

PROCEEDINGS OF **INTERNATIONAL SYMPOSIUM** **ON SMALL ISLANDS AND CORAL REEFS**

Ambon, August 4-5, 2010



Coral Reef Rehabilitation and Management Program Phase II
COREMAP II

The Future of Small Islands
and Coral Reefs is in Our Generation

Proceeding of International Symposium on Small Islands and Coral Reefs

Page iv, 374

ISBN : 978-602-8717-59-5

Honorary Member :

Sudirman Saad

Ferrianto H. S. Djais

Advisors :

Agus Dermawan

Yaya Mulyana

Editor :

Jamaluddin Jompa

Riyanto Basuki

Suraji

Mike Tesoro

Eva Tri Lestari

Cover Design :

Gerald Hudiono

Published by :

Coral Reef Rehabilitation and Management Program Phase II

COREMAP II, 2010

Directorate General of Marine, Coasts and Small Islands

Ministry of Marine Affairs and Fisheries

Jl. Tebet Timur Dalam II No. 45, Jakarta Selatan - Indonesia

P. +62 21 83783931 F. +62 21 8305120

www.coremap.or.id

www.coremap-2.com

Jl. Medan Merdeka Timur No. 16 Gd. Mina Bahari III Lt. 10, Jakarta Pusat

P./F. +62 21 3522045

www.dkp.go.id

© 2010

PREFACE

This proceedings is the outcome of the International Conference on Small Islands and Coral Reefs (ISSIC) 2010 held from 4-5 August 2010 in Ambon, Maluku, Indonesia. With the endorsement and funding support of the World Bank-funded Coral Reef Rehabilitation and Management Program Phase II (COREMAP II), its National Coordination Unit together with the Provincial Government of Maluku and the Pattimura University, successfully brought together government officials, researchers, scientists, representatives of international organizations, students, practitioners and the private sector to discuss ongoing developments and initiatives in small islands and coral reefs conservation and management.

This proceedings contained 32 technical papers ranging from coral reef conservation policies, coastal community empowerment, Marine Protected Areas, small islands development, small islands eco-tourism, sea mapping, institutional capacity building, climate change impacts, alternative energy development and other relevant topics.

With the collaboration and cooperation of various sectors working toward small islands development and coral reef conservation, the international conference provided a very timely and important gathering which highlighted the ongoing efforts and initiatives of various sectors in small islands development and coral reef conservation in the rest of the world. The event also served as a venue not only to share knowledge, information and experiences in coral reef management, but also inspired each and every participants to continuously pursue current initiatives that support sustainability of small islands development.

This proceedings provided detailed information on the technical papers that have been prepared and presented based on the latest researches, academic studies and individual undertakings in the area of (i) Integrated Small Islands and Coral Reef Management; (ii) Small Islands and Associated Ecosystems Dynamics; (iii) Small Islands and Coral Reef Information; (iv) Economic Opportunities for Small Islands and Coral Reefs; (v) Climate Change Adaptation and Mitigation for Small Islands and Coral Reefs; and (vi) Social Issues and Acceptance in Traditional Small Islands Communities.

I trust the readers will find this proceedings useful and informative when considering how best to incorporate small islands development and coral reef conservation in continuously pursuing the goals of sustainable development. Aside from this, sincere appreciation also goes to the members of the ISSIC 2010 Organizing Committee, the COREMAP II-National Coordination Unit and to the speakers who shared their time and talent in preparing and presenting their respective technical papers.

