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Sea Tenure and Its Transformation in the Sangihe Islands of North Sulawesi, Indonesia: The *Seke* Purse-Seine Fishery

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INTRODUCTION

Purse-seine is conducted widely in many parts of the world. It makes it possible to catch a large amount of fish per haul using a driving technique into a net. Modern bottom trawling is also known to be effective in yielding a big catch per haul. Despite the high productivity, these fisheries have two negative aspects. One is resource depletion due to overfishing and the second is a conflict between purse-seiner/trawlers and artisanal fishermen over the use of fishing grounds [MATSUDA and KANEDA 1984; JOMO 1991].

Purse-seine has not only an ill image. In Sangihe Islands of eastern Indonesia, a small-scale purse-seine has been conducted over hundred of years. However, it is now being replaced by modern purse-seine method. What makes the traditional purse-seine efficient and why is it disappearing? Did it have any merits in resource management and social stability? These questions may lead to assess factors involved for the sustainable use of purse-seining in the future.

In Sangihe-Talaud Islands of eastern Indonesia, the Sangiherese have conducted a traditional purse-seine over four hundred years since the Raja period [WAHYONO *et al.* 1991]. It is a communal net fishing technique that employs a unique fish-aggregating device or *seke*. *Seke* itself is a long fence some 30-40 m long, and made of finely-split bamboo sticks tied by ropes so as to make shadows underwater to escaping fish school. *Seke* also designates the fishing technique employed, as well as a group of fishermen that engage in the fishing activity under the auspices of a fishing leader or *tonaseng* who is usually an owner of *seke* and an expert of conducting fishing magic.

This fishing technique seems to have been undertaken exclusively by the Sangiherese inhabiting Sangihe Islands group and has been absent in other parts of Indonesia [SUBANI and BARUS 1988/89].

It can however be found only on two islands of Para and Batunderang at the present time while on other islands it has already been replaced by a modern purse-seine technique or *soma lingkar* without using *seke* fence. Use pattern of the

fishing grounds and entrepreneurship, distribution of the catch are also different between the two.

In order to scrutinize factors bearing such a change and underlying modernization process, the present paper aims to analyse the *seke* purse-seine fishing especially with reference to the sea tenure.

1. ISLANDS AND PEOPLE

Sangihe Islands, together with the neighboring Talaud Islands which lie to the east, form a chain between the northern tip of Sulawesi of Indonesia, and Mindanao of the Philippines (Figure 1). It faces the Pacific Ocean to the east, the Maluku Sea to the south, and the Sulawesi Sea to the west. Most of high islands

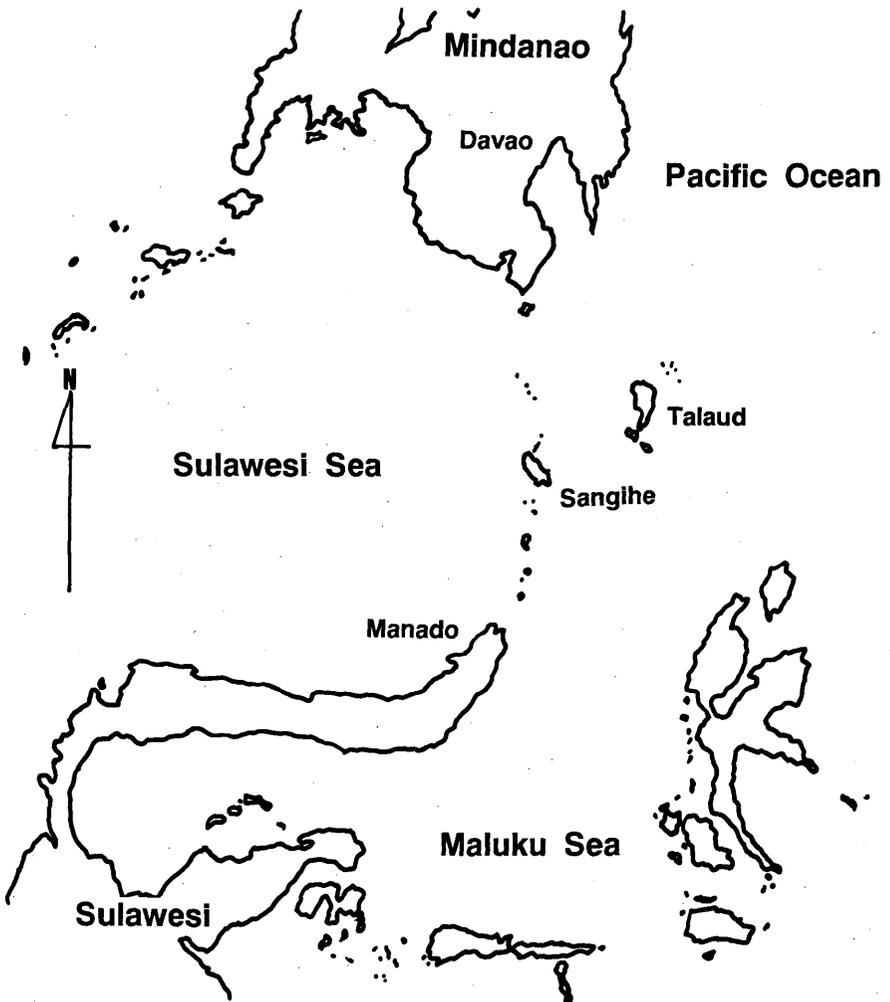


Figure 1. Sangihe Islands in Eastern Indonesia

are volcanic and rugged, others are low coral islands. The highest peak of the group is on the Sangihe Besar and it reaches 1700 m above sea level.

Fieldwork was conducted by the authors in 1991 and 1992 and four islands selected for the present study are Para, Kahakitang, Bebalang and Batunderang which are located at the south of the Sangihe Besar. Administratively, Para and Kahakitang and nearby islands such as Mahengetang and Kalama belong to the Tamako district whereas Bebalang and Batunderang to the Manganitu district (Figure 2). Also, supplementary information of the *seke* on Bukide Islands, located at the northeast off the Sangihe Besar, a major Island of the Sangihe Islands was collected on Tahuna, a capital town on Sangihe Besar during the survey in 1991.

Geographical features of these four islands differ island by island. Land mass of Batunderang is about 3.0 km² and that of Para and Kahakitang being about half of it. Bebalang is a tiny islet and land mass is about one tenth of Batunderang. Para is composed of several small islets but only two of them are inhabited.

Population on each island is fairly large, and it is 1692 (Para), 1935 (Kahakitang), 602 (Bebalang), and 1059 (Batunderang) in 1990 (Table 1). The Sangiherese-speaking inhabitants on these islands live separately at hamlets or *dusun*, and each hamlet forms a practical unit of daily economic activity.

Islanders obtain fish as a source of daily protein food as well as for sales. Although the degree of dependence on agriculture differs island by island, major subsistence crops for cultivation are generally the same. These are starchy food such as sago, cassava and sweet potato while coconut, nutmeg and clove are cultivated as important cash crops. The latter two crops were introduced, in case of Para, around 1950s and 1975, respectively.

2. FISHERIES IN THE SANGIHE ISLANDS

Due to the islands' location in tropical waters and yet the absence of extensive lagoons, fisheries in Sangihe Islands are characterized by net fishing for surface-swimmers and line fishing for demersal species. Of net fishing, purse-seine and drift net are major entries. These net fishing are done communally on an annual basis. Target species are such schooling fish as mackerel scad (*Decapterus* spp.), fusilier (*Caesio* spp.) and garfish (*Hemiramphus* spp.) [MASUDA *et al.* 1975].

