Fish fauna of Meureubo River, Aceh Barat District, Indonesia

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Abstract. Meureubo river is one of river area that has not been studies for it fishery potential source. While it has been overtime used to fulfill the daily need of the community living around it. However that various activities can potential lead to the damage of river ecology that impact to decrease the functions of ecology and the water biota diversity specifically fish. The objective of the present study was to inventory the fish fauna of the Meurebo River, Aceh Barat District, Indonesia. The study was conducted for three months from April to June 2016 at 10 sampling stations along the river and river branches. The fish was caught using various fishing equipment, namely gillnet, casting net, trap, and scope net. The fish samples were transported to the Laboratory of Zoology, Faculty of Mathematics and Natural Sciences for taxonomic identification. A total of 163 individual of fishes were recorded during the sampling, its belong to 7 orders, 21 families and 32 species. Cyprinidae and Carangidae are predominant in Meurebo River, while Cyprinidae inhibit middle and upstream, while Carangidae inhibits downstream. Two species, Osteochilus kappenii and Ambassis vachellii were widely distributed. Osteochilus kappenii was recorded in almost sampling station except in station V. Similarly, while A. vachellii was also recorded in almost sampling station except in station II and station IV. In addition, two species of introduced fish were recorded, namely; Oreochromis niloticus dan Trichogaster pectoralis.

1. Introduction

Indonesia is one of the rich in biodiversity country [1, 2]. Kottelat and Whitten predicted approximately 1300 species of freshwater fish are found in Indonesia waters, this is the highest among the Asian countries [3]. In Aceh Province, Muchlisin and Siti-Azizah [2] reported 114 species of freshwater and brackish water fishes from Aceh waters, of these 73 species are found in Tripa peat swamp. In addition, Batubara et al. [4] reported 77 species of marine fishes from Simeulue Island. However, the number of fish in Indonesia, especially in Aceh waters, is probably an underestimation because there are many areas have not been explored; Hence, it has the potential to discover the new species.

One of the waters that have not been intensively studying is the Meureubo River in West Aceh District, Aceh Province. This river originates in a forest area located in Langoe village, Pante Ceureumen Subdistrict and empties into the Rundeng Village, Johan Pahlawan District in Meulaboh city. The Meureubo River has several tributaries and peat swamps. The previous study in Meureubo River that at least 17 species of fishes were reported from this river [2, 5]. But, we presumed that the number of fish species in Meureubo River in the previous report is underestimated.
Presently, the Meurebo River and its watershed are used by the community for domestic needs and agriculture. Besides that, it was also used as a sand mining area, and some part of the catchment areas was developed as a coal mining area. Various activities that occur along the Meurebo Watershed have the potential to give the negative impact on the ecological conditions of the river and disturbing the diversity of aquatic biota, especially fish. Therefore, the comprehensive study on the biodiversity of fishes of the Meurebo River is crucially needed in relation to complementary the previous data of the fishes from this river.

2. Materials and Methods

2.1. Time and site

The study was conducted for three months from April to June 2016 in Meurebo River, Aceh Barat District, Aceh Province, Indonesia. The fish sample was analyzed in Laboratory of Zoology, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Banda Aceh, Indonesia.

2.2. Sampling, preservation and identification

The sampling was done at 10 sampling locations along the river and its tributaries (Figure 1 and Table 1). The sampling locations were determined purposively at locations that are suspected to have many fish based on information from local fishermen. The fish was caught using various fishing gear such as gillnet, casting nets, trap, and fishhooks. The sampling was carried out from 6 AM to 6 PM. The sampled fishes were counted and photographed prior to preserve in 10% formalin, then transported to the laboratory for further analysis. The fish sample was taxonomically identified based on two identification keys [6, 7].

Figure 1. The map of Aceh Barat District showing the sampling location (yellow circles)
Table 1. Description of sampling locations

| Sampling location | Name of location | Description |
|-------------------|------------------|-------------|
| Station 1         | Rundeng village, Johan Pahlawan subdistrict | Estuary area, fishing port, and settlement |
| Station 2         | Ranto Panyang village, Meureubo subdistrict | This location is affected by tides, agricultural area, sand mining area |
| Station 3         | Ujong Tanoh Darat Village, Meureubo subdistrict | Peat swamp and settlement |
| Station 4         | Pasi Teugoh village, Kaway XVI subdistrict | Settlement and agricultural areas, temporal flooded area |
| Station 5         | Putim village, Kaway XVI subdistrict | Agricultural area, Middle stream |
| Station 6         | Padang Sikabu village, Kaway XVI subdistrict | Agricultural area, middle stream |
| Station 7         | Menuang Kinco village, Pantai Ceuremen subdistrict | Upstream area, shallow and river banks with shrubs |
| Station 8         | Lhok Guci village, Pantai Ceuremen subdistrict | This area is located in the irrigation area. The river in this area has a rocky, clear and fast water flows. In the vicinity of the river, there are plantations and settlements |
| Station 9         | Jambak Village, Pantai Ceuremen subdistrict | This station is in the upstream of the river. The river has rocky, and are in idle agricultural areas. |
| Station 10        | Sikundo Village, Pantai Ceuremen subdistrict | This is an upstream area. The river bank with forest area. The flow of river water is fast flowing |

2.3. Data analysis

The data were presented in the tables and figures then analyzed descriptively by comparing the data with related references or reports.

