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SEDIMENT OXYGEN UPTAKE: KINETIC MODEL EXPRESSIONS AND THEIR RELATIONS TO SEDIMENT QUALITY

Charumas Meksumpun and Hiroo Inoue

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PARTICIPATION OF FISHERMEN IN THE SEASONAL CLOSURE MEASURES FOR MARINE FISHERY RESOURCES CONSERVATION: A CASE STUDY IN THE WESTERN PART OF THE GULF OF THAILAND

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ABSTRACT

The seasonal closure measures is an alternative that the Department of Fisheries utilizes in the management of fishery resources. The objectives of this study were to study the level of participation of fishermen on the seasonal closure measures and to study factors that influence and have relationship with the participation of fishermen. This study covered part of the Gulf of Thailand in the vicinity of Prachuab Kiri Khan, Chumporn and Surat Thani Provinces. Three hundred and eight fishermen were used as sample size in this study. The interview technique with structured questionnaire was used as the method for data collection. The results showed that approximately half of fishermen samples had low level of participation in the seasonal closure measures and low and medium level in planning and evaluation in the measures respectively. For factors influencing their participation on gender, types of fishing gear groups, the result showed that there was a significant difference. With particular reference to social status, the result showed that there was a difference at a highly significant level. The factors that have relationships on levels of participation were knowledge of the seasonal measures and the realization on benefit from conservation of fishery resources which was found at a highly significant level. Other factors having a relationship to the level of participation were satisfaction with the measures, requirements of fishermen on a community-based fishery management framework, perception of fishermen on the values of the measures and perception of fishermen on a community-based fishery management framework these factors were found to have highly significant levels. In addition, factors on the reception of information on the seasonal closure measures and reception of fishery information had a significant relationship to the level of participation of fishermen in the planning of the measures at a highly significant level. Moreover, the result of this study showed that this factor also had a relationship on participation in the implementation and evaluation at a significant level.

INTRODUCTION

The Gulf of Thailand is well known as an important and valuable source of marine fishery resources in Thailand. The Gulf is a natural fishing ground in which fishermen need invest only for fishing boats and fishing gears, this has resulted in an increasing trend in fishing in the Gulf of Thailand. Due to open access harvesting of natural resources without the realization and recognition of conservation of fishery resources, fishermen have continued to develop their fishing boats and gears to increase their efficiency in catching as much fish as possible. This in turn has resulted in a severe impact on fishery resources, which had been in abundance, leading to depletion and exhaustion. In addition, it has caused increasing conflict among different groups of fishermen.

The Department of Fisheries, Thailand, being the directly responsible agency for the fishery resources in the Gulf of Thailand, has conducted various researches in technical support for more than a decade. The enactment of regulations for fishery resources utilization is the management measures in the Gulf of Thailand. Particularly, the "Notification of the prohibition of the use of some fishing gears for fishing during the spawning and nursing seasons in some areas in the western part of the Gulf of Thailand", this is also known as the "Closed Season" for Indo-Pacific mackerel. The enactment of this measures was notified by the Ministry of Agriculture and Cooperatives on 28th November 1984. This prohibits the use of some types of fishing gear and fishing during the spawning season and nursing season in some areas for a specific period (in the Gulf of Thailand, for some areas of Prachuab Kiri Khan, Chumporn and Surat Thani Provinces) between 15th February and 15th May each year. This "closed season" is actually composed of two 45-day periods running consecutively (15th February to 31st March followed by 1st April to 15th May). After this measures had been implemented for a certain period, the effects and results of the implementation were studied in 1996. This study showed that there were some problems including lack of manpower, lack of public announcement on the information regarding this measures, gaps in law that led to illegal fishing operation, potential mass protests, and problem on the use of illegal fishing gears in the closed season.

The successful and effective implementation of this closed season will only be achieved with the participation of the people, especially the fishermen who receive both direct and indirect benefit from fishing in the Gulf of Thailand. The outcome of this study on the "Participation of fishermen in the seasonal closure measures for marine fishery resources conservation : A case study in the western part of the Gulf of Thailand" will give an indication of the identification of factors enhancing the better understanding and realization of the need of the participation of fishermen in marine fishery resources measures conservation . Additionally, the results from this study will also suggest recommendations for the direction of the implementation of future measures.

Objectives of this study are 1) to study the level of participation of fishermen in conservation measures for marine fishery resources in the Gulf of Thailand, case study on the seasonal closure measures, 2) to study factors influencing the participation of fishermen in the conservation measures for marine fishery resources in the western part of the Gulf of Thailand

MATERIALS AND METHODS

Scope of the study

This study area covers three provinces in the western part of the Gulf of Thailand in Prachuab Kiri Khan, Chumporn and Surat Thani Provinces. The population in this study covers groups of small-scale fishermen, commercial fishermen and fishery-related industries i.e. ice plants, fuel stations and processing plants (for Indo-Pacific mackerel, fish sauce and fish meal).

This study covers various issues concerning the seasonal closure measures relating to time, area, types of fishing gear, size of fishing boats, size of fishing gear, laws and penalties, government and fishermen both in the same group and in different groups. The framework of this

study on the participation of fishermen in the conservation measures of marine fishery resources is composed of four aspects i.e. in planning, implementation, benefits received and monitoring and evaluation. Additionally, this study will include the factors influencing the participation of fishermen in conservation of marine fishery resources i.e. their dedication to, and binding relationship with, fishery resources, recognition of the value of the seasonal closure measures, perception of the seasonal closure measures, realization of benefits derived from marine fishery resources conservation and the reception of information on seasonal closure measures

The population in this study composed of the three groups. These are small-scale fishermen, commercial fishermen and fishery-related industries. The number of samples in this study is three hundred and eight in this study area in Prachuab Kiri Khan, Chumporn and Surat Thani Provinces. Date of data collection was during May – June 1997.

Statistical methods

The collected data was edited, coded into the Coding Sheet and input into a diskette then analyzed by SPSS for Windows by using descriptive statistics as frequency, percentage, mean and standard deviation. The inferential statistics will be used for the analysis as comparative and correlation between dependent variables with groups of independent variables.

RESULTS

The number of samples in this study is three hundred and eight in this study area in Prachuab Kiri Khan (12.7 percent, n=39), Chumporn (35.1 percent, n=108) and Surat Thani Provinces (52.3 percent, n=161).

General information of the fishermen

Gender

The majority of the sampled fishermen in this study, or about 92.5 percent are male. The remaining 7.5 percent being female.

Age

The average age of the fishermen in this study was 38 years (S.D. = 10 years). The maximum age being 71 years old, while the minimum age was 18.