Jakarta, November 2010
Prof. Jamaluddin Jompa, M.Sc., Ph.D.
Organizing Committee Chair

TABLE OF CONTENT

| | Page |
|--|-------|
| Preface | i |
| Table of Content | ii |
| 1. Red Tide Phenomenon in Lasongko Bay, Buton District - Abdul Hamid, Yusnaini, Indriyani Nur and Halili | 1 |
| 2. Conservation of Small Island Endemic Species-Banggai Cardinalfish Case Study - Abigail Moore and Samliok Ndobé | 11 |
| 3. Management Strategy Of Small Islands In Indonesia (A Case Study In Padaido Islands, Regency Of Biak Numfor, Papua Province) - Alexander Soselisa | 26 |
| 4. Assessing Vulnerability of Small Islands to The Impacts of Climate Change - Amna Yunus | 35 |
| 5. Towards Self Reliance Coastal Communities Through National Program For Community Empowerment Of Marine Affairs And Fisheries - Anto Sunaryanto | 77 |
| 6. Indonesian Sea Turtle at Risk : A Gap Analysis of Sea Turtle Management in Indonesia Cherryta Yunia and Irawan Asaad | 82 |
| 7. Indonesian Provincial Coastal Zone Management Within The Framework of Archipelagic State Principles - Dhiana Puspitawati | 91 |
| 8. Towards Socially and Ecologically Resilient Coastal Waters : Local Governance Around Locally-Managed Marine Areas in Eastern Indonesia - Dirk J. Steenbergen | 104 |
| 9. Development Concept of Miangas as The Northernmost Island of Indonesia, Based on Its Environmental Capabilities - Djajeng Poedjowibowo, Octavianus H.A. Rogi, Linda Tondobala | 116 |
| 10. Local Needs for Corporate Social Responsibility Implementation of A Mining Company as A Solution to Poverty in Madura - Ekna Satriyati and Devi Rahayu | 131 |
| 11. Application of Local Context in Small Islands for Teaching and Learning - Helti Lygia Mampouw and Ruth Wallace | 140 |
| 12. Holistic and Integrated Policy and Strategy for Managing Change in Complex Situations - Ian Falk | 151 |
| 13. Muroami Fisheries in Weh Island, Aceh Province - Irfan Yulianto, Budi Wiryawan | |

| | Page |
|---|------|
| and Am Azbas Taurusman | 160 |
| 14. The Effectiveness of Karimunjawa National Park - Irfan Yulianto, Tasrif Kartawijaya, Handoko Adi Susanto and Stuart Cambell | 167 |
| 15. Food Security in A Warming Globe : Safeguarding Small Islands Communities from Increasing Biosecurity Threats - I Wayan Mudita, Remi L. Natonis and Ruth Wallace | 179 |
| 16. First Record of Relatively Severe Coral Bleaching in The Spermonde Islands, South Sulawesi Indonesia – Jamaluddin Jompa and S. Yusuf | 195 |
| 17. Marine Aquaculture and Coral Reef Ecosystems : An Integrated Coastal Management Approach to Improve Seafood Production and Value While Preserving Coral Reef Health and Sustainability - James P. Mcvey | 209 |
| 18. Macrozoobenthos as Water Quality Indicator of Barrang Lompo Island Water, South Sulawesi - Magdalena Litaay, Willem Moka, Ambeng and Fatmanugraha | 216 |
| 19. Managing Livelihood in Arhipelagic Regions - Marthen L. Ndoen and Ruth Wallace | 227 |
| 20. Nusa Penida MPA : A Lessons Learned on Co-Management MPA, Klungkung District, Bali Province, Indonesia - Marthen Welly | 237 |
| 21. The Management of Fishery Resource Use of Taka Bonerate Coral Reef Zone Viewed From A Constructionist Perspective - Munsil Lampe | 244 |
| 22. Strategies for Island Sustainability and Well-Being - Philip Hayward | 255 |
| 23. Assessment for The Establishment of A Community-Based Marine Protected Area: Case Study at Pulau Abang Village, Batam Municipality, Kepulauan Riau Province, Indonesia - Rofi Alhanif, Vibeke Simonsen and Tomas Cedhagen | 261 |
| 24. Social Issues and Acceptance of Change in Traditional Small Island Communities With A New View to Sasi - Ronald Z. Titahelu | 280 |
| 25. Spatial Distribution Interpretation of Seagrass Meadow Using The Lyzenga Algorithm Application Around The Shallow Water of Salemo Island Pangkep Regency - Rustam Effendi P and Faizal Rumagia | 294 |
| 26. Local Food Eco-Literacy : A Strategy for Building Eco-Tone Between Ethno-Culture and Scientific Knowledge of Food Security - Sang Putu Kaler Surata and I Putu Tirta Agung Setiawan | 306 |

