

## Biodiversity of Fish Species in River Waters of Pesisir Selatan Regency West Sumatra Province

### Biodiversitas Jenis Ikan di Perairan Sungai Kabupaten Pesisir Selatan Provinsi Sumatera Barat

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#### ABSTRACT

This study aimed to determine fish diversity and assess water pollution in rivers of Pesisir Selatan Regency, West Sumatra, using fish as bioindicators. Conducted from April to October 2024 in six rivers, sampling used cast nets, gill nets, scoop nets, and traps. A total of 25 species were identified, belonging to 4 orders, 13 families, and 20 genera. The most dominant group was garing fish (genus *Tor*) at 24.08%, while lais fish (*Ompok leiacanthus*) was the least (0.33%). The diversity index ( $H = 2.6637-3.0358$ ) indicates moderate to high diversity, with even distribution ( $E = 0.8981-0.9701$ ), low dominance ( $D = 0.0550-0.0853$ ), and high species richness ( $R = 2.8854-3.3762$ ). Overall, river conditions are classified as lightly polluted based on diversity index values ( $2 < H < 3$ ).

**Keywords:** biodiversity, fish, Pesisir Selatan, river

#### ABSTRAK

Penelitian ini bertujuan untuk mengetahui keanekaragaman ikan dan menilai tingkat pencemaran perairan sungai di Kabupaten Pesisir Selatan, Sumatera Barat, menggunakan ikan sebagai bioindikator. Penelitian dilakukan pada April–Oktober 2024 di enam sungai dengan alat tangkap jaring lempar, jaring insang, serok, dan perangkap. Sebanyak 25 spesies ikan berhasil diidentifikasi yang tergolong dalam 4 ordo, 13 famili, dan 20 genus. Jenis yang paling dominan adalah ikan garing (genus *Tor*) sebesar 24,08%, sedangkan yang paling sedikit tertangkap adalah ikan lais (*Ompok leiacanthus*) sebesar 0,33%. Nilai indeks keanekaragaman ( $H = 2,6637-3,0358$ ) menunjukkan kategori sedang hingga tinggi, dengan penyebaran jenis yang merata ( $E = 0,8981-0,9701$ ), tidak ada dominansi spesies ( $D = 0,0550-0,0853$ ), serta kekayaan jenis yang tinggi ( $R = 2,8854-3,3762$ ). Secara keseluruhan, kondisi perairan sungai dikategorikan tercemar ringan berdasarkan nilai indeks keanekaragaman ( $2 < H < 3$ ).

**Kata Kunci:** biodiversitas, ikan, Pesisir Selatan, sungai



## INTRODUCTION

West Sumatra is a province on the island of Sumatra with a fairly extensive public water area, covering 64,200 hectares, consisting of lakes, reservoirs, rivers, swamps, and ponds. These public waters are spread across 19 regencies/cities, one of which is Pesisir Selatan Regency. Pesisir Selatan Regency has a considerable number of rivers flowing through it, namely 23 rivers with a length of 2,088.55 km, 6,760 ha area (West Sumatra in Figures, 2024). In river's waters live various species of fish, which provide a livelihood for the local people who work as fishermen.

Based on data from BPS West Sumatra Province, in 2013 the capture fisheries production in public waters (river) in Pesisir Selatan Regency was 368.20 tons with a total of 304 fishermen consisting of 99 full-time fishermen and 205 main part-time fishermen (West Sumatra in Figures, 2014). In 2018, the production of captured fisheries in public waters was 332.00 tons with a total of 304 fishermen consisting of 28 full-time fishermen, 38 main part-time fishermen and 238 additional part-time fishermen (West Sumatra in Figures, 2019). Then in 2023, the production of capture fisheries in the public waters of Pesisir Selatan Regency will be 254.51 tons with a total of 380 fishermen, all of whom are main part-time fishermen (West Sumatra in Figures, 2024).

The data shows a decline in fishermen's catches over the past ten years, from 368.20 tons in 2013 to 254.51 tons in 2023. In other words, a decline in fishermen's catches of approximately 30.88%. This is caused, among other things, by the increasingly rapid or high rate of land clearing for plantations, agriculture, and land conversion for residential areas. Byproducts in the form of plantation, agricultural, and residential waste will all flow into or enter river waters, thereby increasing pressure on the environment, in this case river waters, and this will certainly cause changes in the physical, chemical, and biological properties of the waters. All of this will affect the life of fish communities in the waters, and this is evident in the decline in fishermen's catches. In addition, the decline in catches is also caused by environmentally unfriendly fishing practices, such as using futas and electric centers carried out by fishermen

themselves. This decline in fishermen's catches is certainly also followed by a decrease in the number of fish species in the river waters.

In order to prevent the decline in the number of fish species, the government has issued several regulations including the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 106/MENLHK/SETJEN/KUM.1/12/2018 concerning the Second Amendment to the Regulation of the Minister of Environment and Forestry Number P.20/Menlhk/Setjen/Kum.1/6/2018 concerning Protected Plant and Animal Species, and the Decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 1 of 2021 concerning Protected Fish Species. With these regulations, it is also possible that there are protected fish species in the river waters of Pesisir Selatan Regency. Based on the results of interviews with the community and related agencies, information was obtained that what fish species live in the river waters of Pesisir Selatan Regency and what fish species are protected species based on these regulations have not been properly recorded.