Education

Concerning the educational level of the fishermen in this study area, the majority of fishermen graduated from compulsory school at primary level (85.7 percent). About 10.7 percent graduated from secondary school. The remainder of 1.9 and 1.6 percent graduated from vocational levels and bachelor degree, respectively. Very few fishermen had no formal education.

Marital status

About 86.4 percent of the sampled fishermen in this study area are married and stay in the same house. 10.4 percent of the fishermen were single. 1.9% are married but stay in different houses. Another 1.3 percent of fishermen are divorced or widowers/widowed.

Family members

The average number of family members of the fishermen in this study area was about 4 people. The maximum number of family members was 11. 46.2 percent of fishermen in this study have more than 5 family members. The remaining 44.9 and 8.9 percent have 3-4 and 1-2 family members, respectively.

As regards the number of other family members engaged in fishing, the majority of sampled fishermen (87.4 percent) have 1-2 family members engaged in fishing. 11.7 percent had 3-4 family members engaged in fishing. About 0.6 and 0.3 percent had more than five family members engaged in fishing and no family member engaged in fishing, respectively.

Status and social status

Of the sampled fishermen, about 82.2 percent of them are head of the household. The remaining 17.8 percent are family members and relatives. Regarding social status (i.e. village committee members, religious committee members, school committee members, temple committee members and local leaders (e.g. village head and head of Sub-district), 14.9 percent of the fishermen had such status. However, the majority, or about 85.1 percent have no social status.

Religion

Out of the total fishermen in this study, about 88 percent of them are Buddhist while the remaining 12 percent are Muslim.

Occupation

Results from this study show that about 89 percent of the sampled fishermen are owners of fishing operations. Another 7.8 percent are master fishermen. The remaining 3.2 percent are employed as crew. With specific reference to the occupation of the fishermen in this study area, 96.1 percent conduct capture fishery operations. Another 2.9 percent are capture fisheries cum processing, e.g. salted and dried fish. The remaining one-percent are in fishery-related industries including fuel stations and ice plants.

Type of fishing gears employed

A majority of fishermen in this study area use one type of fishing gear (81.2 percent) i.e. 1) gill nets, 2) hooks, 3) trawls, 4) purse seines, 5) push nets, 6) traps, and 7) cast nets (with light). Another 15.9 percent operate 2 types of fishing gear i.e. 1) trawls and gill nets, 2) purse seines and gill nets, 3) push nets and gill nets, 4) traps and gill nets, 5) cast nets and gill nets, 6) cast nets and trawls, 7) traps and hooks, and 8) purse seines and hooks. About 1.9 percent of fishermen use 3 types of fishing gear i.e. 1) trawls, gill nets and traps, 2) cast nets, gill nets and hooks, and 3) cast nets, gill nets and traps. The remaining one percent are involved in fisheries related industries that do not use any type of fishing gear.

Fishing grounds

The number of sampled fishermen who operate capture fisheries in this study area is 305, which figure will be used in the analysis. Almost two thirds (63.6 percent) of fishermen operate fishing in front of their houses and in the canals. Another 36.4 percent operate in many areas without being limited to the areas in front of their houses and in the canals.

About half the sampled fishermen (51.6 percent) operate up to 3 kilometers from the shore or islands. One third of the sampled fishermen operate in areas more than 3 km. from the

shore (30.5 percent). The remaining 16.9 percent operate fishing only in areas less than 3 km. from shore.

Types of fishing boat

Of the types of fishing boat employed by fishermen in this study area, almost all of them have their own fishing boats (91.1 percent). Only 8.1 percent of fishermen do not have fishing boats. With particular reference to the types of fishing boat owned, there are 3 types i.e. out-board powered boats (55.2 percent), in-board powered boats (35.7 percent) and one percent owned both types of fishing boat.

Economic status

The results of this study show that 84.4 percent of the sample are full-time fishermen through which all their household income is from fisheries. The other 11.7 percent are part-time fishermen (mainly engaged in fishing) in which more than half of their household income is from fisheries. The remaining 3.9 percent of the sample are part-time (partly engaged in fishing) in which less than half of their household income is from fishery.

The average monthly household income from fishing during October-January was about 9,500 Baht. However, the average monthly household income from fishing during the closed season (February-May) was about 10,000 Baht, while it was about 9,000 Baht in the period after the closed season (June-September). The reason for the difference in the average monthly household income during the three periods was due to the monsoon season before the closed season in which shrimp is the main target species caught even within a reduced number of operational days. In the closed season period, the average monthly household income from fishing is the highest income, this results from the prohibition of illegal fishing gears under the seasonal closure measures. This in turn results in increased fish abundance. However, after the closed season period, even though the quantity of fish caught increases there is a decrease in price because of the greater quantities and smaller size of fish resulting in a lower income for the fishermen.

With regard to income and expenditure of the sample fishermen during the year, about 43.2 percent of the fishermen revealed that their income and expenditure are equal. While 24.4 percent of them revealed that their incomes are higher than expenditure but that there is no saving at all. Another 20.4 percent revealed that their incomes are higher than expenditure and that they can save money. The remaining 12 percent of the sampled fishermen revealed that their incomes are less than their expenditure.

When considering debt, about two thirds of the fishermen have debts (61.4 percent), whereas the remaining one third did not have debt (38.6 percent). The major sources of loans are the fish agents/investors (36 percent). The remaining 31.2, 29.6 and 3.2 percent, respectively are from the Bank of Agriculture and Agricultural Cooperatives, relatives/friends and other sources of funding supported by the government and other cooperatives.

Reception of fishery information

A majority of fishermen received information concerning the measures on the closed season (99 percent). Only 1 percent did not know or had received any information.

During the year period, more than half the fishermen (65.6 percent) received information or knowledge on the seasonal closure measures. About one third (34.4 percent) of fishermen asserted that they never received any information on this measures. Regarding the information received during the closed season, the results show that more than two thirds of the sample in this study (73.1 percent) received information on this measures (see Table 1).

Relating to sources of information, more than half the fishermen revealed that they received information on the seasonal closure measures from friends, announcement boards, fishery

officials and the radio (45.4 percent, 43.8 percent 42.8 percent and 41.2 percent, respectively). Other sources of information range from television, village leaders, family members and committee members of the fisheries groups. The fewest information sources were other government agencies, teachers, non-governmental organizations (NGOs), traders/ middlemen and newspapers.

