

In all three model areas, the ratio of fisheries in the distribution of occupations among the interviewed subjects was decreasing. Consequently, it has been concluded that the number of part-time fishermen is rising. In Pelantai the ratio of self-employed workers was 40 percent, labor was 17 percent, agriculture was 17 percent, fisheries was 13 percent, and the category of "others" was 11 percent, indicating that many workers were employed in occupations other than fisheries or agriculture. The following conclusions given below were drawn on the basis of the average annual income of households in each model area, according to source of income and occupation of the household head.

- 1) If the household head was a farmer, 40 percent of his income derived from farming. In Muntai and Tlk. Ketapang the felling of mangroves succeeded agriculture as a source of income and occupied 30 percent of the total earnings. In Sei Cingam the major source of income was agriculture, followed by labor (37 percent) and fisheries (22 percent).
- 2) If the household head was a fishermen, the ratio of income derived from fishing was high, comprising about 60 to 80 percent of his total income. The ratio of income derived from forestry in Sei Cingam and Pelantai was 10 percent for both Dusun, followed by 20 percent from fisheries, an indication that a fair amount of income is earned from felling mangroves.
- 3) For the majority of the interviewed household heads who were self-employed, the major source of income was from forestry. The income ratio from forestry, the felling of mangroves by self-employed workers, in Sei Cingam was 63 percent, 71 percent in Pelantai, and 65 percent in Tlk. Ketapang. The income of self-employed households were lower than the average of all the householders surveyed; and without a new source of income, they will continue to work felling mangroves.

8.4 Utilization of Coastal Resources

(1) Mangrove felling

The range of *Avicennia* spp. and *Sonneratia* spp. is only in the area facing the open sea in Desa Muntai. Mangrove wood is not much used here. According to the responses to the questionnaire, only a few of the inhabitants use mangrove wood in some ways. It is estimated that most wood is used as firewood, from the tree species composition.

Some inhabitants cut wood to sell (16.0%), and sell almost all wood they get to charcoal makers. The cutting volume is constant all through the year, and the rate of income from wood in their overall annual income is high. They are farmers by occupation; but, it is presumed, they are engaged in cutting for the most time.

About half (52.7%) of the interviewed inhabitants (fishermen and irregular workers) in Sei Cingam utilize mangrove wood. They use it mostly as firewood. Of the four Desa surveyed, only the inhabitants of this district use mangrove wood (0.9%) as material for boats. There is a ship (fishing boat) building yard in this Desa. The boats built there are probably put to local use. The average size of wood used for boats is 8cm in diameter and 4.8m in length. Judging from the size, the wood is probably used in the small parts of boats.

The rate of inhabitants who take the sap of mangroves is comparatively low. 12.9% of the inhabitants in this Desa cut mangrove wood for the purpose of selling. 75% of them sell wood directly to charcoal kiln makers. 25% of them sell wood to wood brokers. Of the wood sold to wood brokers, it is presumed, about 1% is used for boat building.

The inhabitants who cut mangrove wood for the purpose of selling are a few. That is because most of them do not work in charcoal making sites. Charcoal is made by those who are full-time charcoal workers.

The inhabitants of Desa Pelantai rely much on mangroves. Other than the use of mangroves as firewood, 4.1% of them use them as building materials. Comparatively small logs of 5m in the length and 7cm in the diameter on average are used as building materials.

86.2% of the inhabitants cut mangroves for the purpose of selling. 85% of those who cut mangroves are irregular workers and 15% are fishermen.

90.3% of them sell mangrove wood directly to charcoal makers, 8.9% to wood brokers. The rate of income from wood in the overall annual income is the highest in this Desa. 100% for 8.6% of those who cut mangroves, between 75% and 100% for 24.1% of them, between 50% and 75% for 42.0% of them. In this way, the rate of income from wood is more than 50% for about 75% of them. About 13% of the responders work in charcoal making shops.

