



Mangroves Field Identification Manual of Timor Leste



**Building Shoreline Resilience of Timor Leste to Protect Local
Communities and Their Livelihood**

Dili, Timor-Leste 2018

© Copyright: UNDP- MAF 2018

This Manual prepared by United Nations Development Program (UNDP) and National Directorate of Forestry, Coffee and Industrial Plants, Ministry of Agriculture and Fisheries (MAF) of Democratic Republic of Timor Leste. Author and Photographs of the Manual is Mr. Animesh Kar. The copyright of the document remains UNDP and MAF, Timor Leste.

Table Contents

1.	Mangroves of Timor Leste- Local names and Geographical locations	Page- 2-3
2.	Background.....	Page-3
3.	Key Characteristics of Mangroves in Timor Leste.....	Page-4
4.	Mangrove Identifications.....	Page 5-39
5.	Mangrove Associates.....	Page- 40-55
6.	Reference.....	Page-55

Mangroves of Timor Leste- Local names and Geographical locations

SL	Species	Local Names	Geographical Locations	Page no.
1	<i>Acanthus ilicifolius</i>	Dasu Ana Rui, Baotuk, Kaikoli fetu	All North& South Coast	6
2	<i>Acanthus ebracteatus</i>	Dasu Ana Rui, Baotuk, Kaikoli mana	South Coast- Utacarbau, Uaniuma	7
3	<i>Acanthus volubilis</i>	Klalerek Tasi, Kadidi bee, Kailaku	South coast, Aubeon	8
4	<i>Acrostichum speciosum</i>	Kaikoli Lhuku	All North& South Coast	9
5	<i>Acrostichum aureum</i>	Ai irleo	Both North& South Coast	10
6	<i>Lumnitzera racemose</i>	Ai Parapa Tahan Narute, Ai Parapa fetu, Suli Tasi, Lurukala, Tekene, Kafitun	All North& South Coast	11
7	<i>Lumnitzera littorea</i>	Ai Parapa Metan Kiik, Ai Tasi Minin	Not captured	12
8	<i>Aegiceras corniculatum</i>	Ai Parapa Tahan Belar, Goi Abas Tasi	NorthCoast-Metinaro	13
9	<i>Aegiceras floridum</i>	Ai Suli, Parapa Metan Tahan Lotuk, Tekene mutin	South Coast- Utacarbau, Uaniuma, Aubeon	14
10	<i>Avicennia alba</i>	Goiabas tasi, Ai Tai Massin, Ai Parapa Masin,	All North& South Coast	15
11	<i>Avicennia merina</i>	Ai Nase Tasi, Ai Nase Mane, Too	All North& South Coast	16
12	<i>Bruguiera gymnorhyza</i>	Ai Tekene, Ai Parapa Mane	Both North& South Coast - Biacau, Suai Loro	17
13	<i>Bruguiera sexangular</i>	Ai Kamtan, Ai parapa Tunis, Tekene Mutin	NorthCoast-Biacau	18
14	<i>Bruguiera hainesii</i>	Ai Lurukai, Ai Tekene	Both North& South Coast - Biacau, Suai Loro	19
15	<i>Bruguiera parviflora</i>	Takeke Fuan Loto, Ai Parapa Mane(Mutin)	NorthCoast-Hera	20
16	<i>Ceriops tagal</i>	Ai Parapa Mane, Ai Parapa Fuan Naruk, Takeke Kiik	Both North& South Coast- Hera, Metinaro, Suai Loro,	21
17	<i>Cereops decandra</i>	AI Camea, Takeke Kiik	NorthCoast-Metinaro	22
18	<i>Exoecaria agallocha</i>	Tanu Mutin, Ai Tanu, Ai Kabuta	All North& South Coast	23
19	<i>Nypa fruiticans</i>	Onu, Komu, Tua Metan, Nuu Mina	All North& South Coast	24
20	<i>Dolichandrone spathacea</i>	Ai Tui Sapateru,	All North& South Coast	25
21	<i>Rhizophora mucronate</i>	Ai Parapa Mane, Tekene Fuan Naruk Mutin,	All North& South Coast	26
22	<i>Rhizophora apiculate</i>	Tekene Metan, Ai Lokbotu, Ai Parapa Mane	All North& South Coast	27
23	<i>Rhizophora stylosa</i>	Ai Kafitun, Kafitun Tekene	All North& South Coast	28

24	<i>Sonneratia alba</i>	Kalara,	All North& South Coast	29
25	<i>Sonneratia caseolaris</i>	Ai To Bakat Tahan Lotun	South Coast- Modomahut Lake	30
26	<i>Sonneratia ovata</i>	Ai Klara Kabuar, Ai Tiru Mas,	South Coast- Tafara, Modomahut Lake	31
27	<i>Hertiera littoralis</i>	Ai Kaen, Ai Masin, Ai Sia, Ai Nu, Gadakha	Uatucabao & Uaniuma	32
28	<i>Xylocarpus granatum</i>	Ai Beko Fuik, Bika	Not captured	33
29	<i>Xylocarpus molucensis</i>	Kaito, Derok Fuik, Ai Bai	Not captured	34
30	<i>Pemphis acidula</i>	Ai Kafitun, Ai Tekene,	Metinaro	35
31	<i>Pandanus tectoris</i>	Bora Hedan, Bobolaku, Hedan	All North& South Coast	36
32	<i>Pandanus odoratissima</i>	Hede Tasi, Boro Laku	South Coast- Modomahut, Aubeon	37
33	<i>Scyphiphora hydrophyllaceae</i>	Ai Too, Ai Tekene, Ai Suli	Metinaro	38
34	<i>Osbornia octodonta</i>	Ai Parapa Kiik, Ai Suli Funan Mutin,	Both North& South Coast - Suai Loro, Metinaro	39
35	<i>Scaevola teccada</i>	Kafitun Niafunana, Fuan Tasi	South coast- Aubeon, Uatacarbau, Modomahut	40

Background

Mangroves ecosystem plays a significant role in protecting life and livelihood of Timor Leste. Mangroves in Timor Leste are widely distributed along the coasts of North and South of the country with continuous as well as fragmented patches. Total area covering around 1,300 ha, were reported by Alongi, 2014, Richards and Friess, 2015.

Since 1940s for agriculture, timber, and opened for settlements (Alongi, 2014) heavily impacted the ecosystem. 90% of Timor-Leste's mangroves that estimated to be around 9,000 ha in 1940 limited and destructed due to anthropogenic pressure. Some of the areas from the South Coast to were gradually transferred to rice cultivation fields and settlement of community close to the mangroves along with heavy exploitation for fire food and timber to build house and other domestic needs.

