

# FISHERIES SOCIAL STRUCTURE IN THE ISLANDS OF BIAK AND SUPIORI

Kedi Suradisastra<sup>1)</sup>

## ABSTRACT

The study of fisheries social structure among the coastal communities in Biak-Supiori Islands was conducted using a delineated participatory methodology of Appraisal of Fishery Information Systems. Taking place in five sub-districts (*kecamatan*), the study revealed ecological condition of 24 fishing spots located by Global Positioning System (GPS Position). Nominal and qualitative information was collected through extensive, semi-structured interviews. The information were analyzed and empirically reconstructed using inductive statistics.

The study unveiled that fishery is valued as secondary activity among rural communities in the study areas. Local communities protect their natural resources through enforcement of traditional norms, non-formal style, and legal rules and formal way. Yet, differences occur as a manifestation of various interacting variables. Some of these variables are ecological condition, local rules, the government's project and program, and the way the society enforce their local norms and values. It is also important to record the unnoted non-sociological parameter as intervening variables that affect the performance and social behavior of local fishermen in reacting to particular norms and values.

**Key words:** *fishery, fishermen, norms.*

## ABSTRAK

Penelitian struktur sosial kegiatan perikanan masyarakat pantai di Pulau Biak dan Supiori dilaksanakan dengan menerapkan metode partisipatif pemahaman sistem informasi perikanan. Pengamatan yang dilakukan di lima lokasi kecamatan mengungkapkan kondisi ekologis 24 lokasi penangkapan ikan yang dideteksi dengan *Global Positioning System (GPS Position)*. Informasi nominal dan kualitatif dihimpun dengan wawancara semi-struktur dan dianalisis dengan teknik rekonstruksi empiris dengan statistik induktif.

Hasil pengamatan menunjukkan bahwa kegiatan menangkap ikan dinilai sebagai kegiatan sampingan. Masyarakat lokal melindungi sumber daya mereka secara tradisional nonformal, dan secara legal formal. Keragaman yang terdapat merupakan hasil interaksi berbagai peubah. Beberapa parameter yang berperan antara lain adalah kondisi ekologi, tata aturan dan norma lokal, keberadaan proyek dan program pemerintah, dan cara masyarakat setempat menjalankan norma-norma lokal. Selain itu dirasa perlu untuk mempertimbangkan pengaruh parameter nonsosiologis yang tidak terdeteksi untuk lebih memahami penampilan dan perilaku sosial masyarakat dalam bereaksi terhadap norma dan nilai-nilai tertentu.

**Kata kunci:** *perikanan, nelayan, norma.*

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1) Ahli Peneliti Utama pada Pusat Penelitian Sosial Ekonomi Pertanian, Bogor.

## INTRODUCTION

### Background

Social structure in fisheries plays important roles among some traditional societies in Indonesia. One form of the existing social structure in fisheries is *sasi*, which deals with conservation of natural resource. In relation to fisheries and fisheries production activities in Biak area, shallow information on the existing community based coastal management system is found among several coastal communities in the island. Yet, little is known whether such a structure is a common phenomenon among coastal communities in the area. On the contrary, a community based coastal management system form of *sasi* among the Mollucans has been reported in a more detailed fashion (Suradisatra, 1997). *Sasi* in fisheries in Maluku islands so far plays significant roles among local fishermen in the area.

The people of Biak are of Austronesian descent and they are known as former hunter-gatherer and seafarer (Boelaars, 1986 and Muller, 1990). They survive through extensive use of natural resources of the inland and surrounding ocean. Yet, fishing is known more as a supplementary activity (Iwakiri, 1979) and up to these days the Biak people have not evolved to a fishing community. On the other hand, although farming is becoming their primary means for survival, the level of agriculture is still in the early stages in which slash-and-burn agriculture is still widely practiced (Tucker, 1987).

### The Objective and Output

This study is intended primarily to identify the existing social structure in the form of community based coastal management systems of relevance to fisheries in the islands of Biak and Supiori. The expected output is a formal or informal social structure of relevance to fisheries development program.

### The Target

The study is aimed at gathering and analyzing sociological information and data, which are assumed to be useful for fishery sub-sector development in the study site and similar development areas. The primary targets of the study are the fishing communities living along the coasts and the waters of Biak and Supiori islands. The main parameters observed are social values and norms with relevance to fishing activity in the area.