73% of the inhabitants use mangrove wood for their own daily life in Desa Tlk. Ketapang. This percentage is the highest in all model areas. They mostly use mangrove as firewood as in other Desa. 7.7% of them use mangrove wood as the material of fishing gears. This tendency is not found in other Desa. They probably use the wood for the Ambai fishing method applied to fishing in the Channel. Just half of the inhabitants cut mangrove wood for the purpose of selling. 3.2% of them sell wood to wood brokers, 93.5% to charcoal makers and 3.2% to fishermen. The rate of the income from mangrove wood in the overall annual income is 100% for 3.2% of them, between 75 and 100% for 22.6% of them, 50 - 75% for 19.4% of them, 25 - 50% for 35.5% of them, and less than 25% for 19.4% of them. These percentages indicate they are highly dependent of the income from mangrove wood, although there is no full-time workers of charcoal making sites among them.

(2) Conditions of mangrove forest

In comparison to other areas, the degree of mangrove forest decline is marked in Muntai with 25 percent of the interviewed subjects reporting forest "diminution" and 68 percent reporting "decreased". In Sei Cingam 26 percent of the subjects claimed "no change", while 74 percent reported "decreased", indicating an awareness by local inhabitants that the mangrove forest has slightly declined. In Pelantai and Tlk. Ketapang 90 percent of the inhabitants replied "decreased", an indication that they are thoroughly aware of the decline in the mangrove forest.

According to respondents, the major underlying cause for the decrease/diminution of the mangrove forests is "over felling" (60 percent of respondents in Muntai, 80 percent in Sei Cingam, 88 percent in Pelantai, and 94 percent in Tlk. Ketapang). Moreover, 15 to 22 percent of the subjects gave "the felling of small trees" as an underlying cause, testifying to an awareness on the part of the inhabitants that cutting small trees contributes to a decline in the forest.

With regard to the effects of forest diminution, about half of the respondents in Muntai and Sei Cingam reported difficulty in their livelihood. In Muntai 55 percent of the interviewed subjects reported the decrease in fish catch as the underlying cause of their difficulties whereas 35 percent claimed a decline in cash income. It was difficult to assess the local inhabitants' understanding of the relationship between fishery resources and the mangrove forest and its effects on the decreased fish catch; and therefore, a follow-up survey is required. In Sei Cingam 69 percent of the respondents reported a shortage of wood and charcoal, 25 percent reported a decrease in cash income and 18 percent claimed a decrease in fish catch as difficulties in their livelihood.

The majority of the interviewed subjects (more than 80 percent) in Pelantai and Tlk. Ketapang reported that diminution of the mangrove forests would make their livelihoods difficult. Specifically, shortage of wood and charcoal (Pelantai 50 percent, Tlk. Ketapang 69 percent) and decreased cash income (Pelantai 90 percent, 62 percent Tlk. Ketapang).

(6) Opinions concerning protection of coastal resources

1) Management of mangrove forest

In many cases, less than half of the respondents knew that the mangrove forests fostered fishery resources (Muntai 39 percent, Sei Cingam 52 percent, Pelantai 48 percent, Tlk. Ketapang 44 percent).

However, the majority of the subjects surveyed knew that the mangrove forests prevent coastal erosion (Muntai 86 percent, Sei Cingam 77 percent, Pelantai 71 percent, Tlk. Ketapang 76 percent).

Based on the aforementioned, the majority (Muntai 97 percent, Sei Cingam 89 percent, Pelantai 95 percent, Tlk. Ketapang 92 percent) felt that preservation of the mangrove forests were necessary.

In Muntai the majority of the surveyed subjects (77 percent) proposed planting mangrove trees as a means of preserving the forest, followed by restrictions on felling volume (43 percent), and establishing the minimum size of trees which can be felled (24 percent). In other areas, the most popular means of preservation was restricted felling volume (Sei Cingam 78 percent, Pelantai 79 percent, Tlk. Ketapang 76 percent), followed by establishing the minimum size of felled trees (Sei Cingam 30 percent, Pelantai 36 percent, Tlk. Ketapang 45 percent).

2) Conditions in fisheries and preservation of fishery resources

The majority of the surveyed subjects claimed that the number of fishermen "increased" over the past ten years in every area and this result coordinates relevant obtained from the village captain (Kepala Desa).

In Muntai and Pelantai, 60 percent and 51 percent of the respondents, respectively, reported "a smaller fish catch", slightly higher than those claiming "no change" (Muntai 40 percent, Pelantai 45 percent). In Sei Cingam and Tlk. Ketapang, about 72 percent of the subjects reported "no change", which was considerably higher than those claiming "a smaller fish catch".

