

September 2024

Participative Coral Reef Ecological Survey in Sulawesi

Introduction

As a species that is highly associated with coral reefs, octopus populations are highly dependent on the quality of the coral reef ecosystem. A healthy coral reef ecosystem can support the sustainability of octopus fishing activities, so existing fisheries management efforts must also ensure the conservation of coral reefs. One form of fisheries management that can protect the coral reef ecosystem while also maintaining the sustainability of fishing activities is the implementation of a temporary closure. However, the location of the temporary closure needs to be determined based on data. Therefore, the condition of the coral reef ecosystem needs to be assessed as part of fisheries management efforts, so that the community can make accurate and informed decisions regarding temporary closures in their fisheries management areas.

The condition of the coral reef is surveyed using the manta tow method (English *et al.* 1997, Sukmara *et al.* 2001). The manta tow method is used because it provides a snapshot of coral reef conditions in a relatively short time, is simple to perform after brief training, is relatively inexpensive, and can involve the community in its implementation. Between 2023 and 2024, three partners have been able to facilitate 12 communities within the UoC in implementing coral reef ecological surveys using manta tow method (Table 1).

Table 1 Ecological survey locations using manta tow from January 2022 to August 2024

No.	Province	Regency	District	Community	Supporting Partner
1	Sulawesi Tengah	Banggai Kepulauan	Totikum Selatan	Kalumbatan	LINI
2	Sulawesi Tengah	Banggai Kepulauan	Totikum Selatan	Lobuton	LINI
3	Sulawesi Tengah	Banggai Laut	Banggai Utara	Popisi	LINI
4	Sulawesi Selatan	Kepulauan Selayar	Buki	Mekar Indah	LINI
5	Sulawesi Selatan	Kepulauan Selayar	Bontoharu	Kahu-Kahu	LINI
6	Sulawesi Tenggara	Wakatobi	Wangi-Wangi Selatan	Kapota	KOMANANGI
7	Sulawesi Tenggara	Wakatobi	Wangi-Wangi Selatan	Kapota Utara	KOMANANGI

No.	Province	Regency	District	Community	Supporting Partner
8	Sulawesi Tenggara	Wakatobi	Wangi-Wangi Selatan	Kabita	KOMANANGI
9	Sulawesi Tenggara	Wakatobi	Wangi-Wangi Selatan	Kabita Togo	KOMANANGI
10	Sulawesi Tenggara	Wakatobi	Kaledupa	Sombano	FORKANI
11	Sulawesi Tenggara	Wakatobi	Kaledupa Selatan	Tanomeha	FORKANI
12	Sulawesi Tenggara	Wakatobi	Kaledupa Selatan	Darawa	FORKANI

Coral Reef Ecological Survey Results

Based on the manta tow survey, mean live hard coral (HCL) cover across 12 communities in Sulawesi is 32.33% (± 0.92). Figure 1 shows Lohoa (Tanomeha) in Wakatobi yields the highest mean live hard coral cover with 44.29% (± 2.39) and Mekar Indah in Kepulauan Selayar has the lowest mean live hard coral cover with 17.58% (± 2.11). In terms of dead hard coral (HCD) cover, Kalumbatan-Lobuton in Banggai Kepulauan has the highest dead coral cover which is 20.7% (± 2.73) and Darawa in Wakatobi has the lowest with 9.19 (± 1.49). As part of the coral reef complex, rock substrate should also be made into considerations to understand the quality of octopus' habitat. Mekar Indah has the highest rock cover with 44.39% (± 2.77) and Popisi has the lowest rock cover with 4.47% (± 1.57). The coral reef ecosystem condition in Mekar Indah is reflected by the CPUE ([Report 1.2, September 2024](#)) that is showing an increasing trend, indicating that fishers are still able to catch octopus despite low live hard coral cover in their reef system.