Table 1. Percentage of fishermen who received information on the seasonal closure measures by sources

Sources of information	Percentage (n=308)			
	Almost everyday	Almost everyweek	Almost everymonth	Never received
Neighbours / friends	17.2	9.1	19.2	54.5
Announcement boards	6.2	1.9	35.7	56.2
Fishery officials	0.3	1.3	41.2	57.2
Radio	6.8	6.5	27.9	58.8
Television	1.9	3.2	34.4	60.5
Village leaders (Formal)	0.6	2.3	21.1	76.0
Family members	10.7	2.3	1.9	85.1
Committee members of the fisheries groups	0.0	1.0	11.0	88.0
Committee members of village	0.3	1.3	6.5	91.9
Traders/ middlemen	1.6	2.6	2.3	93.5
Newspapers	0.3	0.0	2.6	97.1
Other government agencies	0.0	0.0	1.6	98.4
Religions leaders	0.0	0.6	0.3	99.1
NGOs	0.0	0.3	0.6	99.1
Teachers	0.0	0.0	0.3	99.7

The results from this study show that more than half the fishermen received fishery information from important sources including friends (65.9 percent), television (58 percent) and radio (44.2 percent). Apart from those, about one third of the sampled fishermen received information from fishery officials and family members (32.4 percent and 32.7 percent, respectively). Other sources from which the fishermen received information are announcement boards/documents. Another received information through media and leadership i.e. newspapers, village leaders, village committee members, fisheries groups, religious leaders and NGOs, but these are at a low level (see Table 2).

From this study on the level of knowledge of fishermen on the seasonal closure measures, the results could be summarized as follows (see Table 3) :

More than half the fishermen in the three provinces of Prachuab Kiri Khan, Chumporn and Surat Thani provinces in this study, (61.4 percent) revealed that they knew about the prohibited areas. The remaining one-third (34.7 percent) could identify the areas, while another 3.9 percent did not know about the prohibited areas.

Regarding the duration of the closed season, the majority of fishermen (90.0 percent) had knowledge of the 90 days duration of the closed season.

Apart from that, almost half the sampled fishermen (43.8 percent) had no knowledge of the two periods of the closed season from 15 February-31 March and 1 April-15 May. About one third of the fishermen (37.7 percent) had knowledge of the two periods, but they could not identify the exact periods or dates. Only 18.5 percent of the sample had knowledge of the seasonal closure measures and could identify the correct periods.

In addition to the group of fishermen who had correct knowledge on the measures, 46.1 percent had knowledge on the types of fishing gear prohibited during the spawning and nursing seasons i.e. pair trawls, otter trawls, purse seines, gill nets with mesh a size of less than 4.7 cm. Another 43.5 percent had some knowledge of the types of fishing gear prohibited, while the remaining 10.4 percent asserted that they had no knowledge at all.

33.4 percent of the sampled fishermen who knew about the types of fishing gear allowed for use during the first period (15th February-31st March) could identify the correct types of fishing gear as being beam trawls, small trawls operated at night and bamboo stake traps. Another 38 percent had knowledge of the types of fishing gear and could identify some them. The remaining 28.6 percent of fishermen claimed to have no knowledge at all.

With particular reference to the types of fishing gear prohibited during the second period of the measures (1st April-15th May), one third of the fishermen (27.9 percent) had knowledge i.e. beam trawls, small trawls operated at night and bamboo stake traps. The remainder (37.7 percent) had some knowledge, while another 34.4 percent claimed no knowledge at all.

Table 2. Percentage of fishermen who received fishery information by sources

Sources of fishery information	Percentage (n=308)					
	Almost everyday	Almost everyweek	Almost everymonth	2-3 month/time	1-2 month/year	Never received
Neighbours / friends	53.7	9.4	1.6	0.6	0.6	34.1
Television	22.7	8.4	15.9	9.7	1.3	42.0
Radio	24.8	10.4	5.8	1.6	1.6	55.8
Family members	29.2	1.9	1.0	0.3	0.3	67.3
Fishery officials	0.3	0.6	10.1	6.8	14.6	67.6
Village leaders	0.3	4.2	6.5	4.9	2.6	81.5
Traders/ middlemen	12.3	2.9	1.3	0.3	0.3	82.9
Announcement boards	0.6	0.3	1.3	3.2	11.1	83.5
Committee members of the fisheries groups	0.6	1.9	3.2	1.9	2.7	89.7
Newspapers	0.6	1.9	4.2	2.3	1.0	90.0
Committee members Of village	0.3	1.3	3.6	1.0	0.6	93.2
Religions leaders	0.3	0.6	0.3	0.0	0.3	98.5
NGOs	0.7	0.0	0.0	0.0	0.3	99.0
Other government Agencies	0.0	0.0	0.0	0.3	0.6	99.1
Teachers	0.0	0.0	0.0	0.0	0.0	100.0

Acceptance of fishermen of the seasonal closure measures

About half the sampled fishermen (59.4 percent) stated that the abundance of fishery resources in the closed areas was found to have increased in 1996 as a result of the measures. Another 20.5 percent of fishermen stated that there is no impact concerning the quantity of fish as a result of the closed season. The remaining 20.1 percent claimed that the quantity of fish in the areas decreased in spite of the measures of the closed season.

The perception of the fishermen on the difference in quantity of fish during the period of February-May compared between 1995 and 1996 showed that 57.5 percent considered that there is a difference between the two years. They stated that the quantity of fish reduced when compared between 1995 and 1996. About 24.0 percent believed that there is no difference between the two years. However, about 18.5 percent of them considered that there is a difference on the quantity of

fish between the two years in that period and they stated that the quantity of fish increased when compared between 1995 and 1996 (see Table 4).

Table 3. Percentage of fishermen on level of their knowledge on the seasonal closure measures

Knowledge of fishermen	Percentage (n=308)		
	High	Low	disknowledge
Prohibited areas	61.4	34.7	3.9
Duration of the closed season	90.0	4.5	5.5
The two periods of the closed season	18.5	37.7	43.8
Types of fishing gear prohibited	46.1	43.5	10.4
Types of fishing gear prohibited during the spawning season (15th February-31st March)	33.4	38.0	28.6
Types of fishing gear prohibited during the nursing season (1st April-15th May)	27.9	37.7	34.4

With reference to this study on the perception of fishermen toward the seasonal closure measures, the results are as follows (see Table 5):

The majority of the sampled fishermen (83.9 percent) strongly agreed to have the prohibited area in the three provinces of Prachuab Kiri Khan, Chumporn and Surat Thani. The remaining 8.4, 3.2 and 4.5 percent, respectively of the fishermen agreed, disagreed and strongly disagreed, or were not decided.