Approximately 70 percent to 88 percent of the fishermen in all of the areas reported not changing their net mesh size. However, 23 percent in Muntai replied that they had decreased their mesh size. In view of the fact that a higher ratio of respondents in this area reported "a smaller fish catch" in comparison to other areas, it has been deduced that the fishermen in Muntai decreased their mesh size, in order

to catch smaller fish to offset the decline in fish catch volume.

The majority (70 percent) reported "a decrease" in the fish catch volume in recent years. The most prevalent reason given by a large number of respondents was "an increase in the number of fishermen" (Muntai 94 percent, Sei Cingam 87 percent, Pelantai 58 percent, Tlk. Ketapang 94 percent). Another underlying cause was reported to be "smaller fish" (Muntai 20 percent, Pelantai 31 percent).

In view of the aforementioned problems, the majority of the surveyed subjects replied that preservation of fishery resources was "necessary" (Muntai 78 percent, Sei Cingam 77 percent, Pelantai 73 percent, Tlk. Ketapang 82 percent).

3) Preservation of the mangrove forest in view of protecting fishery resources

The ratio of interviewed subjects who had fished in the mangrove areas was under 40 percent for all areas (Muntai 27 percent, Sei Cingam 36 percent, Pelantai 29 percent, Tlk. Ketapang 37 percent).

In contrast, the number of respondents who had seen fry of fish, shrimp, and crab in the mangrove areas was large (Muntai 65 percent, Sei Cingam 79 percent, Pelantai 63 percent, Tlk. Ketapang 76 percent).

Based on the awareness that fishery resources were fostered in the mangrove forests, more than 90 percent replied that the mangrove forests should be appropriately protected. The ratio of respondents who knew the laws and regulations pertaining to mangrove forests was very low (Muntai 20 percent, Sei Cingam 10 percent, Pelantai 17 percent, Tlk. Ketapang 8 percent). Surveyed subjects who were familiar with the laws and regulations on fishing, fishing seasons, and fishing grounds was 33 percent in Muntai, 28 percent in Sei Cingam, 2 percent in Pelantai, and 10 percent in Tlk. Ketapang. With the exception of Pelantai, they were slightly more knowledgeable about the laws and regulations pertaining to fishing than to mangrove forests.

The majority of the respondents replied that it was necessary to issue regulations pertaining to fisheries in the model areas. Many respondents in each of the model areas stated that regulations "banning specific fishing methods" should be instituted. Although there were differences among the model areas, generally "restrictions on mesh net size, fish net size, and number of fish nets" were thought to be required.

**9. Opinions and Impact Felt by the Residents Regarding
the Draft Policies for Coastal Resource Inventory
Management and Enhancement**

9. Opinions and Impact Felt by the Residents Regarding the Draft Policies for Coastal Resource Inventory Management and Enhancement

9.1 Survey Approach	389
9.2 Characteristics of the Subjects	390
9.3 Opinions and Impact Felt by Residents Regarding the Draft Policies for Fishery Resource Inventory Management and Enhancement	391
9.4 Opinions of and Impact on the Residents Regarding the Draft Policies for Mangrove Forest Resource Management and Enhancement	393

9. Opinions and Impact Felt by the Residents Regarding the Draft Policies for Coastal Resource Inventory Management and Enhancement

9.1 Survey Approach

We have commissioned Riau University to conduct an interview survey on the opinions of and impact on the residents of the model area for fishing village development (four villages). The objective is to gain an understanding of the opinions of and the impact felt by residents regarding the draft policies for coastal resource inventory management and enhancement.

(1) Survey area

The following four villages and their surroundings were selected as the model area for fishing village development.

- Muntai: Bengkalis island, Kec. Bengkalis
- Sei Cingam: Rupal island, Kec. Rupal
- Pelantai: Padan island, Kec. Merbau
- Tik. Ketapang: Merbau island, Kec. Merbau

(2) Subjects

Household heads or their spouses

(3) Sampling method

- About half of the subjects are to be chosen from those who replied to the residents' opinion survey conducted at Phase 2.
- The new subjects shall be selected mainly from the RT having a great number of fishermen in each model area. In the case which the samples of mangrove cutters are few, however, the interview survey shall also be conducted in the adjoining villages with easy access.

