nuat moen	Grass	–
	Spinifex littoreus Merr.	Ya loi lom	Grass	–
	Zoysia matrella (L.) Merr.	Ya nuan noi	Grass	–

Table 3. List of non-flowering vascular plants occurring on coastal sandbars in Narathiwat.

Family	**Species**	**Vernacular**	**Habit**	**Vouch.**[2]
Blechnaceae	*Blechnum* sp.	–	Fern	–
Cycadaceae	*Cycas rumphii* Miq.	Prong thale	Shrubby Tree	–
Davalliaceae	*Davallia denticulata* (Burm.f.) Mett. ex Kuhn	Nakkharat	Epiphytic Fern	*Ch.Laongpol* 196, 207
Gnetaceae	*Gnetum tenuifolium* Ridl.	Mueai nok	Climber	–
Nephrolepidaceae	*Nephrolepis* sp.	–	Fern	–
Polypodiaceae	*Drynaria sparsisora* (Desv.) S.Moore	Kut hok Kut hok	Epiphytic Fern	–
	Microsorum scolopendria (Burm.f.) Copel.	Yai phaek	Epiphytic Fern	–
	Pyrrosia piloselloides (L.) M.G. Price	Kipmalom	Epiphytic Fern	–
	Pyrrosia adnascens (G.Forst.) Ching	Phak pik kai	Epiphytic Fern	–
	Vittaria ensiformis Sw.	Kut pik kai	Epiphytic Fern	–
Pteridaceae	*Stenochlaena palustris* (Burm.f.) Bedd.	Prong suan	Fern	–
Schizaeaceae	*Schizaea dichotoma* (L.) Sm.	Tan san	Fern	*Ch.Laongpol* 56, 65
	Schizaea digitata (L.) Sw.	Tan sai	Fern	*Ch.Laongpol* 44

Table 4. List of dicotyledons found in each study site.

Family	Species	1	2	3	4	5	6	7	8	9	10	11	12
Amaranthaceae	*Achyranthes aspera* L.	X											
Anacadiaceae	*Buchanania arborescens* (Blume) Blume									X			
	Semecarpus curtisii King									X		X	
Ancistrocladaceae	*Ancistrocladus tectorius* (Lour.) Merr.		X			X							
Annonaceae	*Desmos cochinchinensis* Lour.	X				X				X			X
	Desmos dasymachala (Blume) Saff.									X		X	X
	Fissistigma sp.											X	
	Uvaria grandiflora Roxb. ex Hornem											X	
Apocynaceae	*Cerbera odollam* Gaertn.	X	X										X
	Alstonia macrophylla Wall. ex G.Don	X								X			
	Alyxia reinwardtii Blume									X		X	
Asclepiadaceae	*Dischidia major* (Vahl) Merr.	X	X	X	X	X	X	X	X	X	X	X	X
	Hoya diversifolia Blume	X	X	X	X	X	X	X	X	X	X	X	X
	Hoya parasitica (Roxb.) Wall. ex Traill	X	X	X	X	X	X	X	X	X	X	X	X
	Tylophora flexuosa R.Br.	X											
	Tylophora indica (Burm.f.) Merr.	X											
	Cynanchum ovalifolium Wight	X											
Bignoniaceae	*Stereospermum fimbriatum* (Wall. ex G. Don) A. DC.			X									
Celastraceae	*Euonymus cochinchinensis* Pierre	X	X										
	Pleurostylia opposita (Wall.) Alston	X	X	X									
	Salacia chinensis L.	X											
Combretaceae	*Terminalia catappa* L.	X											X

Location: 1= Ban Sai Khao, 2= Ban Pa Se Pu Te, 3= Ban Hu Tae Thu Wo, 4= Ban Bu Ra Pae, 5= Ban Khok Phayom, 6= Ban Khok Khain, 7=Ban Khok Khilek, 8= Ban Ko Sawat, 9= Ban Khok Kraduk Mu, 10= Ban Khok Mafueang, 11= Wat Pip Phliwan, 12= Ban Ko Yao

Table 4. (continued).