Mangroves are diverse group of woody trees, palms, shrubs, vines and ferns that share a common ability to live in waterlogged saline soils subjected to regular flooding. The term "Mangrove" is derived from two words i.e. "mangue" (Portuguese) which means a mangrove tree and "grove" (English) which means community of trees. They occupy shallow water and inter-tidal zones in tropical and subtropical coastal regions, usually which are protected from direct wave action and thus characterized by muddy or fine sediment substrata. These halophytic, highly specialized plants have developed unusual adaptations to the unique environmental conditions of coastal habitats. Possessing the salient feature of interconnectedness, the mangroves constitute complex and extensive ecosystems at the interface of terrestrial, freshwater and marine environments. Living in two worlds at once, mangroves act as nutrient sinks and protect offshore ecosystems. The entangled root masses of mangroves dissipate the wave energy and guard the coastlines and hence are often referred to as bio-shields or natural sea defense. The mangroves are bordering margins of the tropical coast lines providing habitat for a vibrant mix of species of various life stages. Mangroves thrive in saline conditions because of specialized root structures and ability to exclude or excrete salt. They are very productive as they are traversed by many creeks, inlets and streams. Mangrove roots trap silt and build up thick, shifting sediments and thus help in preventing soil erosion. These trees can withstand severe environmental stresses including alternate mixes of freshwater and saltwater, prolonged submersion or exposure with every tide and mud with no Oxygen and high Sulphur content. 1

During this documentation process of Timor Leste Mangrove, the author has sighted about 35 species (including previous identifications) including some back mangroves and mangrove associates which plays an integral part of this coast ecosystem were identified and documented with photographs and brief descriptions needs further conservations efforts to restore and regeneration process. The project extensively supports communities living around knowledge and skill transfer for better restoration and regeneration of the mangrove ecosystems in all project Municipalities.

¹ Mangroves Andaman and Nicobar Islands; S. Dam Roy, P.Krishnan, Grinson George, M.Kaliyamoorthy, M.P.Goutham Bharthi

Key characteristics² of Mangroves Families in Timor Leste

Acanthaceae	Consists of holly mangroves; characterized by thorny leaves and inflorescence at terminal spikes.
Areaceae	Consists of sea palms and date palms; characterized by the presence of aerial roots termed as pneumatophods.
Avicenniaceae	Family of true mangrove trees characterized by peg like aerial roots (pneumatophores) and salt glands in leaves.
Combretaceae	Also called as Terminalia family comprises black mangroves, characterized by the presence of spatula like brittle leaves.
Euphorbiaceae	Also called as spurge family consisting of species containing toxic white latex.
Meliaceae	Comprises of woody trees belonging to the Genus Xylocarpus. The presence of plank roots (snake like) is the key characteristic feature.
Myrsinaceae	Includes trees commonly called as river mangroves with no above ground roots and no indentation at their leaf tip.
Rhizophoraceae	Usually regarded as the family of mangrove trees with arching stilt roots and knee roots.
Sonneratiaceae	Predominantly comprises of mangrove tree species with a wide range of salinity tolerance; well known for their natural hybridization.
Sterculiaceae	The Heritiera trees are classified under this family; characterized by well-developed buttress roots and blind root suckers.

² Mangroves Andaman and Nicobar Islands; S. Dam Roy, P.Krishnan, Grinson George, M.Kaliyamoorthy, M.P.Goutham Bharthi

Acanthus ilicifolius, Family - Acanthaceae



(Metinaro, April 2018)



(Metinaro, April 2018)



(Metinaro, April 2018)



(Metinaro, April 2018)



(Metinaro, April 2018)

Habitat and Ecology: It commonly grows on the river banks or tidal canal sides or low swampy areas in the mangrove forests and This species vicinity.

Systems: Freshwater; Marine

Use and Trade: This plant can be used as medicine for neuralgia and rheumatism. Several authors have described the chemical properties of this species and This species use in China (Peng and Long 2006, Liu and Lin 2008). In Timor Leste there is no direct or indirect use of the plant.

Status: Found in both North and South coast of Timor Leste

Acanthus ebracteatus, Family Acanthaceae



(Uniuma June 2018)



(Uniuma June 2018)



(Uniuma June 2018)

Habitat and Ecology: This species is found in the intermediate estuarine zone in the mid to high intertidal regions (Robertson and Alongi 1992). This species is often sympatric with *Acanthus ilicifolius*.

Systems: Freshwater; Marine

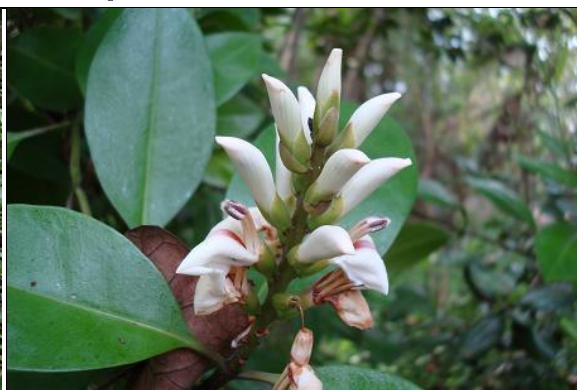
Use and Trade: In Timor Leste there is no direct use of the plant.

Status: This species found in South coast (Uatacarbau, Suai Loro)

Acanthus volubilis, Family Acanthaceae



(Aubeon, 2017)



<http://www.natureloveyou.sg/Acanthus%20volubilis/Main.html>



<http://www.natureloveyou.sg/Acanthus%20volubilis/Main.html>

Habitat and Ecology: It is often sympatric with other Acanthus species and is found more landward among the Acanthus species. It tends to have very few thorns and is a climbing species.

Systems: Freshwater; Marine

Use and Trade: In Timor Leste there is no direct use of the plant.

Status: This species found in South coast (Aubeon)

Acrostichum speciosum, Family Pteridaceae



(Metinaro, March 2018)



(Metinaro, March 2018)



(Metinaro, March 2018)



(Modomahut, May 2018)



(Modomahut, May 2018)

Habitat and Ecology: This species is found in the intermediate estuarine zone in the high intertidal region. This species is more tolerant of saline inundation than *A. aureum*. It is opportunistic and colonizes disturbed areas. It is fast growing, and very robust. It is a medium sized herbaceous fern.

Systems: Terrestrial; Freshwater; Marine

Use and Trade: In Timor Leste there is no direct use of the plant.

Status: This species found in both North & South coast (Metinaro, Modomahut, Aubeon)

Acrostichum aureum, Family Pteridaceae



(Wataba Lake February 2018)



(Modomahut May 2018)



(Modomahut May 2018)

Habitat and Ecology: This species is found in the intermediate estuarine zone in the high intertidal region. It is not restricted to mangrove systems and can grow in other areas in fresh water environments and in salt marshes. This is a species that is opportunistic and colonizes disturbed areas. It is fast growing, and very robust. It is a large herbaceous fern.

Systems: Terrestrial; Freshwater; Marine

Use and Trade: The young leaves are eaten, used for fodder for animals, and are used for thatching. In Timor Leste there is no direct use of the plant.

Status: This species found in South coast (Wataba Lake, Modomahut, Aubeon)

Lumnitzera racemose, Family Combretaceae



(Metinaro April 2018)



(Metinaro April 2018)



(Metinaro April 2018)



(Metinaro April 2018)



(Metinaro April 2018)

Habitat and Ecology: This back-mangrove species is found most often in the upstream zones in the mid to high intertidal region. It can also be found along sandy beaches. It is a colonising species and grows relatively quickly and is shade intolerant with a maximum porewater salinity of 78 ppt (Robertson and Alongi 1992).

Systems: Terrestrial; Marine

Use and Trade: It is used for construction and furniture, and the bark is used for tanning. In Timor Leste mostly degraded from fuel and timber for house construction and fencing.

Status: This species found in both North and South coast

Lumnitzera littorea, Family Combretaceae



<http://tidechaser.blogspot.com/2011/11/teruntum-merah-lumnitzera-littorea.html>



Source- https://en.wikipedia.org/wiki/Lumnitzera#/media/File:Lumnitzera_littorea.jpg



<http://www.wildsingapore.com/wildfacts/plants/mangrove/lumnitzera/littorea.htm>



<http://tidechaser.blogspot.com/2011/11/teruntum-merah-lumnitzera-littorea.html>



<http://tidechaser.blogspot.com/2011/11/teruntum-merah-lumnitzera-littorea.html>

Habitat and Ecology: This species grows at the back and sides of mangrove stands and is gregarious. This species is shade intolerant with a maximum porewater salinity of 35 ppt (Robertson and Alongi 1992). This species only occurs as a shrub to small tree (<6 m) in marginal areas and in favorable sites can attain heights up to 25 m.