3. Results and Discussion

A total of 163 fish samples were caught during the study, it belongs to 7 orders, 21 families, 28 genera, and 32 species. The full species list is presented in Table 2. The previous studies by Muchlisin and Siti-Azizah [2] recorded 6 species of fish in this river. In addition, Mulia [5] recorded an additional 15 species in 2012 resulted in 21 species totally. While 26 species from this study was not reported previously (Table 2). Therefore, a total of 47 species of fish were found on the Meureubo River. The difference in the number of species was probably due to the lack of duration of the research time and explored location in the previous study.

Cyprinidae was predominant with 4 species and Carangidae with 3 species. While, Anguillidae, Bagridae, Belontiidae, Chanidae, Gobiidae, and Tetradontidae were found with two species, respectively (Figure 2). Cyprinidae is true freshwater fishes and is widely distributing in almost freshwater in the world except for Australia, Madagascar, New Zealand and South America [6]. But in this study, O. kappenii (one of the species in family Cyprinidae) was also found in the estuary area, presumably because the sampling was made during rainy season so that salinity decreased to the level that can be tolerated by this species (approximately 0.4 - 0.7 ‰).

Two species have widely distributed, namely O. kappenii and A. vachellii. O. kappenii is found in all research stations except station 5 which is a mid-river zone. While A. vachellii is also found in almost
all research stations, except station 2 which is the estuary zone and station 4 which is the mid-river zone. In addition, there are four species found in three river zones, namely estuary, mid and upper river: *A. vachelli*, *Caranx sexfasciatus*, *O. niloticus* and *O. kappenii*, and there were 19 species found only at one research station (Table 1).

The results showed that there were two introduced species, namely *O. niloticus* was found at 4 research locations in three river zones; estuary, middle stream and upstream; and *Trichopodus pectoralis*, this species is only found in one research location which is in the middle of the river. Kottelat *et al.* [6] reported that *O. niloticus* originated from Africa, and it has been introduced to many countries worldwide. While, According to Vann *et al.* [8] *T. pectoralis* originated from Mekong Delta region (Laos, Thailand, Cambodia and Vietnam). In comparing with other waters in Indonesia, the number of introduced fish in the Meureubo River is less than that of Lake Matano, as many as 7 species [6], Lake Laut Tawar, 7 species [9], Rawa Tripa, 3 species [10], Lake Lauik Tawar, Simeulue District 2 species [11], but the number is higher compared to Lake Laulo, Simeulue Regency, one species [11]. In 2008, Muchlisin and Siti-Azizah [2] conducted research in the waters of Aceh, and they have recorded 9 introduced fish species throughout Aceh, where one of which was found in the Meureubo River, namely *Atractosteus spatula* (garfish), but this species was not found during the research.

Besides has been listed as introduced fish, *O. niloticus* also has the potential to be an invasive species, because it is found in various habitats and disturbing the native fish species. The Nile tilapia has the ability to tolerate salinity changes, and therefore it is able to live in the estuary and upstream [12]. The *Oreochromis* fish can dominate a habitat because it is able to breed quickly and preying on small fish (larvae), so it can potentially compete with endemic fish species [13]. In addition, Muchlisin [14] reported that *O. niloticus* was invasive in Lake Laut Tawar.
### Table 2. The list of the fish based on sampling location and its distribution in Meurebo River, Aceh Barat District, Indonesia