(4) Outlines of survey topics

- a. Characteristics of the subjects (race, religion, family composition, occupation, income)
- b. Opinions of and impact felt by the residents regarding the draft policies for fishery resource inventory management and enhancement
 - Opinions regarding the necessity of fishing restrictions
 - Draft policies for resource inventory management of the fishing activities focused on the resources at a higher level of the food chain system
 - Draft policies for resource inventory management of the fishing activities focused on the resources at a lower level of the food chain system

- Measures to create new means to increase fishermen's income by the organization of fishermen and the effective use of the existing resources
- c. Opinions of and impact felt by the residents regarding the draft policies for mangrove forest management and enhancement

Conditions of the mangrove forests

- Recognition of the laws and restrictions regarding mangrove deforestation
- Conservation of the existing mangrove forests
- Afforestation of the deforested land and unplanted marshlands
- Effective use (afforestation) of marshlands with low vegetative cover
- Improvement measures for the charcoal production industry without changing existing facilities
- Creation of mangrove parks
- Promotion of residents' participation and solutions to the technical problems regarding management and use of the mangrove forests

9.2 Characteristics of the Subjects

The following are the valid respondents in each model areas:

Model Area	Total	Within Desa	Adjacent Desa
Muntai	64	32	32
Sei Cingam	64	30	32
Pelantai	69	39	30
Tlk. Ketapang	60	24	36

About half of the subjects are identical to those of the previous survey, and the survey was conducted in the same RT as the last time. The race, religion, family composition, occupation and income are almost the same as the residents' opinion survey of Phase 2. Therefore, the details will not be given here. Results of the residents' opinion survey will be given as a reference.

9.3 Opinions and Impact Felt by Residents Regarding the Draft Policies for Fishery Resource Inventory Management and Enhancement

(1) Opinions regarding the necessity of fishing restrictions

To the question asking whether it is necessary to establish some kind of fishing restrictions in each model area, the majority (over 80%) of fishermen in Pelantai, Muntai, and Tlk. Ketapang answered "Yes." In Sei Cingam, about 60% answered "Yes," less than other areas.

As for the kind of restrictions, many respondents (approx. 40% - 50%) suggested a "ban on specific fishing methods" in all areas; "restrictions on the mesh net size and the number of fishing gear" came next (approx. 15% - 25%).

(2) Draft policies for resource inventory management of the fishing activities focused on the resources at a higher level of the food chain system

a. Enhancement of the fishing license and monitoring systems

A majority (approx. 90%) of fishermen in Muntai think that the enhancement of the fishing license and monitoring systems is necessary. And about 60% say that such measures are "effective for maintaining the appropriate amount of fish harvest."

In other areas, about 60% - 70% think that the enhancement of the fishing license and monitoring systems is necessary, less than in Muntai but still a majority. However, those who recognized the efficiency of the measures did not constitute a majority (48% in Sei Cingam, 47% in Pelantai, and 36% in Ketapang). This shows that many are apprehensive about the efficiency of the enhancement of the systems.

b. Establishment of monitoring and analysis systems for the resource movement

To the question of whether it is necessary to establish monitoring and analysis systems for the resource movement regarding the harvested fish on the higher level of the food chain system, over 70% of the fishermen in all areas answered "Yes." But most of those who answered "No" to the question say that they could not understand in what way the establishment of monitoring and analysis systems on the resource movement would concern their own life. Some of those who recognized the necessity of such measures may not have understood the contents of the measures, so it will be necessary to conduct appropriate educational activity regarding the conservation of fishery resources and harvested fish prior to establishing monitoring and analysis systems on the resource movement.

(3) Draft policies for resource inventory management of the fishing activities focused on the resources at a lower level of the food chain system

a. Restriction on bag-net fishing such as gombang

To the question regarding the restriction on bag-net fishing such as gombang in the small- and medium-sized rivers within the coastal greenbelt, 94% of the fishermen answered it was necessary in Pelantai, but in Tlk. Ketapang across the Asam channel, only 58% answered it was necessary because of "the loss of fishery-related income." As few fishermen in Pelantai live on bag-net fishing, they do not seem to be too concerned about the consequences of restriction. In Tlk. Ketapang, on the other hand, many fishermen operate gombang fishing. Therefore they must be afraid that the harvest will be reduced as a consequence of the restriction.