Family	Species	1	2	3	4	5	6	7	8	9	10	11	12
Convolvulaceae	*Ipomoea pes-caprae* (L.) R.Br.	X								X			
	Ipomoea imperati (Vahl) Griseb	X								X			
	Merremia hirta (L.) Merr.	X											
Crypteroniaceae	*Crypteronia paniculata* Blume											X	
Dilleniaceae	*Dillenia ovata* Wall. ex Hook.f. & Thomson									X		X	
	Tetracera indica (Christm. & Panz.) Merr.	X	X	X	X	X	X	X	X	X	X	X	X
	Tetracera loureiri (Finet & Gagnep.) Pierre ex Craib	X	X	X	X	X	X	X	X	X	X	X	X
Dipterocarpaceae	*Dipterocarpus chartaceus* Symington									X			
	Hopea odorata Roxb.										X	X	
	Shorea roxburghii G.Don		X	X	X	X	X	X		X	X	X	
	Vatica harmandiana Pierre	X	X	X		X	X						
Ebenaceae	*Diospyros ferrea* (Willd.) Bakh.	X							X				
Elaeocarpaceae	*Elaeocarpus robustus* Roxb.			X					X				X
	Elaeocarpus griffithii (Wight) A.Gray								X				
Ericaceae	*Vaccinium bracteatum* Thunb.					X	X	X	X				
Euphorbiaceae	*Breynia racemosa* (Blume) Mull.Arg.						X	X					
	Chaetocarpus castanocarpus (Roxb.) Thwaites	X	X	X	X	X	X	X	X	X			X
	Euphorbia atoto G.Forst	X											
	Glochidion rubrum Blume	X											
Fagaceae	*Lithocarpus wallichianus* (Lindl. ex Hance) Rehder					X							
Gentianaceae	*Fagraea fragrans* Roxb.			X	X	X	X	X	X	X	X	X	
Guttifereae	*Calophyllum inophyllum* L.	X				X				X			X
	Calophyllum pisiferum Planch. & Triana								X				
	Garcinia cowa Roxb. ex DC.	X					X		X			X	
	Garcinia hombroniana Pierre						X	X	X			X	

Table 4. (continued).

Family	Species	1	2	3	4	5	6	7	8	9	10	11	12
Labiatae	*Gmelina philippensis* Cham.	X	X	X			X						X
	Premna obtusifolia R.Br.	X	X										X
	Vitex pinnata L.	X	X										X
	Vitex rotundifolia L.f.	X											
Lauraceae	*Neolitsea zeylanic* (Nees) Merr.	X	X	X					X	X			X
	Litsea sp.	X	X										X
	Phoebe sp.	X	X										X
	Cinnamomum sp.	X	X							X		X	X
Leguminosae-Papilionideae	*Abrus precatorius* L.	X	X			X				X			X
	Canavalia rosea (Sw.) DC.	X	X							X			X
	Crotalaria elliptica Roxb.	X											
Leguminosea-Mimosoideae	*Entada* sp.		X							X			
Loranthaceae	*Dendrophthoe pantandra* (L.) Miq.	X	X				X	X	X				X
	Helixanthera cylindrica (Jack) Danser	X	X				X	X	X				X
	Helixanthera parasitica Lour.	X	X				X	X	X				X
Melastomataceae	*Melastoma cyanoides* Sm.		X		X	X	X	X	X	X	X	X	X
	Melastoma malabathricum subsp. *malabathricum* L.		X		X	X	X	X	X	X	X	X	X
	Melastoma sanguineum Sims		X		X	X	X	X	X	X	X	X	X
	Memecylon edule Roxb.	X	X	X	X	X	X			X		X	
	Memecylon ovatum Sm.	X	X	X	X	X	X						
Myristicaceae	*Knema globularia* (Lam.) Warb.									X	X	X	
	A*rdisia crenata* Sims	X	X	X	X	X	X	X	X	X		X	

Table 4. (continued).

Family	Species	1	2	3	4	5	6	7	8	9	10	11	12
Myristicaceae	*Rapanea porteriana* (A.DC.) Mez			X									
Myrtaceae	*Rhodomyrtus tomentosa* (Aiton) Hassk.	X	X	X	X	X	X	X	X	X	X		
	Syzygium grande (Wight) Walp	X	X	X	X	X	X	X	X	X	X	X	
	Syzygium gratum (Wight) S.N. Mitra	X	X	X	X	X	X	X	X	X	X		
	Syzygium zeylanicum (L.) DC.	X		X		X	X		X				
	Syzygium sp.								X				
Ochnaceae	*Ochna integerrima* (Lour.) Merr.	X	X										
Olacaceae	*Olax psittacorum* (Willd.) Vahl	X	X										
Oleaceae	*Olea brachiata* (Lour.) Merr.	X				X	X	X		X			
	Jasminum scandens (Retz.) Vahl									X	X	X	
Opiliaceae	*Champereia manillana* (Blume) Merr.		X										
Passifloraceae	*Passiflora* sp.									X			
Pittosporaceae	*Pittosporum ferrugineum* W.T. Aiton	X	X	X			X			X			
Rhizophoraceae	*Carallia brachiata* (Lour.) Merr.								X	X	X	X	
Rubiaceae	*Canthium* sp.		X										
	Psydrax nitida (Craib) K.M. Wong	X	X										
	Catunaregam tomentosa (Blume ex DC.) Tirveng.	X											
	Chassalia chartacea Craib	X				X							
	Prismatomeris tetrandra (Roxb.) K.Schum. var. *tetrandra*						X						
	Guettarda speciosa L.	X											
	Hedyotis sp.						X	X					
	Hydnophytum formicarum Jack						X	X					
	Ixora javanica (Blume) DC.	X	X	X	X	X	X	X	X	X	X	X	X
	Morinda elliptica Ridl.	X	X	X	X	X	X	X	X	X	X	X	X

Table 4. (continued).