Table 4. Percentage of fishermen on the acceptance of the seasonal closure measures

Acceptance of fishermen	Percentage
• Result of the seasonal closure measures concerning the quantity of fishes	
-Increase	59.4
-Decrease	20.1
-No impact	20.5
• Quantity of fish during the period of the closed season measures compared between 1995 and 1996.	
-Increase	18.5
-Decrease	57.5
-No difference	24.0

More than three-quarters of the fishermen (78.3 percent) strongly agreed with the duration of the closed season of 90 days. Another 13.0 and 5.1 percent of them agreed, disagreed and strongly disagreed, respectively.

Concerning the duration of the two closed periods on spawning and nursing seasons, a majority of fishermen in this study area (85.8 percent) stated that they strongly agreed to the periods. The remaining 5.8, 0.6 and 1.6 percent of them agreed, disagreed and strongly disagreed to the designed duration, respectively. Another 6.2 percent of fishermen could offer no opinion on this matter.

Relating to the fishing gear prohibited in the spawning and nursing seasons, a majority of fishermen (86.7 percent) strongly agreed to the types of fishing gear proposed. The remaining 6.2, 3.9 and 3.2 percent of them agreed, strongly disagreed or could not decide upon the matter.

In addition, two thirds of the sampled fishermen (68.2 percent) strongly agreed to the types of fishing gear allowed to operate in the first period for 45 days. However, the 8.8, 13.6 and

0.3 percent agreed, strongly disagreed and disagreed. Another 9.1 percent of fishermen could offer no opinion.

On the types of fishing gear allowed to operate during the second period of 45 days, about three-quarters of the fishermen (65.9 percent) strongly agreed. The remaining 10.1, 14.0 and 0.6 percent of fishermen agreed, strongly disagreed and disagreed, respectively. However, 9.4 percent of the fishermen in this study could offer no opinion.

Two thirds of the fishermen (68.2 percent) strongly agreed to the imposition of arrest and penalties. The remaining 9.4, 6.2 and 2.9 percent agreed, strongly disagreed and disagreed on this, while another 13.3 percent could offer no opinion.

Table 5. Percentage of fishermen on the perception toward the seasonal closure measures

Perception fishermen	Percentage (n=308)				
	Agreed		Disagreed		Undecided
	High	Low	Low	High	
Prohibited areas	83.9	8.4	0.6	2.6	4.5
Duration of the closed season	78.3	13.0	1.9	3.2	3.6
The two periods of the closed season	85.8	5.8	0.6	1.6	6.2
Types of fishing gear prohibited	86.7	6.2	0.0	3.9	3.2
Types of fishing gear prohibited during 15th February-31st March	68.2	8.8	0.3	13.6	9.1
Types of fishing gear prohibited during 1st April-15th May	65.9	10.1	0.6	14.0	9.4
The imposition of arrest and penalties	68.2	9.4	2.9	6.2	13.3

With particular reference to the various aspects of benefits received from the seasonal closure measures, the results from this study show that more than three-quarters of the fishermen (76 percent) received benefits from the measures of closed areas, number of days and the two periods. Regarding the types of fishing gear prohibited in the closed season, 74 percent of the fishermen stated that they received benefit from this measures. However, about two thirds of the sampled fishermen (60 percent) revealed that they received benefits from closed season on types of fishing gear allowed to operate during the first period of 45 days and the second period of 45 days (see Table 6).

For the benefits received on the arrest and penalties, 46.4 percent of the sampled fishermen believed that it was useful. However, it was noticeable that about 40 percent and 39.3 percent of the fishermen stated that there are no benefits from the closed season with particular reference to the types of fishing gear allowed to operate during the first and second periods. About 53.6 percent of them considered that there is no benefit from the potential of arrest and penalties.

Relating to any adverse impact from the closed season, the results show that there are some fishermen who lose benefit from the designed measures the on areas, number of days, types of fishing gear and penalties. About 12.6 and 11.7 percent respectively of the group who perceived impact stated that the highest level of impact from the measures was from the fishing gears allowed to operate during the two periods. For the overall impact of the seasonal closure measures, about 10.1 of the fishermen stated that they received impact on their fishing occupation. In addition, 90.3 percent of the fishermen who perceive an impact did not complain or demand any solution. While another 9.7 percent of them who received an impact from this measures could solve their own problems by changing their fishing gears, stop fishing and becoming hired labour, or continue fishing by circumventing the fisheries officials and regulations (see Table 7).

Table 6. Percentage of fishermen on the benefits received from the seasonal closure measures

Benefits received	Percentage (n=308)				
	Benefits received				Don't received benefits
	Very high	High	Low	Very low	
Prohibited areas	48.7	21.8	4.9	0.6	24.0
Duration of the closed season	48.1	21.8	5.5	0.6	24.0
The two periods of the closed season	46.1	23.4	5.2	0.6	24.7
Types of fishing gear prohibited	46.5	21.5	4.9	1.0	26.1
Types of fishing gear prohibited during 15th February-31st March	41.2	13.3	3.2	2.3	40.0
Types of fishing gear prohibited during 1st April-15th May	41.9	13.0	4.2	1.6	39.3
The imposition of arrest and penalties	31.5	9.4	4.5	1.0	53.6

Table 7. Percentage of fishermen on the adverse impact from the seasonal closure measures

Adverse impact to fishermen	Percentage (n=308)				
	Adverse Impact				No impact
	Very high	High	Low	very low	
Prohibited areas	1.9	6.8	2.6	1.0	87.7
Duration of the closed season	2.3	5.5	2.3	1.6	88.3
The two periods of the closed season	1.6	4.2	2.9	1.6	89.7
Types of fishing gear prohibited	2.6	7.1	3.2	0.6	86.5
Types of fishing gear prohibited during 15th February-31st March	4.5	8.1	4.2	1.3	81.9
Types of fishing gear prohibited during 1st April-15th May	4.2	7.5	4.2	1.0	83.1
The imposition of arrest and penalties	1.6	3.9	1.6	0.6	92.3

When considering the perception of fishermen on improvements to the seasonal closure measures, the results show that almost half the fishermen (42.8 percent) agreed an change in the number of days. About 37.3 percent proposed to reduce the number of days. Another 5.5 percent proposed to increase the number of days. 37.7 percent considered that there should be an improvement of fishery officials, control and protection procedures. About one-quarter of the fishermen considered that there should be an improvement in the fishing gears allowed to operate during the two periods (27.8 and 26.7 percent, respectively). In addition, there are groups of fishermen who support the reduction and increase in the types of fishing gear including the number of days. About 20.4 percent of the fishermen considered that there should be a change in the areas prohibited. About 17.5 percent the fishermen proposed to reduce the areas under the measures while another 2.9 percent proposed to increase the areas. However, the majority of the sampled fishermen (79.6 percent) considered that there is no need to change the prohibited area under the measures while 18.8 percent proposed an change in the arrest procedure and the penalties (see Table 8).

