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MAPPING OF MANGROVE ZONING AND ITS RELATIONSHIP WITH SALINITY IN THE CIJULANG RIVER FLOW, PANGANDARAN REGENCY

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ABSTRACT

This study aims to map mangrove zoning and its relationship with salinity along the Cijulang River flow, Pangandaran Regency. The method used is a survey with a quantitative approach using purposive sampling techniques, focused on analyzing the structure of mangrove communities through important value indices (INP), diversity indexes, Evenness indices, and dominance indices. The results of the study showed that there were six species of mangroves, namely *Aegiceras corniculatum*, *Avicennia marina*, *Bruguiera gymnorrhiza*, *Nypa fruticans*, *Sonneratia alba*, and *Rhizophora mucronata*. Mangrove zoning is divided into three, namely the open zone (Station I, Batukaras Village), the central zone (Stations II and III), and the land zone (Station IV, Kondangjajar Village). *Sonneratia alba* has the highest INP value of 87%, while *Bruguiera gymnorrhiza* has the lowest INP value of 10%. Overall, the results of the study show that the community structure and mangrove zoning pattern in the Cijulang River are related to variations in the salinity level of the waters, sequentially found mangrove vegetation at high salinity values (6,3 ppt) to low (3 ppt) starting with the species *Avicennia marina*, *Rizophora mucronata*, *Sonneratia alba*, *Aegiceras corniculatum*, *Bruguiera gymnorrhiza*, and *Nypa fruticans*.

Keywords: Cijulang River; comunity structure; importance value index (INP); mangrove zoning; mangrove species diversity; salinity

INTRODUCTION

Mangroves refer to individual or community groups of dicotyledonous plants that are able to survive and grow under the influence of tidal seawater (Ramena *et al*., 2020). Naturally, mangroves form a complex ecosystem in which organisms interact with one another. The ecosystem that develops in mangrove areas generates high biodiversity of both flora and fauna (Mughofara *et al*., 2018). Mangroves have crucial functions for ecology and economy. Ecologically, mangrove forests act as feeding grounds, spawning grounds, and nursery grounds for various organisms. Economically, mangrove forests provide such as wood for material and ecotourism (Setiawan, 2013).

Pangandaran Regency is located along the southern coast of West Java Province, geographic at 108p 40' E and 07p 43' S. The region covers an area of 168,509 hectares and has a 91 kilometer coastline bordering the Indian Ocean (Permana *et al*., 2022). Pangandaran is known as a tropical beach tourism icon, supported by mangrove ecosystems that enhance the development of the tourism sector and play an important role in fisheries and marine activities (Shinta *et al.,* 2022). The mangrove ecosystem in this region can be found along the coastline, estuaries, lagoons, and river flows still influenced by tidal activity. The total area of mangrove forests in Pangandaran Regency is approximately 165 hectares, with around 10 hectares under rehabilitation. The Cijulang Watershed (DAS) contains mangrove ecosystems spread across two villages, each with distinct vegetation characteristics (Andhikawati & Permana, 2023).

The Cijulang Watershed divides two land areas that feature mangrove ecosystems with differing environmental characteristics. These are the lands of Batukaras Village, located at the river mouth and directly bordering the Indian Ocean, covering an area of approximately ±25.8 hectares, and the Nusawiru mangrove forest in Kondangjajar Village, designated as an ecotourism area located further upstream, covering around ±6–8 hectares. The two areas differ significantly, particularly in substrate type and salinity level. The Batukaras mangrove area has sandy substrates, while the Nusawiru area has muddy

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substrates (Yuniarti *et al.*, 2023). Furthermore, salinity levels in Kondangjajar Village are lower than in Batukaras Village, due to the ecosystem's location Batukaras lies at the river mouth influenced directly by tides, whereas Kondangjajar is situated further inland (Rosalina & Sofarini, 2021).

The mangrove ecosystem in Pangandaran Regency plays a vital role in supporting the livelihoods of local communities. The mangrove area provides various direct and indirect benefits that are utilized by residents in their daily activities to obtain natural resources (Mulyanie *et al.*, 2023). The mangrove ecosystem along the Cijulang River serves as a biofilter for aquaculture activities, a natural barrier against coastal abrasion, and an ecotourism area. The mangrove forests in the Cijulang River also hold significant economic valuation, amounting to Rp23,312,867,000 per year. This value includes the Nusawiru ecotourism mangrove forest valued at Rp746,757,000 per year and the Batukaras mangrove forest valued at Rp22,566,110,000 per year (Herawati *et al.*, 2023).

Mangrove forests exhibit various zonation structures, starting from the coastal fringe to inland areas or from estuaries to river bodies still affected by tides (Sipayung, 2023). The diversity of mangroves in an ecosystem is influenced by various environmental factors. Mangroves naturally form diverse structural patterns as an adaptation to changing environmental conditions (Chandra *et al.*, 2011). Mangrove community structure varies in composition across areas, influenced by soil conditions, rainfall patterns, and tidal cycles (Rahardi & Suhardi, 2016).