Family	Species	1	2	3	4	5	6	7	8	9	10	11	12
Rubiaceae	*Oxyceros longiflora* (Lam.) T. Yamaz.	X											
	Psychotria sarmentosa Blume	X	X	X	X	X	X	X	X	X	X	X	X
	Tarenna wallichii (Hook.f.) Ridl.	X	X	X	X	X							
	Lucinaea morindae DC.												X
Rutaceae	*Acronychia pedunculata* (L.) Miq.						X	X	X				
	Atalantia monophylla (DC.) Correa								X	X			
	Euadia roxburghiana (Cham.) Benth. ex Hook.f.									X			
	Micromelum minutum (G.Forst.) Wight & Arn.	X	X	X		X	X	X		X			X
Sapindaceae	*Guioa pleuropteris* (Blume) Radlk.	X	X										
	Lepisanthes rubiginosa (Roxb.) Leenh.					X			X			X	
	Mischocarpus sundaicus Blume	X	X										
Sapotaceae	*Pouteria obovata* (R.Br.) Baehni	X	X	X	X	X			X				
Simaroubaceae	*Eurycoma longifolia* Jack	X							X				
Stilaginaceae	*Antidesma ghaesembilla* Gaertn.									X			
Theaceae	*Schima wallichii* (DC.) Korth.						X	X					
Thymelaeaceae	*Wikstroemia ridleyi* Gamble									X			X
Tiliaceae	*Microcos tomentosa* Sm.	X							X			X	
	Triumfetta grandidens Hance	X								X			
Vitaceae	*Tetrastigma mutabile* (Blume) Planch.									X			

Table 5. List of monocoty ledonous species found in each study site

Family	Species	1	2	3	4	5	6	7	8	9	10	11	12
Amaryllidaceae	*Crinum northianum* Baker	X							X				X
Araceae	*Amorphophallus* sp.	X							X	X			X
Commelinaceae	*Cynotis* sp.	X				X							
Cyperaceae	*Cyperus trialatus* (Boeck.) Kern	X		X		X				X			
	Fimbristylis sp. 1	X											
	Fimbristylis sp.2	X											
	Remirea maritima Aubl.	X							X	X			X
	Rhynchospora rubra (Lour.)Makino	X							X				X
	Scleria levis Retz.	X							X				X
	Scleria poaeformis Retz.	X		X					X	X			X
Dioscoreaceae	*Dioscorea* sp.	X		X		X	X		X	X		X	
Liliaceae	*Dianella ensifolia* (L.) DC.	X	X				X		X	X			X
Orchidaceae	*Bromheadia finlaysoniana* (Lindl.) Rchb.f.			X									
Orchidaceae	*Bulbophyllum planibulbe* (Ridl.) Ridl.					X	X		X				
	Bulbophyllum vaginatum (Lindl.) Rchb.f.								X			X	
	Cymbidium findlaysonianum Lindl.						X		X	X	X	X	
	Dendrobium crumenatum Sw.	X	X	X	X	X	X	X	X	X	X	X	X
	Dendrobium secundum (Blume) Lindl.						X						
	Doritis pulcherrima Lindl.								X				
	Luisia zollingeri Rchb.f.								X				
	Micropera pallida (Roxb.) Lindl.			X	X	X			X				
	Vanilla aphylla Blume			X		X			X				

Location: 1= Ban Sai Khao, 2= Ban Pa Se Pu Te, 3= Ban Hu Tae Thu Wo, 4= Ban Bu Rapae, 5= Ban Khok Phayom, 6= Ban Khok Khain, 7=Ban Khok Khilek, 8= Ban Ko Sawat, 9= Ban Khok Kraduk Mu, 10= Ban Khok Mafuaeng, 11= Wat Pip Phliwan, 12= Ban Ko yao

Table 5. (continued).