Table 8. Percentage of fishermen on the improvements to the seasonal closure measures

Improvements	Percentage (n=308)		
	Increase	Decrease	No change
Prohibited areas	2.9	17.5	79.6
Duration of the closed season	5.5	37.3	57.2
The types of fishing gear prohibited	3.9	12.7	83.4
Types of fishing gear prohibited during 15th February-31st March	12.8	15.0	72.2
Types of fishing gear prohibited during 1st April-15th May	11.1	15.6	73.3
The imposition of arrest and penalties	18.8 (need improvement)		81.2
Fishery officials /implementation method	37.7 (need improvement)		62.3

Participation and trend of participation in the seasonal closure measures

Participation in planning

About one third of the sample (30.8 percent) had participated in the meetings concerning the seasonal closure measures, which were organized by government agencies. 18.8 and 17.9 percent respectively participated in the formulation of directions by identifying problems and proposing directions in the formulation of the measures. However, 8.1 percent had participated in planning for local protest arrangements against the seasonal closure measures.

The issues that fishermen were against with regard to the types of fishing gear prohibited. The details are as follows:

- Decision on areas of the measures 0.9 percent
- Decision on types of fishing gear prohibited 5.1 percent
- Decision on the duration of prohibited fishing operation 0.6 percent
- Decision on the types of fishing gear allowed 0.6 percent
- Decision on the implementation of the measures by Government officials 0.3 percent
- Decision on the type of fishing gear prohibited and the implementation of the measures by Government official 0.3 percent
- Decision on areas prohibited under the measures, types of fishing gear, arrest procedures and penalties 0.3 percent

Participation in implementation and coordination

With reference to participation in implementation and coordination, the results show that 63.9 percent of the fishermen participated in the public announcement/dissemination of information on seasonal closure measures to various groups of fishermen. Almost half of the sampled fishermen (48.4 percent) collaborated with the seasonal closure measures by providing labour. About 47.5 percent supported by using their fishing boats for fisheries officials. The remaining 29.7 percent collaborated in identifying illegal fishermen who violate the measures. About 13.2 percent of fishermen changed their fishing grounds, while only 8.0 and 5.3 percent respectively of the fishermen changed their occupation or stopped fishing or changed their fishing gears.

Relating to the fishermen who violated the measures, 9.1 percent did this 1-4 times per year. Their activities were operating fishing in the prohibited areas and using illegal fishing gears. About 11.7 percent of fishermen conducted illegal fishing by operating without licensed fishing gears. 84.0 percent of the sampled fishermen who violated this measures escaped by receiving information before hand. Their sources of information were mainly from friends. Other minor sources are from middlemen, government officials and the police. The result showed that about 5.5

percent of the violating fishermen were arrested and 8.1 percent of the fishermen complained and protested about the implementation by the officials.

Participation in receiving benefits

The outcomes from the implementation of the seasonal closure measures are as follows:

Benefit to fishermen

-The sampled fishermen stated that there is an increase in fishery production of about 67.8 percent. The remaining 7.8 and 24.4 percent respectively stated that fishery production is decreasing or that there is no change,

-Relating to convenience in fishing operation, 63.3 percent fishermen stated that it was increased, while another 9.4 and 27.3 percent respectively stated that their convenience in fishing operations was reduced or that there was no change,

-About 49 percent fishermen revealed that they earned a higher income while the remaining 12 and 39 percent respectively earned less income or that there was no change in their income.

-For safety of life and property, 49.1 percent stated that they felt safer in their life and property. The remaining 4.5 and 46.4 percent respectively felt ~~that~~ it was reduced and that there was no change.

-Concerning living conditions, about 45.7 percent revealed that their living conditions are better, while the remaining 10.1 and 44.2 percent respectively stated that their living conditions are reduced or that there was no change.

-With particular reference to the reception of knowledge on fishery resources conservation and fishery information, 43.5 percent of the fishermen stated that it was increased. The remaining 0.3 and 56.2 percent stated that their information was reduced, or that there was no change at all.

The issues that have low impact on the life of the sampled fishermen in this study areas as a result of the seasonal closure measures are on physical health, savings, stress, time for family, hard work, travelling, household amenities (e.g. radio, television, refrigerator, etc.)

With reference to the overall positive impact on the fishermen, 66.9 percent of sampled fishermen stated that they are increased. Another 8.4 and 24.7 percent respectively stated that they were decreased or no change. For the overall positive impact on the fishermen's families, 68.9, 8.4 and 22.7 percent respectively revealed that they are increased, decreased or no change.

Benefits to fishermen and society

For overall positive impacts on groups of fishermen who operate the same types of fishing gear, the results show that 69.5 percent stated that it was increased. The remaining 10.7 and 19.8 percent respectively stated that it was decreased or not changed. Concerning the positive impact on groups of fishermen who use different types of fishing gear, the results show that 50.3, 29.2 and 20.5 percent of fishermen stated that they are increased, decreased or no change in their benefit. Concerning the positive impact on fisheries related industries, the results show that they are increased, decreased or not changed of 46.5, 21.4 and 32.1 percent, respectively. For the overall benefit to the general public, the results show that 69.7, 5.2 and 25.1 percent found that they are increased, decreased or not changed at all.

Regarding the negative impact caused by the seasonal closure measures, the results show that almost all the fishermen replied that there was no change in the conflict between the fishermen using the same types of fishing gear while the remaining 1 and 1 percent stated that they were decreased or not changed. However, on the negative impact caused by the closed season regarding conflict between the fishermen using different types of fishing gear, the results show that they were increased, decreased or not changed of 1.9, 22.4 and 75.7 percent, respectively.

Participation in monitoring and evaluation

The results from this study show that a majority of the fishermen (90.0 percent) stated that they did not participate in the evaluation concerning the seasonal closure measures. Additionally, they stated that they did not participate in the provision of comment or recommendations to the government officials and local leaders. However, one third of the fishermen (29.6 percent) replied that they had participated in the discussions on this measures within their group of fishermen who use the same type of fishing gear.

