“Samba” Fish Catching Operations in the seagrass meadows of Selayar Island, Indonesia

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Abstract. Seagrass meadows around the world are under threat and most are in decline, including the extensive meadows along the western coast of Selayar Island, Indonesia. In the 1980s these seagrass meadows were still in good condition, as evidenced by the abundance and variety of gastropods which could be caught at high tide using a push net. This Activity has now stopped and shell collection can only be done during low tide. Around 60% of remaining seagrass meadows have been damaged through fishing with a pulled or pushed gear, including traditional "*samba*" seine net and "*sogoro*" push net, as well as trampling during gleaning activities. This study focused on the operation of "samba" in Selayar Island seagrass meadows from 2014 to 2017. Although this fishing gear was prohibited under a Government regulation in 2015, it is still operated on a limited basis by local fishermen. The samba is a small scale seine net operated by 3 fishermen. A boat pulls a leading rope to which coconut leaves are attached so that it also serves as a tool to scare fish. The fishermen pull the rope around to form a trap surrounded by a semi-circular barrier of polyethylene netting. One side of the barrier net is connected to the lead rope, and the trap is gradually closed in from a wide circle until all the fish are confined in a small trap. The samba catch is generally comprised of coral reef and seagrass associated fish families such as Acanthuridae, Balistidae, Chaetodontidae, Labridae, Lethrinidae, Lutjanidae, Scaridae, Siganidae and Zanclidae. With increased surveillance of destructive activities around Selayar Island there has been some improvement in seagrass condition, so that it can be hoped that these seagrass meadows will continue to support the fish, green turtles and dugongs living there.

1. Introduction

Seagrass meadows around the world are under threat and most are in decline [1,2], including the extensive meadows along the western coast of Selayar Island, Indonesia. In the 1980s, these seagrass meadows were still in good condition, as evidenced by the abundance and variety of gastropods which could be caught at high tide by using a push net. This activity has now stopped and shell collection can only be done during low tide (*personal observation*).

Fishing and collecting marine biota in seagrass beds have been carried out for a long time all around the world. The collecting of marine biota for consumption does not require a high level of technical expertise and is mostly done by women. Fishing activities are mostly

carried out by men because they have to operate fishing gear, for example traps, fishing rods, set nets, muroami, gill nets, and beach seine nets [3,4,5]. In Selayar Island, besides the fishing gear mentioned above, a gear called "*samba*" is also operated, in a manner which is in some respects similar to muroami [6] as well as "*sogoro*", which is a type of fishing gear operated by pushing the net. "*Samba*" is used to catch fish that live in coral reefs and seagrass beds, while the *sogoro* push net is operated in seagrass beds at high tide to catch gastropods living among and grazing on seagrass leaves [6]. Similar push nets are used to catch crustaceans attached to seagrass leaves in Lombok Island [7].

Seagrass condition in Selayar Island has declined due to the variety and intensity of human activities. Recent studies indicate that remaining seagrass meadows have been damaged, possibly through fishing with pulled or pushed gear, including traditional "*samba*" seine nets and "*sogoro*" push nets, as well as through trampling, e.g. during gleaning activities [8]. Therefore, the objective of this research was to evaluate the operation of fishing gears in seagrass meadows, especially *samba* nets.

2. Methods

This research was carried out in 2014 to 2018 on the west coast of Selayar Island (Figure 1). This research is a descriptive study to describe the operation of fishing gears in the seagrass meadows of Selayar, especially the operation of "*samba*" nets. Sampling was carried out in several coastal areas, in Bontomatene, Bontomanai, Bontoharu and Bontosikuyu sub-districts. Data were collected through observation and interviews with the fishermen.