## METHODOLOGY

### Location and Time of Study

The study was conducted during the month of February 1996. Four sub-districts (*kecamatan*s) in the islands of Biak and Supiori are selected as the study sites. Applying a multi-stage sampling method, a total of 24 villages (*desa*) indicated by 24 observation points are surveyed. Source of information for each *desa* consists of formal leader, non-formal

leaders or key persons and fishermen. The number of information source varies from 1 to 7, depending upon the quality of information they provide. For the purpose of this study, the numbers of resource persons are shown in Table 1.

Table 1. Number of Information Sources.

Kecamatan	Desa	Formal leader	Key-persons	Laymen	Total
Biak Kota	Parai	1	1	3	5
	Mokmer	1	1	3	5
	Urfu	1	1	5	7
	Samber	1	1	5	7
	(Total)	(4)	(4)	(16)	(24)
Biak Timur	Opiaref	1	1	5	7
	Kajasi	1	1	2	4
	Anggaduber	1	1	5	7
	Amini	1	1	1	3
	Wadibu	1	1	3	5
	Tg. Warari	1	1	2	4
	Woniki	1	1	5	7
	Yenusi	1	1	2	4
	(Total)	(8)	(8)	(25)	(41)
Biak Utara	Yobdi	1	1	1	3
	Marui	1	1	1	3
	Saukobi	1	1	2	4
	Waromi	1	1	3	5
	Wasori	1	1	1	3
	Amoi	1	1	3	5
	Warsa	1	1	2	4
	Sansundi	1	1	2	4
	Douwbo	1	1	1	3
	Bosnabraid	1	1	3	5
	(Total)	(10)	(10)	(19)	(39)
Biak Barat	Wardo	(1)	(1)	(5)	(7)
Supiori Utara	Sorendiweri	(1)	(3)	(5)	(9)
<b>Grand Total</b>		<b>(24)</b>	<b>(26)</b>	<b>(70)</b>	<b>(120)</b>

The uneven distribution of laymen as respondent is due to the difficulty to find local fishermen who are willing to cooperate and provide information. Since virtually all households involve in fish catching, this does not mean that any household is a fisherman family. Most are performing the activity to fill the demand for protein. Therefore, only those who sell their catch are considered as fishermen. In small villages of Douwbo and Yobdi, only one resident in each village considers himself as a fisherman. The rest of the residents are either part-time fishermen or conduct fishing to fulfil the requirement of their kitchens.

## Methodology

The method used in this study is a delineation of Chamber's Rapid Rural Appraisal (1978, 1980) and Engel's (1994) RAAKS (*Rapid Appraisal of Agricultural Information Systems*), namely RAFIS (*Rapid Appraisal of Fisheries Information Systems*), which was developed for the purpose of social-fishery research (Suradisastra, Blowfield and Syafaat 1995). The special feature of this methodology is its flexible, participatory approach to define the situation, problems and possible solutions. For the purpose of the study, the type of RAFIS used is exploratory in nature. This type is intended to explore primary information related to the aim of the study through intensive and participatory approach.

RAFIS, like its parent methodology of Rapid Rural Appraisal (RRA), is a "systematic yet semi-structured activity carried out in the field by a multidisciplinary team and designed to acquire quickly new information and new hypotheses for fisheries sector development". The goal of RAFIS is socially acceptable, economically viable and ecologically sustainable fishery development. The primary aim of RAFIS and RRA is not to solve theoretical puzzles contributing to the generation or verification of social or economic theory, but to facilitate a more rational decision-making process in real-life circumstances. The results of an RRA or RAFIS activity are to be judged by both scientific criteria of validity and reliability, and with reference to the relevance of the research to the problem and its timely delivery in a cost effective fashion. This methodology enables multi-disciplinary teams to work more closely together and to understand better problems, needs, and opportunities. While RRA as the parent of participatory methodology aims at more general issues of development, RAFIS is developed to focus on specific issues of development, namely, fisheries sector development. The steps of RAFIS are similar to the steps of conducting RRA and PRA. The RAFIS methodology starts with review of secondary data, followed by direct observation and data collection through semi-structured interviews. Visualized analyses is also employed during the process of direct observation and biophysical data collection.

In relation to this study, data and information on fisheries social structure were gathered through a participatory, intensive, 14-day field interview during the months of January and February 1996. Interviews were conducted in an informal setting, using semi-structured questionnaires with the topics relevant to the study objectives. The data collected in this study consisted of biophysical information of the study sites, activity profiles and daily routines of the target group.