Systems: Terrestrial; Marine

Use and Trade: This species is used in construction as it is very durable.

Status: This species is not captured so far but reported by previous authors.

Aegiceras corniculatum, Family Myrsinaceae



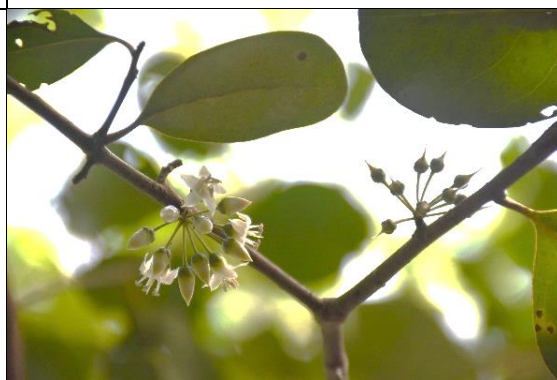
(Modomahut Lake May 2018)



(Uatocarbau June 2018)



(Uatocarbau June 2018)



(Uatocarbau June 2018)



(Uatocarbau June 2018)

Habitat and Ecology: This species is a small bushy shrub from 1-3 m tall. It is found in a range of substrates from sandy to compact mud, often near river banks. It may also occur inland on the same soil type in China (Peng and Xin-men 1983).

Systems: Terrestrial; Marine

Use and Trade: This bark of this species is used as a fish poison and as a dye. It is also used as a medicine. The leaves are also eaten. In Timor Leste there is no direct use.

Status: This species found in South coast (Aubeon, Uatocarbau)

Aegiceras floridum, Family Myrsinaceae



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)

Habitat and Ecology: This species is found in rocky and sandy substrates, and along beaches. It lives in high salinity areas and has a very narrow habitat range. It is a small tree and can be gregarious.

Systems: Terrestrial; Marine

Use and Trade: This species is harvested as a fuelwood and for construction purposes.

Status: This species found in South coast (Aubeon, Utacarbau)

Avicennia alba, Family Avicenniaceae



(Hera, April 2018)



(Hera, April 2018)



(Maubara Lake, May 2018)



(Maubara Lake, May 2018)



(Maubara Lake, May 2018)

Habitat and Ecology: This species is found along tidal riverbanks in the downstream estuarine zone, and in the lower and middle intertidal region (Robertson and Alongi 1992). It occurs as a tree or shrub that grows to 25 m, often around 10 m. Both *Avicennia* and *Sonneratia* species are the colonizing species on newly formed mudflats in SE Asia (Terrados et al. 1997).

Systems: Terrestrial; Freshwater; Marine

Use and Trade: The species is harvested for fodder and medicine in some areas.

Status: This species found in both North and South coast.

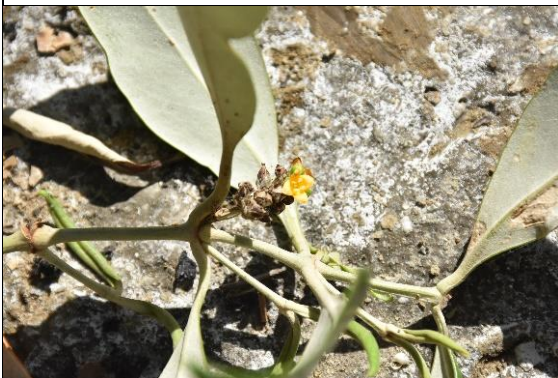
Avicennia merina, Family Avicenniaceae



(Maubara Lake, May 2018)



(Suai Loro, Ilman 2017)



(Suai Loro, May 2018)



(Suai Loro, May 2018)



(Maubara Lake, May 2018)

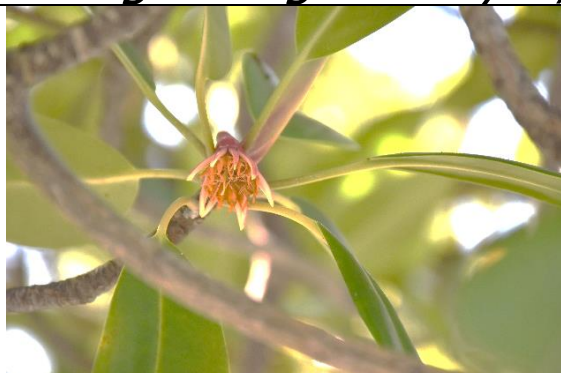
Habitat and Ecology: *Avicennia marina* is a shrub to medium sized tree, 2-5 m tall (Peng and Xin-men 1983). This species is found from downstream to intermediate estuarine zones in all intertidal regions (Robertson and Alongi 1992).

Systems: Terrestrial; Freshwater; Marine

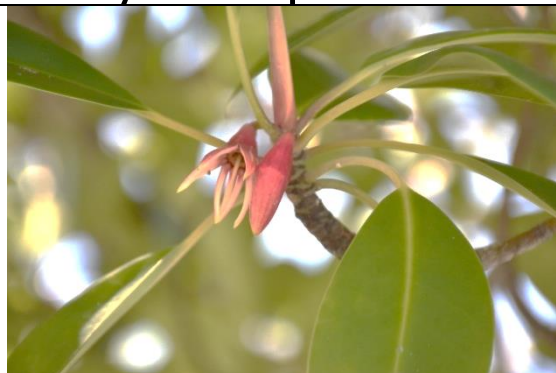
Use and Trade: This species is used for food, fodder, fuelwood, construction materials and medicine in some areas within This species range.

Status: This species found both in North and South coast

Bruguiera gimnorhyza, Family Rhizophoraceae



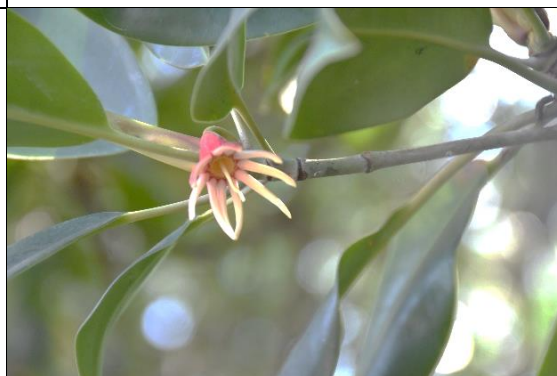
(Biacou May 2018)



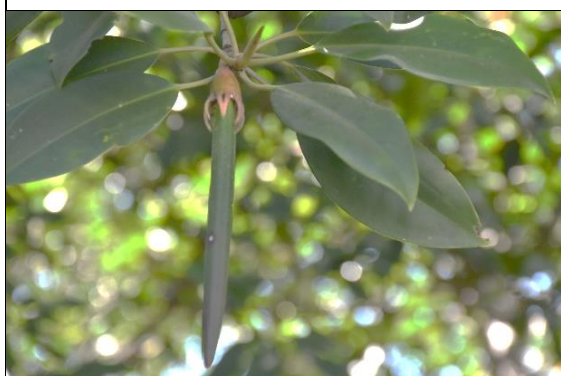
(Biacou May 2018)



(Biacou May 2018)



(Biacou May 2018)