Mapping mangrove zonation is an essential step in describing the species composition of mangroves in an area, which has unique characteristics due to natural factors and changes over time (Sinaga *et al.* , 2019). This study aims to describe the zonation mapping of mangroves along the Cijulang River based on community structure and its relationship with salinity. Identified mangrove species data were processed using a quantitative approach to obtain information on species density, relative frequency, relative dominance, and Importance Value Index (INP). In addition, environmental parameters such as salinity and inundation depth were measured to examine the relationship between these factors and mangrove zonation patterns

METHODS

This research conducted in January 2025. The study site is located along the Cijulang River, specifically in Kondangjajar Village and Batukaras Village, Cijulang Subdistrict, Pangandaran Regency. The selection of this location is based on the presence of two mangrove forest areas on opposite riverbanks, separated by the Cijulang River flow. The research area spans from the river mouth to the midstream section, and sampling ends at the point where only a single mangrove species, *Nypa fruticans*, is found on both sides of the riverbanks (Figure 1). Sampling was carried out at four stations along both sides of the Cijulang River.

The method used in this study is a survey method, conducted through direct field observations with a quantitative approach, using purposive sampling techniques for station selection. Sampling was conducted using the transect plot method (Cox, 1967).

The tools and materials used in this study included: plastic rope with stakes, mobile phone, measuring tape, refractometer, writing tools and logsheets, rubber boots, kayak, mangrove identification book (title: *Panduan Pengenalan Mangrove di Indonesia*), and aquadest.

The main components of producing bio-briquettes consisted of coconut shells, seashells, and binder. The seashells utilized were abundant waste materials naturally accumulating along the shoreline of Muncar Beach in Banyuwangi, specifically the yellowish brown Asiatic hard clam (*Meretrix meretrix* (Linnaeus, 1758)). Conversely, the coconut shells were collected at Banjar Tengah, Jembrana disposal area. Whilst the binder was made of tapioca flour.

Station Determination

The research was conducted on both sides of land along the Cijulang River, from the estuary to the point where only *Nypa fruticans* was found. Each station had a 100-meter observation transect and was selected using purposive sampling based on ecological suitability. Three transect plot were established at each station to record mangrove species and measure environmental parameters. Sampling locations were determined using Google Earth to obtain accurate coordinate (Figure 1).

Transect Plot Setup

Sampling using the transect plot method (Cox, 1967). Each station was selected using purposive sampling with the aim of assessing vegetation homogeneity or heterogeneity of certain mangrove species. Each transect measured 10 × 10 meters,