Data and information collected from key informants were qualitative in nature and should be interpreted and reconstructed to obtain rational explanation, whereas biophysical data were more measurable and can be descriptively analyzed. Therefore, data and information were analyzed and interpreted using descriptive statistic. Nominal and qualitative information were reconstructed into empirical explanation.

Since RAFIS, as its parent methodology of RRA, relies on key informants for relevant data and information, it is recognized that qualitative data, by their nature, are difficult to record, code and analyze objectively. Therefore, it is mandatory to recruit mature, experienced and objective team members of researcher and/or field workers.

This field study was completed just one day prior to the devastating earthquake on 17 February 1996. Some of the study areas, such as village Sansundi and Douwbo, are no

longer exist as they were before the disaster. Therefore, the result of this study may contain facts that are no longer relevant to the new ecological condition of the study area. Nevertheless, sociological condition of the study area is expected to endure little change.

## SOCIAL ASPECTS OF FISHERIES IN BIAK-SUPIORI ISLANDS

### Fishery and Fishing Technology

Fishery is considered as secondary activity among rural communities in Biak-Supiori islands. Although almost all communities in the islands reside in villages adjacent to the ocean, their primary activity to support their daily life is traditional farming. Slash-and-burn agriculture is widely practiced and fishing is considered as a supplementary activity. To some, fishing is merely a means of activity in the leisure time.

Table 2. Percentage of Household in Fisheries

Kecamatan	Percentage
Biak Kota (City of Biak)	58
Biak Timur (East Biak)	20
Biak Utara (North Biak)	25
Biak Barat (West Biak)	25
Supiori Utara (North Supiori)	5
<b>Total</b>	<b>33</b>

Source: Dinas Peternakan Kabupaten Biak and Bappeda (1990).

Table 2 clearly shows that households relying on fisheries in the islands of Biak and Supiori are far lower than those who practice non-fisheries activity. The proportion of fishermen in *Kecamatan* Biak Kota is an exception. The exceptionally high percentage of fishermen in Biak Kota is due to the fact that demand for fish in the *kecamatan* is quite high. The city of Biak is a concentration of consumers for sea products. About 58 percent of the households in *Kecamatan* Biak Kota admit that they consider themselves as fishermen. In fact, the term fisherman to them means part-time fishing as either supplement or secondary activity.

Since fishing is not considered as the primary activity, it is understandable if the fishing technology remains in a relatively backward state. The main fishing gear used by local residents is small-traditional boat, or *sampan* that can accommodate 1 to 3 persons. Sail is not a common part of a traditional *sampan*. The maximum cruising ability of a man-powered *sampan* is very low. Local fishermen seldom go out to the ocean more than a kilometer away. The traditional *sampan* is commonly used to catch fish and other sea creatures over shallow coral reefs, estuarine, or lagoon along the shoreline of the island. Local fishermen in the northern part of Biak often practice *molo* or diving to spear coral fish in the calm and shallow water. Yet, fish hooks and traditional fish net called *pam* or *sauma* are the primary fishing gears used by most fishermen in the islands of Biak and Supiori.

## Government's Efforts and Projects

The condition of fishing activity among rural communities in the area differs considerably. Beside the variation of the proportion of household's involvement in fisheries (see Table 2 and Appendix 1), the existence and involvement of formal and non-formal institutions also affect the development of fisheries and fishing activities in the area. Both regional and local offices of Social Affair play important roles in shaping local communities' interest in fisheries and fishing activities. In the effort to improve local fishermen's well being, the Office of Social Affair provides both financial aid and education to local fishermen in several villages. Groups of fishermen have also been formed in order to stimulate and increase the effectiveness of fishing activities. In *Kecamatan* Biak Timur and Biak Utara, the District Office of Social Affair has provided soft loans to local fishermen to purchase sideboard engines for their fishing boats. Fishermen in villages Anggaduber and Amini in *Kecamatan* Biak Timur, and villages Yobdi, Saukobi, Wasori, and Sansundi in *Kecamatan* Biak Utara have received considerable financial aid in kind as well as extension and non formal education in fishing techniques from the same institution.

In terms of education to improve the fishermen's technical and cooperative ability, groups of fishermen are formed. Fishermen in village Parai, *Kecamatan* Biak Kota formed 3 groups of fishermen, each consists of 20-30 members. They share the responsibility in the operationalization of fishing activity and, in particular, cooperating in selling their catch. Similar phenomenon is also found among fishermen in village Opiaref. They formed 4 groups of fishermen; each consists of 5 households. In village and Kajasi there are 3 groups of fishermen, each of 10 families. All villages are in *Kecamatan* Biak Timur. In village Yobdi local fishermen formed 2 groups of 10 families each. In Saukobi there are 5 groups of fishermen, each consist of 10 families. In Wasori 3 groups of fishermen of 10 families each are found and in village Sansundi there is one group of fishermen. The formation of these groups was stimulated, promoted and, to some extent, sponsored by the District Office of Social Affair.