Perception of fishermen toward the community-based fishery management framework

Concerning the introduction of the fishing rights system to fishing communities in order that they would look after the fishery resources, about two thirds of the sample agreed upon the zoning arrangements for fishing, fishing gears restriction, type of culture species and zoning for aquaculture areas. About half of the sample fishermen agreed on a restriction in the numbers of fishing gear, sizes of boat and duration of fishing.

In case of the transfer of fishing rights to the fishermen in order to manage fishery resources, a majority of the sampled fishermen stated that the government should organize legally supported fishermen groups. These fishing rights will allow the community to take decisions on their regulations to restore their resources and the enforcement of regulations. In addition, the right to resource users must be given only to members of the group and the fees collected should be used for resource restoration.

For the participation of fishermen in the fishing rights system, the results on the transfer of fishing rights to the fishing community show that the majority of fishermen (90.6 percent) will participate in this activity, while only 9.4 percent of them will not participate. When considering the pattern of participation of fishermen in the fishing rights system, 18.8 percent of the fishermen will participate as leaders, while the remaining 6.2 and 65.6 percent of them will be the committee and members, respectively.

Regarding the implementation opportunity in community-based fishery management, about 62.7 percent of the fishermen considered that there is good possibility. The remaining 23.7, 8.4 and 5.2 percent considered that there is a low possibility, no chance and not decided on this matter, respectively.

Concerning the opportunity for the implementation of the community-based fishery management, 62.7 percent of the sample considered it a good opportunity. The remaining 23.7 and 8.4 percent of them stated that it was a low possibility or not possible, respectively. However, concerning the opportunity of fishermen group organization, about two thirds of the sampled fishermen (65.1 percent) stated that there is good opportunity. Another 23.3, 5.8 and 5.8 percent of fishermen considered that there is a low possibility or no chance and not yet decided, respectively. For the success of group organizations, the results show that 75.7 percent was from the fishermen themselves. The remaining 58.7 and 57 percent were from government officials and local leaders, respectively.

Their dedication to, and binding relationship with, fishery resources

When considering the place of birth of the sampled fishermen, about two thirds (70.1 percent) lived in the villages. Another 12.7 and 17.2 percent came from different villages and districts, and different provinces, respectively.

For experience in fishing occupations, about 39.3 percent had experience of between 11-20 years. While another 28, 17.2 and 15.5 percent had experience of between 21-30, 1-10, and more than 30 years, respectively. The average experience of the sampled fishermen is 22 years, while the highest and lowest in experience are 55 and 2 years, respectively.

Concerning the skill of fishermen in fishing gear, half the sample (52.6 percent) had experience in gill nets. The remaining 14, 10.4, 8.4, 6.2, 4.9 and 2.6 percent respectively had experience in cast nets (with light), trawling, traps, push nets, purse seines and hooks.

The reasons for being fishermen were due to their living near the sea, no alternative job opportunities, helping the family, enjoy this occupation and to earn a high return from fishing.

The perception of fishermen toward the fishery resources in the Gulf of Thailand, a majority (95.4 percent) stated that there is a decreasing trend in the resources available. In addition, more than half of this group considered that the resources had reduced but they could still get a balance between their costs and earnings or earn profits. 14.6 percent considered that the resources were reduced and they suffered losses. About 3.6 percent of fishermen considered that there is no change in the fishery resources while only one percent stated that there is an increasing trend in the fishery resources.

Regarding the group of people who should be responsible for the restoration of the fishery resources, the results show that 92.3 percent believe it should be fishery officials. About 71.2 percent think it is the duty of fishermen while 30.1 and 7.4 percent believed it is the duty of the local leaders and the private sector. In ranking of importance of the group of people in restoration of fishery resources, the fishermen considered that the most important group is the Department of Fisheries (77.4 percent). The supporting reasons are from their concerned duty, authority, reliability, knowledge and availability of data and information. 20.2 percent of the fishermen considered that it should be the duty of fishermen. The reason behind this was from being the fishery resources users and successful organization depends upon their collaboration.

In case of delegating the main duty to fishermen in resource restoration, two thirds of the sampled fishermen (74.8 percent) agreed on this matter. While the remaining 25.2 percent did not agree. Moreover, only half the fishermen (54.5 percent) stated that there is a possibility of achieving it while another 45.5 percent considered that it impossible.

About 13.4 percent of the fishermen wanted to fish in other areas. About 14.9 percent of fishermen wanted to change their occupation. Some fishermen wanted to change their occupation but they did not have other job opportunities (25.6 percent). About half the fishermen (59.4 percent) will not change their occupation. The reasons why fishermen want to change their occupation are low catch, uncertain income and high risk.

Reference to the perception of fishermen of the extinction of some fish species in the area, a majority of fishermen (90.9 percent) stated that there are some species of fish that are extinct. The reasons were from high efficiency of fishing gear and high numbers of fishermen and fishing gear. About three-quarters of fishermen stated that the extinction of some fish species has an impact on fishermen. The results show that there is a severe negative impact (30.5 percent). The remainder stated that there was a high negative impact, low negative impact and very low negative impact of 23.4, 6.5 and 11 percent, respectively. However, the majority of the fishermen (92.2 percent) considered that fishery resources should be restored and sustained.

Perception on the value of the seasonal closure measures

The majority of fishermen or 92.2, 84.7, 85.6 and 81.3 percent respectively perceive that at present there is over-fishing and that the seasonal closure measures contributes to the conservation of fishery resources. The close season measure contributes to the conservation of Indo-Pacific mackerel and should be expanded to all the coastal provinces. A majority of fishermen (93.3 percent) strongly agreed to the arrangement of two periods during the spawning and nursing seasons. 74.1 percent of fishermen agreed that this measures could control the fishing operation effectively. However, about half the fishermen (49.4 percent) did not agree that they are responsible for the fishery resources decline.

For this study on the perception of fishermen on factors influencing the occupation of fishing, 83.7 percent considered that fishing gear is the main factor. The other factors are quantity of catch, season, experience, fishing ground and labour of 77.8, 75.2, 61.1, 52.3 and 44.4 percent,

respectively. 33.3, 26.1, 18.5 and 14.2 percent respectively, of the sampled fishermen considered that the quantity of fish, fishing gear, fishing season and experience in fishing are the main factors.

The fishermen in this study areas also stated that if there is a continuity of the seasonal closure measures during the next 3-5 years, positive outcomes will be apparent for Indo-Pacific mackerel, fishermen, income, quality of life and the fishery occupation. For other groups of fishermen who use different types of fishing gear, they will gain benefit from the seasonal closure measures, e.g. trawls, push nets and cast nets (with light).