| Family          | Scientific name          | Species Samp ling location | Local name | Lowe stream/Estuary | Middle stream | Upstream | Local distribution (%) | Mark |
|-----------------|--------------------------|----------------------------|------------|---------------------|---------------|----------|------------------------|------|
|                 |                          |                            |            | I      | II | III | IV | V | VI | VII | VIII | IX | X |                |
| Ambassidae      | Ambassis vachellii       | Lowe stream/Estuary        | Seurideng  | 2     | -  | 3   | -  | 4  | 5   | 2   | 1   | 1   | 1 | 80   | NR   |
| Anabantidae     | Anabas testudineus       | Lowe stream/Estuary        | Krup       | -     | -  | 1   | -  | -  | -   | -   | -   | -   | - | 10   | NR   |
| Anguillidae     | Anguilla bicolor         | Lowe stream/Estuary        | Ileh tembaga | -    | 2  | -   | -  | -  | -   | -   | -   | -   | - | 10   | PR   |
|                 | Anguilla marmorata       | Lowe stream/Estuary        | Ileh gapeuh | -     | 1  | -   | -  | -  | -   | -   | -   | -   | - | 10   | PR   |
| Bagridae        | BAGRUS micracanthus      | Lowe stream/Estuary        | Suik       | -     | -  | 1   | -  | -  | -   | 1   | 2   | 1   | - | 50   | NR   |
| Belontiidae     | Trichogaster pectoralis  | Lowe stream/Estuary        | Seupat siam | -    | -  | 2   | -  | -  | -   | -   | -   | -   | - | 30   | NR   |
|                 | Trichogaster trichopterus| Lowe stream/Estuary        | Jermis     | -     | -  | 6   | -  | -  | -   | -   | -   | -   | - | 10   | NR   |
| Carangidae      | CARANX latus              | Lowe stream/Estuary        | Langkitok  | 1     | -  | -   | -  | -  | -   | -   | -   | -   | - | 10   | NR   |
|                 | CARANX sexfasciatus       | Lowe stream/Estuary        | Langkitok  | 1     | -  | 2   | -  | -  | -   | 4   | 3   | -   | 3 | 40   | PR   |
|                 | Scomberoides commersonianus | Lowe stream/Estuary       | Taleung    | 1     | -  | -   | -  | -  | -   | -   | -   | -   | - | 10   | NR   |
| Channidae       | Chamna lucius             | Lowe stream/Estuary        | Bujok      | -     | -  | 1   | -  | -  | -   | -   | -   | -   | - | 10   | NR   |
|                 | Chamna striata            | Lowe stream/Estuary        | Bace       | -     | -  | 2   | 1  | -  | -   | -   | -   | -   | - | 20   | PR   |
| Cichlidae       | Oreochromis niloticus     | Lowe stream/Estuary        | Nila       | 1     | 1  | -   | -  | 3   | -   | 2   | -   | -   | - | 40   | PR   |
| Claridae        | Claris teijsmanni         | Lowe stream/Estuary        | Ikan kali  | -     | -  | 1   | -  | -  | -   | -   | -   | -   | - | 10   | NR   |
| Cyprinidae      | Hampala macroepipedia     | Lowe stream/Estuary        | Keubare    | -     | -  | -   | -  | -  | -   | 1   | -   | -   | - | 10   | NR   |
|                 | Osteochilus kappenii      | Lowe stream/Estuary        | Seunikan   | 4     | 5  | 3   | 5  | 5   | 4   | 2   | 1   | 1   | - | 90   | NR   |
|                 | Rasbora meinkeni          | Lowe stream/Estuary        | Bileh      | -     | -  | 2   | 1  | -  | 3   | -   | -   | -   | - | 30   | NR   |
|                 | Tor tambra                | Lowe stream/Estuary        | Keureuling | -     | -  | -   | -  | 2   | 3   | 5   | 5   | 4   | - | 50   | NR   |
| Eleotrididae    | Butis butis              | Lowe stream/Estuary        | Cong       | -     | -  | 1   | -  | -  | -   | -   | -   | -   | - | 10   | NR   |
| Gerreidae       | Gerres acinaces           | Lowe stream/Estuary        | Timon-timon | 3    | 4  | -   | -  | -  | 2   | -   | -   | -   | - | 30   | NR   |
| Gobiidae        | Glossogobius celebus      | Lowe stream/Estuary        | Cong       | -     | -  | -   | -  | -  | -   | -   | -   | -   | - | 10   | NR   |
|                 | Glossogobius gigirius     | Lowe stream/Estuary        | Cong       | -     | -  | -   | -  | -  | -   | 2   | -   | -   | - | 10   | NR   |
| Leiognathidae   | Leiognathus equulus       | Lowe stream/Estuary        | Cirk       | -     | -  | 4   | 3  | -  | -   | -   | -   | -   | - | 20   | PR   |
| Family      | Scientific name              | Sampling location | Local name       | Lowe stream/Estuary | Middle stream | Upstream | Local distribution (%) | Mark |
|-------------|------------------------------|-------------------|------------------|---------------------|---------------|----------|------------------------|------|
| Lutjanidae  | *Lutjanus argentimaculatus*  |                   | Bayam            | 1                   | -             | -        | -                      | 10   |
| Megalopidae | *Megalop cyprinoides*        |                   | Ikan Bulan       | -                   | 1             | -        | -                      | 10   |
| Mugilidae   | *Liza aurata*                |                   | Beulaneut        | 4                   | 1             | 3 5      | -                      | 40   |
| Siluridae   | *Kryptopterus minor*         |                   | Leupek           | -                   | -             | 1 1      | -                      | 20   |
| Siluridae   | *Doryichthys heterosoma*     |                   | Tumbak           | -                   | 1             | - -      | -                      | 10   |
| Tetraodontida | *Chelonodon patoca*          |                   | Bukum            | -                   | 1             | - -      | -                      | 10   |
| Tetraodontida | *Tetraodon nigroviridis*     |                   | Bukum            | -                   | 1             | - -      | -                      | 10   |
| Toxotidae   | *Toxotes jaculatrix*         |                   | Sumpit           | 1                   | -             | - -      | -                      | 10   |

Note: PR = Previously reported, NR = New Record
4. Conclusion

There were 32 species of fish recorded during the study, of these two species are alien species. Cyprinidae was predominant followed by Carangidae. Cyprinidae was mostly found in upstream, while Carangidae was mostly recorded in middle and lower stream (estuary).

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