The effort of the local authority to promote fishermen to form groups reflects particular condition in which a so-called community based coastal management systems does not traditionally exist among rural communities in Biak. But such a community-controlled situation may suddenly appear when there is a disruption or destruction to a communal fishing ground. Yet, an early stage of community based coastal management system does exist in relation to particular sea components in the area.

## Social Structure of Production Control

Locals protect their village's natural resource through various way, both traditional and informal (Firth, 1968), or legal and formalized. Rural traditional community usually known as exclusive society (Iwakiri, 1990). They set and maintain their own norms and values to preserve their traditional way and daily life (Firth, 1968). To some, this form of exclusivity can be a hindrance to perform individual or group behavior unacceptable to local norms and rules. Among these norms, exclusion of outsiders to fish in a village's traditional boundary is an effort to protect the community's right and interest. Fish and clams are the components of the village's natural resources that the locals protect through such a norm.

Limited access is another form of fisherfolk community to protect their natural resources. The limitation to fishing is valid to locals who fish in the waters around their village. In particular area, the limitation of fish or sea creatures to catch is also accompanied by fee for outsiders.

The differences in the nature of the existing norms exist due to differences in location and distance to market, the dynamic of economic value of the product or component, abundance and infrastructure of the villages. An example of the dynamics of economic value is shown by the rapid economic value of coral to satisfy the hunger of building construction in the area.

Coral exploitation is not traditionally accepted when local residents were still living in their traditional way and construction building was not common. But when modernization comes and there is a mounting demand of rocks for building material, local communities realize that they cannot easily accept any coral destruction by outsiders in their communal waters. It is then realized that coral destruction by outsiders is not accepted by local norms along the Coast of Biak Island. Yet, collecting coral and rocks from the ocean by local residents is allowed with the approval of local leader, usually by the approval of formal leader or the head of the dominant clan of the village.

Realizing that coral and any other forms of exploitation may damage living environment of sea creatures, several community leaders formalized and issued local regulation regarding environmental exploitation. As example, collecting sand from around the coast of village Amini in Biak Timur is allowed after paying a fee of RP. 5,000 for each cubic meter (by February 1996). This restriction applies to outsiders only. As for the locals themselves, no restriction is applied, particularly since they only catch fish and other sea materials for their own consumption.

Collecting mangrove for firewood in villages Tanjungwarari in Biak Timur and Wardo in Biak Barat is not restricted to the villagers. This situation changes in Tanjungwarari when people start taking mangrove for commercial use. In such a case, a fee of RP. 5,000 per person per day are applied when they collect mangrove for sale. Furthermore, a fee of RP. 50,000 per person come into effect when people intend to collect mangrove in a month period. In addition, only hand-operated tools are allowed (mainly axe and machete). Similar rule of fee is also initiated in village Marui in Biak Utara where people are obliged to pay a RP. 25,000 per week fee to exploit coral and rocks using non-explosive materials. All financial value is referred to the market value during the period on January – February 1996.

Although the fee is trivial in nature, the use of the collected fee varies from village to village. In village Tanjungwarari, the fee is spent as transport cost for village official to conduct on the spot-checking of the exploited area. In village Wardo, the fee is spent as labor wage to paint the village office and to plant flowers around the office. Different use of the collected fee indicates that the village leader is the one who has power to determine on how to use such unconventional and irregular income.

On the contrary, village Sansundi in *Kecamatan* Biak Utara has officially issued a formalized form of community based coastal management system. This form of Sansundi community based coastal management system has been informed throughout the villages in the *kecamatan*. The Sansundi community based coastal management system aims at the non-Sansundi residents who conduct fishing activity in the coast of Sansundi. The brief

content of the formalized Sansundi community based coastal management system is as follows (free translation of the decree issued by Pemerintahan Desa Sansudi or the Authority of Village Sansudi) :

1. Fishing fee per person is RP. 10,000 per day.
2. Fishing fee per group of 6 - 10 persons is RP. 30,000 per day.
3. Fishing fee per group of 11 people or more is RP. 100,000 per day.
4. The maximum limit of fishing in the area of Sansundi is 3 days.
5. All fishing activity should be reported to local authority.