Realization of the benefits in fishery resources conservation

About half the sample (57.2 percent) stated that there should be a control on the number of fishing boats. The responsible agencies should be the Department of Fisheries and the Harbour Department (74.4 and 17.6 percent, respectively). About 51 percent of the fishermen can foresee sustainability in their fishing occupation. The reason was because the god gives fish for human beings. Only one third (39.3 percent) of the fishermen stated that they could not sustain their fishery occupation. In addition they could foresee the loss of their occupation within the next 10 years.

In the case of the availability or non-availability of the seasonal closure measures, the conservation of fishery resources in order to achieve the sustainability could be achieved from appropriate catches, avoiding the use of destructive fishing gears, catching young fish species, release of fish species that are almost extinct, releasing the brood stock, avoiding destruction of the coral reefs, release of fish species, avoiding the discharge of oil into the sea, avoiding the release of garbage into the sea, mangrove replanting, avoiding consumption of specific fish species or pregnant fish. However, the possibility of implementation that the fishermen could not achieve are an appropriate catch, avoiding the use of destructive fishing gears, catching young fish, releasing the brood stock, release of fish species, mangrove replanting, avoidance of the consumption of specific fish species or pregnant fish.

Regarding the types of fishing gear that destroy young fish species, the perception from the sampled fishermen are as follows:

About 81.1 percent of fishermen consider that pair trawls are the fishing gear that destroy the young of fish species.

60.6 percent of fishermen stated that large-size push nets are fishing gear that destroys young fish of all species. Another fishing gear that destroys young fish species are small trawls, otter board trawls, shellfish trawls, small push nets, beam trawls, purse seines and light luring purse seines.

The fishermen stated that the most popular fishing gear was destructive for young fish species (37.5 percent). In addition, large-scale push nets and purse seines were ranked at the top at 19.9 and 13.0 percent, respectively.

Regarding the impact from fishing gear on fishermen e.g. pair trawls, large-scale push nets, otter trawls, small trawls and small-scale push nets, the fishermen stated that the fishing gear was in the first rank of impact of 34.9 percent. They considered that large-scale push nets and small-scale push nets were ranked highest at 14.3 and 6.5 percent, respectively.

With particular reference to the fishing gear for which the sampled fishermen ever received help, those are gill net, light luring purse seine, small trap and small trawl. Their support was on the information of fishing grounds and location of fishing gear. However, less than half of the sampled fishermen received support or help from middlemen and investors.

Pattern and level of participation of fishermen on the closed season

With particular reference to the level of participation of fishermen in the seasonal closure measures, the overall results show that about half the sampled fishermen participated in the seasonal closure measures at a medium level (58.8 percent). Another 41.2 percent of the sampled fishermen participated in the closed season at a low level. When considering the pattern of

participation, the results show that a high level of participation was found on the participation in benefits received (42.5 percent). However, due to no activities of fishermen in the participation in the implementation of the measures, it is shown that the fishermen received benefit from the implementation of the measures at a high level (see Table 9).

Table 9. Pattern and level of participation of fishermen in the seasonal closure measures by percentage

Pattern of participation	Level of participation (Percent)		
	High	Medium	Low
• Planning	4.9	58.8	41.2
• Implementation	-	4.2	95.8
• Benefit derived	42.5	54.3	3.2
• Evaluation	0.3	3.6	96.1
Overall participation	-	**58.8**	**41.2**

Factors influencing the participation of fishermen in the seasonal closure measures

General factors

Gender

The results of this study showed that men participated in the seasonal closure measures more than women at a significance level of (95 percent confidence level).

Social status

For this study on social status, the sampled fishermen who are leaders and committee members of fishermen's groups participate in the seasonal closure measures more than the fishermen who do not have a social position at a significant level of (95 percent confidence level).

Fisheries related factors

The result of this study revealed that the level of participation in the seasonal closure measures by fishermen operating different types of fishing gear are different at a significance level of (95 percent significant level) as shown in the Table 10.

Knowledge of the seasonal closure measures

There is the relationship between the knowledge of the fishermen on the seasonal closure measures and their participation in the measures at a significance level of (95 percent significant level, $r = 0.18$).

Table 10. Level of participation of fishermen in the seasonal closure measures by types of fishing gear

Types of fishing gear	Level of participation (Mark)		p-value
	Average	S.D.	
Gill net	11.57	8.03	0.0251 *
Purse seine	12.75	9.57	
Trawl and push net	17.18	6.59	

Reception of information on the closed season and fishery information

There is no significant relationship between the reception of information on the closed season and fishery information and participation by fishermen in the seasonal closure measures at a significant level. However, the results of the analysis on the relationship between the pattern of participation in planning and the reception of information on the closed season and fishery information show that there is high significance level of (99 percent confidence level, r = 0.28). In addition, there is a significant relationship between the pattern of participation in the implementation, evaluation and reception of information on the closed season and fishery information (95 percent confidence level, r = 0.17 and 0.17, respectively).

Satisfaction with the designed rules of the seasonal closure measures

The results on the satisfaction with the designed rules of the closed measures show that the fishermen are satisfied with the overall seasonal closure measures, i.e. the area covered, duration, types of fishing gear and the implementation by the government officials in arrest of the violators. In addition, the results also show that the perception of fishermen of the benefits received and lost by the implementation of the closed measures revealed that there is a positive relationship at highly significant level of (99 percent confidence level, r = 0.37) between fishermen's satisfaction on the seasonal closure measures and their participation behavior in the measures.

Perception of fishermen toward a community-based fishery management framework

The overall perception of fishermen of a community-based fishery management framework is composed of the perception of fishermen in looking after resources, design of zoning for fishing operations, design of types and numbers of fishing gear, duration of fishing and the pattern of fishery management. From this study, the results show that there is a positive relationship at a highly significant level of (99 percent confidence level, r = 0.28) between the fishermen who agreed on the community-based fishery management framework and their participation in the seasonal closure measures. This means that the fishermen who agreed with the community-based fishery management framework at high level will participate in the seasonal closure measures at a high level. In the opposite way, the fishermen who agreed with the community-based fishery management framework at a low level will participate in the seasonal closure measures at a low level.

Requirements of fishermen from a community-based fishery management framework

Trends on requirements of fishermen from the community-based fishery management framework are composed of many aspects, these are design of zoning areas for fishing, design of types and numbers of fishing gear, the duration and pattern of fishery management. This study showed that there is a relationship at a highly significant level of (99 percent significant level, r = 0.34). This means that fishermen who have higher requirements from participation in the formulation of a framework in coastal fisheries management will participate highly in the seasonal closure measures. However, on the contrary, the fishermen who have low requirements from participation in the formulation of a framework in coastal fisheries management will participate in the seasonal closure measures at a lower level.