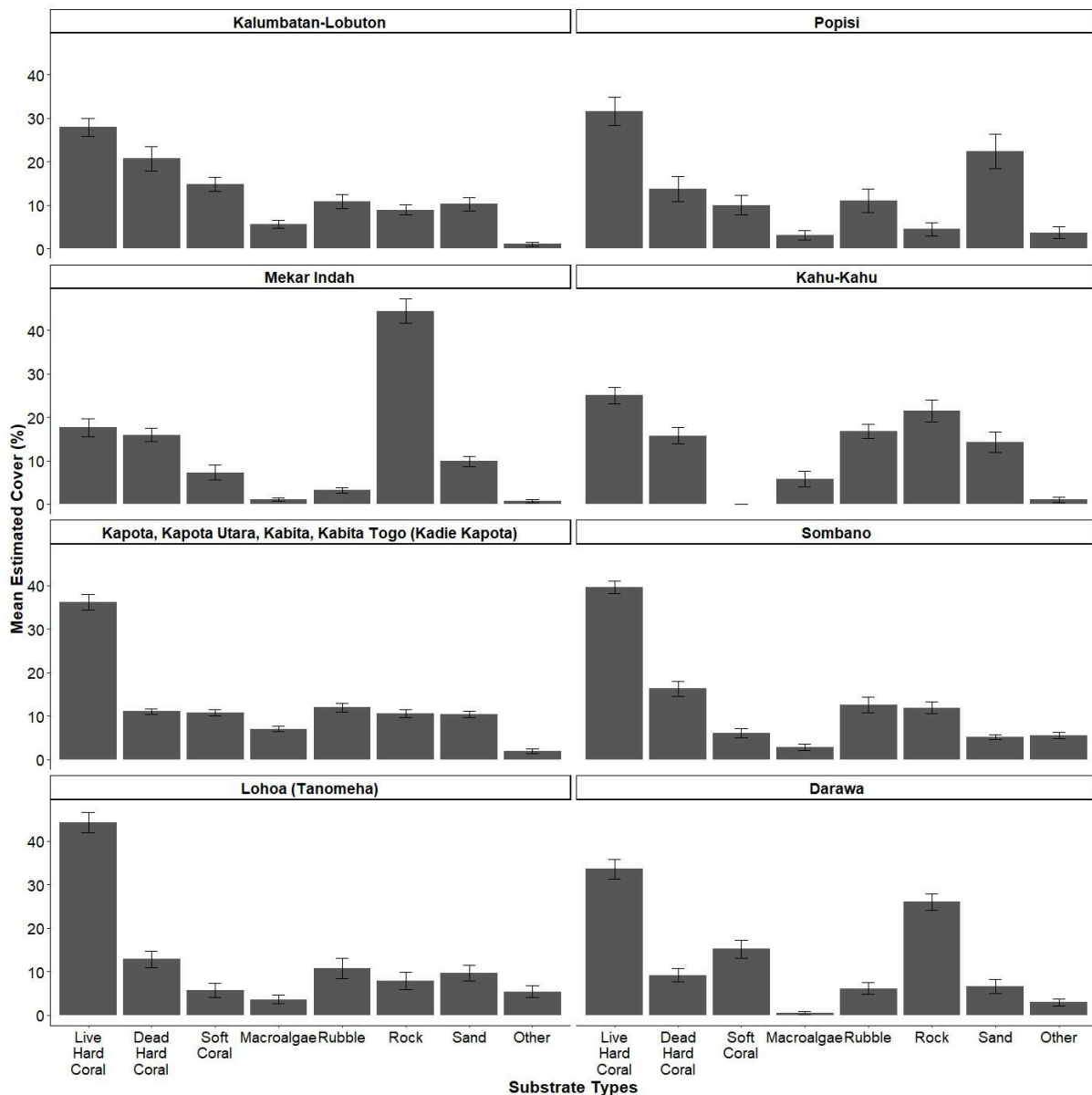


Figure 1 Mean substrate cover with standard error by communities between 2023 and 2024 in Sulawesi

Live hard coral cover in Kalumbatan and Lobuton is generally in moderate condition with one location that showed good hard coral cover (Figure 2). However during the survey, the underwater observer reported there are signs of dynamite fishing in one tow location near Lobuton. The underwater observer also reported the presence of a fish aggregating device (*rumpon*) anchored at the reef in front of Kalumbatan. According to the manta tow results, the existing temporary closure area in Kalumbatan-Lobuton is already appropriately placed and should the community decides to relocate or expand their closure area, it is recommended to relocate and/or expand to the south.