| | Page |
|---|------|
| 27. Towards Decentralized Coastal Management Policy in Indonesia : Three Years After The Coastal and Small Island Management Act Was Enacted - Sapta Putra Ginting | 316 |
| 28. Rainwater Management for Agriculture on Small Islands in Arid Region of Indonesia – Susilawati | 324 |
| 29. Spatial And Temporal Pattern in Spawning Aggregations of Groupers (Serranidae) and Napoleon Wrasse (Labridae) in Karimunjawa National Park - Tasrif Kartawijaya, Shinta T. Pardede, Yusuf Syaifudin and Mulyadi | 335 |
| 30. Coastal Area Transformation and The Need for Management Policy : Case Study of Recreational Beach Areas in Natsepa (Ambon Island) and Nemberala (Rote Island) - Theofransus Litaay and Jeanne Ivonne Nendissa | 343 |
| 31. Empowerment of Roswar Island Community Through Development of Marine Ecotourism : A Preliminary Study - Yuanike Kaber, Ridwan Sala and Jemmy Manan | 358 |
| 32. Benefit of Ocean Thermal Energy Conversion (Otec) for Small Islands in Maluku Sea Water - Yusuf Siahaya | 367 |

MUROAMI FISHERIES IN WEH ISLAND, ACEH PROVINCE

By : **Irfan Yulianto**⁸⁸, Budi Wiryawan⁸⁹ and Am Azbas Taurusman⁹⁰

Abstract

Weh Island is located in the most western part of Aceh Province, Indonesia which has been considered to have good coral reef condition and rich of reef fish, therefore; reef fisheries is abundant and prominent. There are eight (8) fishing gears that are being used by fishermen in Weh Island and these are set gillnet, encircling gillnet, handline, muroami, troll line, speargun, longline, and purse seine. The Muroami is one of the fishing gears that causes severe damage coral reef and marine ecosystems. The objective of this study is to examine Muroami fishing activities and its negative impact to coral reef ecosystem. Fish catch analysis, a correlation between fish length and trophic level and the comparison fish catch and biomass are among the methods employed in this study. The fish catch data which include the total of catch (kg), species name and measure of fish length, and fishing grounds were collected using photograph during west monsoon of 2008 and east monsoon of 2009. In addition, fish size structure and biomass estimation were sampled using visual census methods. The financial analysis of Muroami had also been taken to obtain pertinent financial information of Muroami fisheries. The results showed majority of Muroami fish catch are Acanthuridae and Scaridae. The Muroami net income was Rp.77,705,357 for each fishing gear per year.

Keywords : strategic and vulnerable area, restriction, self supported, local

BACKGROUND

Pulau Weh, is an island located at the northwestern tip of Sumatra Island, a territory of the Province of Aceh. Sabang Municipality has four other islands in addition to Pulau Weh, namely Pulau Klah, Pulau Seulako Island, Pulau Rubiah, and Pulau Rondo which is one of the outermost islands directly adjacent to the Nicobar Islands (India). Of the 18 villages in the municipality of Sabang, 16 of whom are located in coastal areas, such dependence and interaction with communities to coastal resources is very high (Figure 1). Traditionally, Pulau Weh is currently divided into ten (10) Lhok which is an area that is managed by customary institutions led by one Panglima Laot. Ten Lhok region, among others; Lhok Iboih, Lhok Men Laot, Lhok Krueng Raya, Lhok Sandy, Lhok Meulee le, Lhok Anoi Itam, Lhok Balohan, Lhok Jaboi, Lhok Keuneukai, and Lhok Paya.