Perception of fishermen on the value of the seasonal closure measures

The overall perception of fishermen toward the value of the seasonal closure measures is considered from the overall perception in order to conserve and derive benefit in the future as well as the future gain and loss expected as individuals and communities. The results show that this

factor had a significant relationship at a highly significant level of (95% confidence level, r = 0.34).

Realization of benefit derived from the conservation of the fishery resources

Realization of the benefit derived from the conservation of fishery resources or expectations of fishermen on the conservation of fishery resources was considered by multiplying the perception of fishermen on particular issues with opportunities in the implementation of the concerned activities relating to the perception on conservation for sustainable fishery resources.

These concern the use of fishing gear that does not destroy young species of fish. Realization on releasing fish during spawning. Realization on releasing of brood stock, Realization on species and size of fish, cooperation in public activities, non-disposal of waste, rehabilitation of fish habitats, Realization on patterns of consumption. The results show that there is a relationship at the significant level of (95 percent confidence level, r = 0.17) (see Table 11).

DISCUSSION

From this study, the overall results showed that the participation of the fishermen on the seasonal closure measures are at low and medium level, or about 41.2 and 58.8 percent, respectively. Moreover, the majority of the sampled fishermen participated in the implementation of the measures at a low level (95.8 percent). Patterns of participation of fishermen in the seasonal closure measures are on dissemination of information to various groups of fishermen on the measures and supporting the implementation of the measures i.e. fishing boats. Other patterns of participation are planning by participation in the meetings with the government agencies, identification of problems and directions to the Department of Fisheries. About half the sampled fishermen participated in the measures at medium level (54.3 percent). From the result, it could be noticed that the implementation of the seasonal closure measures was basically carried out by the government. Constraint in the participation of the community concerned found in the lack of coordination and cooperation or organization of activities related to the seasonal closure measures. The pattern of participation of fishermen in the seasonal closure measures are mainly on benefit received which was found to be at medium and high level (54.3 and 42.5 percent, respectively). More than half the sampled fishermen receive positive benefits for themselves, their families and their fishermen's groups. Regarding the participation in the evaluation of the seasonal closure measures, it was found in discussion among the fishermen in their group. However, the participation in the discussion and analysis of the measures is found at a low level.

This study also showed that the participation of fishermen in the closed season will be increased through encouraging the community or local organizations to participate in the measures by enhancement of knowledge and understanding on the seasonal closure measures. This includes enhancement of the reception of fishery information and the measures as well as awareness building in the local communities. These were supported by the results of the analysis that there is a relationship with the participation in the seasonal closure measures at a significant level. In addition, this study also supported by perception of fishermen on the effects of the seasonal closure measures. The results showed that more than half the sampled fishermen (59.4 percent) revealed that numbers of fish increased during the seasonal closure measures. However, when compared with the same period of the measures to last year, 57.5 percent of the fishermen said that the fish were reduced. Even though the fishermen could catch larger numbers of fish, they considered that they caught smaller sizes of fish and received a lower price. This resulted in the low aggregate revenue of fishermen due to the lack of a pattern in looking after the fish in relation to the seasonal closure measures and the lack of setting the catch quota in fishing operations consistently with the demand in the market, in order that the fishermen will get a higher price.

Table 11. Relationship of factors influencing the participation of fishermen in the closed season measures

Factors of relationship	Participation of fishermen on the seasonal closure measures (Pearson Correlation Product Moment (r))				
	In planning	In implementation	Benefit derived	Evaluation	Overall
Knowledge of the seasonal closure measures	0.2511*	0.0368	0.1316	0.1788*	0.1792*
Reception of information on the seasonal closure measures and fishery information	0.2788**	0.1723*	-0.1183	0.1701*	0.0814
Satisfaction with the seasonal closure measures	0.1121	0.1876**	0.3576**	0.1076	0.3725**
Perception of community-based fishery management of the framework	-0.0093	0.1898**	0.2208**	0.1850**	0.2797**
Requirement of fishermen from community-based fishery management of the framework	0.0458	0.2157**	0.2724**	0.2051**	0.3399**
Perception of fishermen on values of the seasonal closure measures	-0.1274	0.2337**	0.3945**	-0.0790	0.3366**
Realization of benefit derived from conservation of fishery resources	0.1133	0.0383	0.0968	0.2116**	0.1674*

Remark: * Significance level of 95 percent confidence level
** Highly significant level at 99 percent confidence level

With particular reference to the enhancement and encouragement of the fishermen in the communities in participation in the seasonal closure measures according to the community-based fishery management concept, the overall perception of fishermen agreed with the concept. However, it was considered that there is little chance for it to succeed. One of the reasons revealed by fishermen was that it should be the role and function of the government, rather than the fishermen. In addition, the fishermen perceived that it is the main function of the Department of fisheries to look after the fishery resources. However, their perception showed the need of an improvement in government relative to the arrest and penalty on people violating the measures. About one thirds of the sampled fishermen (37.3 percent). Considered that the number of days when fishing is prohibited (90 days) should be reduced, even the communities agreed on the present situation of the over-exploitation of the resources and that this measures is intended to conserve the resources. Only 49.4 percent of the sampled fishermen considered that they cause resources depletion resulting in severely decreased resources.

The potential opportunity to enhance the participation of fishermen according to the framework of community-based fishery management, in planning, implementation, benefit received and evaluation to succeed could be at a low or high level. The next thing that the government should do is to improve the mechanisms of implementation. They should allow the fishermen in the community to participate at all levels including planning, implementation and evaluation, rather than for benefit only. In addition, the government should looking at the allocation of benefit, which becomes a more serious problem due to the over-exploitation of the resources, and including the encouragement of sufficiency and equality in the fishing communities

and other groups. Finally, in the implementation of the activities, the government should have a role in providing assistance to vulnerable people in the society. Because they have low economic status, low development in fishing gear in order to increase their opportunity in utilizing the resources for living. In addition, the government should consider the development of participation from the basis of local communities as well as the development of the local leaders or local organizations, e.g. a Sub-district administrative organization, to participate in the management and conservation of fishery resources. The future direction of the research should be conducted on a feasibility study of the development of local organizations concerning the problems of the fishermen in the communities, in order to strengthen their organizations and performing their function as defined in the constitution. These include the participation of the people in the management of the resources in their local areas, as well as development in allowing all groups of people to participate in the management of the resources in their communities together with the collaboration and coordination with all concerned in conducting responsible fishing in the future.

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