

## Identification of Mangrove Types in Wersar Waters, South Sorong Regency

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Article Info	Abstract
<p><b>Received:</b> October 25, 2022</p> <p><b>Revised:</b> December 9, 2022</p> <p><b>Online available:</b> January 31, 2023</p> <p><b>Keywords:</b> <i>Identification, Mangrove, Sorong District</i></p>	<p>Mangroves are coastal ecosystems that have many benefits including ecological benefits and as a source of food for the life of terrestrial organisms. The purpose of this study was to determine the types of mangroves in Wersar waters, Kab. South Sorong. This research was conducted in October 2022 in the waters of Wersar Kab. South Sorong. The method used in this study is a survey method in which this method is used to collect primary data obtained directly from the sampling location for data inventory including identification and spatial distribution allocation. Field sampling was carried out using exploration and documentation techniques. Photographed plant samples to identify mangrove species. The data obtained was analyzed descriptively in the form of images. The results obtained in the field show that there are seven dominant types of mangroves growing in the Wersar Waters area of Kab. South Sorong include <i>Lumnitzera littorea</i> (Jack) Voigt, <i>Osbornia octodonta</i> F. Muell, <i>Nypa fruticans</i> (Thunb.) Wurmb., 1781, <i>Avicennia marina</i> (Forsk.) Vierh., 1907, <i>Sonneratia alba</i> JE Smith, 1819, <i>Rhizophora apiculata</i> Blume , 1827, and <i>Bruguiera gymnorrhiza</i> (L.) Lamk.</p>

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### INTRODUCTION

Mangrove forest is a type of forest that is found along the coast or estuaries of rivers that are affected by tides (Soerianegara, 1987; Supardjo, 2008). Ecologically, mangrove forests function to prevent abrasion, withstand sea waves, and as spawning and rearing areas for certain organisms such as fish, crabs and other species (Noor et al., 2006; Sidik et al., 2018; Silitonga et al. al., 2019; Purwanto & Wikanti, 2019). Mangrove forests can also be used by the community as a place for land conservation, especially ecotourism (Setyawan, 2006). The mangrove area in a place is determined by the size of the available growth habitat (Aksornkoe, 1996). On the coast of Indonesia, this plant is found growing to form extensive coastal forests in coastal areas with formations in the form of bays, deltas at the mouths of large rivers, sloping beaches and lagoons (Djamaluddin, 2018). In 2015, mangrove forests in Indonesia were recorded at 3,489,140 ha which is equivalent to 23% of the world's mangrove ecosystems (KLHK, 2017). The area of mangrove forests in the provinces of Papua and West Papua is recorded at 1,634,003.454 ha with an area of 50.4% of the total mangroves in Indonesia (Djamaluddin, 2018).

In its growth, mangrove trees have characteristics of muddy, loamy and sandy substrates. In general, mangrove trees can grow in areas that are inundated with water (Saputra et al., 2016). One type of mangrove, namely the *Avicennia marina* species, has a very close

relationship and growth rate with muddy substrate conditions (Masruroh & Insafitri, 2020). In its growth, the density level of mangroves is lower on sandy substrates with a mixture of rocks and mangrove density is higher on muddy substrates because the regeneration process does not occur (Kordi, 2012).

One type of mangrove that is often found in Indonesia, especially in Papua and West Papua, is *Sonneratia alba* JE Smith. The sour fruit can be consumed by humans. In the Sulawesi region, this type of mangrove stem is used to make boats and building materials. Usually it can also be used as fuel when other fuels are not available (Santoso & Arifin, 1998; Noor et al., 2006; Djamaluddin, 2018). According to Ball (1998), the mangrove species *Sonneratia alba* JE Smith has physiological conditions that contribute to interspecific differences shown by mangrove species such as salinity and submergence. Most types of mangroves thrive in environmental conditions with relatively low salinity. In general, under optimal salinity conditions,

South Sorong Regency is one of the regencies in Southwest Papua Province. The district is known to be rich in potential for abundant natural resources, especially the fisheries sector, where this district is one of the largest crab and shrimp producers in Southwest Papua Province. The area is also surrounded by mangrove forests which are spread throughout, especially in Wersar waters. Where in that area there is a mangrove forest area which has a diversity of mangrove trees which until now there is no supporting data, especially for South Sorong Regency about the types of mangrove trees that are in that location. Therefore, this study aims to identify the types of mangroves that are in the waters of Wersar District. South Sorong.

