Distribution of Soft Coral *Octocorallia (Alcyonacea)* in coastal waters of Gonda, Polewali-Mandar, West Sulawesi

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**Abstract.** The research on "Distribution of Soft Coral *Octocorallia: Alcyonacea* population in coastal waters of Gonda, Polewali-Mandar, West Sulawesi" has been done from August to December 2017. This study aims to determine the soft coral distribution and diversity at different depths in Coastal waters of Gonda, Polewali-Mandar, West Sulawesi. The data collection was performed by using the "Line Intercept Transect (LIT)" method with 50 meters transect at a depth of 3 meters and 10 meters at each station. The transect line was following the contour lines. Sample identification was performed by means of video recording. Environmental parameters including temperature, salinity, dissolved oxygen, current, brightness, turbidity, and pH was measured during field campaign, respectively. Data analysis was done by using the Shannon-Wiener Diversity Index, Uniformity index, Dominance index and Morisita Index. The results showed that 16 species from four families of Soft Coral has been found in Gonda Beach, where the number of species found at 10m depth are higher than 3m depth, respectively. The average value of the diversity index at 3m depth (1.62) is higher than at 10m depth (1.34), but both are still classified in the moderate category. The pattern of population distribution in the overall site at this location tends to be random.

1. **Introduction**

The Gonda coastal area is one of travel destination in West Sulawesi, this location placed in the middle of Coral triangle which streched out in Indonesia-Filipina-Papua New Guinea coastal water. Gonda coastal water not have been explored yet. This area has a big biodiverity of marine biota, one of the biota that can be found in this area is soft corals.

Soft corals (*Octocorallia:Alcyonacea*) belongs to Coelenterata [1], which distributed along a shallow water in tropical and subtropical regions. Nowadays, many soft corals have known to have some important use in varoius filed such as ecology, pharmaehy as economic perspective. Some member of genus *Sarcophyton* are notified as current indicator for surrounding environment. Beside, many soft coral also are known for their potency in producing bioactive compound that basic material for drugs [2]. Soft coral from South west Sulawesi province is far less documented. Most of soft coral from Indonesia was recorded from Sumatera, Jawa, Borneo, South Sulawesi Province and eastern part of Indonesia [3][4]. There are 96 genera from 4 families that found in Indo-Pasific, while 28 genera of it found in Indonesia [5]. Study done by Manuputty in 2002, recorded approximately 219 species of soft coral are distributed in Indonesia [5]. This present study was first attempt to record a distribution of soft coral from Gonda waters in South West Sulawesi province of Indonesia.
2. Material and method

2.1. Sampling site

Sampling site was determined according to visual habitat characteristic. Data collection was done at three different locations as follows: 3°29′91″S, 119°07′62″E (Site I), closed to nonexistent mangrove forest, 3°30′50″S 119°07′33″E (Site II), closed to mangrove forest, and 3°30′82″S, 119°07′25″E (Site III), closed to inhabited area.

![Research Site Map](image)

**Figure 1.** Sampling site

2.2. Sampling method.

Data on soft corals was collected by using visual census method in combination with Belt transect [6]. A 50 m belt transect was applied at three sites, in which observation on soft coral was done at an area of 2.5 m at the left and right side of the transect. All soft coral (solitary or colony) inside the observation area was photographed, counted, and sub samples were collected for further identification. Sample photographs were done by help of an underwater camera. Species identification was based on species characteristic according to Tropical Pacific Invertebrates [7], and Soft Corals and Sea Fans A Comprehensive Guide to the Tropical Shallow Water Genera of the Central-West Pacific, the Indian Ocean and the Red Sea [8].

3. Result and Discussion

3.1. Result

3.1.1. Species composition

The result of species identification indicates that there are sixteen species belonging to four families of soft coral present in Gonda waters (Table 1). As can be seen from Table 1, Family Alcyoniidae consist of 9 species; Family Nephtheidae (5 species); Family Tubiporidae (1 species) and Family Xeniidae (1 species). Some examples of soft coral, most common ones, are shown in Figures 2, 3, and 4.

| Table 1. Soft coral species composition at different sites in Gonda coastal waters |
|----------------------------------------------------------------------------------|
| **No** | **Species** | **Site I** | **Site II** | **Site III** |
|        |            | (m)       | (m)         | (m)         |
| 1       | *Cladiella* sp. Gray, 1869 | √          | √           | √           |
| No. | Genus                  | Species                          | Author, Year | \( √ \) |
|-----|------------------------|----------------------------------|--------------|--------|
| 2   | *Klyxum*              | *sp.* Alderslade, 2000            |              |        |
| 3   | *Lobophyrum*          | *sp.* Marenzeller, 1886           |              | ✓      |
| 4   | *Lobophyrum compactum*| Tixier-Durivault, 1956           |              | ✓      |
| 5   | *Lobophyrum crassum*  | von Morenzeller, 1886             |              | ✓      |
| 6   | *Sarcophyton crassocaule*| Moser, 1919                    |              | ✓      |
| 7   | *Sarcophyton elegans* | Moser, 1919                      |              | ✓      |
| 8   | *Sinularia sp.*       | May, 1898                        |              | ✓      |
| 9   | *Sinularia flexibilis*| Quoy & Gaimard, 1833             |              | ✓      |
| 10  | *Paralemnalia sp.*    | Kükenthal, 1913                  |              | ✓      |
| 11  | *Paralemnalia thyrsoide*s | Ehrenberg, 1834              |              | ✓      |
| 12  | *Litophyton sp.*      | Forskål, 1775                    |              | ✓      |
| 13  | *Scleronephthya sp.* | Studer, 1887                    |              | ✓      |
| 14  | *Stereonephtya sp.*   | Kükenthal, 1905                  |              | ✓      |