The above fishing regulation is effective per 11 May 1995. This local regulation has been made official by 30 October 1995. The use of the collected fee in village Sansundi is rather official. Since the amount of fee is officially determined, the fee is considered as part of the official income and it is spent as official expenditure.

Based on its origin, the above community based coastal management system can be considered as a formal top-down community based coastal management system in the island of Biak. This is a considerable change since such community based coastal management system does not traditionally exist in the area. The historical background of Sansundi community based coastal management system is the fact that Mos and Sor fishermen often fish in Sansundi water so that local residents developed a fear of their traditional water being over exploited by outsiders. Mos and Sor fisherfolk are the most frequent fishermen fishing in Sansundi water, which is known as one of the most fertile fishing grounds in the northern part of Biak.

The Sansundi community based coastal management system comes into effect when non-resident fishermen enter the Sansundi water with a distance of less than 1 kilometer, or -according to local key persons- "to the line where the wave breaks", which is estimated as less than 300 meters from the shore line.

In both technical and economic terms, such a restriction does not significantly affect fishery development in the area, nor does it influence fish catch by local resident. But such a concept implies that village Sansundi has developed and introduced a local "exclusive economic zone".

Reinforcement of the existing community based coastal management system in Biak and Supiori Island, including the limitation of coral and sea creatures' extraction, depend upon the village leaders' level of charisma as well as the dominant clans in the respective area. The roles of dominant clans among the Biak communities are traditionally respected. Large clans usually play important roles in local affairs. For example, village Sansundi and Douwbo are the home for clans Maninem, Pombos, and Boseran, while clan Rumansara is the dominant clan in village Korido in Supiori Island. One of the practical roles of local community based coastal management system is to distinguish outsiders through the identification of their family names.



Table 3. Existing Formal and Informal Control System

Control System	Legal Aspect	Product/ Component	Kecamatan (village)
Exclusion of Outsiders	Informal	Fish and corals	Biak Kota (Parai, Mokmer), Biak Timur (Kajasi), Biak Utara (Marui, Saukobi)
		Mollusk and clams	Biak Timur (Amini), Biak Utara (Yobdi, Bosnabraid, Amoi), Biak Barât (Wardo)
Limitation to Access	Formal	Fish	Biak Timur (Tg. Warari, Wonihi)
		Fish and corals	Biak Utara (Douwbo)
	Informal	Fish	Biak Utara (Waromi)
Limitation to Access and Fee	Formal	Fish and corals	Biak Utara (Sansundi)

### Relation of Control System to Physical Condition

At a glance, it is difficult to determine whether physical condition of local natural resources related to the existing control system. In fact there are conditions where physical condition of fishing area shows different level of degradation. The degradation level varies from good to threatened, depending upon the fishermen's judgment. To them, the condition of the fishing ground is considered good if their fishing effort produces expected and reasonable yield. But when the turnout appear to be extremely lower than their expectation and the fishing ecology seems to be disturbed, their plain judgment on the physical condition is simply threatened. Appendices 2 to 5 indicate illusive relation between points of observation determined by GPS position, control system, and relative physical condition of the existing fishing area. These plausible associations are not the result of interrelationships between the parameters entangled in such connection. Yet, such corporations indicate logical relationships between points of observation and unnoted intervening variables in the area. On the other hand, the existing norms and their enforcement can be assumed as playing important roles in determining the level of damage of the physical condition of the observed area. This statement is supported by the fact that in all observed villages in *Kecamatan* Biak Timur, no matter what the control system is, all observed areas appear in relative good physical condition. On the other side, variation do occurs in *Kecamatan* Biak Utara in terms of relative physical condition of the observed areas. One possible explanation in comparing these circumstances is the difference in infrastructure, level of communication and the availability of transportation facilities. In Biak Utara, different physical condition of spots of fishing area shows different degrees of degradation. This condition is particularly due to the level of exploitation method and activity to satisfy the needs of the patrons or end users of such sea products.

## CONCLUSIONS

- (1) Social structure of fisheries in the islands of Biak and Supiori are related to the island's ecological condition, formal and non-formal rules and regulations, the government's development program, and the enforcement of the existing local rules of the study areas.
- (2) Form and enforcement of the existing local regulations vary between villages and style (top-down and grass-root style).
- (3) It is important to involve non-sociological parameters as the intervening variables to measure the effect of fishermen's social behavior on the degradation of local fishing spots' ecology.
- (4) The application and enforcement of local control system has significantly affect the quality of the study area's environmental condition and resources.