Line fishing is, on the other hand, basically an individual-oriented activity. Troll line, drop line, and long line are practiced. Major catch includes shark, mackerel tuna, trevally, grouper, and other reef fish.

Other than these, several small-scale fishing techniques are employed. Traps (*igi* or *bubu* in Indonesian), made of bamboos and rattan are used in shallow waters. Generally, these traps are small in size and are round, pentagonal or conical in shape. Reef fish are a major target and sea-algae is often used as bait for attracting fish into the trap. Trapping activity is yearly-based and individualistic

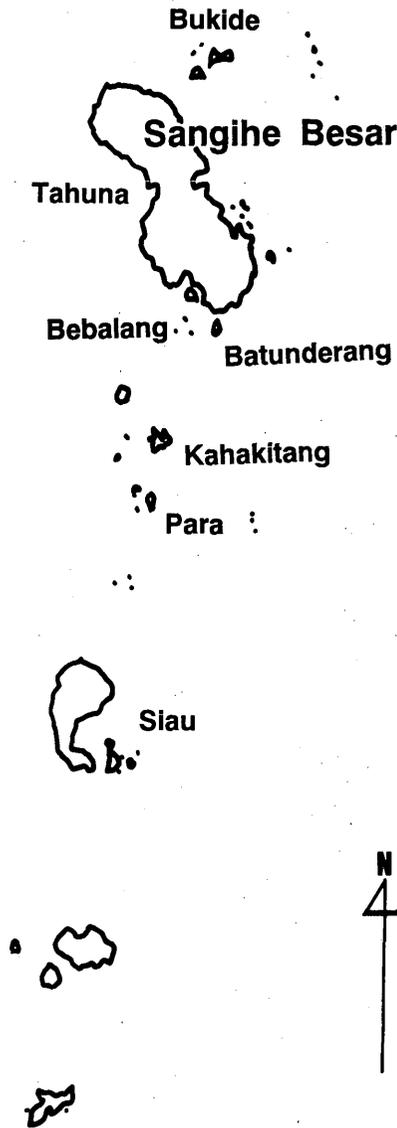


Figure 2. Study Areas in the Sangihe Islands

rather than communal. A kite made of wild *Polypodium* leaf baited with a spider web or shark skin is specifically prepared for catching needlefish. Stupifying fish used to be practiced with crushed roots of *Derris* and unidentified stalks of plants. The use of fish poison is now banned.

Harvest of sea-cucumber, trochus shells, and sea algae are exclusively for commercial purposes. Fish aggregating devices known as *bagan* and *rumpon* in

Table 1. Population and Household Number of Four Study Islands

Island	Population		Total	Area (km ²)	Popu. Density	No. of <i>Dusun</i>	No. of Household
	M	F					
Para	859	833	1692	1.4	1208.6	3	357
Kahakitang	902	1033	1935	1.6	1209.4	6	404
Bebalang	329	273	602	0.34	1770.6	3	228
Batunderang	553	506	1059	3.0	353.0	3	325

Indonesia as well as a stationary bamboo weir or *sero* have never been employed in the area, excepts in Tahuna of Sangihe Besar where inhabitants of *kampung* Tidore (the former migrants' settlement from Tidore Island) use *rumpon* fishery in the coastal waters.

In most of the fishing activities, small double-outrigger canoes or *londe* are used. These have a long projection extending from the bottom of the bow [SHIBATA and MASENGI 1991: 44-55]. It is about 4 to 7 meters long. For loading a purse-seine and a big amount of fish catch, medium-sized canoes (*pelang* and *pamo*) are employed. Some *pelang* is modified so as to have a stern transom for being equipped with outboard engine [SHIBATA and MASENGI 1991: 50-51].

For the Sangiherese who inhabit an isolated island environment, fish is a major source of daily food. During our stay on these four islands, mackerel scad and fusilier taken by *seke* or mackerel tuna caught by trolling were served for almost every meal as a side-dish of sago and cassava. Fish is also an important source of income for the islanders. A large amount of raw or smoked mackerel scad fish is transported to neighboring islands or markets along the coast of Sangihe Besar.

Sometimes salted or smoked fish are transported as far as Manado by a small passenger ship which connects between Tahuna and Manado. Mackerel scad is an important fish in such a dealing. A price of smoked mackerel scad fish per tail is 50-100 Rupiah (1000 Rupiah is about 50-60 Japanese yen) on the island of production whereas it rises 100-250 Rp. in Tahuna. Shark fins are also important as these are sold at high price to the Chinese in Manado.

3. ETHNOGRAPHY OF PURSE-SEINE FISHERY (*SEKE*)

1) *Seke* Equipment and Catch

Seke is a kind of fish-threatening device made of bamboo fence attached with long coconut-leaf ropes on both sides. In the purse-seine fishing it is supported by several men who hold long bamboo poles individually at some distances so as to make the *seke* stood upright underwater and hence to block a fish school to flee (Figure 3).

A set of *seke* fishing device is composed of *pandihé*, *elisé*, and *usu*. *Pandihé*



Figure 3. *Seke* Equipment in Para Island
One *tonaseng* is repairing the *seke*.

is a main part of *seke*. It is a long bamboo fence, which is about 25 fathoms or 45 m long and 80–90 cm high. Splitted bamboo stick of 0.8 to 1.0 cm wide are sewn by rattan ropes to make a long fence. Pieces of coconut leaves of 70–80 cm long are attached to the upper and the lower parts of bamboo stick at about 10 cm distance.

Both ends of the fence are connected by a hard wooden stick, from which are tied by a long rope made of palm fibres about 100 to 150 m long, respectively. This rope is *elisé*. It is rolled by young coconut leaves or *tuwo* as a means to

threat fish. *Tuwo* is renewed every two months as it becomes old and torn. Those who contribute for preparing *tuwo* are privileged to receive about 200 fish from *tonaseng*. This present is called *kakendage*. In the *seke* fishing *tuwo* is alternatively called *elisé*.

Usu is a long bamboo pole of 7-12 m, and one end is inserted by a fork-shaped hard wood. This pole is held by swimmers in the water in order to make the *seke* upright. For supporting *seke* in the water, about seven to ten *usu* poles are employed (e.g., seven to ten men).

Major catch of *seke* fishing is mackerel scad. *Malalungis* is a common name for this fish species, but locally in the Sangihe Islands, it is termed as *talang*. It is generally composed of two species; *Decapterus maruadsi* (*talang biasa*) and *D. russellii* (*talang mahamu*). The latter tends to be caught by longline technique, and thus called *anguru malalungis* (lit., *anguru*; wire). In addition, fusilier (*Caesio* spp.) and unicornfish (*Naso* spp.) are mixed catch.

A school of mackerel scad fish is generally called *bawatang*, and it is further classified according to size and condition of the school. A small school of fish is called *sinpalang* while a big one as *swenehe*. A sparse aggregate of fish is called *kina kaese*, and fish in a chaotic condition is termed *kina magila*. *Kina* denotes fish in the Sangiherese.

2) Fishing Organization and Operation

Fishing operation is held twice a day when mackerel scad may rise and aggregate around reef areas. It corresponds to feeding time of this fish. Thus, the fishing time is focussed upon the natural cycle of fish behavior. A fishing party departs the village around 04:00 in the morning and around 16:30 in the evening of the same day. Fishing starts about 05:00 and 17:30 in the evening that ends one and half hour later when a fish school is finally hauled. It is not clear if lunar cycle may affect an amount of catch. However, it should be noted lamp and illuminating apparatus are banned in *seke* fishing, and it suggests that the moon light may not be a primary factor in the fishing. The major function of *seke* is to block fish to flee as the *seke* underwater may be seen as a barrier or shadow for the fish.