Family	Species	1	2	3	4	5	6	7	8	9	10	11	12
Palmae	*Licuala spinosa* Thunb.					X			X	X	X	X	
	Oncosperma tigillarium (Jack) Ridl.			X		X	X	X	X		X	X	
Pandanaceae	*Pandanus odoratissimus* L.f.	X											
Poaceae	*Chrysopogon orientalis* A.Camus	X							X				
	Eragrostis cilianensis (All.) Vignolo-Lutati	X											
	Eremochloa ciliaris (L.) Merr.	X											
	Eriachne pallescens R.Br.	X											
	Spinifex littoreus Merr.	X							X	X			
	Zoysia matrella (L.) Merr.	X							X	X			

Table 6. List of non-flowering vascular plant species found in each study site

Family	Species	1	2	3	4	5	6	7	8	9	10	11	12
Blechnaceae	*Blechnum* sp.											X	
Cycadaceae	*Cycas rumphii* Miq.	X											X
Davalliaceae	*Davallia denticulata* (Burm.f.) Mett. ex Kuhn	X	X	X	X	X	X	X	X	X	X	X	X
Gnetaceae	*Gnetum tenuifolium* Ridl.	X	X	X					X				X
Nephrolepidaceae	*Nephrolepis* sp.	X									X	X	
Polypodiaceae	*Drynaria sparsisora* (Desv.) S.Moore	X	X	X	X	X	X	X	X	X	X	X	X
	Microsorum scolopendria (Burm.f.) Copel.	X	X						X				X
	Pyrrosia piloselloides (L.) M.G.Price	X	X	X	X	X	X	X	X	X	X	X	X
	Pyrrosia adnascens (G.Forst.) Ching	X							X				X
Pteridaceae	*Stenochlaena palustris* (Burm.f.) Bedd.					X			X			X	
	Vittaria ensiformis Sw.	X	X						X				X
Schizaeaceae	*Schizaea dichotoma* (L.) Sm.	X	X			X							
	Schizaea digitata (L.) Sw.	X				X		X					

Location: 1= Ban Sai Khao, 2= Ban Pa Se Pu Te, 3= Ban Hu Tae Thu Wo, 4= Ban Bu Rapae, 5= Ban Khok Phayom, 6= Ban Khok Khain,7=Ban Khok Khilek, 8= Ban Ko Sawat, 9= Ban Khok Kraduk Mu, 10= Ban Khok Mafueang, 11= Wat Pip Phliwan, 12= Ban Ko yao

DISCUSSION AND CONCLUSIONS

It is estimated that 85–90% of species in the study area were investigated during the study period (October 2001– March 2003). Field collecting expeditions did not coincide with the flowering period of some plant species, either because the flowering period was very short or because it varied from year to year.

Flowering plants

Dicotyledonous plants

The biggest group among the dicotyledonous species is the family Rubiaceae (Table 1). Fourteen species were recorded. Almost all species were found in one or two study sites (see also Table 4), usually those confined to the first sandbars beside the sea, viz. *Canthium* sp., *Guettarda speciosa* L., *Hedyotis* sp., *Catunaregam tomentosa* (Blume ex DC.) Tirveng., *Chassalia chartacea* Craib. However, some were recorded in all sites, i.e. *Ixora javanica* (Blume) DC., *Morinda elliptica* Ridl. and *Psychotria sarmentosa* Blume.

The second biggest group in the area is the family Asclepiadaceae. Six species in four genera were found, viz. *Dischidia major* (Vahl) Merr., *Hoya diversifolia* Blume (plate 1, F) and *H. parasitica* (Roxb.) Wall. ex Traill; *Tylophora flexuosa* R.Br., *T. indica* (Burm.f.) Merr. and *Cynanchum ovalifolium* Wight. All members of the family Asclepiadaceae found are wiry climbers. The first three species are the most common ones, being recorded at every study site (Table 4).

When the occurrences of all plants in the study area had been taken into account, the most abundant species, which were found everywhere, were: *Dischidia major* (Vahl) Merr., *Hoya diversifolia* Blume and *H. parasitica* (Roxb.) Wall. ex Traill, *Tetracera indica* (Christm. & Panz.) Merr., *T. loureiri* (Finet & Gagnep.) Pierre ex Craib, *Ixora javanica* (Blume) DC., *Morinda elliptica* Ridl. and *Psychotria sarmentosa* Blume.

Monocotyledonous plants

The richest group of monocotyledonous species is the orchids (Table 2). Ten species in eight genera were found, the most common one being *Dendrobium crumenatum* Sw. (recorded at every study site). The less common species are: *Bulbophyllum planibulbe* (Ridl.) Ridl., *Bulbophyllum vaginatum* (Lindl.) Rchb.f., *Cymbidium findlaysonianum* Lindl., *Micropera pallida* (Roxb.) Lindl. and *Vanilla aphylla* Blume. Besides, *Bromheadia finlaysoniana* (Lindl.) Rchb.f., *Dendrobium secundum* (Blume) Lindl., *Doritis pulcherrima* Lindl.(plate 1, C) and *Luisia zollingeri* Rchb.f, each of which was recorded only once at different study sites.

Two other big groups of monocotyledons are the Cyperaceae and Poaceae (Table 2). The most interesting one in the family Cyperaceae might be *Remirea maritima* Aubl. It dominates the area next to the tidal zone. Therefore, it is sometimes affected by seawater.