Issues related to the condition of fish resources in the rivers of Pesisir Selatan Regency have prompted research into the biodiversity of freshwater fish in the region. This research focuses on data collection on the types of fish living in the rivers, as information on their species composition remains limited. Furthermore, this study aims to determine the conservation status of each species found and describe the overall condition of the fish community as a whole ecosystem.

The information generated from this research is expected to provide a realistic picture of the condition of fish communities in the rivers of Pesisir Selatan Regency, which have long played a vital role as a source of livelihood for local communities. With this scientific data, the results of this study can be used as a reference and basis for decision-making by stakeholders in formulating policies and programs for developing freshwater capture fisheries, both at the Pesisir Selatan Regency level and in West Sumatra Province in general.

**RESEARCH METHODS**

This research was conducted from April to October 2024 in Pesisir Selatan Regency, West Sumatra Province. Fishing was conducted in six rivers: the Batang Tarusan, Batang Bayang, Batang Kambang, Batang Pelangai, Batang

Indropuro, and Batang Lunang. Each river consisted of two fishing locations or stations. Fishing was carried out by local fishermen using cast nets, gill nets, traps, fish shooters, and fish traps. The research location is more clearly presented on the map in Figure 1.

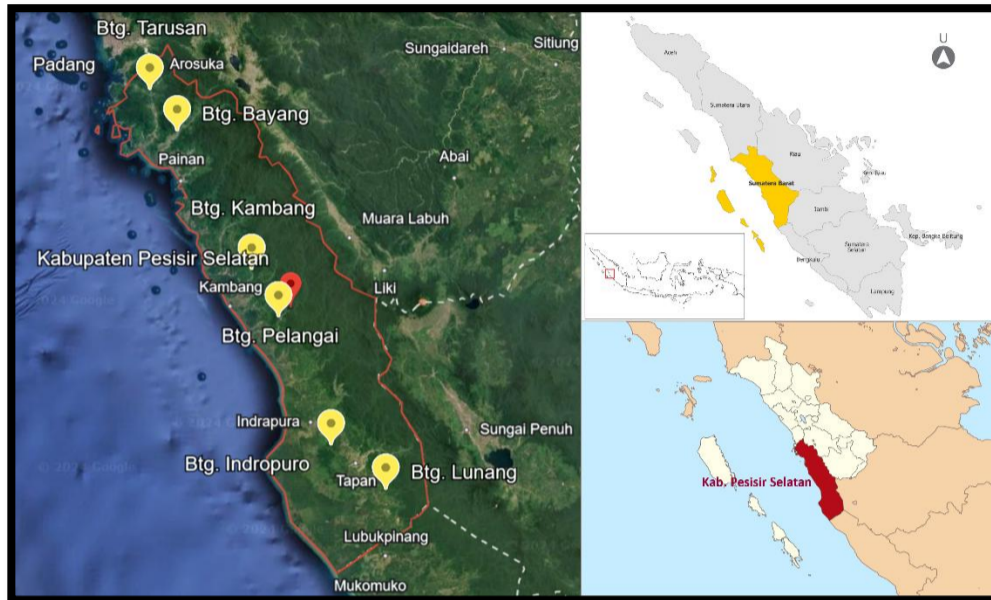


Figure 1. Map of Research Sample Fishing Locations  
Source: Google Earth

- Descriptions: Tarusan Trunk: 1°05'43"S 100°29'14"E
- Shadow Rod: 1°12'53"S 100°33'57"E
- Floating Stem: 1°36'44"S 100°46'47"E
- Rainbow Trunk: 1°44'54"S 100°51'24"E
- Indropuro Trunk: 2°07'00"S 101°00'29"E
- Batang Lunang: 2°14'41"S 101°09'56"E

The type (species) and quantity of fish samples from the catch are recorded, then preserved using 4% formalin and put into large jars that have been labeled for identification in the laboratory. Identification and classification of sample fish is done by looking at and observing their morphological and anatomical characteristics. Observation of the morphological and anatomical characteristics of sample fish is done using a magnifying glass and a 5 x 10 magnification microscope. The results of the observation of morphological and anatomical characteristics are referred to using reference books from Weber and deBeaufor (1913, 1916, 1922, 1929, 1931, 1936, 1940, 1951, 1952), and Kottelat et al (1993).

The data were analyzed descriptively quantitatively based on the Diversity Index, Evenness Index, Dominance Index and Species Richness Index (Odum, 1971), namely:

**1. Diversity Index**

$$H' = - \sum_{i=1}^n pi \ln pi$$

Descriptions:

H' = diversity index

Pi = proportion of species i or the ratio of the number of individuals of species i to the total number of individuals of species (ni/N)

Diversity index value criteria:

H' < 1 = Low diversity

1 < H' < 3 = Moderate diversity

H' > 3 = High diversity

**2. Equity Index**

$$E = \frac{H'}{H_{max}}$$

Descriptions:

E = evenness index

H' = diversity index

Hmax = LnS = maximum diversity index

S = number of species

Diversity index value criteria:

0.00 ≤ E ≤ 0.25 = Uneven

$0.26 \leq E \leq 0.50$  = Less even  
 $0.51 \leq E \leq 0.75$  = Fairly even  
 $0.76 \leq E \leq 0.95$  = Almost even  
 $0.96 \leq E \leq 1.00$  = Even

### 3. Dominance Index

$$D = \sum \left(\frac{ni}{N}\right)^2$$

Descriptions:

D = dominance index

ni = number of individuals of species i

N = total number of individuals

Dominance index value criteria:

$0.00 \leq D < 0.50$  = Low dominance (no dominant)

$0.50 \leq D \leq 1.00$  = High dominance (some are dominant)

### 4. Species Richness Index

$$R = \frac{S - 1}{\ln N}$$

Descriptions:

R = species richness index

S = number of types (species).