(Biacou May 2018)

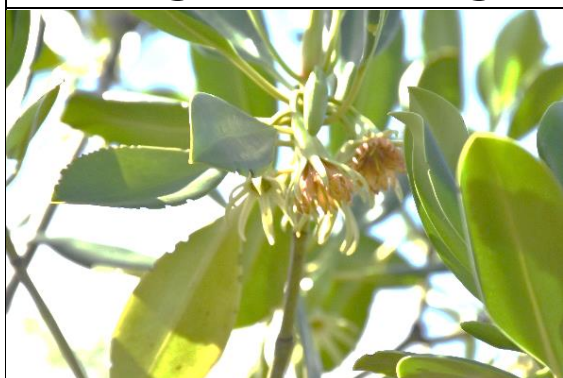
Habitat and Ecology: This species is found in downstream to intermediate estuarine zones in the mid to high intertidal region. It is shade tolerant with a maximum porewater salinity of 50 ppt and a salinity of optimal growth of 8-34ppt (Robertson and Alongi 1992). It is a small to large buttressed tree that can grow to 25 m but more commonly is found up to 10 m. The trunk is characterized by lenticels.

Systems: Terrestrial; Marine

Use and Trade: This species is a preferred timber species, as it grows very straight. It is commonly sold as commercial firewood.

Status: This species found both in North and South coast

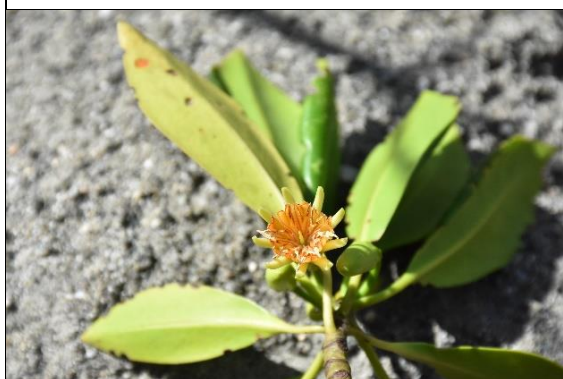
Bruguiera sexungula, Family Rhizophoraceae



(Suai Loro May 2018)



(Suai Loro May 2018)



(Suai Loro May 2018)



(Suai Loro May 2018)



(Suai Loro May 2018)

Habitat and Ecology: This species is found in intermediate to upstream estuarine zones in middle intertidal regions. It is restricted to larger riverine estuaries and tidal swamps, and prefers a maximum porewater salinity of 33 ppt (Robertson and Alongi 1992). This is a slow-growing species that can grow to 30 m. It is often associated with *Sonneratia caseolaris*.

Systems: Terrestrial; Marine

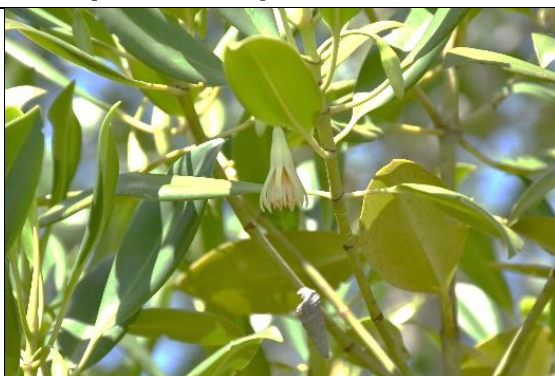
Use and Trade: In Timor Leste no such specific use. Timber for fuel.

Status: This species found in South coast (Suai Loro)

Bruguiera hainesii, Family Rhizophoraceae



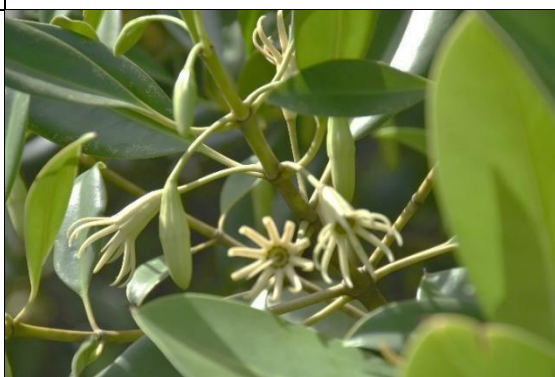
(Suai Loro May 2018)



(Suai Loro May 2018)



(Suai Loro May 2018)



(Suai Loro May 2018)



© Ron Yeo @ tidechaser.blogspot.com

Source: <http://tidechaser.blogspot.com/2011/11/berus-mata-buaya-bruguiera-hainesii.html>

Habitat and Ecology: This species is found in the intermediate estuarine zone in the high intertidal region (Robertson and Alongi 1992). It has very low rates of propagation and low rates of germination. It takes 18 months to go through maturation cycle. It can grow up to 30 m tall.

Systems: Terrestrial; Marine

Use and Trade: In Timor Leste no such specific use. Timber for fuel.

Status: This species found in South coast (Suai Loro)

Bruguiera parviflora, Family Rhizophoraceae



(Hera April 2018)



(Hera April 2018)



(Hera April 2018)

Habitat and Ecology: This species is found in downstream to intermediate estuarine zones in the mid-intertidal region. It is shade intolerant with a maximum porewater salinity of 66 ppt and a salinity of optimal growth of 8-34 ppt (Robertson and Alongi 1992). This is a slow-growing species that grows to 25 m height.

Systems: Terrestrial; Marine

Use and Trade: This species may be attractive to timber extraction as it grows very straight. In Timor Leste no such specific use. Timber for fuel and boat.

Status: This species found in North Coast (Hera)

Ceriops tagal, Family Rhizophoraceae



(Suai Loro May 2018)



(Hera April 2018)



(Hera April 2018)



(Hera April 2018)



(Hera April 2018)

Habitat and Ecology: This species is found from downstream to intermediate estuarine zones in the mid to high intertidal regions. It is shade intolerant with a maximum porewater salinity of 45 ppt and a salinity of optimal growth of 0-15 ppt (Robertson and Alongi 1992).

Systems: Terrestrial; Marine

Use and Trade: This species' bark is also harvested for tannins for dyes, and it is harvested for construction materials and fuelwood. In Timor Leste widely used for fencing, boat and house construction materials.

Status: This species found in both North & South Coast (Hera, Metinaro, Suai Loro)

Ceriops decandra, Family Rhizophoraceae



(Hera April 2018)



(Hera April 2018)



(Hera April 2018)



(Hera April 2018)



(Hera April 2018)

Habitat and Ecology: This species is found in the intermediate estuarine zone in mid to high intertidal regions. It has a maximum tolerance of salinity at 67 ppt and a salinity of optimal growth at 15 ppt (Robertson and Alongi 1992). This is a slow-growing species and can be tolerant of extreme environmental conditions.

Systems: Marine

Use and Trade: In Timor Leste widely used for fencing, boat and house construction materials.

Status: This species found in both North & South Coast (Hera, Metinaro, Suai Loro)

Excoecaria agalocha, Family Euphorbiaceae



(Metinaro April 2018)



(Modomahut May 2018)



(Modomahut May 2018)



(Metinaro April 2018)



(Uatacarbau June 2018)

Habitat and Ecology: This is a back mangrove species and often exploits open areas and is tolerant of disturbed areas. It is a small to medium sized tree with extensive cable roots. It has multiple stems. It can be deciduous in cooler/drier areas. It produces a latex (milky sap) that causes temporary blindness. This species is the main associate in China (Peng and Xin-men 1983).