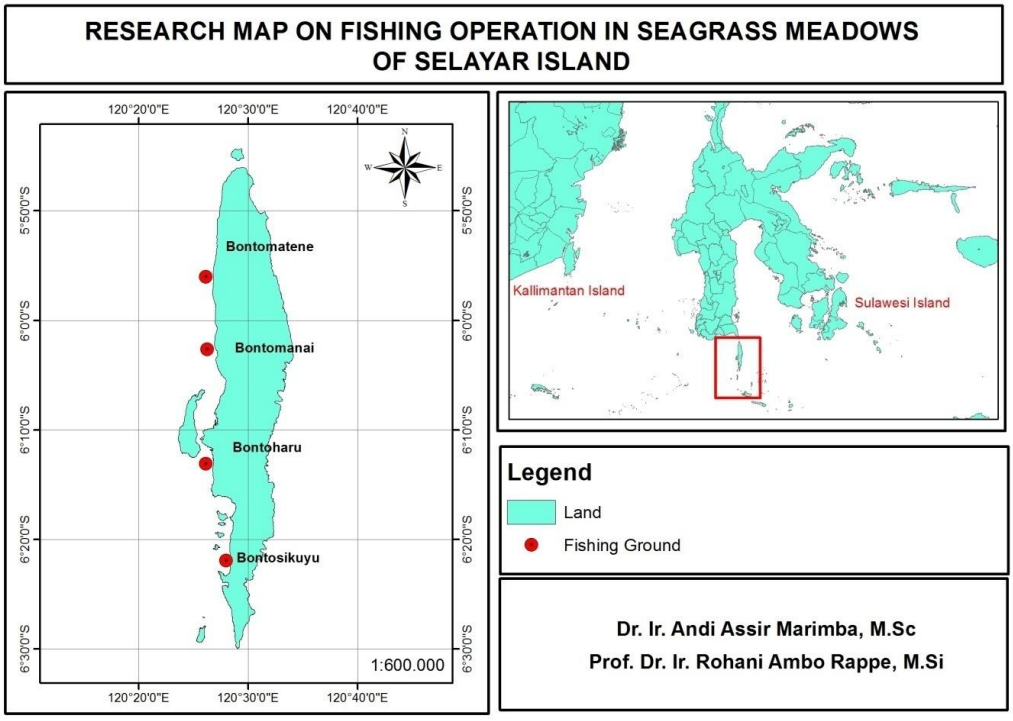

Figure 1. Map of Selayar Island showing the study sites

3. Results and Discussion

The samba is a small scale seine net operated by 3 fishermen (Figure 2). In terms of fishing methods, this gear is classified as a seine net although the construction of this gear does in fact comprise a trap, a barrier net and a leading rope to which coconut leaves are attached so that it also serves as a fish barrier. This gear is operated by pulling the rope from a boat. Two fishermen operate the boat, circling around to form a trap surrounded by a semi-circular barrier of polyethylene netting (fence net, Figure 3). One side of the barrier net is connected to a leading rope, which is held by one fisherman. The trap is gradually closed in from a wide circle until all the fish are confined in a small trap.

The boats used in samba fishing operations are typically small wooden outrigger canoes. For example, the *samba* fishing boat shown in Figure 2 had a total length of 7 m LOA, with a maximum beam of 0.8 m and a depth 0.6 m. This boat was equipped with two outriggers to make it more stable and was driven by a 6.5 HP gasoline engine. From the boat, one fisherman will pull the 200 m long leading rope around to form the trap which will be surrounded by a 25-30 m long semi-circular polyethylene fence net (Figure 3). Another fisherman will move the boat using a bamboo pole.

Figure 2. A "Samba" net ready for setting

Figure 3. A "*Samba*" fence net

The lead rope is generally made of polyethylene, which has a density of 0.95 kg/m^3, and therefore floats on the water surface [9]. An example of such a rope to which coconut leaves are attached is shown in Figure 4. The leaves serve as a tool to scare fish, acting as a barrier

to prevent the fish from escaping the swept area before the trap is closed (Figure 4). One end of this leading barrier rope is connected to the semi-circular fence net and the other is held by one fisherman. The other end of this rope is held by one of the fishermen in the boat.

Figure 4. A Samba leading rope with coconut leaves to scare and act as a barrier to retain the fish in the trap

The samba trap of is traditionally made of bamboo and has a semi-circular cylindrical shape. A typical *samba* trap shown in Figure 5 was 120 cm long, 60 cm wide, and had a height of 30 cm. One end of the trap is the entrance and the other end is a door made of wooden boards which is closed during fishing but can then be opened to collect the fish (Figure 5).

Figure 5. A typical *Samba* trap

The samba catch observed was generally comprised of coral reef and seagrass associated fish families such as Acanthuridae, Balistidae, Chaetodontidae, Labridae, Lethrinidae,

Lutjanidae, Lutjanidae, Scaridae, Siganidae and Zanclidae (Figure 6). Sometimes pelagic fish which enter seagrass meadow areas were also found in the catch.

Figure 6. A typical Samba catch

For several years, the operation of a number of fishing gears, including *samba*, beach seine and push nets, has been banned under a government regulation promulgated in 2015. However, these gears are still operated on a limited basis by local fishermen. During the most recent survey, *samba* was operated in several places along the west coast of Selayar Island, including the waters along the west coast of Bontosikuyu and Bontoharu Sub-districts. Two other banned fishing gears, the beach seine and push net, were intensively operated in the waters along the west coast of Bontomanai and Bontomatene Sub-districts. Damage to seagrass beds was most common in Bontomanai and Bontomatene Sub-districts where the beach seine and push nets were operated. However in Bontosikuyu Sub-district, where *samba* nets are operated, there was little visible damage.

The modes of operation of beach seines and "*sogoro*" push nets are probably more destructive than that of *samba*. Beach seines used a bottom rope that is weighted with lead sinkers to sweep the bottom of the sea in a manner similar to that of trawls. Meanwhile the push nets used in Selayar have a sharp leading edge to the net that might cut the leaves of seagrass. *Samba*, however, is operated differently from either beach seines or push nets. Its effectiveness relies heavily on the operation of a leading rope which scares the fish into the catchable area. Because the repellent rope is made of lightweight polyethylene which floats, the rope itself rarely touches the seagrass leaves.

Seagrass meadows are mostly found along the west coast and on the northern and southern tips of east coast of Selayar Island, stretching along the coastline. Although it has been reported that seagrass meadows had been threatened [8], major changes over time in seagrass condition and possibly extent are likely to be related to human population growth, fishing and gleaning activities. However, there was insufficient information and a lack of long-term studies from which to draw conclusions. Moreover the population of tropical seagrass meadows can fluctuate seasonally and change from year to year due to natural and climate change related processes [10].

This study found that the condition of seagrass meadows has been improving in several areas around Selayar Island. This appears to be due to improved management, including strict surveillance of activities that can damage seagrass beds and coral reefs by the local

community in collaboration with local NGOs (Non-Government Organizations). The local communities in each coastal village have made some local regulations to limit fishing gear and activities in coastal areas. Therefore the remaining seagrass beds are expected to continue to support marine life including herbivorous fish, as well as the green turtles and dugongs that are still found in many coastal areas around Selayar Island. Based on our observations, we conclude that the operation of *samba* in seagrass beds has a relatively minor effect on seagrass meadows. In the context of sustainable community-based fisheries management in the coastal waters of Selayar Island, the *samba* net could therefore be considered as a relatively environmentally friendly fishing gear which could be sustainably operated on a limited scale as an artisanal seagrass fishery.

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