No less than eight or ten fishing canoes take part in the *seke* fishing in which 40 to 50 participants work altogether. Two canoes that load *pandihé* and *elisé* are called *pondole*. A boat carrying a purse-seine net is called *pamo* and several small double-outrigger canoes (*londe*) which load divers and workers, and especially one for a fishing leader (*tonaseng*).

In each fishing group, there are some division of role and work. Most important is *tonaseng* who is an expert not only in the operational skills and knowledge in fishing but also as a mastery of "fish calling magic". Usually, the elder experienced men are elected as *tonaseng*. *Tonaseng* is always supported by young fishermen who are good divers and usually work as pilots to search for a fish school before the *seke* and net are cast in the water. Such pilot fishermen are

called *mararui* and a few members in each group are allocated for the job.

When a school of fish is found by the *mararui*, shouting by *mararui* signals members on two *pondole* canoes to start casting *seke*. About seven to ten men and women who dive in the water and hold *usu* bamboo poles and make the *seke* upright position are called *tetelidé*. While a *pamo* boat spreads a net and stands-by for hauling an aggregating fish, several men dive and try to chase fish into a encircling net. These men are called *matobo*. There are about five *matobo* in each group, and they are selected in the meeting under the direction of *tonaseng*. If the wife of a *matobo* is pregnant, he cannot attend as a *matobo* diver until his wife delivers a baby. Otherwise, the fish are said to flee. As the fish is driven into a net, *tonaseng* delivers a direction to members on a *pamo* boat to haul the net. On this occasion, the pressure lamp is used for lighting when hauling fish into the boat.

3) *Seke* and Social Organization

Members in *seke* fishing are usually fixed and those who belong to a particular group of *seke* fishing are also termed *seke*. For instance, in Para, there are six groups of *seke* fishing; Balaba, Lumairo, Ramenusa, Lembo, Lembe, and Kampium. An individual group consists of 40 to 58 households as shown in Table 2. Household is an important socio-economic unit in rural Indonesia. Here, households are used as a term almost synonymous with nuclear family [MANUS *et al.* 1992]. It should be noted that all men and women, young and old, of these households are potential members of *seke* fishing. Members in each group are also affiliated with another social organization.

Generally, members of six groups reside near the coastal hut where *seke* equipment and canoes are stored (See Figure 3.). However, it does not mean that *seke* groups are resident-oriented. On the other hand, a residential group itself is called *mapaluse* by which cooperative labors such as gardening, roof thatching, and church activity are organized.

For instance, one group of *seke* fishing, Ramenusa is composed of members belonging to 48 households. However, members of Ramenusa, can also be divided into six residential groups or *mapaluse*; Lele satu, Lele dua, Lele tiga, Lesa satu, Lesa dua, and Hego tiga, among which Lele satu has the greatest number.

Table 2. *Seke* Group and Number of Household included

Name of Group	No. of Household	No. of <i>Seke</i> Owned
Balaba	50	1
Lumairo	58	1
Ramunusa	48	1
Lembo	40	1
Lembe	40	1
Kampium	45	1

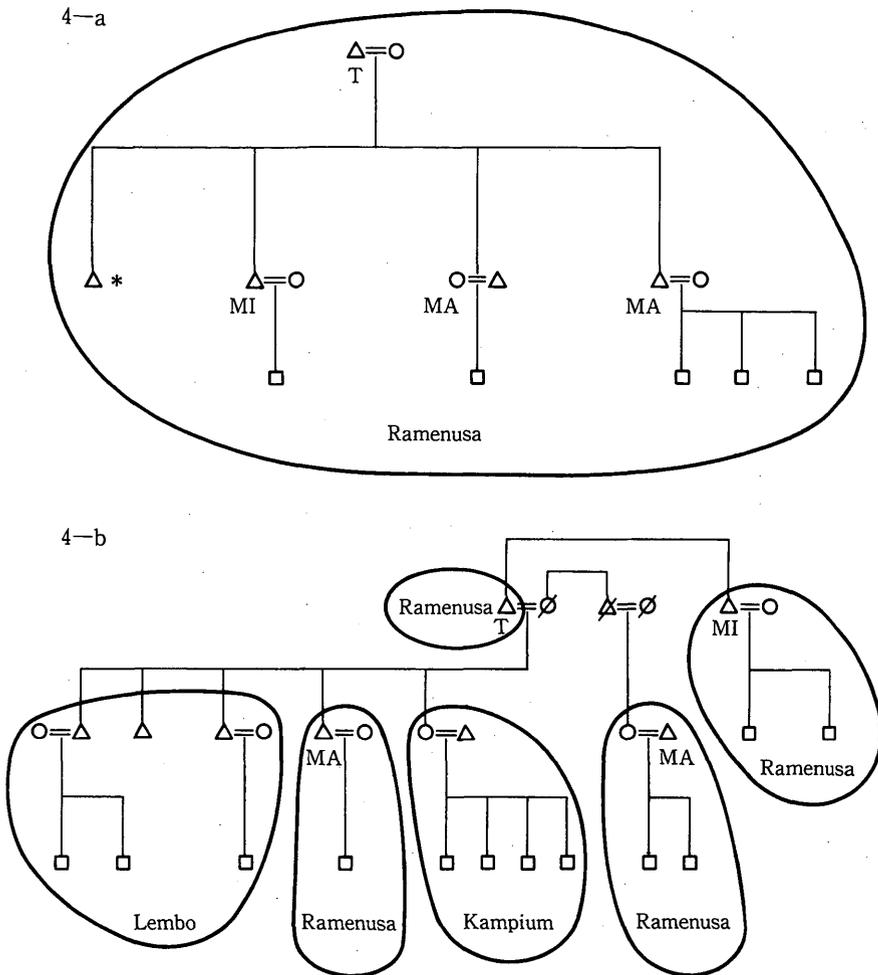


Figure 4. Examples of *Seke* Group Formation

T: *Tonaseng* (fishing leader), MA: *Manobo* (diver), MI: *Mindoreng* (distributor)

Lembo, Ramenusa and Kampium designate names of *seke* groups.

*: staying in Manado, and this man does not get share of fish.

○ shows the name and range of *seke* group membership.

Satu, dua and tiga means 1, 2, and 3.

The same kin group members do not always belong to the same *seke* group nor residential group. Figure 4 shows how members of the households belong to both *seke* group and residential group. Members included in Figure 4-a belong to Ramenusa *seke* group and all members are also affiliated to the same residential group; Lele satu. On the contrary, Figure 4-b shows that there are members belonging to different *seke* group (e.g., Ramenusa, Lembo and Kampium) and different residential groups despite the same kin affiliation. Only one family live in

Lele satu, the others living in other residential areas. These suggest that *seke* group organization is unique as it is distinct from both kin and residential affiliation.

4) Fish Distribution

Most conspicuously, fish catch in the *seke* fishery is shared, based on equity principle. For instance, membership of fish share is accounted regardless of age and sex. Also, shares are given to some important community members as well as the unprivileged such as village head, school teacher, midwife, nurse, priest, widower, and orphan.

Practical distribution of the catch is made by the *mindoreng* or secretary of the *seke* group in three steps. First, from the total catch those for village head, school teachers, midwife, nurse, widower, priest, and orphan are deducted. This portion is termed *tonggole*. Second, certain amount of the catch is distributed to group leaders of *seke*; *tonaseng*, secretary and treasurer. Generally, the secretary receives his own share after all the other members have taken theirs. For this reason, he often does not receive any profit when the catch is small. At the third step, group members receive their own shares. Table 3 shows one example of the catch distribution when one group consisting of 40 household members caught about 4,000 fish in August, 1991.