N = total number of individual fish.

Criteria for species richness index values:

$R < 2.5$  = Low species richness.

$2.5 < R < 4$  = Moderate species richness.

$R > 4$  = High species richness

## RESULTS AND DISCUSSION

### Type Composition

Based on the identification results that have been carried out on the catches in 6 (six) rivers, namely the Batang Tarusan, Batang Bayang, Batang Kambang, Batang Pelangai, Batang Indropuro and Batang Lunang rivers, 25 species of fish were found which can be grouped into 4 ordo, 13 families, and 20 genus. For more details, please see Table 1.

Table 1. Fish species caught in 6 (six) rivers at research locations in Pesisir Selatan Regency

| Order           | Family     | No                                   | Species                            | Local/Regional Name               |                                     |
|-----------------|------------|--------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|
| Cypriniformes   | Cyprinidae | 1.                                   | <i>Tor douronensis</i> CV          | Garing                            |                                     |
|                 |            | 2.                                   | <i>Tor tambroides</i> Blkr         | Garing                            |                                     |
|                 |            | 3.                                   | <i>Tor soro</i> CV                 | Garing                            |                                     |
|                 |            | 4.                                   | <i>Tor</i> sp                      | Garing                            |                                     |
|                 |            | 5.                                   | <i>Osteochilus vittatus</i> CV     | Puyau                             |                                     |
|                 |            | 6.                                   | <i>Puntius binotatus</i> CV        | Kapareh                           |                                     |
|                 |            | 7.                                   | <i>Rasbora latetristriata</i> Blkr | Seluang                           |                                     |
|                 | Mugilidae  | 8.                                   | <i>Cestraceus plicatilis</i> CV    | Mingkih                           |                                     |
|                 |            | 9.                                   | <i>Liza tade</i> Forsk             | Belanak                           |                                     |
|                 |            | Tetraodonidae                        | 10.                                | <i>Mesopristes cancellatus</i> CV | Andiak-andiak                       |
|                 |            |                                      | Kuhliidae                          | 11.                               | <i>Kuhlia marginate</i> CV          |
|                 |            | Gobiidae                             |                                    | 12.                               | <i>Sicyopterus longifilis</i> Bfrt  |
|                 |            |                                      | Perciformes                        | 13.                               | <i>Sicyopterus cyanocephalus</i> CV |
| Eleotrididae    | 14.        | <i>Glossogobius celebius</i> HB      |                                    | Simbubua                          |                                     |
|                 | 15.        | <i>Belobranchus belobranchus</i> CV  |                                    | Mungkuih                          |                                     |
| Rhyacichthyidae | 16.        | <i>Oxyeleotris urophthalmus</i> Blkr |                                    | Simontong                         |                                     |
|                 | 17.        | <i>Rhyacichthys aspro</i> CV         |                                    | Pinang-pinang                     |                                     |
| Mastacembelidae | 18.        | <i>Macrognathus maculatus</i> Bl     |                                    | Tilan                             |                                     |
|                 | 19.        | <i>Mastacembelus armatus</i> Lec     |                                    | Tilan                             |                                     |
|                 | Channidae  | 20.                                  |                                    | <i>Channa striata</i> BI          | Gabus                               |
| Anguilliformes  |            | 21.                                  |                                    | <i>Anguilla marmota</i> Benn      | Ikan Panjang                        |
|                 | Bagridae   | 22.                                  |                                    | <i>Anguilla bicolor</i> Rich      | Lumpai                              |
| Siluriformes    |            | 23.                                  | <i>Mystus nigriceps</i> V          | Sangek                            |                                     |
|                 | Siluridae  | 24.                                  | <i>Leiakanthus group</i> Blkr      | Lais                              |                                     |
| Clariidae       |            | 25.                                  | <i>Clarias teysmanni</i> Blkr      | Limbek                            |                                     |

From Table 1, it can be seen that the fish species that commonly live in the river waters of Pesisir Selatan Regency are species from the order Perciformes with 13 species, then followed by the ordo Cypriniformes with 7 species, Siluriformes with 3 species, and Anguilliformes with 2 species. Then, if also seen from the family, the types of fish that are often found are from the family Cyprinidae with 7 species, Gobiidae with 3 species, Mungilidae and Eleotrididae, Mastacembelidae and

Anguillidae each with 2 species, then the families Tetraodonidae, Kuhliidae, Rhyacichthyidae, Channidae, Bagridae, Siluridae, and Clariidae each with 1 species. Goldman and Horne (1983) stated that the types or species of fish commonly found in river waters are Fish species from the families Cyprinidae, Bagridae, Pangasidae, and Bagaridae. Furthermore, Wahyuni and Zakaria (2018) stated that the Cyprinidae family can thrive in rivers with strong and weak currents and good water

quality. The number of fish caught for each species in each river is presented in Table 2.