## METHOD

This research was conducted in October 2022 in the waters of Wersar Kab. South Sorong. The tools and materials used in this study were cameras, GPS, mangrove, mangrove and aquadest identification modules. The method used in this study is a survey method in which this method is used to collect primary data obtained directly from the sampling location for data inventory including identification and spatial distribution allocation. Field sampling was carried out using exploration and documentation techniques. Photographed plant samples to identify mangrove species. The data obtained was analyzed descriptively in the form of images.

## RESULTS AND DISCUSSION

Based on the results obtained in the field, there are seven dominant types of mangroves growing in the Wersar Waters area of Kab. South Sorong include, among others, *Lumnitzera littorea* (Jack) Voigt, *Osbornia octodonta* F. Muell, *Nypa fruticans* (Thunb.) Wurmb., 1781, *Avicennia marina* (Forsk.) Vierh., 1907, *Sonneratia alba* JE Smith, 1819, *Rhizophora apiculata* Blume, 1827, and *Bruguiera gymnorrhiza* (L.) Lamk.

1. *Lumnitzera littorea* (Jack) Voigt



Figure 1. *Lumnitzera littorea* (Jack) Voigt

Mangrove trees of the type *Lumnitzera littorea* (Jack) Voigt can grow to a height of 15 meters although in general they are lower, this plant often has many branches and has very hard wood. The roots are knee-shaped, spread along the ground and are blackish brown in color and the bark has longitudinal slits or fissures. The leaves are rather thick fleshy, hard and clumped at the ends of the branches. Petiole length reaches 5 mm, oval inverted shape with rounded edges with a size of 2-8 x 1-2.5 cm. The bisexual flowers are bright red, fragrant and filled with nectar. The length of the flower stalk reaches 3 mm. It has two pinak leaves that are oval in shape and measure 1 mm at the base. It is located at the end with a total of 5 red crowns with a size of 4-6 x 1.5-2 mm. It has 5 green petals with a size of 1 x 12 mm with a number of stamens < 10 with a length twice the size of the corolla. The fruit is shaped like a purple-green pot with a length of 9-20 mm.

The ecology of this type of mangrove is that it likes smooth and muddy substrates on the edge of the land where inundation rarely occurs. This type of mangrove can usually be found in waterways that have a strong and steady supply of fresh water. Nectar production, flower color, and morphology and location indicate that pollination is assisted by birds. The light, buoyant fruit greatly facilitates waterborne dispersal. The benefit of this type of mangrove is that the wood is very suitable to be used as a material for making cabinets and other furniture.

## 2. *Osbornia octodonta* F. Muell



**Figure 2.** *Osbornia orthodontia* F. Muell

The mangrove tree, *Osbornia orthodontia* F. Muell, reaches a height of 7 meters, its roots spread horizontally, and usually have breath roots. The bark is brown, blackish-gray fibrous, and easily peels off. The leaves are thin-skinned, smelly to the touch, have oil glands, are obovate in shape, and have a rounded tip with a size of 2.5-5 x 1.3 cm. The flowers are bisexual, in one bunch there are 1-3 flowers in clusters, the flowers are not stalked but directly attached to the bunch. There are 2 ellipse-shaped pinks with a length of 6 mm which are located at the base of the peduncle. The flower petals are 8 which are green in color with a size of 3-6 mm. The stamens are white to yellow, totaling 48 strands, the size is longer than the lobes of the flower petals. The fruit is covered by calyx lobes and the calyx does not open when it is ripe. It has 1-2 seeds which are flat and ovoid inverted with a length of 5-10 mm.

The type *Osbornia orthodontia* F. Muell grows in a more open place on the edge of the land in the water channel edge area which is affected by the tides. It has no special dependence on growing substrates and can be found in fine silt, rocks and sand. However, this plant is not found growing in areas that are often inundated by fresh water. Flowers are pollinated by insects. Flowers are spread by water and float in water because of the hairs that can trap air. Usually, the fishermen use the leaves to repel insects. Usually, the bark is also used to patch parahu because the wood can last a long time.