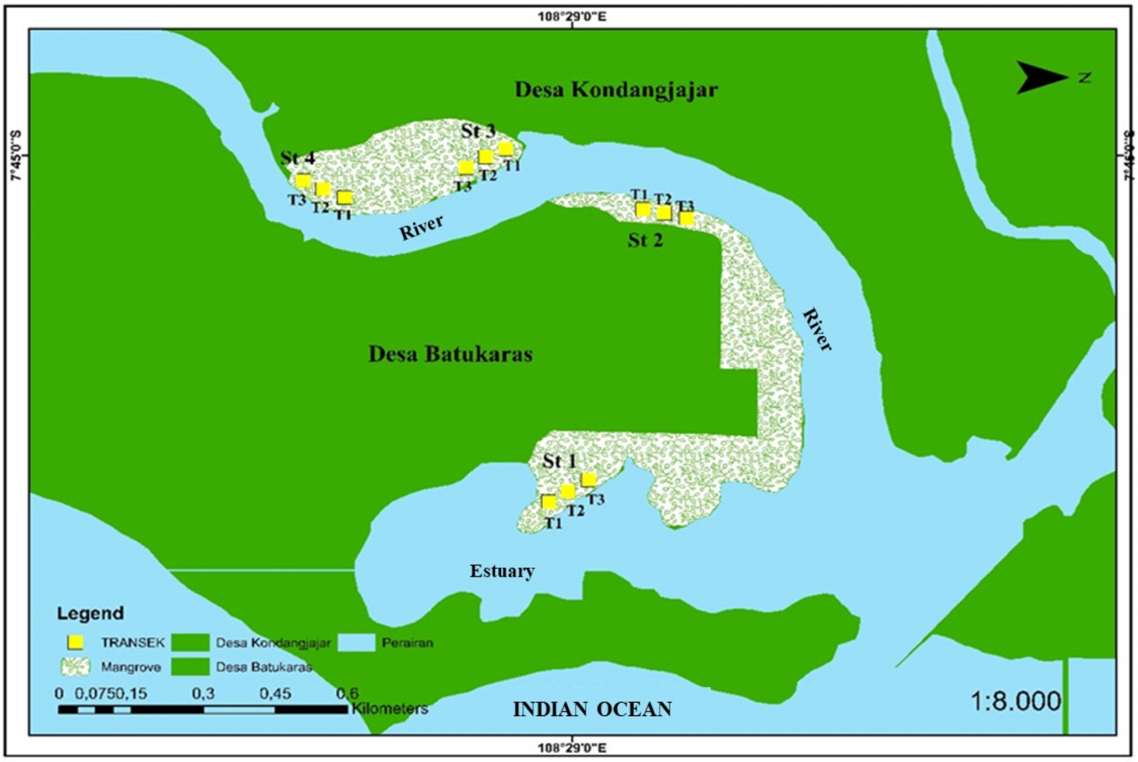

Figure 1. Research location, Cijulang River flow, Pangandaran Regency

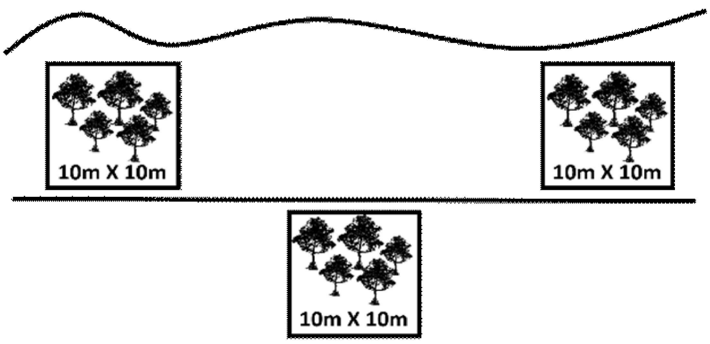

Figure 2. Transect plot setup

and three plots were established at each station (Figure 2).

Sample Identification

Sample identification was conducted to determine each individual mangrove found in the study area, including its species, scientific name, and tree category (based on stem diameter). To improve the accuracy of species identification, a reference book entitled Panduan Pengenalan Mangrove di Indonesia was used, which describes the morphological characteristics of each mangrove species. In addition to morphological identification, physical measurements of the plants were also carried out, including stem diameter, to determine the size and classification of the mangrove stands.

Measurement of Environmental Parameters

Observation of aquatic environmental parameters was conducted to determine the extent to which environmental conditions affect the composition of mangrove communities. Salinity was measured using a refractometer, while water depth was measured using a stake with a measuring tape. Each parameter was measured in triplicate at each observation station to obtain more representative and accurate data.

Research Parameters

The analysis of mangrove community structure was conducted using a quantitative approach, as described by Bhardwaj (1979) in Katili *et al.*, (2020). Several important parameters used to describe the zonation structure of mangrove communities include the Importance Value Index (INP), diversity index, evenness index, and dominance index. These indices are essential for assessing how significantly a species contributes to the stability of the ecosystem. The INP is derived from the sum of several basic parameters such as density, relative density, frequency, dominance, and relative dominance (Hariyanto *et al.*, 2023).

Community Structure Formulas

Density (K):

Density refers to the number of individual organisms per unit area (expressed as individuals per hectare).

$$(K)=\frac{\Sigma \text{ individuals of a species}}{\text{Total area of sample plots}}$$

Relative Density (KR):

The proportion of a species' density compared to the total density of all species.

$$(KR)=\frac{\text{K of a species}}{\text{K of all species}}x100$$

Frequency (F):

The proportion of plots containing a particular species relative to the total number of plots.

$$(F)=\frac{\Sigma \text{ of plots where a species is found}}{\text{Total number of plots}}$$

Relative Frequency (FR):

The proportion of a species' frequency compared to the total frequency of all species.

$$(FR)=\frac{\text{F of a species}}{\text{F frequency of all species}}x100\%$$

Dominance (D):

Dominance is based on the basal area of a species, representing its influence within the community.

$$(D)=\frac{\text{Total basal area of a species}}{\text{Total area of the sample plots}}$$

Relative Dominance (DR):

The proportion of a species' dominance compared to the total dominance of all species.

$$(DR)=\frac{\text{D of a species}}{\text{D of all species}}x100\%$$

Importance Value Index (INP):

A composite index used to assess a species' ecological role in a plant community.

$$INP = KR + RF + RD$$

Diversity Index (H'):

Calculated using the Shannon-Wiener diversity index formula Shannon & Wiener, 1984 in Hariyanto *et al.*, (2023).

$$H'=\sum \frac{ni}{N} \ln \frac{ni}{n}$$

H' = Species Diversity Index
ni = Number of individuals of each species
N = Total number of individuals of all species

Evenness Index (E):

Measures how evenly individuals are distributed among species, by comparing the diversity index to its maximum potential value (Odum, 1997).

$$E = H'/\log S$$

E = Pielou species evenness index
H = Shannon-Wiener diversity index

Dominance Index (C):

Reflects the degree to which a few species dominate the community structure (Odum, 1997).

$$C=\sum_{i=1}^{s}\left[\frac{Ni}{N}\right]^2$$

C = Simpson-dominance index
Ni = Number of individuals of the i-th species
N = Total number of individuals
S = Number of species

Data Analysis

The observational data were analyzed quantitatively to obtain values for the Importance Value Index (INP), diversity index, evenness index, and dominance index. These values were then compared with environmental parameters, particularly salinity, at each observation station.

The analysis results will be presented in the form of mangrove zonation maps, which illustrate the community structure of mangroves at each location. A descriptive explanation will be provided to elaborate the relationship between mangrove zonation and salinity levels along the Cijulang River, Pangandaran Regency.

RESULTS AND DISCUSSION

Results

The selection of research stations was based on field survey results, which identified four observation stations. Two stations are located within the Batukaras Village area (Station 1 and Station 2), while the remaining two are situated along the riverbanks within Kondangjajar Village (Station 3 and Station 4) (Figure 1). Each station is equipped with a single transect line, drawn perpendicularly from the riverbank inland for 100 meters. Along each transect, three observation plots measuring 10 × 10 meters were established. Station placement began at the river mouth and continued upstream until the point where no other mangrove species were found except *Nypa fruticans*.