The total number of fishermen from the 10 Lhok is 1420 fishermen (BPS Sabang, 2005). The types of fish catches in Pulau Weh are snapper (lutjanidae), grouper (Serranidae),

⁸⁸ Faculty of Fisheries and Marine Science, Bogor Agricultural University, Indonesia and Wildlife Conservation Society, Indonesia Program, Jl. Burangrang 18, Bogor, Jawa Barat, Indonesia

⁸⁹ Faculty of Fisheries and Marine Science, Bogor Agricultural University

⁹⁰ Faculty of Fisheries and Marine Science, Bogor Agricultural University

big eye fish (holocentridae), barracuda (sphyraenidae), yellow tail (caesonidae), older brother (scaridae), naso (acanthuridae), and jabong (balistidae). The types of fishing gear which recorded, there are handline, tonda, speargun, gill nets, and reef fish nets (Pisang-pisang net and Muroami).

Muroami is driving the fish into the net, such that fish can be caught by driving them into a fishing gear of any type. There are some constructions of stationary gear which only catches fish when the fish are driven into them among other methods by swimming or diving fishermen, or by frightening lines (Gabriel *et al.*, 2005). The Muroami has negative impact to coral reef and marine ecosystems and generated social conflict in Weh Island.

OBJECTIVES AND METHODS

The objective of this study is to examine Muroami fishing activities and its impact to the coral reef ecosystem. This research has been conducted in Weh Island, Sabang, Aceh Province. Data collection was conducted from January until August 2009.

Fish Catch

Fish catch data were collected using photograph method (Cinner *et al.* 2005a) during the period of October – November 2008 and May 2009. Data were recorded such as gear description, total of catch (kg), species name, and measure fish length by photo and fishing ground.

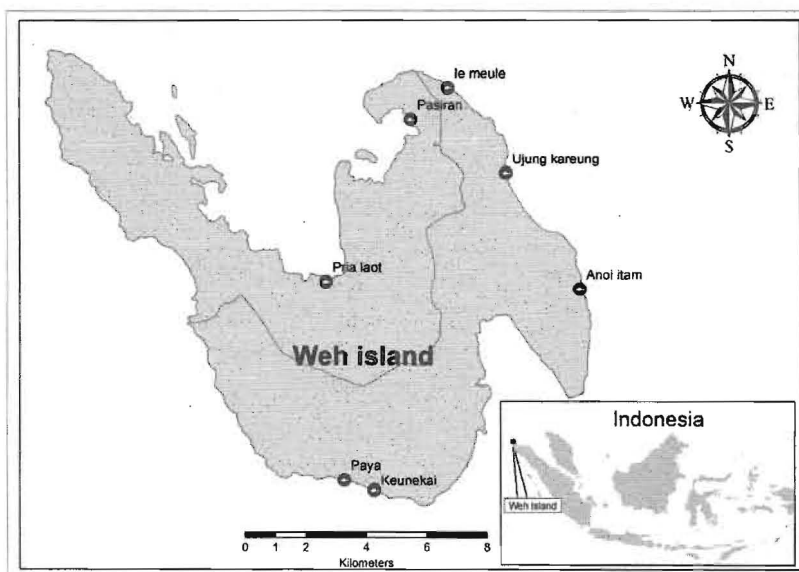


Figure 1. Map of Villages that were studied in Pulau Weh

DATA ANALYSIS

The method used in data analysis is fishing gear description and fish catch composition, biomass analysis, and economic analysis of Muroami.

Fishing Gear Description and Catch Composition

The fishing gear description is the analysis to figure out the type of Muroami fishing gear, operation of Muroami and fishing ground of Muroami. The catch composition is made by calculating the species composition of Muroami catch. In addition, the calculation of CPUE and catch comparison with existing stock based on secondary data.