3. *Nypa fruticans*(Thunb.) Wurmb., 1781



**Figure 3.** *Nypa fruticans* (Thunb.) Wurmb., 1781

The mangrove tree species *Nypa fruticans* (Thunb.) Wurmb., 1781 is a palm that does not have a stem on the surface and forms clumps. The trunk is underground, strong and forking, tree height can reach 4-9 m. the leaves are like an arrangement of coconut leaves with a petiole length of 4-9 m. There are 100-120 pinicles on each leaf bunch. The leaves are shiny green on the upper surface and powdery on the underside. The leaves are 60-130 x 5-8 cm. Bunches of bisexual flowers grow from near the top of the stem on a peduncle 1-2 m long. The female flowers form a circular head 25-30 cm in diameter. Bright yellow male flowers, located under the flower heads. The fruit is round, brown and fibrous. In each fruit there is one egg-shaped seed. The diameter of the fruit head is up to 45 cm and the diameter of the seeds is 4-5 cm.

This type of mangrove grows on smooth substrates, on the upper edge of waterways. Requires a high annual input of fresh water. This type of mangrove is rarely found outside the coastal zone. Usually grows in groups of stands. It has a dense and strong root system that is better adapted to changes in water input than most other mangrove plant species. The pollen is sticky and pollination seems to be aided by *Drosophila* flies. The fibrous fruit and the presence of air cavities in the seeds help them spread through water. This type of mangrove tree is usually used to make sweet syrup in large quantities. It is also usually used to produce alcohol and sugar. The leaves are used to make umbrellas, hats, mats, baskets and cigarette paper. The seeds are edible.

4. *Avicennia marina*(Forsk.) Vierh., 1907



**Figure 4.** *Avicennia marina* (Forsk.) Vierh., 1907

The type of mangrove *Avicennia marina* (Forsk.) Vierh., 1907 is a tree that grows upright or spreads and reaches a height of 30 meters. This type of mangrove has a complex horizontal root system and is pencil-shaped or asparagus-shaped, upright breath roots with numerous lenticels. The bark is smooth with gray-green mottled and peels off in small sections. Young twigs and petioles are yellow and hairless. The upper surface of the leaves is covered with concave glandular spots. The underside of the leaves is white to light gray. The leaves are elliptical, elongated round, inverted ovate. The tip is tapered to a round shape with a size of 9 x 4.5 cm. trident-shaped flowers with clustered flowers that appear at the ends of the bunches, have a strong smell and have a lot of nectar. It has 4 pale yellow-orange crown leaves with a diameter of 5-8 mm. 5 petals and 4 stamens.

This type of mangrove is a pioneer plant on protected coastal lands, having the ability to occupy and grow in a variety of tidal habitats, even in salty areas. This type of mangrove is one of the most common plant species found in tidal habitats. The roots are often reported to help bind sediment and accelerate the process of forming raised soil. This species can also cluster to form a group in certain habitats. Fruits all year round, sometimes viviparous. The fruit opens when it is ripe, through the dorsal layer. The fruit can also open because it is eaten by ants or after water absorption occurs. Usually this type of mangrove is used to treat burned skin. The resin that comes out of the bark is used as a contraceptive.

5. *Sonneratia alba* J.E. Smith, 1819



**Figure 5.** *Sonneratia alba* JE Smith, 1819

The mangrove type *Sonneratia alba* JE Smith, 1819 has a height of up to 15 m, the trees are green and grow spread out. Bark is dark white to brown with fine longitudinal fissures. The root is cable-shaped and appears on the surface as a conical breath root and reaches 25 cm in height. The leaves are leathery and have glands at the base of the petiole with a length of 6-15 mm. The leaves are ovoid inverted with rounded ends measuring 5-12.5 x 3-9 cm. This type of mangrove has flowers that are bisexual with blunt peduncles that are 1 cm long, located at the end or usually on a small branch. The crown leaves are white and fall off easily. It has 6-8 flower petals which are skinned and the outside is green while the inside is reddish. The flowers are bell-shaped and 2-2.5 cm long. In the flowers there are stamens that easily fall out in large numbers, the tips are white and the base is yellow. This type of mangrove also has fruit that is shaped like a ball with a stalked end and the bottom is wrapped in flower petals. The fruit contains many seeds numbering 150-200 seeds and will not open when ripe. The fruit has a diameter of 3.5-4.5 cm. The fruit contains many seeds numbering 150-200 seeds and will not open when ripe. The fruit has a diameter of 3.5-4.5 cm. The fruit contains many seeds numbering 150-200 seeds and will not open when ripe. The fruit has a diameter of 3.5-4.5 cm.