Station I is characterized by relatively clear waters with a greenish hue and minor wave and tidal exposure. On the outermost part of this area, thousands of *Rhizophora* planting stakes were observed, all submerged due to tidal inundation. Fauna such as reptiles and various bird species are quite dominant in this area, with some species nesting and residing within the mangrove forest.

Previously, the Batukaras mangrove area functioned as an ecotourism site, but is currently non operational. Infrastructure damage such as broken bridges, collapsed observation huts, and disused piers has rendered the area inaccessible and unsuitable for visitors.

Station II features murky waters, and is located near an effluent discharge point from shrimp aquaculture ponds. Around the discharge area, bivalves were found attached to mangrove roots and trunks, indicating biological activity adapted to changing environmental conditions. Community activities remain vibrant in this area, as indicated by the presence of *jodang* (traditional fish traps) and fishing huts built by local residents along the riverbanks.

Station III is an area heavily influenced by periodic tidal fluctuations. The mangrove area here is utilized as part of the Nusawiru Mangrove Ecotourism Area. The local community, many of whom work as fishers, benefit from nearby piers and a fish auction facility, both of which are located in close proximity to the mangrove forest.

Station IV is characterized by turbid waters with low visibility. The mangrove forest in this station is densely vegetated, which restricts access and makes the observation area difficult to reach. The thick vegetation contributes to the accumulation of waste and household debris, which is carried by river currents and trapped among the mangrove roots. This condition reflects environmental stress resulting from human activity in the surrounding area.

Environmental Parameters

Salinity is an environmental parameter that directly influences the distribution and growth of mangroves. Field measurements revealed that salinity levels in the Cijulang River ranged between 3 and 6.3 ppt. The highest value was recorded at Station I of 6.3 ppt (measured at 13:00) located closest to the sea and receiving the most direct input of saltwater. Station II had a lower salinity of 3.6 ppt (measured at 14:00), reflecting its position further inland. On the opposite riverbank, Station III recorded 4.6 ppt (measured at 16:30), which was unexpectedly higher than Station II. This anomaly is likely due to the timing of data collection, which coincided with high tide, allowing greater seawater intrusion. The lowest salinity was recorded at Station IV of 3 ppt (measured at 17:30), indicating a location farther upstream but still under the influence of brackish conditions.

Overall, the variation in salinity values at each station is influenced by both geographic location and sampling time in relation to the tidal cycle. Previous studies (Jumarang *et al.*, 2011; Nugroho, 2019) support stating that salinity increases during high tide due to seawater influx and decreases during low tide due to freshwater dominance. With a salinity range between 3–7 ppt, the study area remains the optimal tolerance range for mangrove vegetation, which is 2–22 ppt.

Water depth is a crucial factor influencing the structure and zonation of mangrove communities. Observations along the Cijulang River revealed water depths ranging from 9 to 88 cm, indicating notable variations between locations. The average depth at Station I was 56 cm, Station II 24.6 cm, Station III 71 cm, and Station IV 66 cm. These variations are likely influenced by local topography, tidal conditions during sampling, and the density of mangrove vegetation, which affects water flow and sediment deposition.

Water depth impacts sediment mobility and nutrient distribution, both of which are vital in shaping the habitat characteristics for different mangrove species. A previous study (Nurfajrin & Rosada, 2018) in the Batukaras mangrove area reported a wider depth range of 19–140 cm, emphasizing the role of oceanographic factors and observation timing. These depth variations significantly influence mangrove species distribution, sediment accumulation, and the overall ecological dynamics of the mangrove zone.

Mangrove Species Identification

Along the Cijulang River, six mangrove species were identified: *Aegiceras corniculatum*, *Avicennia marina*, *Bruguiera gymnorrhiza*, *Nypa fruticans*, *Sonneratia alba*, and *Rhizophora mucronata*. This composition reflects a mixed vegetation type, where two or more mangrove species coexist within the same area similar to findings by Afriyani et al. (2017) in Payung Island. Among all the identified species, *Aegiceras* and *Sonneratia* exhibited the most consistent distribution across the sampling stations, indicating their high adaptability to varying environmental conditions along the river flow.

Mangrove Composition

Mangroves can grow as pure stands, with their distinctive root systems serving as a specialized physiological mechanism that enables adaptation to their surrounding environment (Rofi'i *et al.*, 2021), Observations of mangrove stands along the Cijulang River revealed variations in both the number and composition of species across stations (Figure 3).

These differences are attributed to species-specific adaptations to environmental conditions such as salinity, substrate, and tidal influence. Station I and II each recorded four species; *Avicennia marina* dominated Station I due to its high salinity tolerance, while *Aegiceras corniculatum* and *Sonneratia alba* dominated Station II in brackish areas. Station III exhibited the highest diversity, with all six recorded species present, indicating a transitional zone still affected by tidal flows. In contrast, Station IV contained only two species *Aegiceras corniculatum* and *Nypa fruticans* with *Nypa* forming dense clusters, suggesting it lies on the outer edge of the mangrove forest. These findings align with previous studies in the Batukaras and Nusawiru regions, which reported habitat-specific distribution patterns among mangrove species.