Biomass Analysis

The length of the fish from fish catch survey converted into weight by the equation:

$$W = aL^b$$

Where :

- W : Weight estimation of fish
- L : Total Length
- a, b : L-W relationship

L-W relationship of each fish obtained from fish base online at www.fishbase.org (Froese and Pauly, 2000).

Economic Analysis

Calculation of total net profit of fishing equipment Muroami (1 year) conducted by the equation (Fauzi dan Anna, 2005):

$$TV = \sum_{i=1}^N KB_i$$

Where :

- TV : Total income per year
- KB_i : Net income per trip
- N : Total trip per year.

Value of net profit per trip obtained with the modified equations of the equation as in the present value Fauzi and Anna (2005):

$$KB_i = Y - Bo - Bp - B_i$$

Where:

- KB_i : Net income per trip
- Y : Bruto Income per trip

- Bo : Operation cost per trip
 Bp : Maintenance cost per trip
 B_t : Fix cost per trip

RESULTS AND DISCUSSION

Fishermen in Weh Island called Muroami as Pukat Jepang (Japanese net). The Pukat Jepang usually use boats, the first boat is a wooden boat that functions as a main boat and the second boat is a fiber boat that sets the Muroami net. The length of the main boat is 6 to 9 meters while the length of the fiber boat is 4 meters. The Muroami net is a multi-filament net that have a mesh size of 1 to 1.5 inches and a length of around 300 meters. The fishermen known for using Muroami nets are from the Pasiran village which scour the fishing grounds of Gapang, Pulau Klah, Ujung Kareung and Anoi Itam (Figure 2).

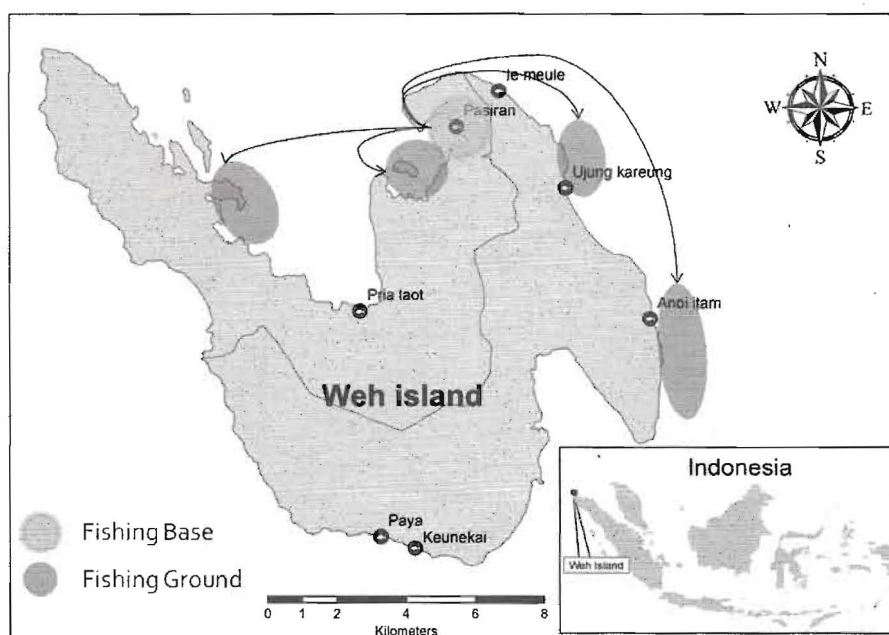


Figure2. Fishing Base and Fishing Grounds of Muroami

The fishing operation of Muroami involves a one day fishing activity and consists of boat crew from 3 to 12 fishermen depending on the boat capacity. The Muroami net is usually placed and operated in reef areas. The fiber boat on the other hand is used to set the net in a circular formation. Soon after the net is set the boat crew will start to scare the fish which will then move towards the location of the net and will eventually hauled to the main boat.