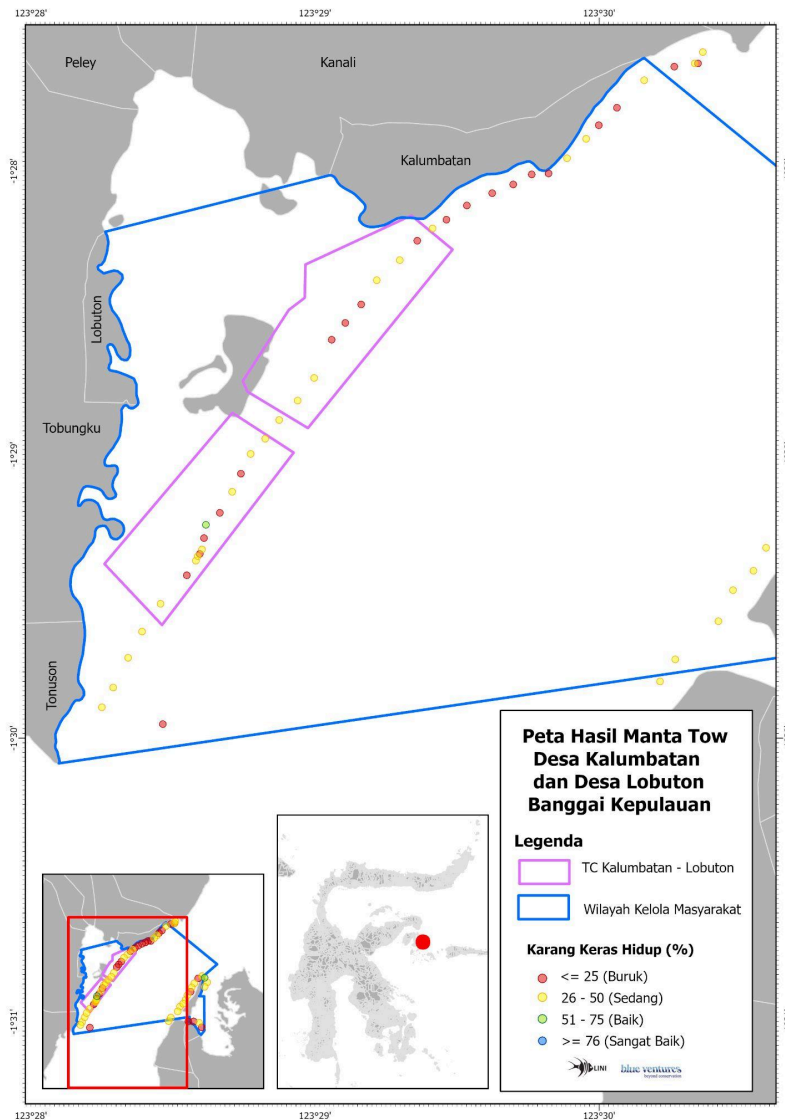


Figure 2 Manta tow results and analysis in Kalumbatan and Lobuton August 2024

Live hard coral cover in Popisi is in relatively good condition when compared to Kalumbatan-Lobuton (Figure 3). During the tows, the boat observer reported that the team passed through fishers' boat and a pelagic fishing boat (*kapal padola*). The fisheries management area of Popisi comprises the reef in front of the settlement and the reef at the western part of Asasal Island (north of Popisi). Based on the manta tow results, the reef at the front of the settlement is in worse condition compared to the reef around Asasal Island. Since the temporary closure area is located at the reef of Asasal Island, the area is already properly located based on the live hard coral condition. If the community of Popisi decides to expand their closure area, it is recommended to expand the closure area to the southwest.