Density

The distribution of mangrove species along the Cijulang River (Figure 4) was analyzed through species density values at each observation station, ranging from 190 to 610 individuals per hectare, categorized as low. The species with the highest individual counts varied by station: *Avicennia marina* was most abundant at Station I, *Sonneratia alba* at Station II, while *Nypa*

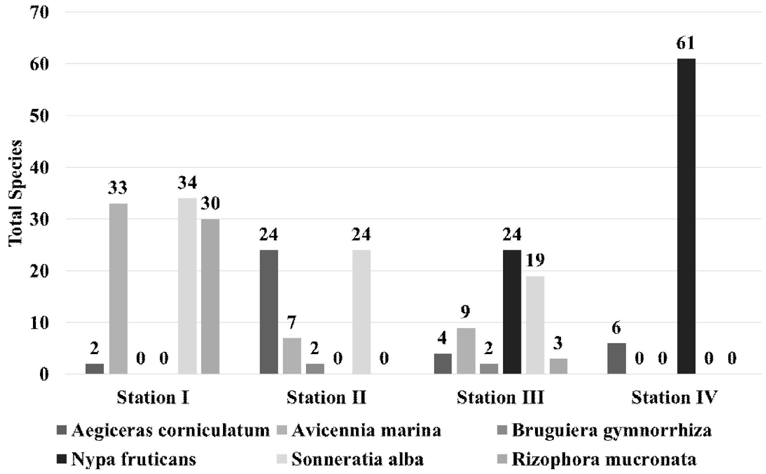

Figure 3. Mangrove composition along Cijulang River flow, Pangandaran Regency

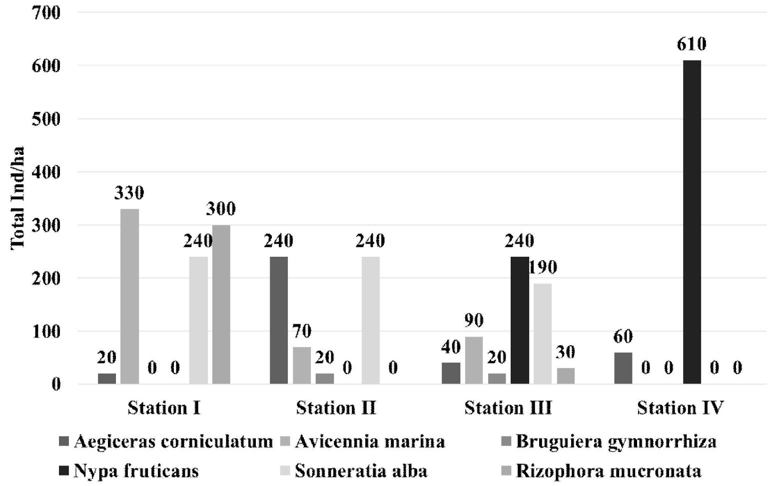

Figure 4. Mangrove density along Cijulang River flow, Pangandaran Regency

fruticans had the highest count at Stations III and IV.

The average density across stations remains below the moderate threshold set by the Indonesian Ministry of Environment Decree No. 201 of 2004 (690 ind/ha), indicating that the mangrove ecosystem in this area has not yet reached optimal density. This condition is likely influenced by environmental pressures caused by human activities, including land conversion, pollution, and hydrological disturbances, as also reported by Nugroho (2019) and Spalding *et al.*, (2014).

Dominance

The dominance of mangrove species along the Cijulang River shows variation that reflects ecological zoning based on environmental tolerance (Figure 5). *Avicennia marina* dominates Stations I and III, *Sonneratia alba* is dominant at Station II, while *Nypa fruticans* is the most dominant at Station IV. Overall, *Sonneratia alba* recorded the highest dominance value across all stations at Cijulang River. This high dominance is linked to its ability to adapt to tidal fluctuations and salinity variations. The observed dominance patterns indicate a strong relationship between community structure and habitat characteristics, with dominant species serving as key indicators for mangrove vegetation zoning. These findings align with previous studies in the Nusawiru mangrove area.

Importance Value Index (INP)

The Importance Value Index (INP) reflects the influence or ecological role of a mangrove species within an ecosystem. It is obtained by summing the values of relative density (KR), relative frequency (RF), and relative dominance (DR), as proposed by Odum (1997).

INP values for mangrove species across the observation stations along the Cijulang River range from 16% to 237% (Figure 6). At Station I, *Avicennia marina* recorded the highest INP at 117%, indicating

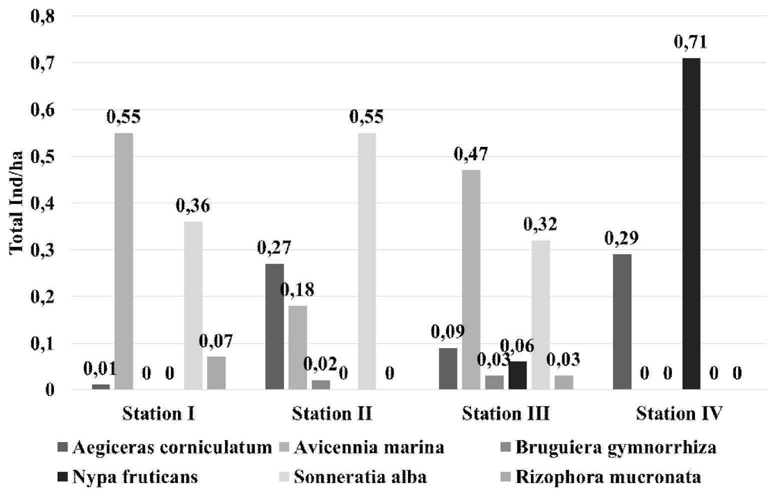

Figure 5. The dominance of mangrove species along Cijulang River flow, Pangandaran Regency