According to the information, the amount of catch in Singgaluhang seems constant during the last decade. Its price, however, fluctuates year by year between 15 Rp. and 35 Rp. per tail. One fish is about 60 to 80 g, and in each haul a large amount of catch between 3.3 tons and 5.2 tons of fish is gained. Annual landing may be 165–250 tons and it corresponds to 185–280 millions Rp. In other fishing grounds near Para Island, catch trend seems more or less the same.

4. SEA TENURE IN SEKE FISHERY

How individual or group of fishermen decide to choose particular fishing grounds may be associated with various factors. Not only physical factors such as winds, tidal rhythms, and fish migration, but also such socio-economic conditions as the number of fishermen engaged in the fishing, the price of fish and the technology employed may considerably affect the use pattern and frequency of the fishing ground [RUDDLE and AKIMICHI 1989; CORDELL 1989].

Hitherto, it has been demonstrated that there exist a variety of institutions and practices to limit access to particular marine resources [JOHANNES 1978; CHRISTY 1982]. These sea tenuring practices are considered as a means to avoid social conflict over the use of fishing grounds, and/or to serve for the sustainable use of marine resources [ACHESON 1975; CARRIER 1980, 1987; RUDDLE and AKIMICHI 1984; RUDDLE and JOHANNES 1985].

Here, we will see specific tenuring practices that have been claimed by local fishermen who engage in purse-seine fishing in the Sangihe Islands. The case of

Table 3. Share System among the Group Members of *Seke* Fishermen in Para Island

	Households Members	Share Quantity (tail)
I. COMMUNITY'S LEADERS		
1. Village Head	1	9
2. Village Secretary	1	9
3. Priest	1	9
4. School Teachers	6	54
5. Nurse	1	9
6. Midwife	1	9
7. Church Charity	3	27
II. GROUP LEADERS		
1. Head of Group	6	108
2. Secretary	5	90
3. Tresurer	7	126
III. GROUP MEMBERS		
1.	5	90
2.	4	72
3.	7	126
4.	10	180
5.	2	36
6.	4	72
7.	3	54
8.	2	36
9.	5	90
10.	6	108
.	.	..
.	.	..
.	.	..
40.	5	90
Total	229	3996

Source: Survey data, August 1991.

Note: No. 11-39 of group members omitted.

five islands were compared regarding sea tenuring behavior in the purse-seine fishing.

Fishing grounds used by purse-seine are located at inshore waters of the individual islands. These are generally claimed as the village ownership. By village, it is defined *desa* as a unit of the administrative organization where village head (*kepala desa* or *opolao*) works as a leader of the village. Within a village, there are several hamlets or *dusun* in which a head of the hamlets (*kepala dusun*) administers general affairs of the hamlets.

Individual fishing site for purse-seine is not used freely, but subject to certain rules. Customary sea tenure to regulate the access to fishing grounds may be

Table 4. Name of *Seke* Fishing Grounds in Four Selected Islands

Island	Unit in Use (): No. of Group	Name of Fishing Ground (): No. of FG
Batunderang	Dusun (3)	Anpulanging, Bunaking, Bénteluhang, Beoe, Kalea, Lahiaka, Mala, Punguwatu, Éhé, Dolosang (10)
Para	Kelompok (6)	Bintobago, Binuwu, Mangareng, Lanteke, Singgaluhang (5)
Bukide	Dusun (8)	Baturila, Sasarane, Tuhong, Talahahé, Kawa, Lémbuta, Kélumang, Nipa Géghuwa, Nipa Rio, Talahamu, Salise, Sésihang, Laengbira, Mélahuwo, Poa, Liang, Tatengkelang, Limbalo, Bukide (19)
Kahakitang	Dusun (6)	Tapurung, Siha, Hiwu, Linggoan, Salehe, Batulohang, Torengikan, Taleko, Areng kambing, Sowang (10)

analysed in line with factors such as ecology of fishing (fish behavior, marine environments, and technology employed), cultural and social conditions (ownership of the fishing gears, distribution of the catch, use of magic) [CORDELL 1989], but here special attention is paid to the use pattern of fishing grounds in purse-seine fishery.

In *seke* fishing, any fishing ground is used communally, either by *dusun* or *kelompok*, a particular group within the *dusun*. In Table 4, names of the fishing grounds used in *seke* fishing of four islands of Para, Kahakitang, Batunderang and Bukide are illustrated.

As shown in the Table, basic unit of *seke* fishing operation is either a *dusun* or a *kelompok*. The number of units also varies island by island and the details will be described below.

In Batunderang, three existing *dusun* have their own *seke* and each *dusun* has claims for specific fishing grounds; *i.e.*, Dusun-1 (Soa) has three, Dusun-2 (Mala) three and Dusun-3 (Metengihe) four, respectively. How to choose the fishing ground of the day then depends on temporary abundance of fish in either of *dusun*-owned fishing grounds. Indeed, the leader of a group decides the spot of the day, based on a prior inspection by a fellow fisherman. Location of each *seke* fishing grounds is shown in Figure 5.

In Bukide, on the other hand, fishing grounds are similarly divided by eight *dusun*, but these are not exclusively used by a particular group. Five of the nineteen fishing grounds are allowed to use communally by more than two groups (fishing grounds number 4, 5, 14, 15, and 16 in Figure 6.). Three of such fishing grounds are located around uninhabited small islets of Liang and Poa while the other two being nearby the village (4 and 5). Also, number of fishing grounds retained by *dusun* differ widely as shown in Table 5.

In Kahakitang, there used to be ten *seke* fishing grounds around the island. Five of the six *dusun* on the island had each their own fishing grounds that could be used exclusively (Figure 7). Only one *dusun* (Behongang), located at the center

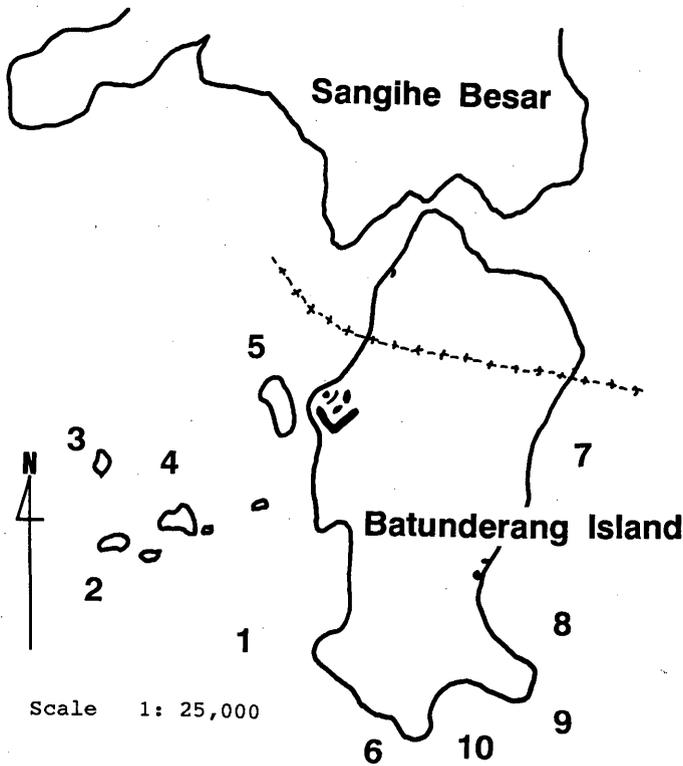


Figure 5. Location of *Seke* Fishing Grounds in Batunderang Island

- | | |
|----------------------|--------------------|
| 1. Anpulanging (D-1) | 6. Lahikia (D-2) |
| 2. Bunaking (D-1) | 7. Mala (D-2) |
| 3. Bénteluhang (D-3) | 8. Punguwatu (D-3) |
| 4. Beoe (D-1) | 9. Éhé (D-3) |
| 5. Kalea (D-2) | 10. Dolosang (D-3) |

D-1, D-2, and D-3 indicate names of *Dusun*.

of the island could get access to five fishing grounds (fishing ground number 1, 2, 3, 4, and 5 in Figure 7), using three sets of *seke* equipment. No particular arrangement was required, however, as three *seke* were connected together as a longer unit. In the other fishing spots, a particular *dusun* is owned and used exclusively. In other words, fishing ground number 6 by *Dusun* Daleko, 7 by *Dusun* Bembanehe, 8 by *Dusun* Taleko, 9 by *Dusun* Batusaiki, and 10 by *Dusun* Sowang. Kahakitang's case falls into a general pattern of communal use as found in Batunderang.