In Muntai and Sei Cingam, those who answered that the restriction was not necessary were about 50% and 60%, respectively. Many said the reason for their answer was that they did not understand the necessity of the restriction, or they gave other reasons than those proposed in the questionnaire. Those reasons were often irrelevant. As bag-net fishing such as gombang in small- and medium-sized rivers is hardly operated in these areas, it is possible that the respondents did not understand that the restriction would take place in small- and medium-sized rivers within the coastal greenbelt, or that they thought the restriction would also be carried out in channels and in the Malacca Straits.

b. Establishment of monitoring and analysis systems on the resource movement

To the question of whether it is necessary to establish monitoring and analysis systems on the movement of the fishery resources on the lower level of the food chain system, such as mysids, shrimp and anchovies, over 70% of fishermen in all areas answered "Yes." However, just like the reaction to the question on the establishment of monitoring and analysis systems on the movement of the resources on the higher level of the food chain system, most of those who answered "No" to the question said they did not understand how the establishment of monitoring and analysis systems of the resource movement would concern their own life. They might not have adequately understood the question itself. It will be necessary to conduct appropriate educational activity on the relations between the fishery resources and harvested fish on the lower level of the food chain system prior to establishing monitoring and analysis systems on the resource movement.

(4) Measures to create new means to increase fishermen's income by the reorganization of fishermen and the effective use of the existing resources

a. Organization of fishermen

Regarding the contribution to the increase in profit distribution by establishing and improving the fishing organizations that will be involved in the

clarification of the business records between the fishermen and the distributors, most of the fishermen (over 90%) showed their approval. A few answered that the organization was not necessary because "organization is not easy" and "they could prepare their own investment fund."

As for the consequences of the organization, over 80% think that they would be able to invest in fishing activities easily. This shows that many fishermen have positive expectations about the future results of the organization; few feared that the distributors would reduce the payment towards the harvested fish. It is possible that the fishermen expect that the government will invoke the legal authority to maintain the payment, meaning that they may not recognize the basic fact that the fishermen themselves need to take the initiative of the organization in an effort to increase the profit distribution to them.

b. Increasing the fishermen's income by the effective use of the existing resources

In every area, a majority of fishermen (over 80%) said it is necessary to pursue the increase of fishermen's income by the effective use of the existing resources, reflecting the high expectations of the fishermen.

On the other hand, half of those who denied such necessity said that they did not have the funds for taking up new fishing activities. This shows that the fishermen feel uncertain about the financing.

9.4 Opinions of and Impact on the Residents Regarding the Draft Policies for Mangrove Forest Resource Management and Enhancement

(1) Conditions of the mangrove forests

In the areas other than Muntai, 70% to 90% said that the mangrove forests have disappeared, while in Muntai, 75% gave the same answer. This shows that the mangrove forests are disappearing at a significant rate.

Many say that the land from which mangroves have disappeared becomes "barren". Others say that the land becomes "damp." In Pelantai, the gap between the two was smaller than other areas: 60% said that the land would become "barren" and 40% said "damp."

Asked about the best use of the barren and damp land, the majority (75%) of fishermen in Muntai gave the afforestation of mangroves as an answer. Also in Sei Cingam, the most popular answer was "mangrove afforestation (34%)," but other suggestions such as "planting trees for firewood" and "no use" got almost many votes, 23% and 19%, respectively. In Pelantai, half of the respondents supported "planting trees for firewood," followed by "mangrove afforestation (19%)" and "no use (12%)." In Tlk. Ketapang, both "planting trees for firewood" and "mangrove afforestation" got 35% of the votes.

Regarding the afforestation of the land from which mangroves have disappeared or become scarce, many of the respondents (approx. 50% - 70%) said the owners of small-scale concessions should be responsible for afforestation. This was followed by the opinion that those who have felled the mangroves should be responsible for afforestation.