Based on Table 2, the highest number of fish caught was found in the Batang Indropuro River (763 individuals; 23 species), followed by the Batang Tarusan River (736 individuals; 21 species). The lowest number was recorded in the Batang Lunang River, namely 362 individuals with 18 species. The low abundance in the Batang Lunang River is thought to be related to unfavorable water quality conditions, characterized by relatively high levels of water turbidity. Fish distribution and abundance are influenced by the interaction of various

environmental factors, including temperature, depth, turbidity, light intensity, pH, dissolved oxygen, food availability, and aquatic vegetation (Bhukaswan, 1980). Rivers with larger size and area generally have higher habitat diversity, thus being able to support a greater number of fish individuals and species (Kottelat et al., 1993). In addition, the richness and structure of fish communities are closely related to habitat heterogeneity, substrate complexity, the presence of microhabitats, and physical characteristics of waters such as current, depth, river width, and conductivity (Li et al., 2012; Mote, 2017; Guo et al., 2018; Huang et al., 2019).

Table 2. Number of fish (tails) caught based on species in each river at the research location in Pesisir Selatan Regency

| No                            | Species                              | River          |               |                |                 |                  |               | Amount |        |
|-------------------------------|--------------------------------------|----------------|---------------|----------------|-----------------|------------------|---------------|--------|--------|
|                               |                                      | Batang Tarusan | Batang Bayang | Batang Kambang | Batang Pelangai | Batang Indropuro | Batang Lunang | Tail   | %      |
| 1.                            | <i>Tor douronensis</i> CV            | 70             | 52            | 50             | 37              | 64               | 56            | 329    | 9,17   |
| 2.                            | <i>Tor tambroides</i> Blkr           | 37             | -             | 45             | 42              | 48               | -             | 172    | 4,79   |
| 3.                            | <i>Tor soro</i> CV                   | 40             | 59            | 37             | 28              | 58               | 38            | 260    | 7,25   |
| 4.                            | <i>Tor</i> sp                        | 28             | 12            | 19             | 18              | 18               | 8             | 103    | 2,87   |
| 5.                            | <i>Osteochilus vittatus</i> CV       | 41             | 43            | 57             | 34              | 37               | 41            | 253    | 7,05   |
| 6.                            | <i>Puntius binotatus</i> CV          | 56             | 60            | 62             | 28              | 46               | 10            | 262    | 7,30   |
| 7.                            | <i>Rasbora latetristriata</i> Blkr   | 37             | 38            | 21             | 21              | 58               | 14            | 189    | 5,27   |
| 8.                            | <i>Cestraceus plicatilis</i> CV      | 18             | -             | 15             | 53              | 21               | -             | 107    | 2,98   |
| 9.                            | <i>Liza tade</i> Forsk               | 14             | 8             | 16             | 13              | 8                | 36            | 95     | 2,65   |
| 10.                           | <i>Mesopristes cancellatus</i> CV    | -              | -             | -              | 12              | 24               | 6             | 42     | 1,17   |
| 11.                           | <i>Kuhlia marginata</i> CV           | 37             | 12            | 13             | 19              | 12               | 8             | 101    | 2,81   |
| 12.                           | <i>Sicyopterus longifilis</i> Bfrit  | 62             | 52            | 54             | 62              | 67               | 39            | 336    | 9,36   |
| 13.                           | <i>Sicyopterus cyanocephalus</i> CV  | 43             | 53            | 45             | 75              | 62               | 23            | 301    | 8,39   |
| 14.                           | <i>Glossogobius celebius</i> HB      | 42             | 19            | 15             | 33              | 35               | 24            | 168    | 4,68   |
| 15.                           | <i>Belobranchius belobranchus</i> CV | -              | -             | -              | 28              | 25               | -             | 53     | 1,48   |
| 16.                           | <i>Oxyeleotris urophthalmus</i> Blkr | 35             | 10            | 14             | 25              | 23               | 9             | 116    | 3,23   |
| 17.                           | <i>Rhyachichthys aspro</i> CV        | 40             | 18            | 16             | 28              | 52               | 13            | 167    | 4,65   |
| 18.                           | <i>Macrogathus maculatus</i> BI      | 27             | 4             | 12             | 25              | 16               | 9             | 93     | 2,59   |
| 19.                           | <i>Mastacembelus armatus</i> Lec     | 22             | 9             | 17             | 17              | -                | -             | 65     | 1,81   |
| 20.                           | <i>Channa striata</i> BI             | -              | -             | 9              | 10              | 15               | 5,0           | 39     | 1,09   |
| 21.                           | <i>Anguilla marmota</i> Benn         | 25             | 15            | 8              | 24              | 16               | 6             | 94     | 2,62   |
| 22.                           | <i>Anguilla bicolor</i> Rich         | 15             | 6             | 14             | 16              | 18               | 10            | 79     | 2,20   |
| 23.                           | <i>Mystus nigriceps</i> V            | 35             | 7             | 18             | 19              | 28               | 7             | 114    | 3,18   |
| 24.                           | <i>Ompok leiocanthus</i> Blkr        | -              | -             | -              | -               | 12               | -             | 12     | 0,33   |
| 25.                           | <i>Clarias teysmanni</i> Blkr        | 12             | 12            | 5              | 9               | -                | -             | 38     | 1,06   |
| Number of individuals (tails) |                                      | 736            | 489           | 562            | 676             | 763              | 362           | 3.588  | 100,00 |
| Number of species             |                                      | 21             | 19            | 22             | 23              | 23               | 18            | 25     | -      |

Source: Data Processing

When viewed at the family level, the captured fish community was dominated by the Cyprinidae family. The number of individuals reached 1,568, or approximately 43.70% of the total catch. This dominance was followed by the Gobiidae family with a total of 805 individuals, equivalent to 22.44% of the total number of fish caught during the study. Conversely, the Siluridae family contributed the least, with only 12 individuals, or 0.33% of the total catch.