The Muroami fishing gear usually catches fish consisting of naso (Acanthuridae) with 79.84 percent. When compared with secondary data of fish biomass, hence the catch at Pulau Weh in one year is still below the existing stock. This shows that the fish catch of Muroami has less impact on existing fish stocks as their catch is considered below the sustainable fish catch.

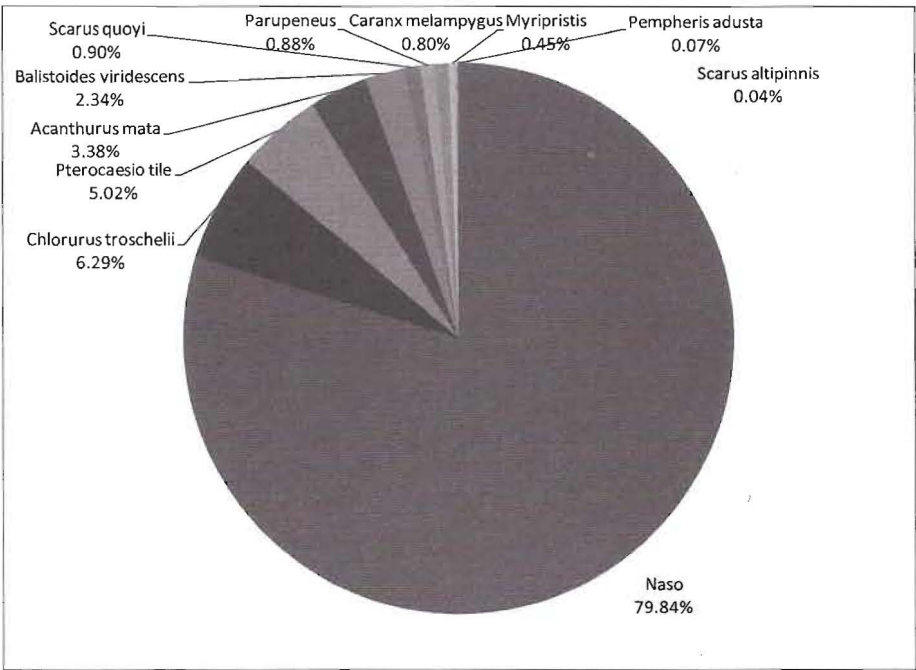


Figure 3. Catch Composition of Muroami in Weh Island

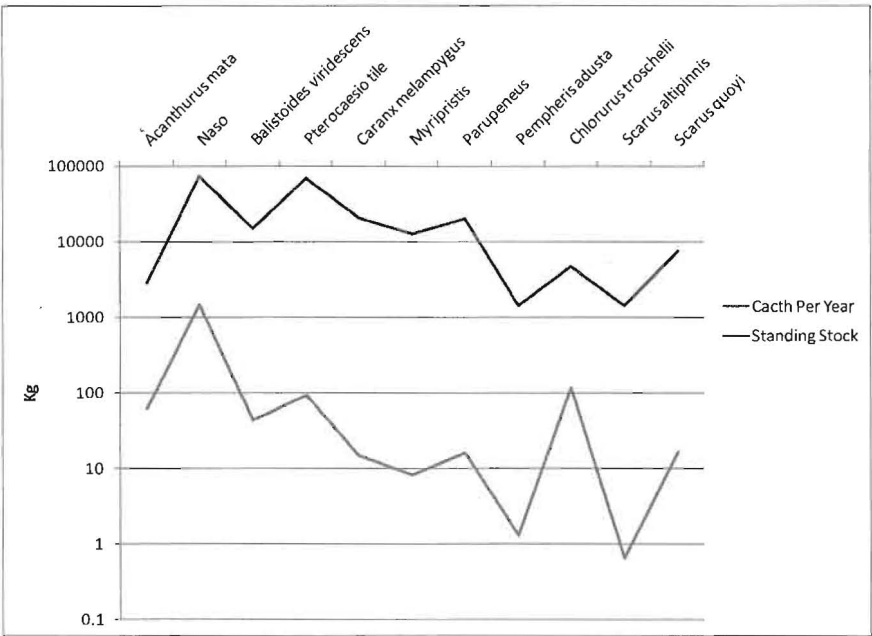


Figure 4. Standing Stock versus Catch per Year

Although the number of fish catches are still below the existing stock, but Muroami fishing gear may cause negative effect because of its direct impact to habitat destruction due to its bottom operation. During the process of driving the fish into the net, the fishermen walk into the coral reefs and in most instances hit corals to scare off the fish. This activity had generated conflict between fishermen so that Muroami operations will be restricted in some areas in Pulau Weh. This shows that the gear has greater risk of damaging the coral reefs and provides negative impact on the resource and social conditions the community.

Muroami fishing gear has a net income of Rp77,705,357 per fishing gear per year. This value was obtained with the assumption that the gross revenue per trip is normally in the range of Rp.1,000,000. This value was obtained based on interviews with fishermen, wherein information on the smallest revenue is Rp.300,000 and the largest revenue is Rp1,500,000 while during normal conditions the revenue may reach as much as Rp. 1,000,000. Another basis of the calculation is the depreciation cost of Rp.11,062,500 per month, the monthly maintenance fee of Rp.750,000, and operating cost per trip of Rp.500,000. The detailed calculation of each assumption on the present economic value Muroami is indicated in Table 1.

Table 1. Total Cost of Muroami Operation

| Description | Cost (in Rp.) |