In Para, the basic unit of fishing operation is not *dusun* but particular group or *seke*. Para has a long history regarding the use of fishing grounds in *seke* fishing. Since the early 18th century when Rajas of Siau Island governed the area, six fishing grounds (*purihé*) have been exclusively exploited using *seke* as is shown

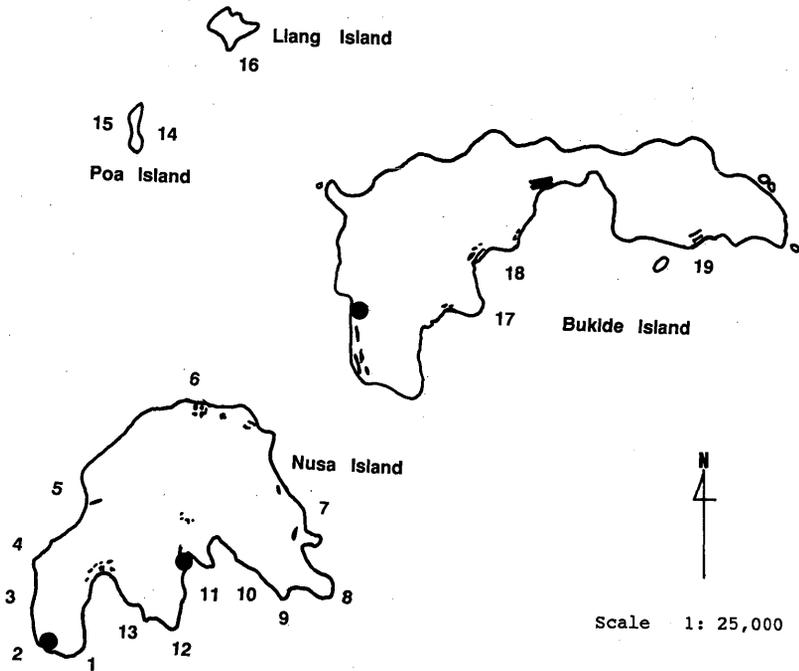


Figure 6. Location of *Seke* Fishing Grounds in Bukide Islands

- | | |
|------------------------|---------------------------|
| 1. Baturila (D-1) | 11. Salise (D-5) |
| 2. Sasaane (D-1) | 12. Sésihang (D-4) |
| 3. Tuhong (D-1) | 13. Laengbira (D-4) |
| 4. Talahahe (D-1, D-3) | 14. Mélahuwo (D-2, D-5) |
| 5. Kawa (D-3, D-5) | 15. Poa (D-2, D-5) |
| 6. Lémbuta (D-2) | 16. Liang (D-2, D-5, D-7) |
| 7. Kélumang (D-6) | 17. Tatengkelang (D-7) |
| 8. Nipa Géghuwa (D-6) | 18. Limbalo (D-7) |
| 9. Nipa Rio (D-5) | 19. Bukide (D-8) |
| 10. Talahamu (D-5) | |

D-1: Tinakarewa, D-2: Nane (Dakale), D-3: Lue, D-4: Nusa, D-5: Daleweng, D-6: Nipa, D-7: Tatengkelang, D-8: Bukide (Each indicates names of *Dusun*).

Table 5. Use of Fishing Grounds by *Dusun* in Bukide Islands

Use Pattern	D-1	D-2	D-3	D-4	D-5	D-6	D-7	D-8
Exclusive	3	1	0	2	3	2	2	1
Communal	1	3	2	0	4	0	1	0
Total	4	4	2	2	7	2	3	1

D: indicates *Dusun*.

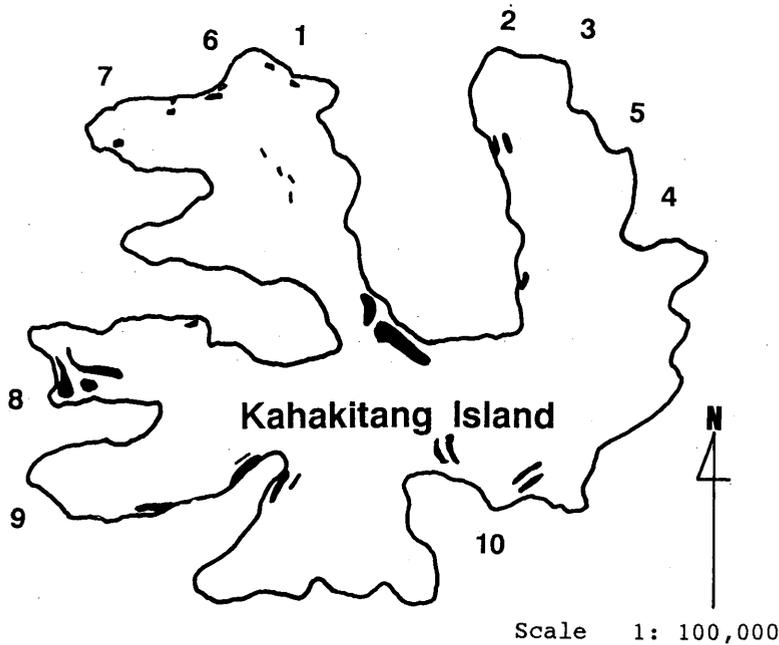


Figure 7. Location of *Seke* Fishing Grounds in Kahakitang Island

- | | | |
|-------------|---------------|-----------------|
| 1. Tapurung | 4. Linggoan | 7. Torengikan |
| 2. Siha | 5. Salehe | 8. Taleko |
| 3. Hiwu | 6. Batulohang | 9. Arengkambing |
| | | 10. Sowang |

in Figure 8. Amongst them all, Singgaluhang, being located ten kilometers south from Para Island, provides the richest ground for mackerel scad while the other four fishing grounds are located at near the home island of Para.