Systems: Terrestrial; Freshwater; Marine
Use and Trade: In Timor-Leste no such use.

Status: This species is found in both North & South Coast (Hera, Metinaro, Suai Loro)

Nypa Fruticans, Family Arecaceae



(Tafara May 2018)



(Tafara May 2018)



(Tafara May 2018)



(Tafara May 2018)



(Suai Loro 2018)

Habitat and Ecology: This species is found in the upstream estuarine zone in low, mid, and high intertidal regions (Robertson and Alongi 1992). It forms extensive belts along brackish to tidal freshwater creeks and rivers.

Systems: Terrestrial; Freshwater; Marine

Use and Trade: This palm is used for a wide range of goods and services. It is used for thatching and for making alcoholic drinks through a fermentation process. In Timor Leste highly degraded due to use preparation of thatch roofs of the houses.

Status: This species found in both North & South Coast (Hera, Metinaro, Suai Loro)

Dollchandrone spathaceae, Family Bignoniaceae



(Sabuli April 2018)



(Modomahut May 2018)



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)

Habitat and Ecology: This species grows in the upstream estuarine areas, riverine influenced areas, areas of high rainfall, and all across intertidal zones. This is a small, sprawling tree and is fast growing. This species is often associated with *Nypa fruticans* and *Acanthus ilicifolius*.

Systems: Terrestrial; Freshwater; Marine

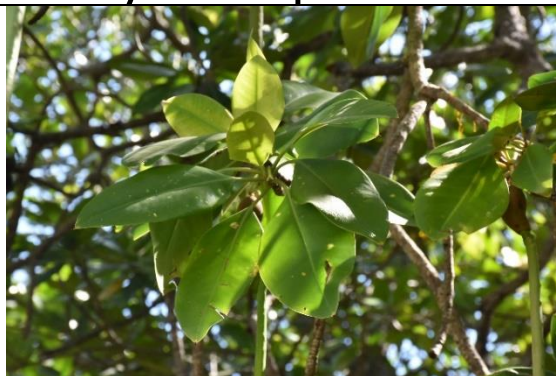
Use and Trade: Timber wood for boat and house repairing.

Status: This species found in both North & South Coast (Hera, Metinaro, Suai Loro)

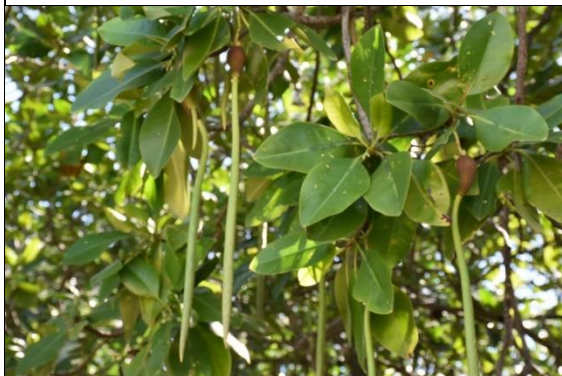
Rhizophora mucronate, Family Rhizophoraceae



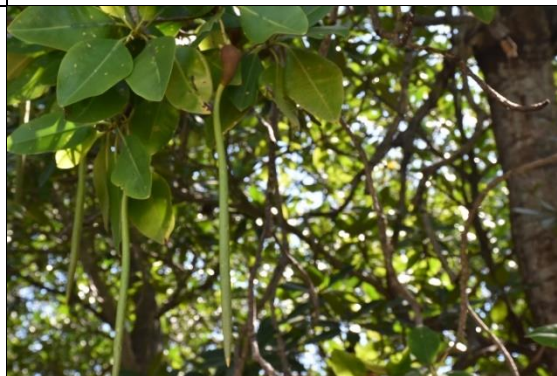
(Biacu May 2018)



(Biacu May 2018)



(Biacu May 2018)



(Biacu May 2018)



(Biacu May 2018)

Habitat and Ecology: This species is found in the intermediate to upstream estuarine zone in the lower to mid-intertidal region, and more to the seaward side. This species tolerates a maximum salinity of 40 ppt and a salinity of optimal growth of 8-33 ppt. (Robertson and Alongi 1992). This is a hardy species that is easily propagated and is fast-growing.

Systems: Terrestrial; Marine

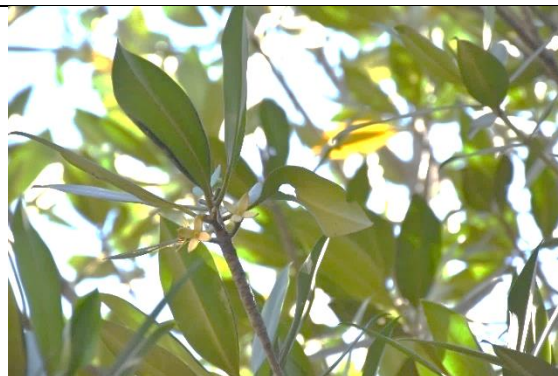
Use and Trade: Timber wood is for construction of boat materials and house constructions.

Status: This species found in both North & South Coast (Biacu, Suai Loro)

Rhizophora apiculata, Family Rhizophoraceae



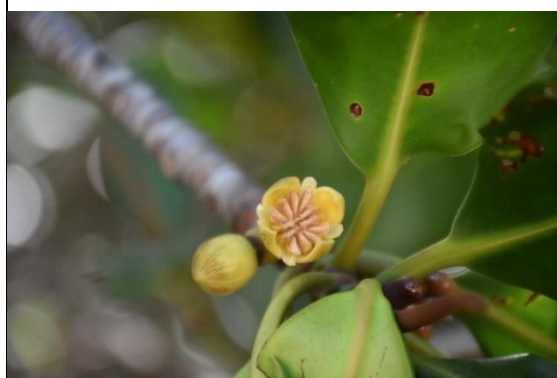
(Metinaro March 2018)



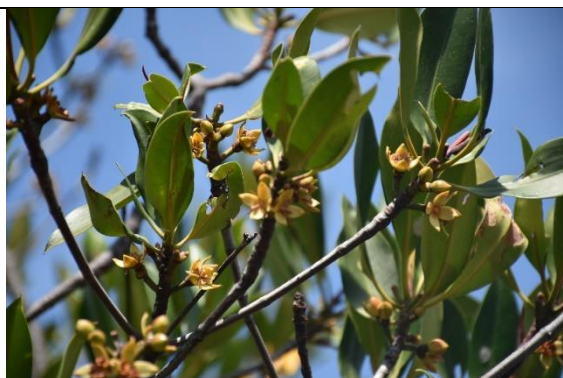
(Metinaro April 2018)



(Biacu April 2018)



(Suai Loro May 2018)



(Ulmera April 2018)

Habitat and Ecology: This species is found in the intermediate estuarine zone in the mid-intertidal region. This species tolerates a maximum salinity of 65 ppt and a salinity of optimal growth of 8-15 ppt (Robertson and Alongi 1992). It is a hardy species, and fast-growing. This species can grow to 30 m.

Systems: Terrestrial; Freshwater; Marine

Use and Trade: Timber wood is for construction of boat materials and house constructions.

Status: This species found in both North & South Coast (Biacu, Metinaro, Suai Loro)

Rhizophora stylosa, Family Rhizophoraceae



(Suai Loro, 2018)



(Suai Loro, 2018)



(Ulmera, 2018)



(Ulmera, 2018)



(Suai Loro, 2018)

Habitat and Ecology: This species is always found at the mouth of estuaries. It is commonly found in open seawater on exposed shores, including on live reef and sandy shores. This species can grow to 30 m, but is more common at 5-10 m. This species is hardy, but if the mature plants are disturbed it can be difficult for them to re-establish, especially in active surf zones.