|-------------------------------|-------------------|
| Depreciation | |
| Boat price (Rp) | 24,000,000 |
| Boat (months) | 72 |
| Boat depreciation (Rp/month) | 333,333 |
| Engine price (Rp) | 8,250,000 |
| Engine (month) | 48 |
| Boat depreciation (Rp/month) | 171,875 |
| Fishing gear price (Rp) | 20,000,000 |
| Fishing gear (month) | 48 |
| Total depreciation (Rp/month) | 416,667 |
| Total depreciation (Rp/year) | 11,062,500 |
| Maintenance Cost | |
| Maintenance cost per month | 750,000 |
| Maintenance cost per year | 9,000,000 |
| Operational Cost | |
| Operational Cost (per trip) | 500,000 |
| Operational Cost (per year) | 97,767,857 |

CONCLUSIONS

- Muroami known as Pukat Jepang usually have two (2) boats during its one day fishing operation.
- It is being practiced by fishermen based in the Pasiran village while there are four (4) identified fishing grounds and these are: Anoi Itam, le Meulee, Pulau Klah and Gapang.
- The Acanthuridae species is the most common type of fish being caught by Muroami operation.
- The normal net income of Muroami operation is Rp 77,705,357 per fishing gear per year.
- Muroami has direct negative impacts to coral reefs and has generated social conflicts among community residents

REFERENCES

- Cinner JE, Marnane MJ, McClanahan TR, 2005a. Conservation and community benefits from traditional coral reef management at Athus Island, Papua New Guinea. *Conservation Biology* 19: 1714-1723.
- BPS Sabang. 2005. Sabang dalam Angka 2005. Badan Pusat Statistik dan Badan Perencanaan Pembangunan Daerah Kota Sabang. Sabang. 255p.
- Fauzi, A. dan S. Anna. 2005. Studi Valuasi Ekonomi Perencanaan Kawasan Konservasi Selat Lembeh, Sulawesi Utara. USAID, DKP dan Mitra Pesisir. Jakarta. 66p.
- Froese, R. and D. Pauly. 2000. Editors. Fishbase. World Wide Web Electronic Publication. www.fishbase.org [25 September 2008].
- Gabriel O, K. Lange, E. Dahm and T.Wendt. 2005 Fish catching methods of the world. Blackwell Publishing. Oxford, UK