**Nephtheidae**

| No. | Genus                  | Species                          | Author, Year | \( √ \) |
|-----|------------------------|----------------------------------|--------------|--------|
| 15  | *Tubipora musica*     | Linneaus, 1758                   |              | ✓      |

**Tubiporidae**

| No. | Genus                  | Species                          | Author, Year | \( √ \) |
|-----|------------------------|----------------------------------|--------------|--------|
| 16  | *Heteroxenia sp.*     | Koelliker, 1874                  |              | ✓      |

**Figure 2.** *Sinularia flexibilis* Quoy & Gaimard, 1833

**Figure 3.** *Paralemnalia sp.* Kükenthal, 1913
3.1.2. Species Diversity and distribution
The result of analysis on species diversity as indicated by Shannon-Wienner diversity index is given in Table 2, while soft coral distribution pattern is shown in Table 3. As described in Table 2, diversity index range from 0 (site I 10m) to 23.6 (site II 10m), this means that most of value reflect as moderate category except low category was found at site I at 10 m depth, respectively. Value of Morisita dispersion index ranges from ~ to 0.52 (Table 3), indicating that soft coral in the study area are mostly random distributed.

| Site | Depth (m) | Diversity | Category |
|------|-----------|-----------|----------|
| I    | 3         | 1.96      | Moderate |
|      | 10        | 0         | Low      |
| II   | 3         | 1.30      | Moderate |
|      | 10        | 2.36      | Moderate |
| III  | 3         | 1.60      | Moderate |
|      | 10        | 1.66      | Moderate |

Data on environmental parameters is shown in Table 4. As seen the Table, each parameter are not significantly differ amongst sites except for current at site II (0.4±0.30 km/h), lower than at site I (1.03 ± 0.09 km/h) and site III (1.3 ± 0.25 km/h).
3.2 Discussion
The result of present study indicates that number of soft coral are less compared to one reported from Biak waters that of 18 species, those belongs to 5 families [4]. However, number of species of soft coral found in Gonda coastal water is higher than one found by Goh [9] that recorded 8 species in Singapore waters.

The composition of species found in Gonda coastal waters are generally dominating by Lobophytum sp and Sarcophyton elegans (Figure 4), counted for 83.33% in total population. It is known that these two species can almost be found in all observed sites at different depths, except at site I at 10 m depth. This result is very reasonable considering that site I with a depth of 10 m has a substrate that is entirely sand. This shows that both species have a fairly good level of adaptation. On the other hand, the six species shows low species composition in which 16.67% is the lowest species composition value among other species.

The existence of soft coral in waters is strongly influenced by natural factors that exist in the region. Some soft coral species also have different substrates to grow, but majority of soft corals grow on hard substrates such as rocks or hard corals that have died. The depth level also affects soft coral growth. Depth is one of factors that influence the amount of light penetration that reaches the bottom substrate. In addition, the level of turbidity also affects the amount of light penetration that entering a body of water.

Different soft coral also has a tolerance limit for different environmental factors. For example as stated by Fabricus and Adersladde 2001 [8], vapor salinity that supports growth of soft coral range from 25‰ to 45‰. This level of tolerance can be seen from the distribution of soft coral growth. Direct observations made in the field reveals that there was damage to coral reefs in several different places. At these three observation sites, we observed almost the same cause of coral reefs damage, which is due to the use of cyanide poison. This can be seen from the pattern of coral damage that follows the direction of sea water flows, with the lime frame still intact. In some observed places, we found rubble which became a marker of bombings or anchoring activities in the region. Damage that occurs at the site also occurs due to natural factors, such as waves that can break several types of coral. At some point, there are also dead coral that covered by sediments from land. This dead coral organism will gradually become a growing place for some soft coral species.

4. Conclusion
The present study reveals that 16 species of soft coral belongs to 4 families is recorded in Gonda waters, in which more species was found in 10 m compared to 3 m. Environmental parameters are in vapour to support soft coral in this area. In addition, diversity index shows species diversity is moderate and soft coral tends to randomly distributed in the area.

References
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| Site | Temperature (°C) | Salinity (‰) | DO (mg/L) | Current (km/h) | Brightness (m) | Turbidity (%Transmitant) | pH |
|------|------------------|--------------|-----------|----------------|----------------|--------------------------|----|
| I    | 27 ± 1.00        | 26 ± 1.00    | 8.3 ± 0.75| 1.03 ± 0.09    | 6.5 ± 0.29     | 89 ± 0.00                | 8.4 ± 0.06 |
| II   | 27 ± 1.15        | 25 ± 1.3     | 9 ± 0.30  | 0.4 ± 0.30     | 6 ± 0.00       | 98 ± 0.01                | 8.4 ± 0.00 |
| III  | 28 ± 1.00        | 26 ± 0.0     | 9.2 ± 0.6 | 1.3 ± 0.25     | 6.5 ± 0.32     | 98 ± 0.01                | 8.5 ± 0.20 |

Tabel 4. Environmental parameters at different sites at Gonda coastal waters (mean ± sd)
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