In Singgaluhang, fishing has been permitted only for three months (between around May 20 and August 20) while in the other fishing was to be conducted yearly-based. According to one *tonaseng* of about 70 years old, there existed six *seke* groups when he was nominated as *tonaseng* in 1962. Singgaluhang was, at that time, used together with two groups whereas the other four fishing grounds were fished by the five groups throughout the fishing season. During the rest of the year, four fishing grounds were used in daily rotation. However, since 1980 the only one group has been permitted to use the Singgaluhang fishing ground. This is not because of the fish depletion but due to the population increase of the island. For example, before 1980 members in each group were between 15 and 20 households but these have reached 40–58. Now, Singgaluhang can be exploited by only one group every year between May 20 and August 20, and rotation is

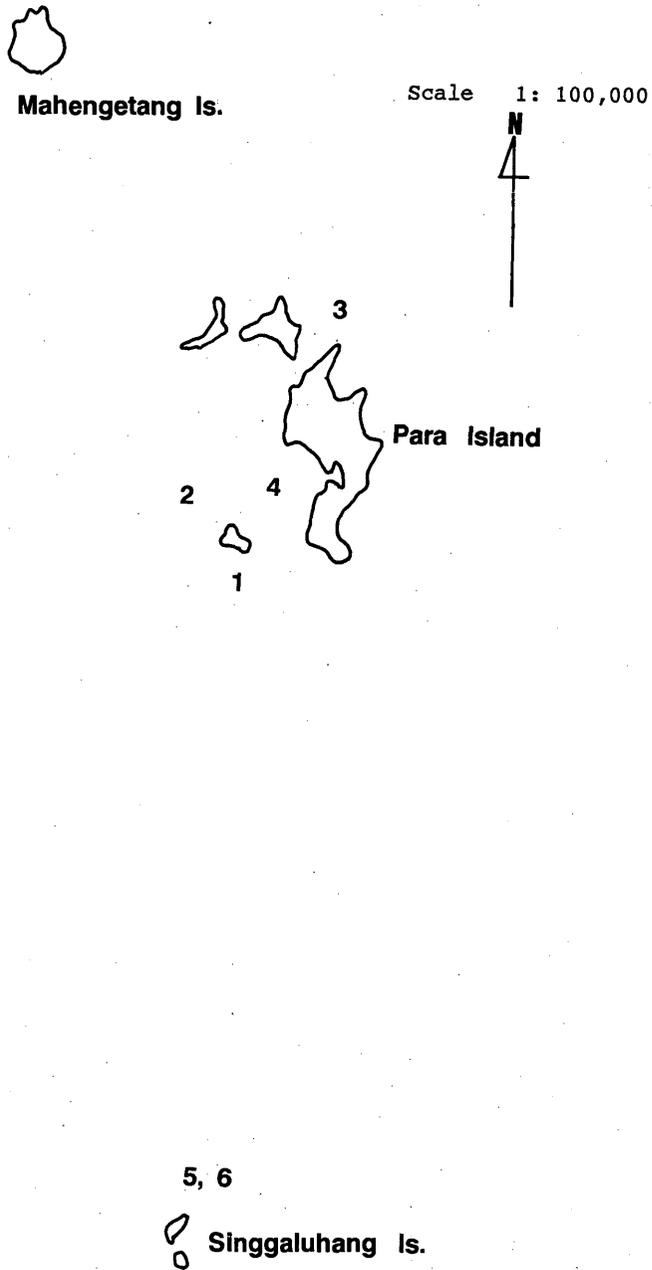


Figure 8. Location of *Seke* Fishing Grounds in Para Island

- 1. Bintobango 2. Binuwu 3. Mangareng
- 4. Lanteke 5. and 6. Singgaluhang

Table 6. Rotational Use of Singgaluhang Fishing Ground (1980–1997) in Para Island

Name of the <i>Seke</i> Group		Year		
1	Balaba	1980	1986	1992
2	Lembe	1981	1987	1993
3	Lumairo	1982	1988	1994
4	Ramenusa	1983	1989	1995
5	Lembo	1984	1990	1996
6	Kampium	1985	1991	1997

Table 7. Rotation of Fishing Operation in Four Fishing Grounds of *Seke* by 6 groups in Para Island

Day of the Week	Tantobango	Fishing Ground Binuwu	Mangareng	Lanteke
Mon	Ra	Ba	Lo	Lu
Tue	Lo	Lu	Le	Ra
Wed	Le	Ra	Ka	Lo
Thr	Ka	Lo	Ba	Le
Fri	Ba	Le	Lu	Ka
Sat	Lu	Kp	Ra	Ba

Ra: Ramenusa, Ba: Balaba, Lo: Lembo, Lu: Lumairo, Le: Lembe, Ka: Kampium.

practiced annually among six existing groups (Table 6). Thus, Singgaluhang is temporarily occupied by the fishermen's group during the fishing season. As the fresh water is lacking on the island, a few fishermen return to Para to bring back fresh water every three or four days.

During the rest of the year (*i.e.*, from September to April) four fishing grounds in nearshore waters of Para Island, are also used rotationally by six groups. Rotation is practiced on a daily basis except on Sunday. By this, each group can equally exploit four fishing grounds within a week (Table 7). Rotational use (*rorose*) of the fishing grounds for *seke* based on annual and daily cycles characterizes *seke* fishing sea tenure in Para.

From four examples mentioned above, it is evident that there exists a differential tenure system in *seke* fishing between the exclusive ownership and the rotational allocation. Whether or not the corresponding tenure system fits the society may need further inquiries, but it should be noted that the idea on the common-pool resources [OSTROM 1990] is differentiated even among communities that share the same socio-cultural tradition.

5. SEA TENURE IN SOMA FISHERY

Nowadays, two types of purse-seine are conducted, *seke* and *soma lingkari*,

and these can be distinguished in technological and socio-economic terms. *Soma* and *lingkar* denote "net" and "to encircle", respectively. Purse-seine net is usually 90–100 m long and the depth of the net is 5–8 m. A bigger type of net has 200 m length and 6–7 m depth. Stone sinker (2–7 kg) is attached with 1.2 m rope and bound with the lower end of the net every 3–4 m interval. Fishing technique of *soma* is similar to *seke* fishing in which a schooling mackerel scad is driven into a purse-seine net.

As we have seen, *seke* has been employed over hundred of years whereas *soma* has been introduced quite recently in the 1970s to eastern Indonesia. The latter does not employ *seke* equipment in fishing operation. In this section, use pattern of fishing grounds in *soma* fishing will be examined.

In Para, there are 24 units of *soma* purse-seine nets owned and operated by individual groups, which consist of 15 to 23 male members. As only four fishing grounds for *soma* fishery (Mamalokang, Batuleke, Bawondeke and Nenung) are available, daily rotation is also applied for the equity. Sunday is excluded from this rotation, and each group can operate as many as four to seven times monthly (Table 8).

In Kahakitang, there are 31 fishing grounds used for *soma* fishing. Contrary to the case of Para, each of these fishing grounds is claimed by 31 individuals who are the net-owners as well. The number of owners both of nets and fishing grounds, differ *dusun* by *dusun* as Table 9 shows. It should be noted here that fishing ground are not located within the proximity of owners' residential area as shown in Figure 9. It is apparent that in Kahakitang the sea is privatized by individual owners of nets. Interestingly, only one of the 32 net-owners does not have his own fishing ground as he has just purchased a net and started operation since one month before of our research in 1991. Despite this handicap, he can use any spot, so long as it is not owned by the others.

Exceptionally, the Tapurung fishing ground, located at north of the island is appointed as a common property of the village as a whole (*kampung taghuwangé*). This fishing ground used to be exploited for *seke* fishery. As it potentially abounds in fish, four or five groups would operate almost daily in adjacent waters (See Figure 7.).