Systems: Terrestrial; Freshwater; Marine

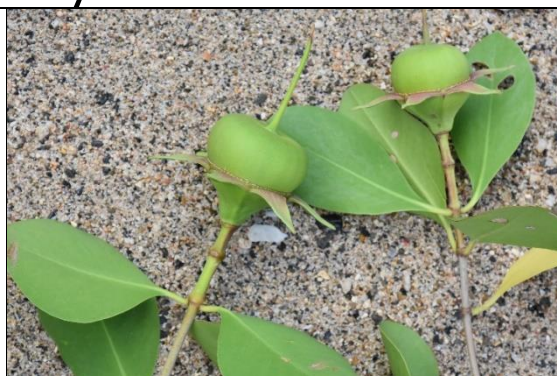
Use and Trade: Timber wood is for construction of boat materials and house constructions.

Status: This species found in both North & South Coast (Biacu, Metinaro, Suai Loro)

Sonneratia alba, Family Sonneratiaceae



(Wenunuk, May 2018)



(Suai Loro Feb 2018)



(Wenunuk, May 2018)



(Wenunuk, May 2018)



(Wenunuk, May 2018)

Habitat and Ecology: This species is found in the low-intertidal zone. It is intolerant of long periods of freshwater and prefers high salinity. It is a pioneering species, that is fast growing, but has low seed-viability. This species can grow to 30 m in height.

Systems: Terrestrial; Freshwater; Marine

Use and Trade: Used for Boats, house construction and flooring, and bridge and wharf construction. A beverage is prepared from the fruit. This species in India and Indonesia. The pneumatophores of this species are used as floats and for cork-making.

Status: This species found in both North & South Coast

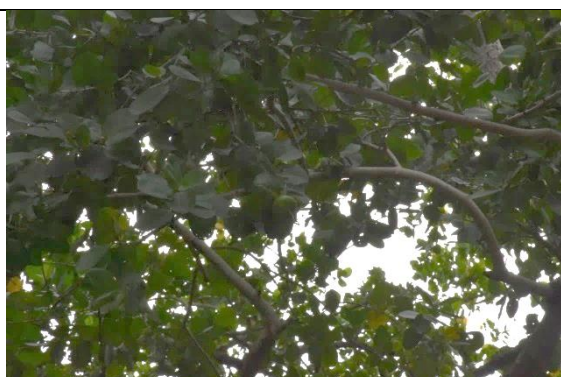
Sonneratia caseolaris, Family Sonneratiaceae



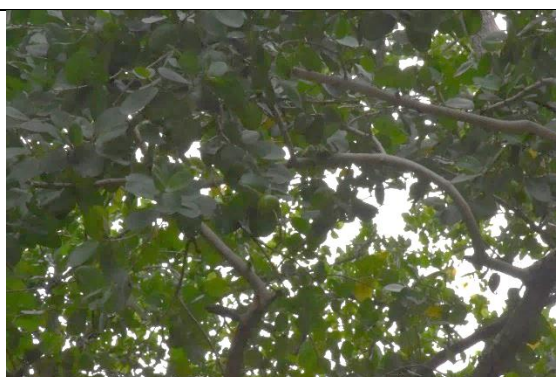
(Motomahut Lake May 2018)



(Motomahut Lake May 2018)



(Motomahut Lake May 2018)



(Motomahut Lake May 2018)



(Motomahut Lake May 2018)

Habitat and Ecology: It is found in lower saline areas on deep muddy soil along tidal creeks with slow moving freshwater. It is fast growing with low seed viability (sets fruit only three months of the year). It grows to 30-40 m and is associated with the firefly insect (*Ptyerocyx* spp.).

Systems: Terrestrial; Freshwater; Marine

Use and Trade: Timber is used for various construction and as fuelwood. Leaves are used as forage, and tannins from bark for dyes.

Status: This species found in South Coast (Aubeon, Modomahut lake)

Sonneratia ovata, Family Sonneratiaceae



(Tafara June 2018)



(Tafara June 2018)



(Tafara June 2018)



(Tafara June 2018)



(Tafara June 2018)

Habitat and Ecology: It is found in the downstream estuarine zone in the high intertidal region (Robertson and Alongi 1992). It is a fast-growing and pioneering species that colonizes newly formed mudflats (Terrados et al. 1997). It can grow up to 20 m and is found on primarily on firm mud on terra firma, which is the farthest distance from shore.

Systems: Terrestrial; Freshwater; Marine

Use and Trade: It is planted in some villages in Malaysia and Indonesia as a food source. But in Timor Leste no such use observed.

Status: This species found in South Coast (Tafara)

Heritiera littoralis, Family Malvaceae



(Utacarbau June 2018)



(Utacarbau June 2018)



(Utacarbau June 2018)



(Utacarbau June 2018)



(Utacarbau June 2018)

Habitat and Ecology: This is a large tree that is found in mid and landward mangroves. It can tolerate brackish conditions but avoids hypersaline environments. This species can form very impressive buttress roots and exist in groves but can also occur individually.

Systems: Terrestrial; Marine

Use and Trade: This species is a high-quality timber and is also harvested as for food and medicine in some parts of This species range.

Status: This species found in South Coast (Irabin De Baxio & Uaniuma)

Xylocarpus granatum, Family Meliaceae



<http://tidechaser.blogspot.com/2011/11/nyireh-bunga-xylocarpus-granatum.html>



<http://tidechaser.blogspot.com/2011/11/nyireh-bunga-xylocarpus-granatum.html>



<http://tidechaser.blogspot.com/2011/11/nyireh-bunga-xylocarpus-granatum.html>



<http://tidechaser.blogspot.com/2011/11/nyireh-bunga-xylocarpus-granatum.html>



<http://tidechaser.blogspot.com/2011/11/nyireh-bunga-xylocarpus-granatum.html>

Habitat & Ecology: This species is found in the intermediate estuarine zone in the mid to high intertidal regions along banks of tidal creeks. This species grows to as a large tree and is slow growing. The species is mostly scattered, but sometimes grows in stands.

System: Terrestrial; Marine

Use & trade: High quality timber for door frames and windows, and medium quality charcoal and firewood. It is used as a medicine and ointment. This species is an excellent hard wood for furniture and carvings.

Status: in Timor Leste: This species is not captured so far but reported by previous authors.

Xylocarpus moluccensis, Family Meliaceae



© Ron Yeo @ tidechaser.blogspot.com

<http://tidechaser.blogspot.com/2011/11/nyireh-batu-xylocarpus-moluccensis.html>



© Ron Yeo @ tidechaser.blogspot.com

<http://tidechaser.blogspot.com/2011/11/nyireh-batu-xylocarpus-moluccensis.html>



© Ron Yeo @ tidechaser.blogspot.com

<http://tidechaser.blogspot.com/2011/11/nyireh-batu-xylocarpus-moluccensis.html>



© Ron Yeo @ tidechaser.blogspot.com

<http://tidechaser.blogspot.com/2011/11/nyireh-batu-xylocarpus-moluccensis.html>



© Ron Yeo @ tidechaser.blogspot.com

<http://tidechaser.blogspot.com/2011/11/nyireh-batu-xylocarpus-moluccensis.html>

Habitat & Ecology: This species lives slightly more inland than *X. granatum* which occurs closer to riverbanks. This is a completely deciduous species. This species has peg or cone-shaped pneumatophores and differs from *X. granatum* which has snake-like buttress roots. This is a large tree and it usually grows individually rather than in stands

System: Terrestrial; Marine

Use & trade: This species is used for woodcraft and is an excellent hard wood for furniture and carvings.