Among the Poaceae, *Zoysia matrella* (L.) Merr. and *Spinifex littoreus* Merr. occurred as large patches on the beach along the shoreline next to the zone of *Remirea maritima* Aubl. Some other grass species are not common, found in only one or two study sites, viz. *Chrysopogon orientalis* A.Camus, *Eragrostis cilianensis* (All.) Vignolo-Lutaati, *Eremochloa ciliaris* (L.) Merr. and *Eriachne pallescens* R.Br.

Non-flowering vascular plants

Ferns and fern-allies

On the sandbars in Narathiwat, there are few ferns and fern-allies. The ferns are the most common non-flowering vascular plants, the biggest family in the study area being the Polypodiaceae (Table 3). Four species were recorded viz. *Drynaria sparsisora* (Desv.) S.Moore, *Pyrrosia piloselloides* (L.) M.G.Price, *Microsorium scolopendria* (Burm.f.) Copel. and *Pyrrosia adnascens* (G.Forst.) Ching. The first two were the most common species in the area (found in all study sites - Table 6). However, the most interesting ones were *Schizaea dichotoma* (L.) Sm., and *Schizaea digitata* (L.) Sw. in the Schizaeaceae. These were said to be quite common in peninsular Thailand by Tagawa & Iwatsuki (1979). However in this study, they were found only in a few specific sites (Table 6).

Gymnosperms

Two gymnosperms were recorded in this study, viz. *Cycas rumphii* Miq. (Cycadaceae) and *Gnetum tenuifolium* Ridl. (Gnetaceae). The former was recorded only at two sites.

Note on plant species found on sandbars in Narathiwat:

Comparing the plant species of sandbars found in the present study with those of peat swamp forest in Narathiwat, 57 species are found in both vegetation types (Phengklai et al., 1989, 1991). This might be due to the following reasons: some species of both vegetation types are common wiry climbers or parasitic plants found in the canopy of trees, e.g. *Hoya* spp., *Tetrastigma mutabile* (Blume) Planch., *Viscum articulatum* Burm.f., while others are in the "ecotone" area between these two habitats (sandbars vs. swamp), e.g. *Stenochlaena palustris* (Burm.f.) Bedd., *Licuala spinosa* Thunb. and *Oncosperma tigillarium* (Jack) Ridl., *Schima wallichii* (DC.) Korth, *Pittosporum ferrugineum* W.T.Aiton. Other species again are rather flexible, found in a wide range of habitats, from swamp to dry land, e.g. *Dalvallia denticulata* (Burm.f.) Mett. ex Kuhn; *Fagraea fragrans* Roxb., *Ixora javanica* (Blume) DC., *Melastoma* spp. and *Morinda elliptica* Ridl.

Fifty-four species of plants found in this study also occur on sandbars in Songkhla (Sridith, 2002), e.g. *Syzygium grande* (Wight) Walp. (plate 1, D), *S. gratum* (Wight) S.N.Mitra, *Olea bracheata* (Lour.) Merr., *Pouteria obovata* (R.Br.) Baehni, *Vatica harmandiana* Pierre. These common species might be characteristic of sandbars in general.

Note on the characteristics of plant species in the study area:

Herbaceous plant species alone occur next to the tidal zone. As they would be affected by drought and, sometimes, by salt-water, almost all of them have xerophytic characteristics (pale colour, succulent habit etc.) and might also have halophytic physiological properties, since they are exposed to salt-water either directly from tidal movements or indirectly from wind-blown salt-spray. These species are *Remirea maritima* Aubl., *Ipomoea pes–caprae* (L.) R.Br., *Canavalia rosea* (Sw.) DC., *Euphorbia atoto* G.Forst., and *Spinifex littoreus* Merr.

Common features of the trees and shrubs occurring behind this herbaceous zone are sclerophyllous leaves with thick cuticles and pale coloration, e.g. *Pouteria obovata* (R.Br.) Baehni, *Rapanea porteriana* (A.DC.) Mez, *Rhodomyrtus tomentosa* (Aiton) Hassk., *Syzygium grande* (Wight) Walp., *S. gratum* (Wight) S.N. Mitra, and *Vitex rotundifolia* L.f. Some with thin chartaceous leaves have short shoots, e.g. *Neolitsea zeylanica* (Nees) Merr. and *Ochna integerrima* (Lour.) Merr.

Plants in more inland areas have the regular characteristics of mesophytes since they are not affected by tides, salt spray or strong winds. Where there is a direct influence of strong wind from the sea and salt spray certain species are not found, for example *Shorea roxburghii* G.Don (Dipterocarpaceae) (plate 1, A) and *Vatica harmandiana* Pierre (Dipterocarpaceae). On the other hand, some tree species occur almost everywhere, e.g. *Syzygium grande* (Wight) Walp. but it is noticeable that individuals of these species occuring next to the open sea, have a very low canopy which comes close to the ground, whilst individuals further inland have a more regular canopy. This confirms the findings of Sridith (2002).