In Bebalang Island, 11 fishing grounds for *soma* are claimed and divided by three *dusun* as shown in Figure 10. As *soma* fishery on this island develops into two types, the use of fishing grounds is differentiated into two; one is by a large-scale net (*soma kaum*) and the other a small-scale net (*bawululé*). Owners of *soma* net differ in number according to *dusun*; Dusun-1 (one *kaum* and one *bawululé*), Dusun-2 (three *kaum*) and Dusun-3 (one *kaum* and seven *bawululé*). About half of the fishing grounds are subject to the exclusive use by *dusun*, but the others are permitted for communal use by two or three *dusun*. If more than two groups happen to encounter at the same fishing ground, there is no particular rule to solve the trouble or conflicting situation. In practice, however, even in such a case, every participating group can operate together in the neighboring waters

Table 8. Rotation of the Fishing Operation in Four Fishing Grounds of *Soma* by 24 groups in Para Island

Date	Fishing Grounds							
	<i>Mamalokang</i>		<i>Batuleke</i>		<i>Bawondeke</i>		<i>Nenung</i>	
	Group	No.	Group	No.	Group	No.	Group	No.
1.	1	15	24	21	23	17	22	20
2.	2	25	1	15	24	21	23	17
3.	3	20	2	25	1	15	24	21
4.	-	-	-	-	-	-	-	-
5.	4	25	3	20	2	25	1	15
6.	5	25	4	25	3	20	2	25
7.	6	25	5	25	4	25	3	20
8.	7	25	6	25	5	25	4	25
9.	8	15	7	25	6	25	5	25
10.	9	20	8	15	7	25	6	25
11.	-	-	-	-	-	-	-	-
12.	10	15	9	20	8	15	7	25
13.	11	15	10	15	9	20	8	15
14.	12	15	11	15	10	15	9	20
15.	13	20	12	15	11	15	10	15
16.	14	17	13	20	12	15	11	15
17.	15	17	14	17	13	20	12	15
18.	-	-	-	-	-	-	-	-
19.	16	20	15	17	14	17	13	20
20.	17	18	16	20	15	17	14	17
21.	18	23	17	18	16	20	15	17
22.	19	20	18	23	17	18	16	20
23.	20	22	19	20	18	23	17	18
24.	21	17	20	22	19	20	18	23
25.	-	-	-	-	-	-	-	-
26.	22	20	21	17	20	22	19	20
27.	23	21	22	20	21	17	20	22
28.	24	21	23	21	22	20	21	17
29.	1	15	24	21	23	21	22	20
30.	2	25	1	15	24	21	23	21
31.	3	20	2	25	1	15	24	21

Source: Survey data, August 1991.

No.: indicates number of members included in each *soma* group.

-: Holiday.

(*senkasio mévmévlo*). If five nets are lined-up side by side, nobody knows which net gains most. The fishermen say that the success depends on the luck.

On the other hand, *Dusun-3* has five fishing grounds for exclusive use. As there are seven nets in this *dusun*, prior arrangement to avoid crowding appear to be made. When a large *kaum* is announced to operate at a certain spot, the other

Table 9. Number of Owner of *Soma* Net by *Dusun* in Kahakitang Island.

Dusun	Population		T.	No. Household	No. of Owner
	M	F			
1	201	210	411	79	4
2	139	162	301	72	5
3	167	216	383	74	10
4	136	168	304	63	10
5	137	153	290	55	1
6	122	124	246	61	2

small *bawulsé* netter refrain from using the spot. And in the same fishing grounds no more than two nets are usually operated (Table 10).

6. TRANSFORMATION OF SEA TENURE IN PURSE-SEINE IN THE SANGIHE ISLANDS

At the time of the present research in 1991, the *seke* fishery was not conducted so widely as it was before, but only on two islands of the Sangihe group; Para and Batunderang. In the other islands, *seke* fishery disappeared and was replaced by *soma* fishery. This has certainly coincided with the nationwide and global social change during these few decades [BAILEY *et al.* 1987; POLLNAC *et al.* 1992]. In Indonesia, traditional marine practices for conservation have been witnessed nationwide around that period of time [POLUNIN 1985].

Even in the local setting, change in fishing technology has also been seen in the small-scale purse-seine fishery in north Sulawesi. In Kematiga of Minahasa Regency, for instance, the old *giop* fishery for mackerel scad has been replaced by the new *pajeko* technique in which more capital investment is required for the operation but higher income is expected than by the *giop* [MANUS *et al.* 1992].

It should however be noted that the transformational process that each area and individual fishing community have experienced is not the same, but there may exist a differentiation in terms of sea tenure, ownership of fishing grounds, and distribution of catch. In this section, factors involved in the process from *seke* to *soma* are examined from cases that have already been described, and the significance of the study as to the change in small-scale fishery will be mentioned [AKIMICHI 1992].

In the past, in the Singgaluhang fishing ground used by Para fishermen, two groups used to operate, but due to the increase of the number of participant, fish share per capita became smaller than before. Then, the entry to this fishing ground was restricted to only one group in 1980. Agreement was made through the joint meeting among *tonaseng*. Such a customary meeting as above is generally termed as *gighilé* (Indonesian as *musyawarah*). The community-based negotiation and customary practices over the sustainable use of resources may be

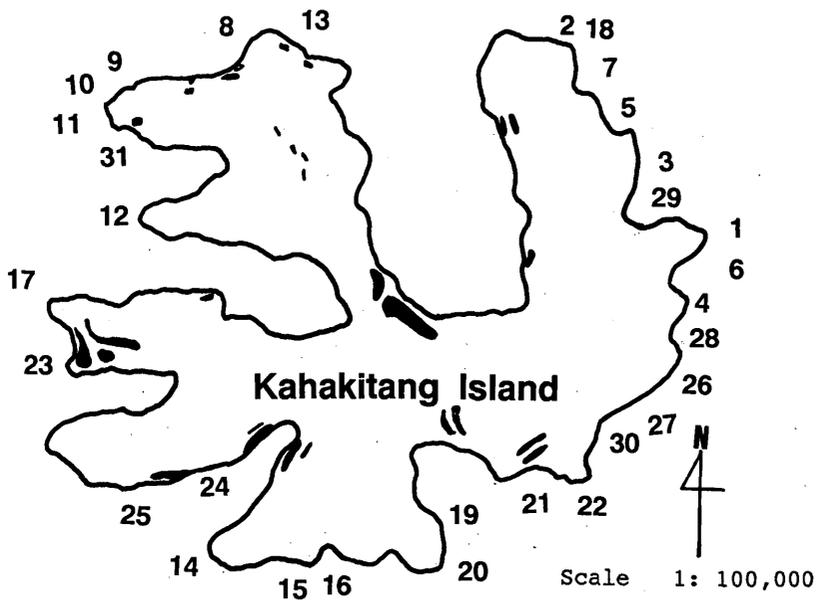


Figure 9. Location of *Soma* Fishing Grounds in Kahakitang Island

- | | |
|---------------------------|-------------------------|
| 1. Ondole (D-1) | 17. Tengonbangong (D-4) |
| 2. Mami (D-1) | 18. Dinkaleng (D-4) |
| 3. Lingoang (D-1) | 19. Nielese (D-4) |
| 4. Bintuaheng (D-2) | 20. Walisung (D-4) |
| 5. Salehé (D-2) | 21. Sowang (D-4) |
| 6. Kanalung (D-2) | 22. Nameng (D-4) |
| 7. Hiwu (D-2) | 23. Taleko (D-4) |
| 8. Batulohang (D-3) | 24. Batudarua (D-4) |
| 9. Tolengikan Kadio (D-3) | 25. Arengkambing (D-5) |
| 10. Tolengikan Labo (D-3) | 26. Parara (D-6) |
| 11. Lesue (D-3) | 27. Mandiala (D-6) |
| 12. Salanbeang (D-3) | 28. Lumaeng (D-1) |
| 13. Dalako Kadio (D-3) | 29. Lahope-1 (D-3) |
| 14. Lempung (D-3) | 30. Lahope-2 (D-4) |
| 15. Tuhong (D-3) | 31. Lesué (D-3) |
| 16. Banahung (D-4) | |

D-1, D-2, D-3, D-4, D-5, and D-6 indicate names of *Dusun*.

effective in the resource management as well as avoiding social conflicts and it is also reported from other parts of Indonesia [BAILEY and ZERNER 1992; AKIMICHI 1995]. Here, it should be noted that the fishing leader not the village head is the man who works as decision-maker. In Maluku, similar type of resource manager, *kepala adat* is said to have controlled resource use in the *sasi* practices [BAILEY and