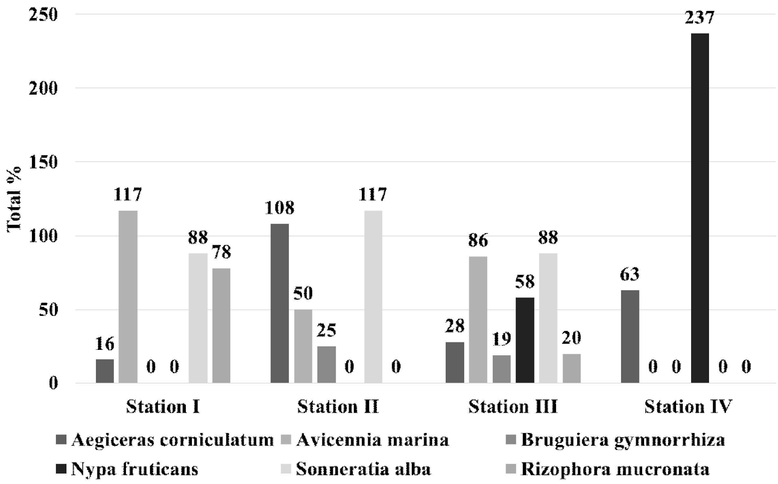

Figure 6. The Importance Value Index (INP) for mangrove species across observations

its strong dominance and adaptive capacity near coastal areas. In contrast, at Stations II and III, *Sonneratia alba* exhibited the highest illustrates the ecological dynamics and species zonation along the Cijulang River (Figure 6) . Each species' dominance corresponds to its tolerance and adaptability to specific environmental factors such as salinity, sediment type, and tidal exposure.

The analysis of the Importance Value Index (INP) revealed that *Sonneratia alba* is the most dominant mangrove species along the Cijulang River, with the highest INP of 86% (Figure 7). Although this value falls under the moderate category, the species was recorded at all observation stations with relatively high density and frequency values. *Bruguiera gymnorrhiza* had the lowest INP of 10%, indicating a very low influence on the overall structure of the mangrove community. These findings align with previous studies which suggest that *Sonneratia alba* has a strong adaptive capacity to environmental conditions, making it more dominant than other species.

Diversity Index (H')

The Diversity Index (H') reflects the community structure of mangroves based on species richness and relative abundance. Results showed (Figure 8) that Station III had the highest diversity index at 1.45, indicating a relatively stable and balanced community structure.

Stations I and II also fell into the moderate diversity category, where individuals were fairly evenly distributed among species. In contrast, Station IV had the lowest diversity index at 0.3, suggesting low species richness and the dominance of one particular species, which reduces ecosystem stability. This low diversity is likely influenced by environmental stress and the continuous decline in habitat quality. These findings align with Odum's theory and previous research, which emphasize that diversity is shaped not only by the number of species, but also by how evenly they are distributed within the community.

Evenness Index (E)

According to the study (Figure 9). Station II had

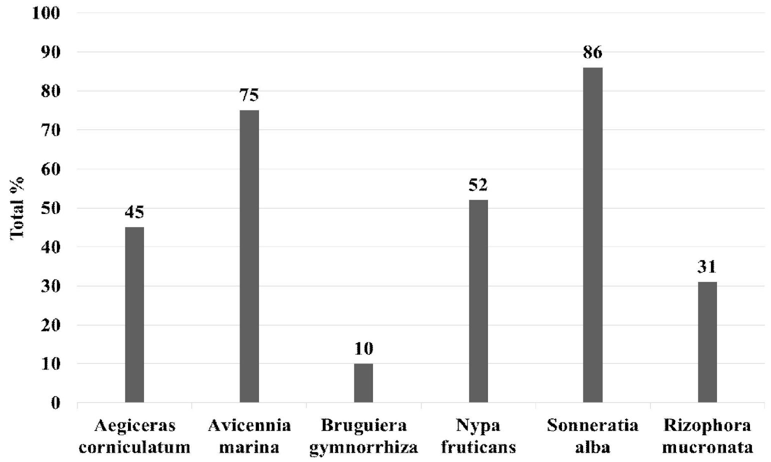

Figure 7. The Importance Value Index (INP) mangrove along Cijulang River flow, Pangandaran Regency