CONSERVATION RECOMMENDATIONS

The plant communities along the Narathiwat coast, though not of great economic value, are very important in terms of biodiversity and habitat conservation. Most of the natural vegetation on sandbars in Narathiwat has been eradicated and the remnants, left as isolated patches, have been very much depleted by human activities such as land development and agriculture. Unless the local inhabitants and/or government organisations take immediate action to reverse this destruction, even these small remnants will very soon disappear.

Urgent action is required to designate the best of the remaining vegetation on sandbars in Narathiwat as reserves so that they may be protected for the future. Further studies of the vegetational history and the distribution patterns of plants in the area should be encouraged to fill remaining gaps in our knowledge and to improve sustainable management of this neglected vegetation.

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REFERENCES

Bridson, D. & Forman, L. 1998. The Herbarium Handbook, 3rd ed., 334 pp. Royal Botanic Gardens, Kew, UK.

Land Survey Devision.1975. Soil Survey Report. 159 pp. Bangkok: Land Development Department, Ministry of Agriculture and Co-op, Thailand.

Narathiwat Provincial office. 2001. General information on Narathiwat Province. pp.12. Narathiwat: Narathiwat Provincial Office, Ministry of the Interior, Thailand.

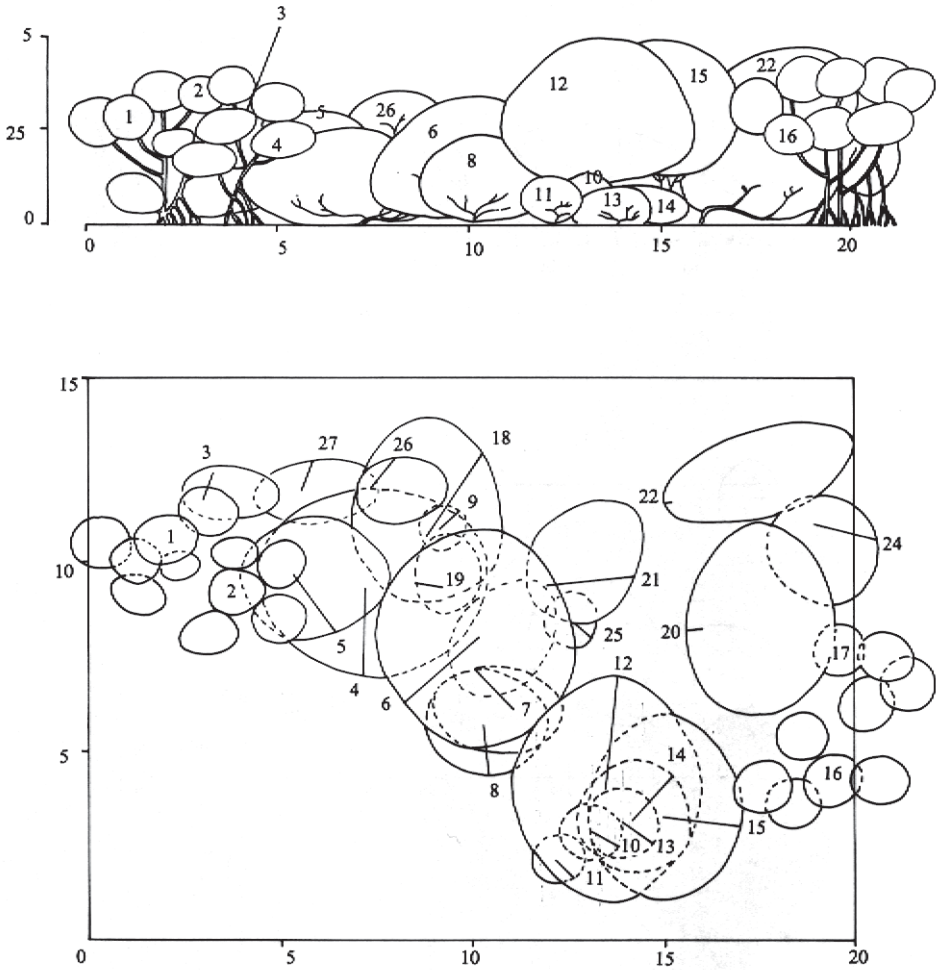
Phengklai, C., Niyomdham, C., Premrasmi, A., Chirathanakoen, K. & Pooma, R. 1989. Peat Swamp Forest of Thailand. Thai Forest Bulletin (Botany) 18: 1–42.

Phengklai, C., Niyomdham, C. and Ueachirakan, W. 1991. Flora in peat swamp areas of Narathiwat, Thailand. 368 pp. Bangkok: S.Sombunu Press.

Sridith, K. 2002. The remnants of vegetation on coastal sandbars in Songkhla Province, Peninsular Thailand. Thai Forest Bulletin (Botany) 30: 49–58.