(2) Recognition of the laws and restrictions regarding mangrove deforestation

The percentage of those who did not know about the laws and restrictions at all was 78% in Muntai, 63% in Sei Cingam, 49% in Pelantai, and 68% in Tlk. Ketapang - approximately a majority in all areas. Those who knew only the headings of the laws and restrictions were 16% in Muntai, 27% in Sei Cingam, 41% in Pelantai, and 18% in Tlk. Ketapang. As there are many people who live from mangrove felling, they should know at least the headings.

In Sei Cingam, many people know at least the headings of the laws and restrictions, probably because many of them are involved in charcoal production and therefore in mangrove felling as well.

To the question of whether the residents respect the laws and restrictions, about half of the respondents said "Yes" in Sei Cingam and Tlk. Ketapang, but in Muntai and Pelantai, the "No" answer is predominant with 52% and 71% respectively.

As a way to make the residents observe the laws and restrictions, many suggested "take punitive measures against violation" or "strengthen strict management of laws and restrictions" (30% - 45%). Only a few suggested "expect the residents to be prudent (11% - 18%)."

(3) Conservation of the existing mangrove forests

In Pelantai, about 40% are against the conservation of the existing mangrove forests through felling restrictions. They may be reluctant to restrict the felling because many people in the area live on it. In other areas, over 80% show their approval for the restriction.

The main reason for opposition in all areas was the reduction of income. In Muntai, another important reason was that the relation between the mangrove forests and the fishery resources is not clear. In other areas, the argument that many people would break the rules came in second.

(4) Afforestation of the deforested land and unplanted marshlands

In all areas, most of the respondents (over 90%) admit that it is necessary to plant mangroves on the deforested land and unplanted marshlands for afforestation.

As examples of the positive effects of afforestation, the most supported opinion was that the erosion of the shores would be prevented, followed closely by such opinions as: the wood could be consumed daily as firewoods, or as charcoal wood, and that they could help in the expansion of the fishery resources.

(5) Effective use (afforestation) of marshlands with low vegetative cover

In all areas, most of the respondents (over 90%) recognize the necessity of afforestation of marshlands with low vegetative cover as an effective use, just as in the case of afforestation of the deforested land and unplanted marshlands.

As examples of the positive effects of afforestation, the most supported opinion was that the erosion of the shores would be prevented, slightly more than such opinions as the wood could be consumed daily as firewood or as charcoal wood.

(6) Improvement measures for the charcoal production industry without changing the existing facilities

To the question of whether improvement measures for the charcoal production industry are necessary, the results showed a tie between "Yes" and "No" in Pelantai, but in other areas "No" was predominant.

The main reason for "No" in Muntai, Sei Cingam and Tlk. Ketapang was that they were not interested in the charcoal industry (52% - 73%), followed by the opinion that they were unable to implement improvement measures (26% - 33%). In Pelantai, however, those who said that they were unable to implement improvement measures constituted the majority with 52%.

(7) Creation of mangrove parks

A great majority of people think that it is "necessary" to create mangrove parks where residents and visitors can rest: 70% in Muntai, 91% in Sei Cingam, 84% in Pelantai, and 82% in Tlk. Ketapang.

The others do not think that the parks are necessary because "they do not intend to use such parks," or "they have a better place to rest."

(8) Promotion of the residents' participation and solutions to the technical problems regarding management and use of the mangrove forests

a. Building a training and research center

When asked whether it is necessary to build a training and research center in order to promote the residents' participation and to solve the technical problems regarding the management and use of mangrove forests, the majority

of the respondents in all areas answered "Yes" (86% in Muntai, 84% in Sei Cingam, 91% in Pelantai, 75% in Tlk. Ketapang).

Only a few said that such center was not necessary because "they were not interested in the technical problems regarding management and use of the mangrove forests," or "it would be better to build another kind of facility."

b. Joint control of the mangrove forest on the village (DESA) level

In Muntai and Sei Cingam, about 90% think that joint control of the mangrove forest on the village (DESA) level is "possible," but in Pelantai and Tlk. Ketapang, the percentage is slightly lower, approx. 70% and 60%, respectively.

In Pelantai and Tlk. Ketapang, about 60% of those who think it is "impossible" claim that there is no suitable leader. In Muntai and Sei Cingam, the reason for thinking joint control is "impossible" is that they do not intend to participate in the mangrove management. This is also the common argument in the other two areas.

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