This dominance pattern aligns with Goldman and Horne's (1983) opinion, which states that river waters are generally inhabited by certain fish groups,

particularly those from the families Cyprinidae, Bagridae, Pangasidae, and Bagaridae. Similar findings have been reported in various previous studies, including those by Purwanto et al. (2014) and Samitra and Rozi (2018), which showed that Cyprinidae is the most frequently found family and has a high abundance in river ecosystems. Furthermore, Novita et al. (2020) emphasized that the Cyprinidae group plays a major role in inhabiting several river waters in Sumatra, with a relatively larger population size compared to other fish families.

If examined based on the Regulation of the Minister of Environment and

Forestry of the Republic of Indonesia Number 106/MENLHK/SETJEN/KUM.1/12/2018, Decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 1 of 2021, and Appendices I, II, and III of CITES (Convention on International Trade in Endangered Species) in 2024, there are no types of fish included in the protected category or prohibited from being traded according to these provisions.

Furthermore, referring to the Red List of Threatened Species published by

the IUCN (International Union for Conservation of Nature), most of the fish species studied are at least risk of extinction (Least Concern/LC). However, two species are classified as near threatened (NT): *Anguilla bicolor* Rich and *Ompok leiacanthus* Blkr. Furthermore, another species, *Rasbora lateristriata* Blkr, is listed as vulnerable to extinction (Vulnerable/VU). Details of the conservation status of each fish species based on the IUCN classification are presented in Table 3.

Table 3. Conservation Status of Each Fish Species According to IUCN (International Union for Conservation of Nature).

| Species Name                                 | Conservation Status | Reference                        |
|--|---------------------|----------------------------------|
| <i>Tor douronensis/T. tambra</i> CV          | DD                  | Kottelat et. al., 2018a          |
| <i>Tor tambroides</i> Blkr                   | DD                  | Kottelat et. al., 2018b          |
| <i>Tor/Neolissochilus soro</i> CV            | LC                  | Lumbantobing, 2021a              |
| <i>Tor</i> sp                                | -                   | -                                |
| <i>Osteochilus vittatus</i> CV               | LC                  | Lumbantobing & Vidthayanon, 2020 |
| <i>Puntius/Barbodes binotatus</i> CV         | LC                  | Chua & Lim, 2019.                |
| <i>Rasbora latetristriata</i> Blkr           | VU                  | Lumbantobing, 2021b              |
| <i>Cestraceus plicatilis</i> CV              | DD                  | Hoese, et. al., 2021             |
| <i>Liza/Planiliza tade</i> Forsk             | DD                  | Hoese, 2018                      |
| <i>Mesopristes cancellatus</i> CV            | LC                  | Hoese, 2012                      |
| <i>Kuhlia marginata</i> CV                   | LC                  | Hoese et. al., 2019              |
| <i>Sicyopterus longifilis</i> Bfrr           | LC                  | Jaafar, 2019a                    |
| <i>Sicyopterus cyanocephalus</i> CV          | LC                  | Jaafar, 2019b                    |
| <i>Glossogobius celebius</i> HB              | LC                  | Larson, 2019a                    |
| <i>Belobranchus belobranchus</i> CV          | LC                  | Larson, 2021                     |
| <i>Oxyeleotris urophthalmus</i> Blkr         | DD                  | Larson, 2019b                    |
| <i>Rhyachichthys aspro</i> CV                | DD                  | Jaafar, 2019c                    |
| <i>Macrognathus maculatus</i> Bl             | LC                  | Vidthayanon & Daniels, 2020a     |
| <i>Mastacembelus armatus/M. favus</i> Lec    | LC                  | Vidthayanon & Daniels, 2020b     |
| <i>Channa striata</i> Bl                     | LC                  | Chaudhry et. al., 2019           |
| <i>Anguilla marmota</i> Benn                 | LC                  | Pike et al., 2020a               |
| <i>Anguilla bicolor</i> Rich                 | NT                  | Pike et al., 2020b               |
| <i>Mystus nigriceps</i> V                    | LC                  | Ng, 2019a                        |
| <i>Ompok leiacanthus</i> Blkr                | NT                  | Ng et. al., 2020                 |
| <i>Clarias teysmanni/C. leiacanthus</i> Blkr | LC                  | Ng, 2019b                        |

Descriptions:

- EX: Extinct
- EW: Extinct in the Wild
- CR: Critically Endangered
- EN: Endangered
- VU: Vulnerable
- NT: Near Threatened
- LC: Least Concern
- DD: Data Deficient
- NE: Not Evaluated

Based on interviews with the community, particularly fishermen living around the Batang Tarusan, Batang Bayang, Batang Kambang, Batang Pelangai, Batang Indropuro, and Batang Lunang rivers, it was discovered that catches in these rivers have experienced a

significant decline. This decline is not only felt directly by the fishermen but is also reflected in official statistics.