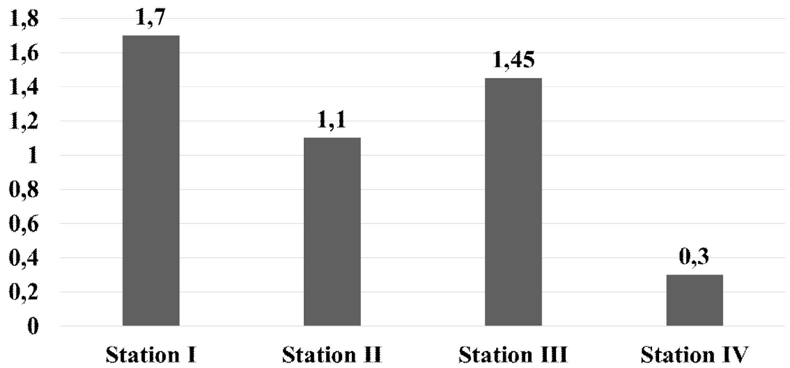

Figure 8. The Diversity Index (H') mangrove along Cijulang River flow, Pangandaran Regency

the highest evenness value of 1, indicating a perfectly balanced distribution of individuals with no single species dominating the ecosystem. Stations I and III also showed stable community conditions (E > 0.6), with balanced presence of species such as *Avicennia marina*, *Sonneratia alba*, and *Rhizophora mucronata*. In contrast, Station IV had the lowest evenness value at 0.43, indicating ecological stress. The low evenness in this station was mainly due to the dominance of *Nypa fruticans*, which grew densely and suppressed the presence of other species due to limited growing space and less favorable habitat conditions. These findings align with Odum's (1997) concept that high evenness indicates a stable and ecologically healthy system, while the dominance of a single species suggests imbalance and environmental pressure.

Dominance Index (C)

The dominance index describes the extent to which a particular mangrove species dominates within a community, often suppressing the growth of other species. According to Odum (1997), this index ranges from 0 to 1, where values close to 0 indicate a stable community with no dominant species, while values close to 1 suggest ecological stress due to species dominance.

Based on the findings in Figure 10, Stations I, II, and III had low dominance index values, suggesting no single mangrove species dominated significantly. In contrast, Station IV recorded the highest dominance index of 0.84, indicating that one species *Nypa fruticans* was overwhelmingly dominant. The dense presence of *Nypa fruticans* at this station limited the growth of other species due to space and resource competition. This result is consistent with Kuslani and Sukamto (2016), who reported 100% dominance of *Nypa fruticans* in the same area, with no other mangrove species observed. This suggests that *Nypa fruticans* has a high competitive ability under certain environmental conditions, allowing it to dominate the mangrove ecosystem.

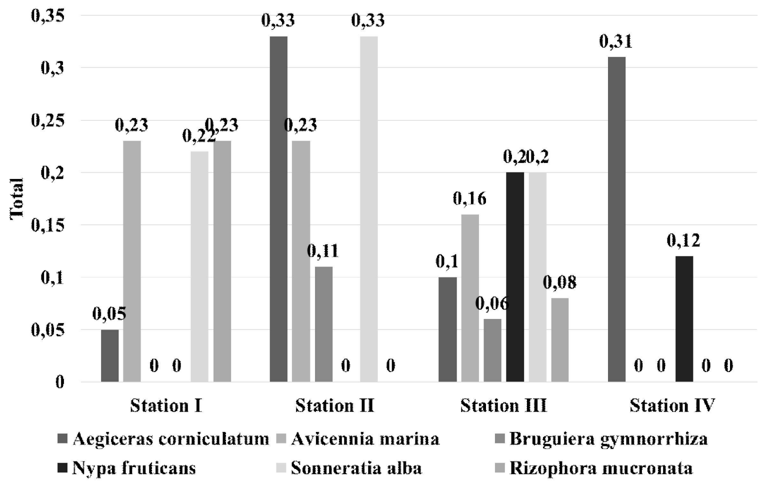

Figure 9. The Evenness Index (E) of mangrove along Cijulang River flow, Pangandaran Regency

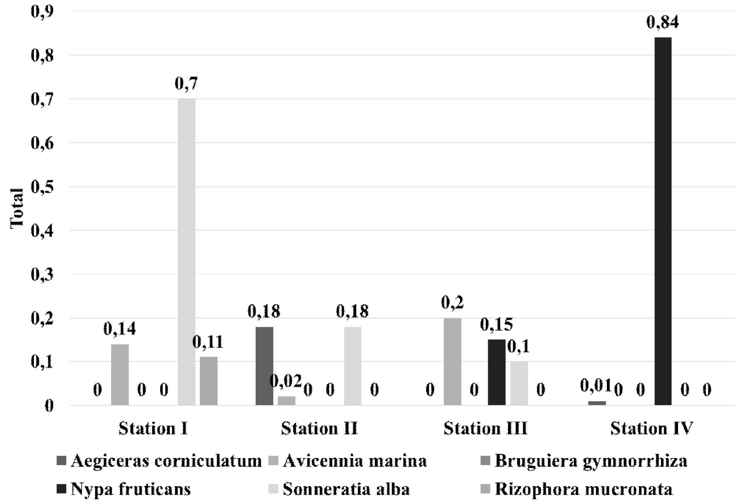

Figure 10. The Dominance Index (C) of mangrove along Cijulang River flow, Pangandaran Regency

Discussion

Mangrove Zoning

The mangrove zoning along the Cijulang River was established through field surveys using transect plots, stretching from the coastline inland until no other mangrove species besides *Nypa fruticans* were found. Species identification data from each station were analyzed quantitatively and mapped accordingly in Figure 11.