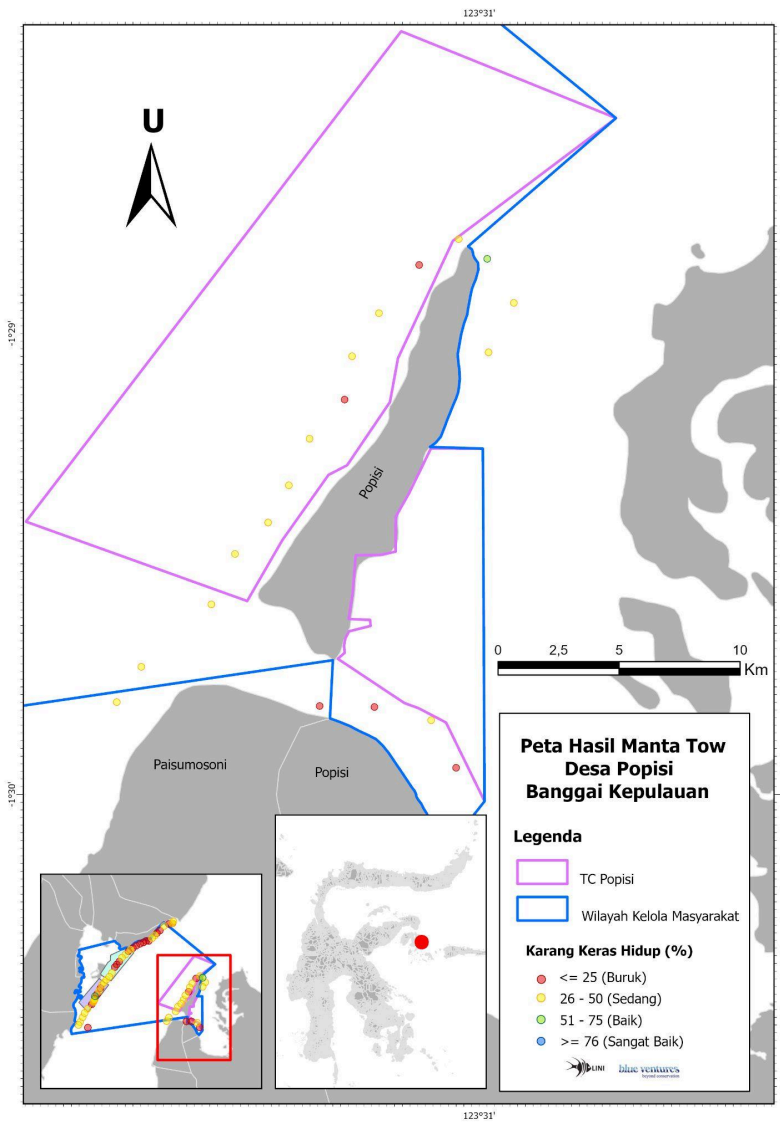


Figure 3 Manta tow results and analysis in Popisi August 2024

Live hard coral cover in Mekar Indah is generally low with some reef parts in moderate condition (Figure 4). The reef condition might be caused by two rivers present in the north and south part of the community. Community members of Mekar Indah had just agreed to establish temporary closure, and the current closure area is located around moderate reef condition. Based on live hard coral cover, the existing temporary closure area is already appropriately placed and should the community decides to relocate or expand their closure area, it is recommended to relocate and/or expand to the southern reef part of Mekar Indah.