Fisheries catch data listed in West Sumatra in Figures shows a downward trend in production, from 368.20 tons in 2013 to 254.51 tons in 2023, a decrease of

approximately 30.88 percent. Furthermore, fishing communities also revealed that certain fish species, such as the Selarian and Zebra fish, are no longer found in the river. This decline in fishermen's catches indicates a decline in fish populations, even accompanied by the disappearance of several fish species that previously lived and thrived in the river. This condition is influenced by various interrelated factors. One of the main factors is the clearing and deforestation of forests for plantations, agriculture, settlements, and various other human activities. Furthermore, environmentally unfriendly fishing practices, such as the use of electric shocks and futas (chemicals), have also worsened the condition of the waters.

These fishing methods not only kill adult fish, but also eggs and larvae, and even micro-organisms that serve as a natural food source for fish. Another factor

is the entry of fertilizer residues and pest and disease control chemicals from agricultural and plantation lands into the river body, coupled with the disposal of household waste and industrial waste from factories located around the River Basin (Kottelat et al., 1993). In addition, the construction of dams for agricultural irrigation and flood control purposes also contributes to the decline in the existence of several fish species. The existence of dams hinders the migration path of fish from downstream to upstream, so that fish cannot carry out the spawning and feeding process optimally (Nakamura, 1998).

### Species Diversity Index

The Shannon Wiener ( $H'$ ) diversity index of fish in the river waters of Pesisir Selatan Regency ranges from 2.6444-3.0358 (Figure 2).

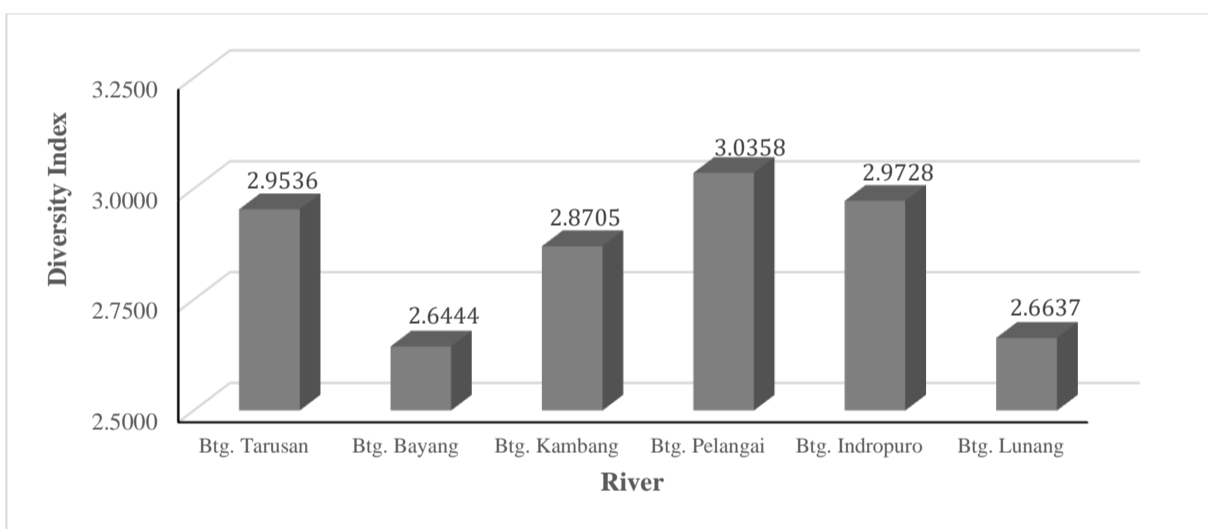


Figure 2. Fish species diversity index in the river waters of Pesisir Selatan Regency  
Source: Data Processing

Based on Figure 2, it can be seen that the highest fish species diversity index value is found in the waters of the Batang Pelangai River, which is 3.0358. Conversely, the lowest value is found in the waters of the Batang Lunang River with an index of 2.6637. These values indicate that the diversity of fish species in the river waters of Pesisir Selatan Regency is generally classified as moderate, because it is above the value of 2, as stated by Odum (1971). This diversity index not only describes the condition of the fish community, but can also be used as an indicator of the quality of the aquatic environment. Fachrul, in Muhammad et al. (2013), explains that the diversity index is useful for assessing the presence of disturbances from environmental factors, especially abiotic factors, on a community,

as well as for understanding the level of succession and stability of the fish community. Furthermore, Wilhm (1975) states that based on the diversity index value ( $H'$ ), the water quality of a body of water can be classified into several categories, namely:

1. Heavily polluted, if the diversity index is less than one ( $H' < 1$ ).
2. Moderately polluted, if the diversity index is between one and two ( $1 < H' < 2$ ).
3. Lightly polluted, if the diversity index is between two and three ( $2 < H' < 3$ ).
4. Very lightly polluted, if the diversity index is between three and four point five ( $3 < H' < 4.5$ ).

These conditions indicate that differences in diversity index values

between locations are closely related to variations in the environmental characteristics of each river's waters. Supportive habitat factors, such as current stability, availability of living space, and food sources, allow some locations to have more diverse fish community structures than others. Thus, although the general condition of the river waters in Pesisir Selatan Regency is still considered quite good, there are differences in diversity levels that reflect local environmental dynamics. In addition to the diversity

index, another important parameter to consider in assessing fish community structure is the species evenness index. This index describes how evenly distributed individuals of each species are within a community, thus providing additional information regarding the balance of fish populations in each river.

### Species Evenness Index

The Evenness Index of fish in the river waters of Pesisir Selatan Regency ranges from 0.8981-0.9701 (Figure 3).