Status: in Timor Leste: This species is not captured so far but reported by previous authors.

Pemphis acidula, Family-Lythraceae



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)

Habitat & Ecology: This species lives in calcareous rocky and sandy beaches high in the intertidal zone, and often above the high tide line. This species is beneficial for shoreline protection against high wind. It is a very sturdy and resilient plant; however, it will not grow anywhere other than the appropriate habitat type.

System: Terrestrial; Marine

Use & trade: Collection for trade as bonsai ornaments is a local threat to this species. It is also collected for fuelwood or construction purposes in some areas. In Timor Leste no such use.

Status: in Timor Leste: Present both in North & South coast of Timor Leste

Pandanus tectorius, Family- Pandanaceae



(Modomahut May 2018)



(Modomahut May 2018)



(Modomahut May 2018)

Habitat & Ecology: Occurs along beaches and occasionally on margins of mangroves, but also inland, up to an altitude of 800 m. Probably the most widespread Pandanus species also refer as associates. A gregarious shrub or small tree, widely branching, sometimes with several trunks, often with stilt roots around the stem, and aerial roots emerging from the branches; 3-7 m tall.

System: Terrestrial; Marine

Use & trade: Used for weaving mats, hats and baskets, often cultivated for this purpose. Fruit is edible. Leaves yield a strong fiber which is used for making rope. In Timor Leste multiple use including thatches preparation, mats, buckets etc

Status: in Timor Leste: Present both in North & South coast of Timor Leste

(Source: Mangrove Guide book of South East Asia)

Pandanus odoratissimus, Family- Pandanaceae



(Modomahut May 2018)



(Modomahut May 2018)



(Modomahut May 2018)



(Modomahut May 2018)



(Modomahut May 2018)

Habitat & Ecology: Occurs along beaches and occasionally on margins of mangroves.

System: Terrestrial; Marine

Use & trade: Leaves used for thatching and weaving. In Timor Leste multiple use including thatches preparation, mats, buckets etc. Pandanus odoratissimus is also windbreaks to stabilize soil.

Status: in Timor Leste: Present both in North & South coast of Timor Leste

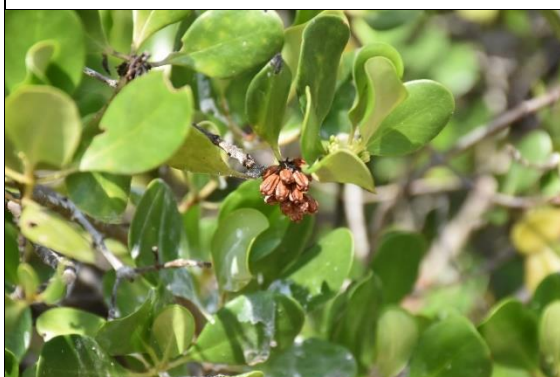
Scyphiphora hydrophylacea, Family Rubiaceae



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)



(Sabuli April 2018)

Habitat & Ecology: This species is found on banks of tidal waterways, creeks and rivers, and in the intermediate estuarine zone in the high intertidal region. This species is a small tree up to 10 meters.

System: Terrestrial; Marine

Use & trade: In Timor Leste no such use.

Status: in Timor Leste: Present in North Coast of Timor Leste

Osbornia octodonta, Family Myrtaceae



(Suai Loro Near Port May 2018)



(Suai Loro Near Port May 2018)



(Suai Loro Near Port May 2018)



(Suai Loro Near Port May 2018)



(Suai Loro Near Port May 2018)

Habitat & Ecology: Habitat & Ecology: This species is found on banks of tidal waterways, creeks and rivers, and in the intermediate estuarine zone in the high intertidal region. This species is a small tree up to 10 meters.

System: Terrestrial; Marine

Use & trade: It is also used for fuel. In Timor Leste no such use.

Status: in Timor Leste: Present in North& South coast (Metinaro & Suai Loro near Port)

Scaevola taccada, Family Goodeniaceae



(Modomahut May 2018)



(Modomahut May 2018)



(Modomahut May 2018)



(Modomahut May 2018)



(Modomahut May 2018)

Habitat & Ecology: Habitat & Ecology: Scaevola taccada generally grows directly on the beaches and sandy areas close to sea.
System: Terrestrial; Marine
Use & trade: In Timor Leste no such use.
Status: in Timor Leste: Present in South coast (Aubeon, Irabin De Baxio, Modomahut)

Mangrove Associates

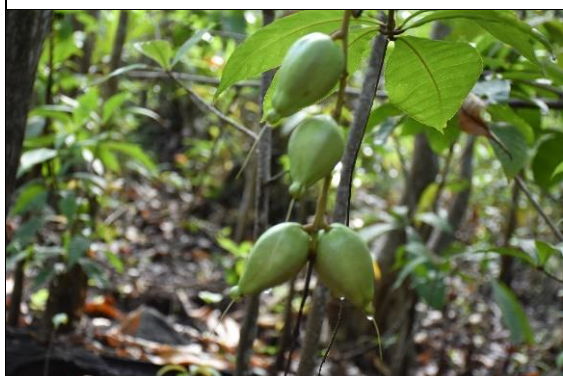
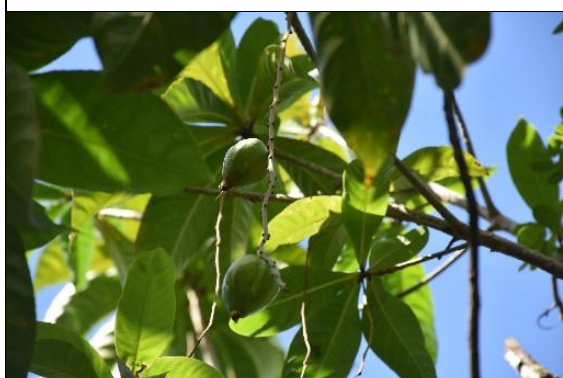
Numerous plants are often found along with the mangroves, termed as mangrove associates. They comprise of herbs, ferns, creepers, vines, shrubs, trees and orchids and are mostly found in the landward margins. Mangrove associates are usually not immersed by high tides. They form a complex interlocking framework for added strength and serve as wind breakers and effective shield from destructive waves. ³

SL	Associate Species	Local Name	Geographical Locations
1	<i>Barringtonia racemosa</i>	Ai Kamanesa, AI Bika	Soth Coast
2	<i>Callophylum inophyllum</i>	Tanu Mutin, Ai Too	Soth Coast
3	<i>Calotropis gigantea</i>	Huka, Huka Tasi, Hukan Huko	All North& Soth Coast
4	<i>Premna serratifolia</i>	Ai	All North& Soth Coast
5	<i>Cerebra manghas</i>	Kai Hudi	All North& Soth Coast
6	<i>Cerebra odolum</i>	Ai Malae Tasi,	Soth Coast
7	<i>Ipomea pes-caprae</i>	Ai Fehuk Tasi	All North& Soth Coast
8	<i>Dodonaea viscosa</i>	Mangkudu	Biacu
8	<i>Clerodendrum inerme</i>	Klisa,	Irabin De Baxio
9	<i>Terminalia catappa</i>	Ai Ketapan	All North& Soth Coast
10	<i>Deris trifolia</i>		All North& Soth Coast
11	<i>Cassytha filiformis</i>		
12	<i>Hibiscus tiliaceus</i>	Ai Fauk Tasi, Ai Botu	All North& Soth Coast
13	<i>Thespesia populnea</i>	Ai Kabas Fuik Tasi	All North& Soth Coast
14	<i>Morinda citrifolia</i>	Denu, Ai Lenuk,	All North& Soth Coast
16	<i>Passiflora foetida</i>	Barbotun,	Modomahut, Utacarbau
17	<i>Guettarda speciosa</i>	Senoura fuik	Uatacarbau
18	<i>Sesuvium portulacastrum</i>	Barlenka Tasi	All North& Soth Coast