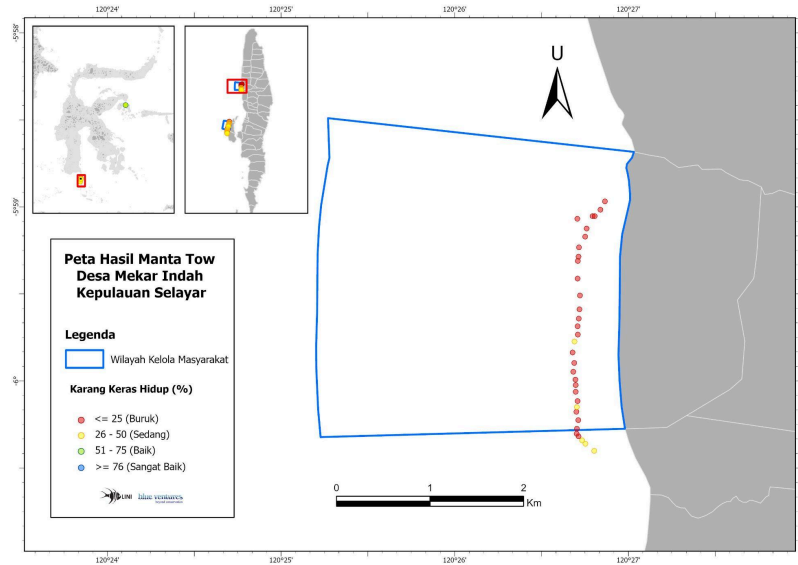


Figure 4 Manta tow results and analysis in Mekar Indah June 2024

Live hard coral cover in Kahu-Kahu is relatively higher than its Kepulauan Selayar counterpart, Mekar Indah. Most of the reef system is in moderate condition (Figure 5). During the survey, the boat observer recorded that the manta tow team passed through a couple of octopus fishers along the towing route. The current temporary closure area is already located in the appropriate location with moderate live hard coral cover. In the future, if the community decides to relocate and/or expand, the northern part of the reef system is recommended for future potential temporary closure area.

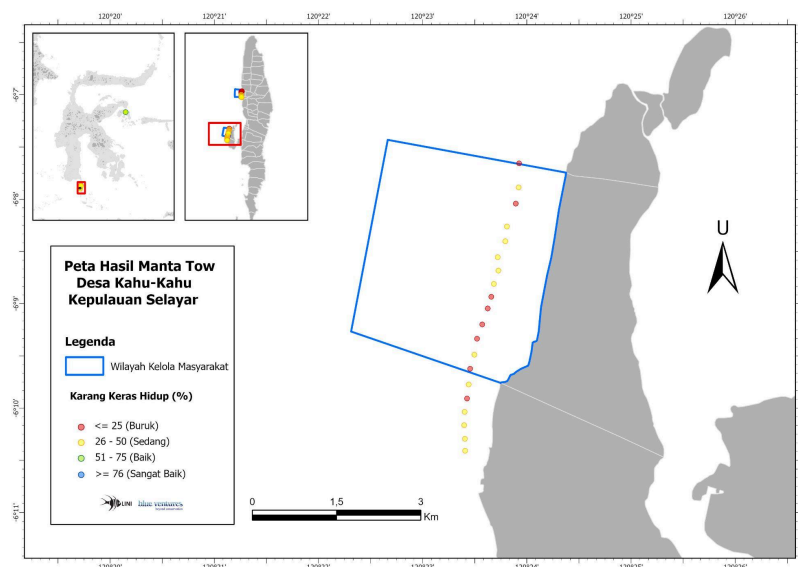


Figure 5 Manta tow results and analysis in Kahu-Kahu June 2024

Four villages, namely Kapota, Kapota Utara, Kabita, and Kabita Togo, in Wakatobi share the same management area because the fisheries management boundaries are based on the customary boundaries. Those four villages are a part of one customary

community, named Kadie Kapota. Coral reef in Kadie Kapota is relatively in good condition with the exception of the north-eastern part of the island (Figure 6). Low cover of live hard coral in the north east area is assumed because of the location of jetties and settlements, whereas in the south west area there are no jetties or settlements, only landing sites along the shores for local fishers. The temporary closure area agreed by the customary community of Kadie Kapota is already located in an appropriate location with relatively good live hard coral cover. In the future, if the community decides to relocate and/or expand, potential closure areas are located on the southern part of the island according to the manta tow results.