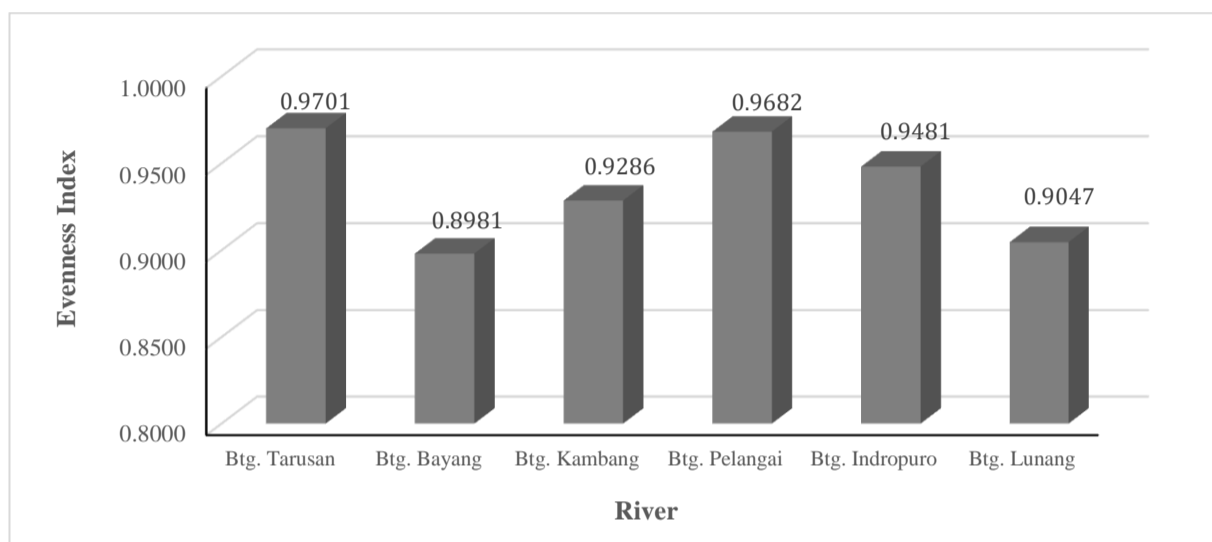


Figure 3. Evenness index of fish species in the river waters of Pesisir Selatan Regency

Source: Data Processing

Figure 3 shows that the highest fish evenness index is in the Batang Tarusan river waters, namely 0.9701, while the lowest is in the Batang Bayang river waters, namely 0.8981. From this evenness index, it shows that the evenness of fish species in the river waters of Pesisir Selatan Regency is almost even ( $0.76 \leq E \leq 0.95$ ) namely the Batang Bayang, Batang Kambang, Batang Lunang and Batang Indropuro rivers. Then in the Batang Tarusan and Batang Pelangai rivers, the evenness index is even ( $0.96 \leq E \leq 1.00$ ) (Odum, 1971). Rada et. al. (2025), stated that factors that influence the high and low evenness index of fish species in a body of water include habitat structure, water quality, and anthropogenic influences. High evenness or uniformity is often associated with a healthy ecosystem, while low diversity and dominance by a few species can indicate ecological stress or degradation.

### Species Dominance Index

The dominance index is a parameter that indicates the level of concentration of dominance of a species

within a biota community. Dominance index values in the six rivers in Pesisir Selatan Regency varied from 0.0550 to 0.0853 (Figure 4).

Based on Figure 4, the highest dominance index value was recorded in the Batang Lunang River at 0.0853, while the lowest value was in the Batang Pelangai River at 0.0550. Dominance index values that were all below 0.5 indicate that no fish species dominated the fish community in the river waters of Pesisir Selatan Regency. This condition indicates a relatively balanced community structure, where individuals are evenly distributed across species (Odum, 1971). A low dominance index reflects a balanced distribution of species and a fairly good level of diversity in an aquatic habitat (Leidonald & Rusdi, 2022). The absence of dominant species also indicates stable aquatic environmental conditions that support the sustainability of the fish community, so that the river waters in Pesisir Selatan Regency are classified as suitable habitats for aquatic biota (Purwanto et al., 2014). The presence and composition of species play an important role in determining the number of

individuals and families, and influence the diversity, evenness, and dominance values of the fish community (Magurran, 2013). The low dominance value also indicates the stability of the aquatic environment, which is influenced by the ability of species to utilize resources efficiently,

abiotic factor conditions, changes in land use, and the distribution and productivity of biotic communities in aquatic ecosystems (Doffou et al., 2019; Maureaud et al., 2019; Aryani et al., 2019; Liu et al., 2018).