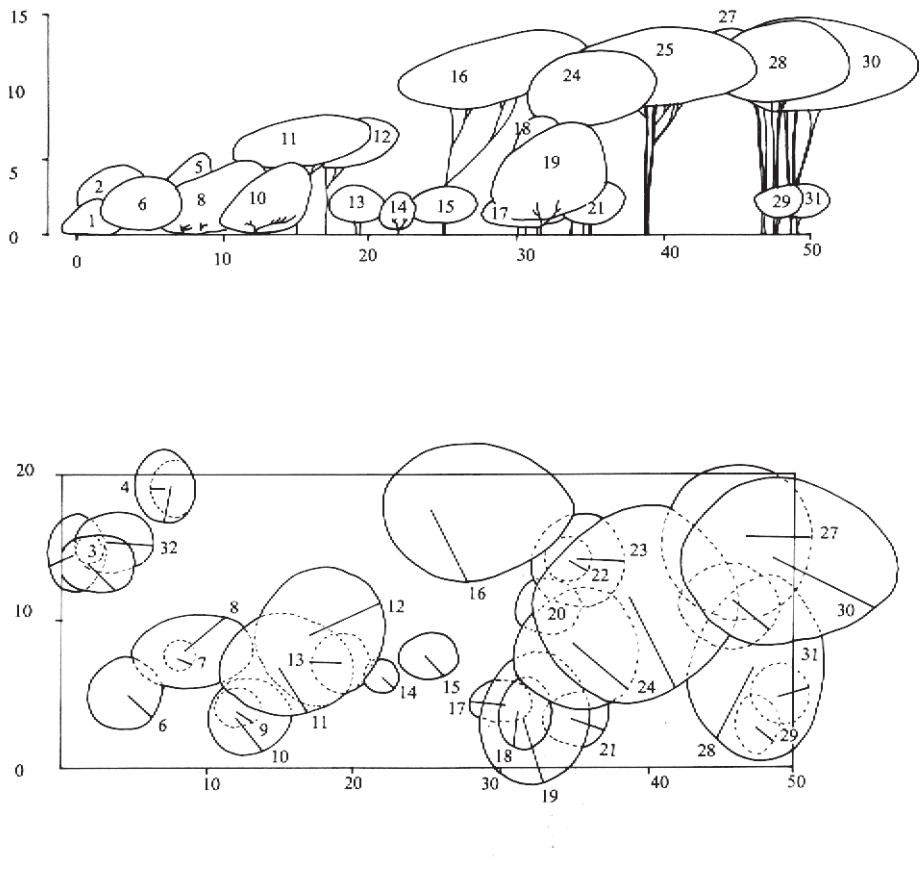
Tagawa, M. & Iwatsuki, K. 1979. Schizaeaceae. In: Smitinand, T. & Larsen, K. (eds), Flora of Thailand Vol. 3(1): 57–58. Bangkok: The Tistre Press.