The mangrove ecosystem in this area spans two villages: Batukaras and Kondangjajar. In Batukaras, which is closest to the sea, the ecosystem is dominated by *Avicennia marina* and influenced by *Sonneratia alba*. These pioneer species indicate an open zone classification. According to Kusmana *et al.,* (2022), species dominance and importance are influenced by environmental factors, particularly salinity. Although mangroves tolerate high salinity, growth disturbances may occur when salinity exceeds species-specific thresholds. In Batukaras, salinity levels range from 3 to 7 ppt with water depths of 9–64 cm, supporting the growth of pioneer mangrove species like *Aegiceras corniculatum*, *Avicennia marina*, *Sonneratia alba*, and *Rhizophora mucronata*.

Both Batukaras (Station I) and Kondangjajar (Station III) host high species diversity and are influenced by tidal salinity influx. These locations have salinity ranges of 3–5 ppt and water column depths between 9–88 cm. Their favorable environmental conditions support optimal mangrove growth, and the presence of *Bruguiera gymnorrhiza* characterizes them as mid-zones. In contrast, Station IV is dominated by *Nypa fruticans*, which indicates the landward zone and marks the end of the mangrove zoning.

The Relationship Between Mangroves and Salinity

The observation results show that there is an influence of salinity levels on the existence of mangrove species. Ecosystems with higher salinity levels are generally filled by species such as *Avicennia marina*, *Sonneratia alba*, and *Rhizophora mucronata*, followed by *Aegiceras corniculatum* and *Bruguiera gymnorrhiza*, the lowest salinity is filled by *Nypa fruticans*, which is a species that is intolerant to high salinity but can survive in low salinity conditions. This relationship can be further described in Figure 12.

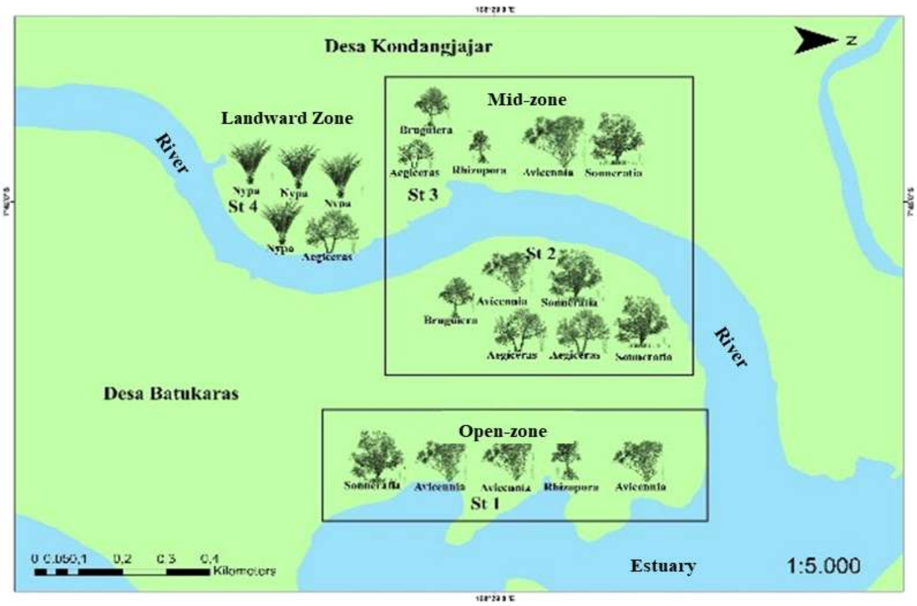

Figure 11. Mapping of mangrove zoning

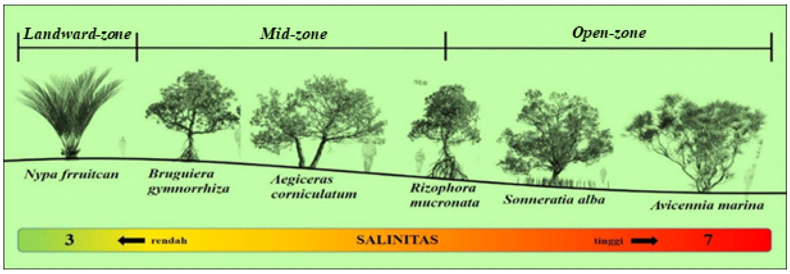

Figure 12. Relationship between mangroves and salinity

CONCLUSION

The mangrove composition along the Cijulang River consists of six identified species: *Aegiceras corniculatum*, *Avicennia marina*, *Bruguiera gymnorrhiza*, *Nypa fruticans*, *Sonneratia alba*, and *Rhizophora mucronata*. The highest Importance Value Index (INP) among the mangrove species was recorded for *Sonneratia alba* at 86%, while the lowest was *Bruguiera gymnorrhiza* at 10%. The diversity index for the mangrove ecosystem falls under the moderate category. The evenness index suggests a stable condition, whereas the dominance index indicates an unstable ecological structure. Mangrove zoning along the Cijulang River begins with the open zone (Station I, Batukaras Village), followed by the mid-zone located in both Batukaras (Station II) and Kondangjajar Village (Station III), and ends with the landward zone (Station IV, Kondangjajar Village). The salinity gradient shows a clear relationship with mangrove species distribution. Species were found in descending order of salinity tolerance from 6.3 ppt to 3 ppt, starting with *Avicennia marina*, followed by *Sonneratia alba*, *Rhizophora mucronata*, *Aegiceras corniculatum*, *Bruguiera gymnorrhiza*, and ending with *Nypa fruticans*, which thrives in lower salinity conditions.

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