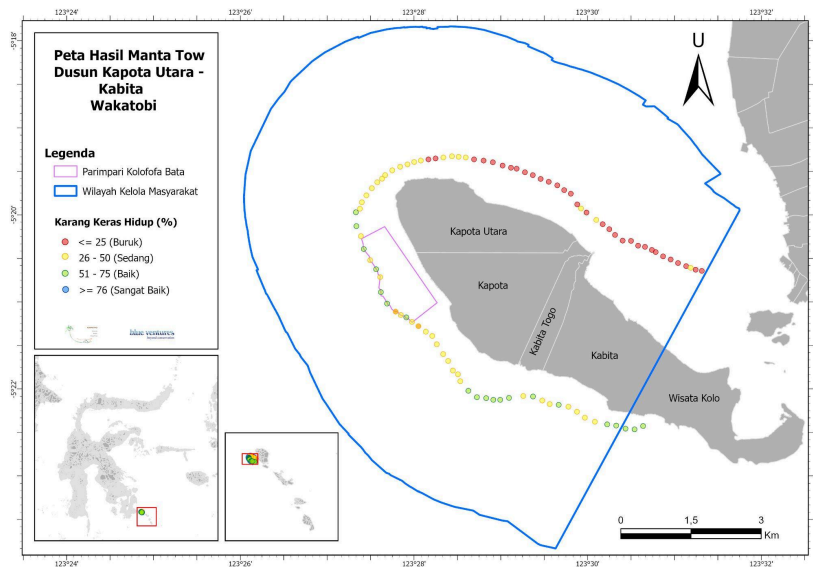


Figure 6 Manta tow results and analysis in Kapota, Kapota Utara, Kabita, and Kabita Togo January 2024

The community members of Darawa, Sombano, and Tanomeha is facilitated to establish an appropriate temporary closure using both fisheries and ecological data. After understanding which fishing grounds yield the most octopus catch from the fisheries data collection process, the community members proceed to understand the locations of healthy corals that should be established as temporary closure areas. To obtain the spatial distribution of healthy live hard coral, a series of habitat monitoring was conducted using manta tow method as per trained previously.

The habitat monitoring results confirmed that the previously identified area for potential temporary closure is indeed an appropriate location with relatively healthy reef condition. Using the collected information, community members of Darawa, Sombano, and Tanomeha then proceed to establish a temporary closure as part of the fisheries management effort. The figures below indicate the condition of the coral reef ecosystem using rapid assessment by manta tow method application by several customary communities in Wakatobi (Figure 7, Figure 8, Figure 9).