The Profiles of Plant communities (coastal woodland) on sandbars in Narathiwat



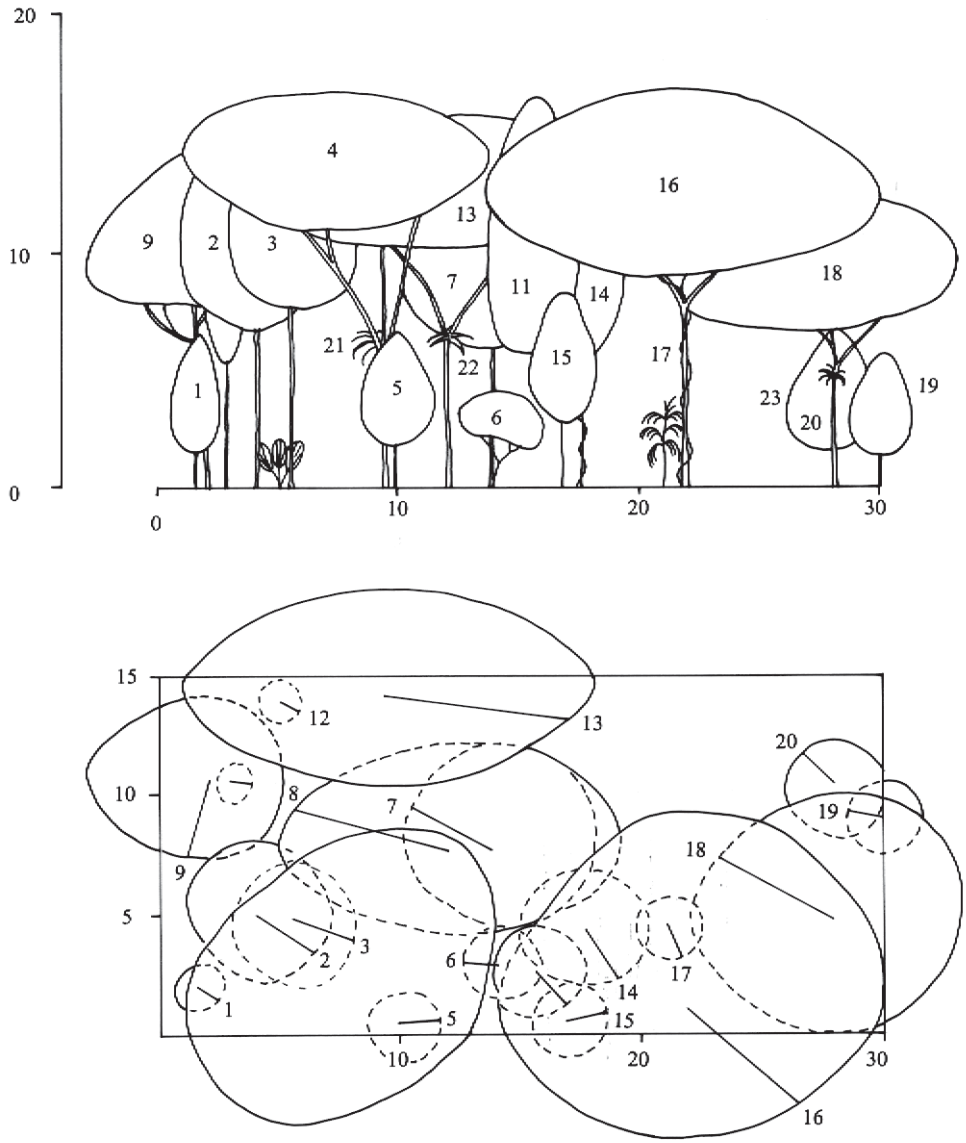
1,2	*Pandanus odoratissimus* L.f.	13 *Memecylon lilacinum* Zoll. & Moritzi
3,4,5,6,16,17,22,26,27	*Pouteria obovata* (R.Br.) Baehni	15,19,25 *Olea brachiata* (Lour.) Merr.
7,24	*Pleurotylia opposita* (Wall.) Alston	18 *Mischochapus sundiacus* Blume
8,10,11,14,23	*Diospyros ferrea* (Willd.) Bakh.	20 *Vitex pinnata* L.
9	*Morinda elliptica* Ridl.	21 *Ochna integerrima* (Lour.) Merr.
12	*Chaetocarpus castanocarpus* (Roxb.) Thwaites	

Figure 2. Profile of coastal woodland vegetation remnant at Ban Sai Khao site, Mueang Narathiwat district.



1,2,3,11,12,13,16,23,24,	*Syzygium grande* (Wight) Walp.	15	*Lepisanthes rubiginosa* (Roxb.) Leenh.
25,26,27,28,30,31,32		17	*Mischocarpus sundiacus* Blume
4,5,6,8,9,22	*Pouteria obovata* (R.Br.) Baehni	18	*Vitex Pinnata* L.
7,10	*Memecylon lilacinum* Zoll. & Moritzi		
14,19, 20	*Chaetocarpus castanacarpus* (Roxb.) Thwaites		
21	*Catunaeregam tomentosa* (Blume ex DC.) Tirveng.		
29	*Atalantia monophylla* (DC.) Correa		

Figure 3. Profile of coastal scrub/woodland vegetation remnant at Ban Sai Khao site, Mueang Narathiwat district.



1,2,3,5,7,9,11, 14,15,19,20,21	*Knema globularia* (Lam.) Warb.	12	*Licuala spinosa* Thunb.
		17	*Oncosperma tigillarium* (Jack) Ridl.
4,8m13,16	*Syzygium grande* (Wight) Walp.	18	*Carallia brachiata* (Lour.) Merr.
7,10	*Memecylon lilacinum* Zoll. & Moritzi		
6	*Desmos dasymachala* (Blume) Saff.	20, 21	*Asplenium nidus* L.
10	*Cinnamomum* sp.	23	*Cymbidium finlaysonianum* Lindl.

Figure 4. Profile of coastal woodland vegetation remnant at Wat Pip Phliwan site, Tak Bai district.

Figure 5. A. *Shorea roxburghii* G. Don, Ban Khok Khain –site 6 in figure 1; B. *Crinum northianum* Baker, Ban Ko Yao –site 12; C. *Doritis pulcherrima* Lindl., Ban Ko Sawat –site 8; D. *Syzygium grande* (Wight) Walp., Ban Sai Khao –site 1; E. *Ipomoea imperati* (Vahl.) Griseb, Ban Sai Khao –site 1; F. *Hoya diversifolia* Blume, Ban Khok Mafueang –site 10; G-H. coastal scrub-vegetation at the site of Ban Sai Khao district, Narathiwat, Peninsular Thailand.