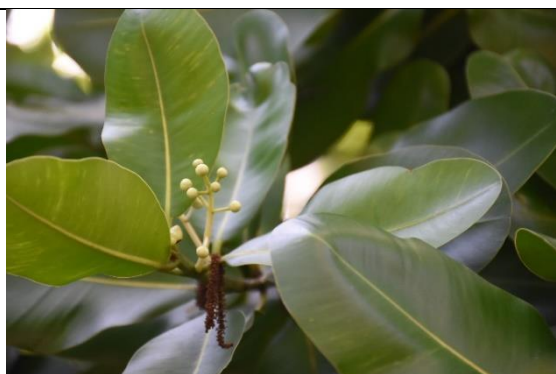
³ Mangroves Andaman and Nicobar Islands; S. Dam Roy, P.Krishnan, Grinson George, M.Kaliyamoorthy, M.P.Goutham Bharthi

19	<i>Stachytarpheta jamaicensis</i>	Meit, Sirabua	All North& Soth Coast
20	<i>Syzygium samarangense</i>	Ai Du, Ai Beko	All North& Soth Coast
21	<i>Casuarina equisetifolia</i>	Ai Kakeu	All North& Soth Coast
22	<i>Drynaria quercifolia</i>	Ai Funana Manulete, Ai Funan Manuliras	All North& Soth Coast
23	<i>Wedelia biflora</i>		All North& Soth Coast
24	<i>Caesalpinia bonduc</i>		All North& Soth Coast
25	<i>Spinifex sericeus</i>	Halai	All North& Soth Coast
26	<i>Canarium ovatum</i>	Ai Ata Maus	Modomahut
27	<i>Conocarpus erectus</i>	Ai Ata Fuik	Modomahut
28	<i>Cymbidium aloifolium</i>	Ai Rota	Modomahut
29	<i>Calamus erinaceus</i>	Oe	Modomahut, Aubeon

Barrintonia racemose- Modomahut Lake, Salele



Callophyllum inophyllum- Modomahut Lake,
Uatacarbau, Dili



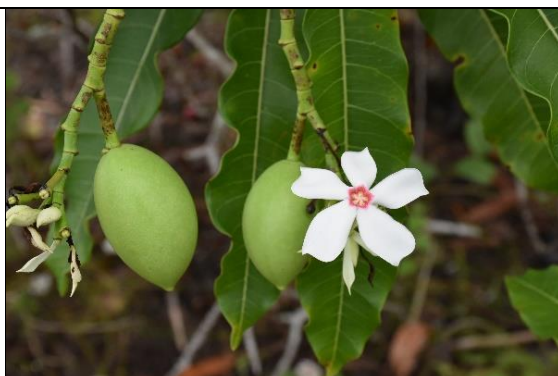
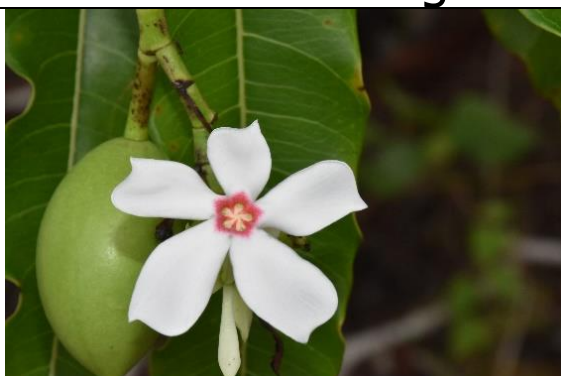
Calotropis gigantean- North & South Coast



Premna serratifolia- North & South Coast



Cerbera manghas- North & South Coast



Cerbera odolum- Modomahut Lake



Ipomea pes-caprae- North & South Coast



Dodonaea viscosa- Biacu



**Clerodendrum inerme- Uatacarbau, Aubeon,
Modomahut**



Terminalia catappa- North & South Coast



Derris trifoliata- Fateberleu, Modomahut Lake



Cassytha filiformis- Modomahut Lake, Suai Loro



Hibiscus tiliaceus- Metinaro, Modomahut Lake,
Aubeon



Thespesia populnea- Wenunuk, Metinaro

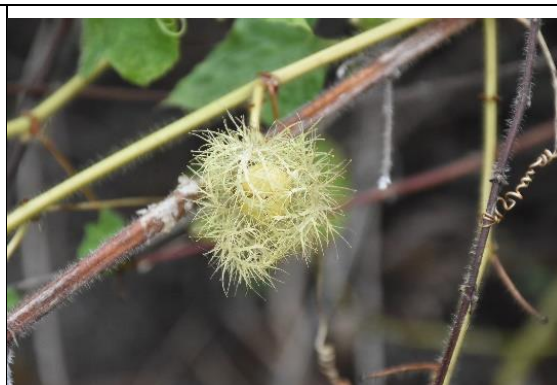


Morinda citrifolia- North & South Coast



Passiflora foetida- Uanniuma, Modomahut

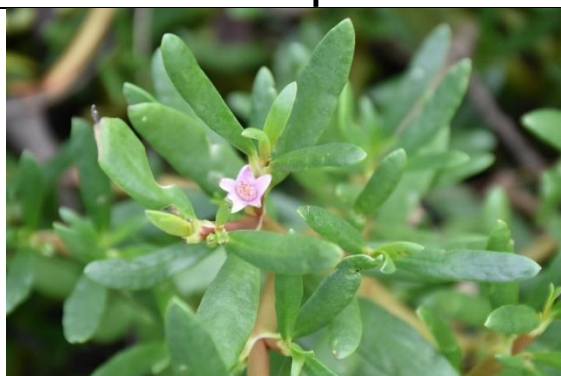




Guettarda speciose- Uatacarbaw



Sesuvium portulacastrum- Modomahut Lake



Stchytarpheta jamaicensis- Modomahut Lake











Syzygium samarangense-North & South Coast



Casuarina equisetifolia- North & South Coast



<p>Drynaria quercifolia – Uatacarbau, Modomahut</p>	<p>Wedelia biflora- North & South Coast</p>
	
<p>Caesalpinia bonduc – Modomahut, Metinaro, Biacu;</p>	<p>Spinifex sericeus- Suai, Uatacarbau,Modomahut</p>
	

Canarium ovatum – Modomahut, Aubeon	Conocarpus erectus- Modomahut
	
Cymbidium aloifolium- Modomahut	
	
Calamus erinaceus- Modomahut, Aubeon	
	

Reference

- Descriptions of mangroves are taken from -<http://www.iucnredlist.org>- The IUCN Red List of Threatened Species
- Mangrove Guide Book of South East Asia
- UNDP reports on Timor Leste Mangroves
- Mangroves Andaman and Nicobar Islands; S. Dam Roy, P.Krishnan, Grinson George, M.Kaliyamoorthy, M.P. Goutham Bharthi