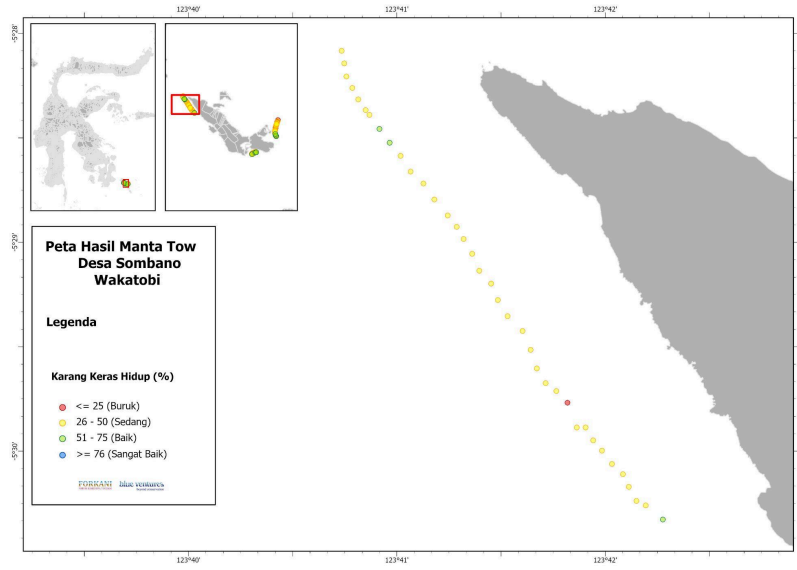


Figure 7 Manta tow results and analysis in Sombano February 2023

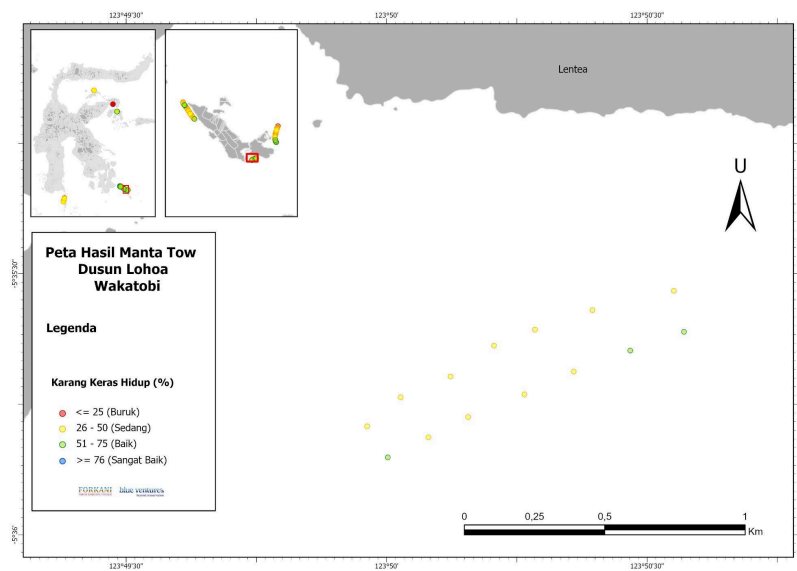


Figure 8 Manta tow results and analysis in Loha Hamlet, Tanomeha Village July 2023

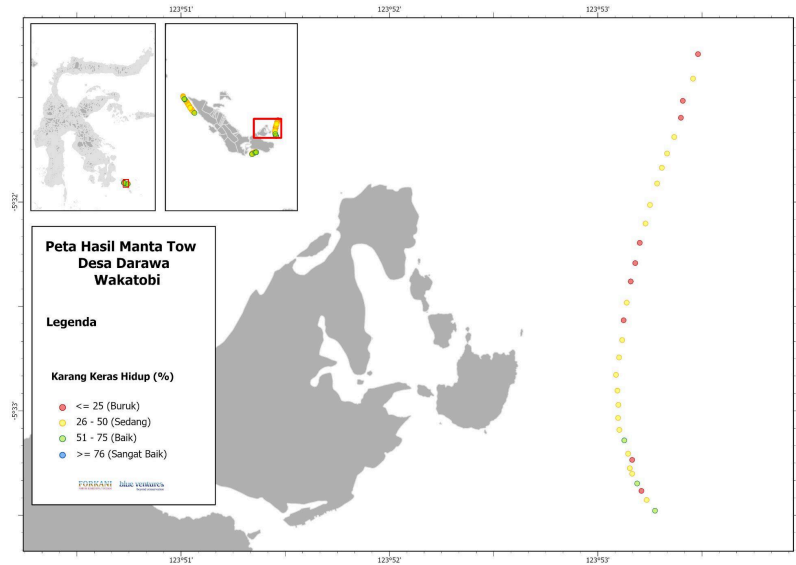


Figure 9 Manta tow results and analysis in Darawa January 2023

References

- English S, Wilkinson C, Baker V. 1997. Survey manual for tropical marine resources 2nd Edition. Australian Institute of Marine Science.
- Sukmara A., Siahainenia AJ, Rotinsulu C. 2001. Panduan pemantauan terumbu karang berbasis-masyarakat dengan metoda manta tow. Proyek Pesisir. Publikasi Khusus. University of Rhode Island, Coastal Resources Center, Narragansett, Rhode Island, USA.

Appendix



Appendix 1 Manta tow team members in Kadie Kapota, Wakatobi is standing on their respective position



Appendix 2 Underwater observer in Kadie Kapota, Wakatobi is preparing for observation



Appendix 3 Octopus fishers in Kahu-Kahu, Kepulauan Selayar as one of the underwater observers in the manta tow team



Appendix 4 Octopus fishers in Kahu-Kahu, Kepulauan Selayar is recording his observations based on the 2 minutes tow



Appendix 5 Manta tow team members in Popisi, Banggai Laut



Appendix 6 Underwater observer in Popisi, Banggai Laut is being towed for 2 minutes



Appendix 7 Community members participates in the manta tow team as boat observer in Kadie Kapota, Wakatobi



Appendix 8 Boat observer is recording the tow location in Kadie Kapota, Wakatobi



Appendix 9 Manta tow team members work together to archive the filled out underwater observation form in Kadie Kapota, Wakatobi