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**Appendix 1. Number of Household and Fishermen in the Study Area.**

Kecamatan	Desa (village)	Total HH	No. of Fishermen	% of Fishermen
Biak Kota	Parai	247	187	76
	Mokmer	100	N/A	-
	Urfu	192	90	47
	Samber	200	150	75
	<b>(Total)</b>	<b>(739)</b>	<b>(427)</b>	<b>(58)</b>
Biak Timur	Opiaref	142	20	14
	Kajasi	160	30	19
	Anggaduber	60	30	50
	Amini	53	33	62
	Wadibu	n.a.	N/A	-
	Tg. Warari	132	20	15
	Woniki	125	11	9
	Yenusi	115	15	13
	<b>(Total)</b>	<b>(787)</b>	<b>(159)</b>	<b>(20)</b>
Biak Utara	Yobdi	63	20	32
	Marui	115	20	17
	Saukobi	111	N/A	-
	Waromi	78	20	26
	Wasori	68	30	44
	Amoi	124	54	44
	Warsa	93	15	16
	Sansundi	32	8	25
	Douwbo	81	9	11
	Bosnabraid	70	30	43
	<b>(Total)</b>	<b>(835)</b>	<b>(206)</b>	<b>(25)</b>
Biak Barat	Wardo	32	8	25
Supiori Utara	Sorendiweri	56	3	5
<b>GRAND TOTAL</b>		<b>(2,449)</b>	<b>(803)</b>	<b>(33)</b>

**Appendix 2. Relative Physical Condition of Local Fishing Area With Global Positioning System (GPS Position): Kecamatan Biak Kota.**

Desa	Position GPS	Control System	Relative Physical Condition
Parai	S 01 11.545 E 136 09.305	Exclusion of outsiders	Good
Mokmer	S 01 11.922 E 136 08.818	Exclusion of outsiders	Threatened
Urfu	S 01 08.427 E 135 56.313		Good
Samber	S 01 08.398 E 135 54.415		Good

**Appendix 3. Relative Physical Condition of Local Fishing Area With Global Positioning System (GPS Position): Kecamatan Biak Timur.**

Desa	GPS Position	Control System	Relative Physical Condition
Opiaref	S 01 09.581 E 136 15.778	-	Good
Kajasi	S 01 10.104 E 136 14.716	Exclusion of outsiders	Good
Anggaduber	S 01 08.000 E 136 19.590	-	Good
Amini	S 01 07.311 E 136 20.342	Exclusion of outsiders	Good
Wadibu	S 01 09.035 E 136 20.342	-	Good
Tanjung- warari	S 01 06.182 E 136 21.360	Limited access	Good
Woniki	S 01 10.381 E 136 13.330	Limited access	Good
Yenusi	S 01 10.420 E 136 12.315	-	Good

**Appendix 4. Relative Physical Condition of Local Fishing Area With Global Positioning System (GPS Position): Kecamatan Biak Utara.**

Desa	GPS Position	Control System	Relative Physical Condition
Yobdi	S 00 52.843 E 136 02.802	Limited fishing, outsiders excluded	Good
Marui	S 00 48.654 E 135 58.246	Exclusion of outsiders	Good
Saukobi	S 00 53.925 E 136 02.841	Exclusion of outsiders	Good
Waromi	S 00 51.533 E 136 02.094	Limited fishing, no fee	Good
Bosnabraid	S 00 49.721 E 136 01.031	Limited fishing, outsiders excluded	Threatened
Wasori	S 00 49.721 E 136 00.277	Exclusion of outsiders	Good
Amoi	S 00 47.452 E 136 55.664	Exclusion of outsiders	Threatened
Warsa	S 00 50.448 E 135 35.252	Limited fishing, outsiders excluded	Threatened
Sansundi	S 00 41.402 E 135 49.137	Limited fishing, with fee	Threatened
Douwbo	S 00 42.912 E 136 47.235	Limited fishing, with fee	Threatened

**Appendix 5. Relative Physical Condition of Local Fishing Area With Global Positioning System (GPS Position): Kecamatan Biak Barat and Supiori Utara.**

Desa	GPS Position	Control System	Relative Physical Condition
Wardo	S 01 02.081 E 135 44.616	Limited fishing, outsiders excluded	Threatened Good
Sorendiweri	S 00 44.343 E 135 44.831		