The mangrove species *Sonneratia alba* JE Smith, 1819 is not tolerant to fresh water for long periods of time. This type of mangrove prefers soil mixed with silt and sand, usually rocks and coral. This type of mangrove is usually found in coastal areas that are protected from waves, usually found in estuaries and around offshore islands. If other mangrove species are cut down at certain locations, this type of mangrove can form dense stands. Flowers on this type of mangrove occur throughout the year and their life is not too long. The flowers can fully expand at night and are likely pollinated by moths, birds and fruit-eating bats, so fireflies often stick to the tree. On rocky coasts, this type of mangrove spreads vegetatively. The fruit floats because of the water-containing tissue in the seeds. Usually this type of mangrove is used for making boats and building materials. While the root of the breath is used as a cork and float.

6. *Rhizophora apiculata* Blume, 1827



**Figure 6.** *Rhizophora apiculata* Blume, 1827

The mangrove species *Rhizophora apiculata* Blume, 1827 has trees reaching a height of 30 m with a trunk diameter of 50 cm. has roots reaching a height of 5 m and usually has aerial roots that come out of the branches. The bark is dark gray and capricious. It has leathery leaves, dark green or light green in the middle and reddish below. It has a leaf stalk with a length of 17-35 mm and is reddish in color. The leaves are elliptical and narrow with a tapered tip measuring 7-19 x 3.5-8 cm. This type of mangrove has bisexual flowers with yellowish flower heads located on stalks measuring <14 mm. The crown leaves are 4 which are yellow-white and 9-11 mm long. It has 4 yellow-brown flower petals. Has 11-12 stamens which are not stalked. This type of mangrove has fruit that is rough, round, elongated like a pear and brown in color with a length of 2-3.5 cm. It has a hypocotyl which is cylindrical in shape, has nodules and is orange green in color. Has a hypocotyl size with a length of 18-38 cm with a diameter of 1-2 cm.

This type of mangrove grows on muddy, smooth and inundated soils during normal tides. Dislikes harder substrate mixed with sand. The dominance level can reach 90% of the vegetation that grows in a location. This type of mangrove prefers tidal waters which have a permanent influence of fresh water input. Branching roots can grow abnormally due to interference from beetles that attack the ends of the roots. The presence of crabs can also inhibit the growth of this type of mangrove because it disturbs the root skin of its tillers. This type of mangrove is usually used for building materials, firewood and charcoal. The branches at the roots can be used as anchors with stones as weight.

7. *Bruguiera gymnorrhiza* (L.) Lamk.



**Figure 7.** *Bruguiera gymnorrhiza* (L.) Lamk.

The mangrove species *Bruguiera gymnorrhiza* (L.) Lamk. has a tree height of up to 30 m. The bark has lenticels with a smooth to rough gray to brown surface. The roots are like planks extending sideways at the base of the tree and have knee roots. It has green skinned leaves on the top layer and yellowish green on the bottom. The leaves are elliptical with a tapered tip measuring 4.5-7 x 8.5-22 cm. It has hanging flowers, has 10-14 white and brown petals and has a length of 13-16 mm. Has 10-14 pink flower petals with a length of 30-50 mm. This type of mangrove has fruit that is spiral, round and transverse with a length of 2-2.5 cm. Has a straight hypocotyl

The *Bruguiera gymnorrhiza* (L.) Lamk mangrove species is the dominant mangrove species in tall forests and its development is in the late stages of coastal forest and the initial stages of transition into terrestrial vegetation types. This type of mangrove grows in areas with low salinity and dry and well-aerated soil. This mangrove species is tolerant of protected areas and direct sunlight. This type of mangrove also grows on the edge of the mangrove land along ponds and tidal and brackish rivers. The substrate consists of silt, sand and usually black peat soil. This type of mangrove is also usually found on the banks of rivers that are less affected by sea water which is possible because the fruit is carried by the water currents. Regeneration is often only a limited amount. Flowers and fruit are available all year round. The fruit is also relatively large and has reddish petals, hanging and inviting birds to pollinate. This type of mangrove wood is usually used for firewood and to make charcoal.

## CONCLUSION

There are 7 (seven) mangrove species found in Wersar Waters, Kab. South Sorong include *Lumnitzera littorea* (Jack) Voigt, *Osbornia octodonta* F. Muell, *Nypa fruticans* (Thunb.) Wurmb., 1781, *Avicennia marina* (Forsk.) Vierh., 1907, *Sonneratia alba* JE Smith, 1819, *Rhizophora apiculata* Blume, 1827, and *Bruguiera gymnorrhiza* (L.) Lamk.

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