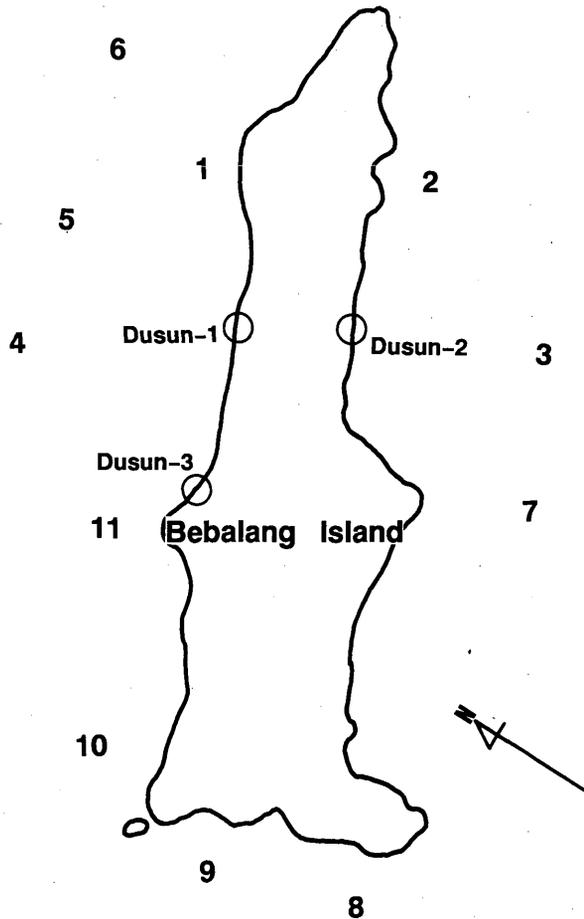


Figure 10. Location of *Seke* and *Soma* Fishing Grounds in Bebalang Island

- | | | |
|------------------|----------------|--------------------|
| 1. Béba | 5. Napo Lumain | 9. Kahe Ngura |
| 2. Lanise | 6. Dakupang | 10. Nenanga |
| 3. Napo Raket | 7. Liang Bala | 11. Liang Tatibasé |
| 4. Napo Tatapang | 8. Baloto | |

ZERNER 1992].

In Kahakitang, *seke* fishery disappeared around 1960s. Of the six *seke* groups five disappeared in 1958, but the last group persisted as late as 1960. According to the secretary of the village, the reason for this change is said to be associated with organizational malfunctioning of *seke* fishery. *Seke* fishery is communal in nature but the leadership of *tonaseng* as a fishing expert as well as an esoteric fish-caller is also vital to integrate the group as one unity. The management of *seke* fishery is characterized by communal labor participation not only for the fishing operation

Table 10. Use of Fishing Grounds by Two Types of *Soma* in Bebalang Island

Fishing Ground	Type of <i>Soma</i>	Entry of <i>Dusun</i>
1	K	D1
2	K and B	D1+D2
3	B	D1+D2+D3
4	B	D1+D2+D3
5	K and B	D1+D2+D3
6	K and B	D1+D2+D3
7	K and B	D3
8	K and B	D3
9	K and B	D3
10	K and B	D3
11	K and B	D3

K: *Kaum* (large-scale net), B: *Bawulé* (small-scale net), D: *Dusun* (1~3)
See Figure 10.

but also for the repair and maintenance of fishing devices, supply of raw materials in exchange with an equal share of the catch. Failures in financial entrepreneurship and the maintenance of fishing device by some of the leaders brought about the degrading of the leaderships.

On the other hand, the method of participation in *soma* fishery as crews does not demand such social imperative as net repair and supply of materials required in *seke* fishery. All the operational cost in *soma* fishery was paid by a single person, the owner both of the net and the engine-boat. Catch by *soma* was distributed equally among only those who participated in the operation, and not for the community members nor the widows and handicapped. Unlike the method of distribution in *seke* fishery, even the *tonaseng*, usually a net owner, does not obtain extra shares but the same as other crews do, although both net and boat account for shares to equivalent to two people.

Therefore, it is evident that the *seke* is community-based fishery that is sharply different from the *soma* which is based on a capitalistic principle in terms of participation in the fishing operation and distribution of catch.

Nevertheless, the change from *seke* to *soma* might occur without any serious conflicts. For understanding the smooth change from *seke* fishery to *soma* fishery, organizational differences between the two should be examined. In *seke* fishery, as we have seen, each group organization is socially fixed and embedded in the social system. Although day-to-day participants vary in composition, the right to obtain shares is guaranteed.

In contrast, in *soma* fishery group organization is relatively fluid. However, it does not mean members are optionally called for by the owner. There are two types of participants; the fixed members and those who work temporarily without long-term engagement. The former core members or *masanae tatape* (crew)

include *tonaseng* (net-owner), two fish-sharers (*mandore*), about five watchers (*antoho*). The latter temporary members or *masanae lora* include about ten crews who work on a daily basis. It is pointed out that such a hierarchical labor organization is also found in the *seke* fishery. Difference may lie however, in how the catch is optimally shared and satisfy participants. In such a group organization, comprised of a few owners with nets and boats and skilled fishermen and a majority of workers without capital, inter-personal networks surely bear a certain significance in the group formation.

Similarly, on Bebalang Island, the reason for the decline of *seke* fishery is, as Singgaluhang's case suggests, said to be the less shares due to the increase of members within a group. It is also said that the *tonaseng* considered a new technology as a better thing. In Dusun-3 of the island, *seke* fishery persisted until 1959, and in Dusun-1 it had already disappeared around that time. *Seke* once recovered in Dusun-1 in 1969, but on the following year it ceased, and then *soma* fishery started. It finally disappeared in early 1970.

In Batunderang *seke* fishery is still practiced. However, the future of *seke* fishery does not appear to be promising. According to the *opolao*, one reason is that the younger generations prefer line fishing to communal *seke* fishery, which makes it difficult to organize the fishing. The second reason is the aging of the *tonaseng* and lack of the successors. He insisted on the role of *opolao* to have the responsibility to promote *seke* fishery despite the difficult situation. He also insisted on the low cost of *seke* fishing gear as the *seke* is composed of bamboo, coconut leaves and rattan which are available on the island. It is much cheaper than the imported materials.

In Bukide Islands, *seke* has already disappeared. According to one man, who was born in 1933 and whose father used to be *tonaseng*, the year when *seke* disappeared varies considerably. In some villages, *seke* finished around early 1940s while in the others it lasted as late as the mid 1960s. In Nusa village it persisted until the year 1970. The major reason for the decline is said to be the increase of the crews and the decline of profit.

From the above examples, it becomes apparent that the decline of *seke* fishery is related to various factors; technological, socio-economic, and cultural.

An individualistic attitude towards fishing labor is associated with the decline. The *tonaseng* bears an important role in the collapse or persistence of *seke* fishery organization. Increase in the number of fishermen is, however, the critical factor to make the *seke* fishery less profitable; malfunctioning of equal share system.

In a process from the *seke* to the *soma*, an increase in the number of fishing groups as well as fishing grounds is apparently found. Although there is no sign of overfishing at the moment, intensification of fishing efforts may bring about resource depletion and conflict over the fishing grounds. Unfortunately, there has already occurred blood fighting over the territoriality of Singgaluhang between fishermen of Para and Mahengetang in February 1987, which resulted in the death

of four victims.

Observation of the transformation processes in small-scale fishery thus provides us with many important implications. Despite a strong claim for a community-based resource management scheme [BAILEY and ZERNER 1992], it is now rapidly disappearing. The future of *seke* fishery should then be carefully examined for another ten years or so, focussing on how the people think and choose their own way of living.

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