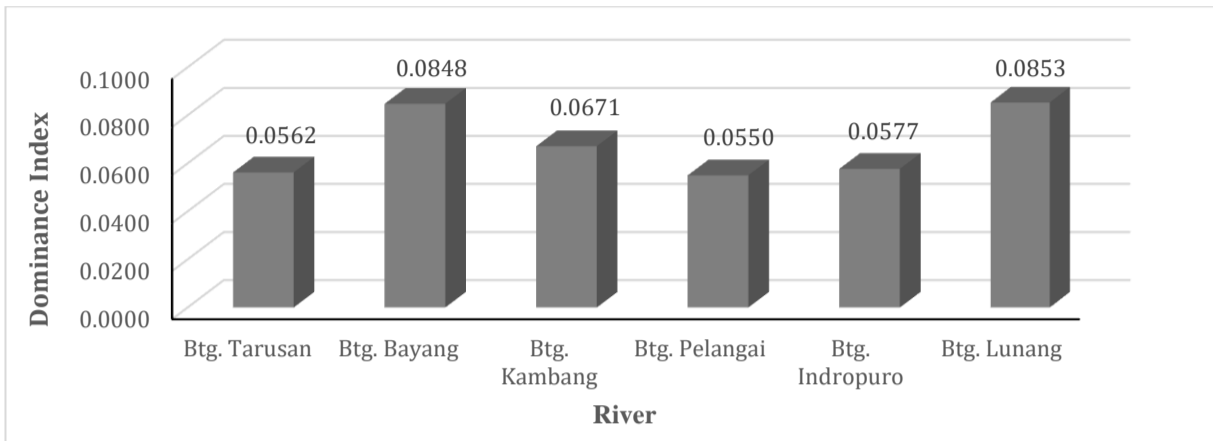


Figure 4. Dominance index of fish species in the river waters of Pesisir Selatan Regency  
Source: Data Processing

**Species Richness Index**

The species richness index is a measure of the richness of species within a fish community. Research results found

that the species richness index values in the six rivers in Pesisir Selatan Regency ranged from 2.8854 to 3.3762 (Figure 5).

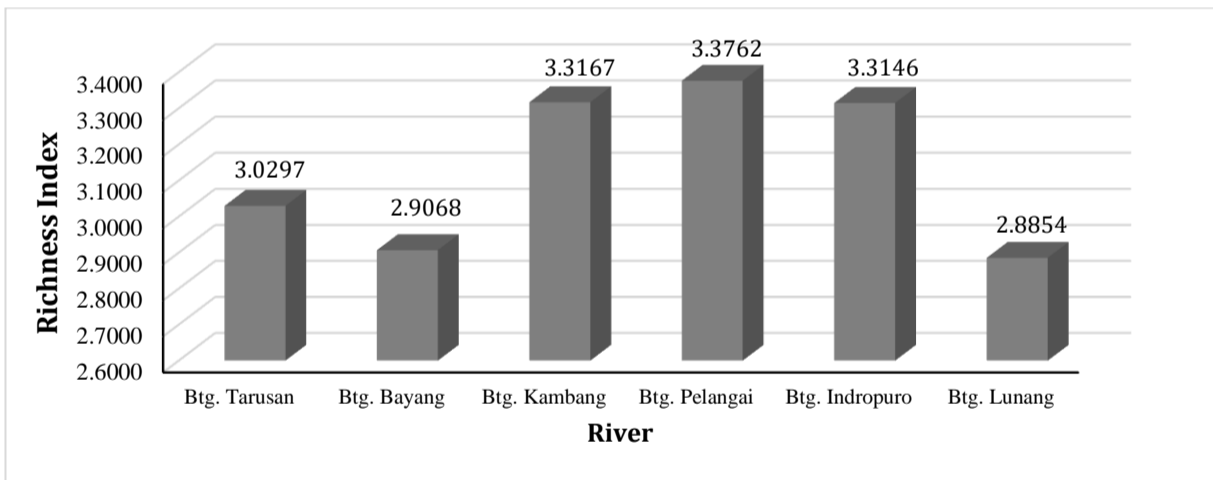


Figure 5. Fish species richness index in the river waters of Pesisir Selatan Regency  
Source: Data Processing

Figure 5 shows that the highest species richness index is found in the Batang Pelangai River, namely 3.3762, while the lowest is found in the Batang Lunang River, namely 2.8854. Referring to the criteria proposed by Odum (1971), the fish community in the river waters of Pesisir Selatan Regency has a moderate level of species richness, where the species richness index is 2.8854-3.3762 ( $2.5 < R < 4.0$ ). From this richness index, it can be stated that the six river waters have moderate species richness. This is certainly related to the water quality conditions of these waters, which are still relatively

good. According to Ngor et. al., (2023), species richness and abundance are determined by water level, alkalinity, dissolved oxygen, water temperature, and total nitrate are important predictors of species richness, while conductivity is important in determining the abundance of fish species. Then it was stated that species richness increases with increasing water level, dissolved oxygen, and water temperature, but decreases with increasing alkalinity and total nitrate. Furthermore, it was also stated that the abundance of fish species increases with conductivity, but

decreases with increasing water level and alkalinity.

## CONCLUSION

Based on the results of this study, it can be concluded that in the river waters of Pesisir Selatan Regency, 25 species of fish were found consisting of 4 orders, 13 families and 20 genera. Of the 25 species of fish, no protected fish species were found according to the laws and regulations of the Republic of Indonesia, but based on the IUCN there are two species of fish that are threatened with extinction, namely *Anguilla bicolor Rich*, *Ompok leiacanthus Blkr* and *Rasbora latetristriata Blkr*. Based on the diversity, abundance, dominance and species richness indices, the level of pollution in the river waters of Pesisir Selatan Regency is classified light.

## RECOMMENDATIONS

Further research is needed to domesticate the fish in the waters of Pesisir Selatan Regency including Mingkih fish, *Cestraceus plicatilis C.V*. This fish is a fish that has quite high economic value, where this fish matures sexually in the upstream of a fast-flowing river, then spawns in front of the river mouth to the middle of the sea.

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