



Provincial trawl fisheries management plan in Kien Giang

2016

Strategies for trawl fisheries bycatch management project



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**Provincial people's committees of
Kien Giang**

No: /KH-UBND

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Independence - Freedom - Happiness**

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**Strategies for trawl fisheries bycatch management
(REBYC-II CTI; GCP/RAS/269/GFF)**

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1. Necessity of developing the management plan on trawl fishery

1.1. Necessity

Currently, the challenges in the effective fishery management have become increasingly difficult for the Asian region in particular and the world in general, which is the increase in fishing capacity and overfishing beyond the allowable catch limits of the aquatic resources, along with unsustainable fishing methods (such as unmanaged trawling). These are to be considered in the fishery management worldwide as well as in the region. Overfishing, if not well and promptly managed, will become a major factor causing depletion of aquatic resources and loss of socio-economic benefits. The life of coastal fishing communities will face difficulties and affect the food security of many countries.

In recognition of this issue, the Food and Agriculture Organization of the United Nations (FAO) adopted the 1995 Code of Conduct for Responsible Fisheries (CCRF) calling for the sustainable use of marine ecosystems and requiring the fishing activities to be developed based on environment-friendly methods. The CCRF also aims to enhance the maintenance and conservation of ecosystem biodiversity by minimizing the impacts on non-target species, including catches from the trawlers. The environment unfriendly methods could threaten the sustainability of fishery and the instability of biodiversity in many regions; affect the food security as well as impact on the livelihood of fishing communities and the people who live on aquatic resources.

The call for action to manage bycatch and discard was mentioned in the FAO International Guidelines on Bycatch Management and Reduction of Discards and endorsed by the Committee on Fisheries (COFI) at its twenty-ninth session in order to ensure the sustainable development. Simultaneously, countries in the region, the relating international organizations have urgently done studies and applied measures to reduce, exclude the bycatch, production caught by inappropriate fishing gears.

Trawling is one of the fishing methods having the highest production in the world. In Vietnam, trawl fisheries are also important fisheries and provide the highest production in total catch. Trawls have thrived in Kien Giang province, where its production accounts for more than 80% of the province's total catch. Although the province's total catch continues to increase, the productivity as catch per unit effort (CPUE) declined. The average catch per unit effort in 2015 was 0.24 tonnes/HP/year, lower than the one of 2005, which was 0.26 tonnes/HP/year. On the other hand, the increasing demand for production of fishmeal and other products from catches of the trawls in Vietnam in general and Kien Giang province in particular also causes the increased fishing capacity, fishing gear improvement, trawling speed, expanded fishing grounds to catch all types of species (species with short life cycles, fingerlings, trash fish, the species with fast growth rate), seriously threatening the stability of trawls and sustainability of aquatic resources.

Besides, the regulations on the management on developing the trawls have been incomplete and not indicating its effectiveness. The fishery statistical data system so far has not been fully constructed from central to local. The vessel management is still inadequate, which basically collects only the vessel number whereas the information on fishing capacity is limited; there is a lack of consistency in studying and managing the trawls and there is no specific guidance or regulation for managing the trawls.

Therefore, development of a provincial trawl fisheries management plan in Kien Giang (PTFMP) is very necessary to reduce above shortcomings and to support provincial management agencies to have appropriate management actions and measures which are consistent with local socio-economic conditions and capacity. In addition, the PTFMP also address problems on current local management system and establish an effective and sustainable trawl fisheries management system at local level.

1.2. Legal basis

- Decision no. 787/QĐ-BNN-TCTS dated April 21th 2014 of the Ministry of Agriculture and Rural Development on approving the national action plan on managing the fishing capacity.
- Decision no. 3151/QĐ-BNN-HTQT dated December 22th 2011 of the Ministry of Agriculture and Rural Development on approving and assigning the Directorate of Fisheries to implement the project “Strategies for Trawl Fisheries Bycatch Management ” – REBYC II-CTI funded by the Global Environment Fund (GEF).
- Decision no. 1105/QĐ-UBND dated May 23th 2014 of the People’s Committee of Kien Giang province on approving the master-planning project on developing the fisheries in Kien Giang towards 2020.
- Plan no. 101/KH-UBND dated November 4th 2014 of the People’s Committee of Kien Giang province (Plan no. 101/KH-UBND) on Implementing the Scheme on reorganizing the production in capture fishery in Kien Giang province towards 2020; Plan no. 107/KH-UBND dated November 13th 2014 on implementing the programme on protecting and developing the aquatic resources towards 2020 in Kien Giang province (Plan no. 107/KH-UBND).
- Decision no. 23/2015/QĐ-UBND dated June 25th 2015 of the People’s Committee of Kien Giang province on promulgating the Regulation on managing the capture fisheries and aquatic resources protection in Kien Giang province.
- Official letter no. 1682/TCTS-KTTS dated July 02nd 2015 of the Directorate of Fisheries on developing the Management plan of trawl fishery in Kien Giang province.

2. Overview of the trawl fishery in the world and the current status of fishing and management in trawl fishery in Viet Nam

2.1. General context of the trawl fishery in the world

According to FAO’s statistic of current status of fisheries in the world in 2004 indicate that:

- Fish is provided to over 2.6 billion people (nearly 40% of the world population), equivalent to approximate 20% of animal protein.
- The world population is increasing faster than the total food supply from fish.
- Capture fisheries is declining while aquaculture is developing.
- The world’s fisheries resource scenario is: 50% completely exploited – unable to fish anymore; 25% overexploited, depleted or recovering and 25% are underexploited or moderately exploited.
- 97% of the population from developing countries depends on fishing for income and food.
- 50% of the world fish catch is from small-scale fisheries.

Since 1970s, the fishing capacity of trawl fishery of the world in general and Asia in particular led to an enormous decline of aquatic resources. The efforts to regulate and control the development of trawls are usually not sufficient and ineffective due to the lack of understanding of regulations; enforcement activities are somewhat limited and the lack of compliance of among fishers.

Trawl management in the tropical region of Asia-Pacific requires implementable actions with considerations for management and social-economic aspects of member countries of the Asia Pacific Fishery Commission (APFIC). Using the ecosystem approach to fisheries management can best solve the above complicated perspectives. APFIC emphasized these issues at the 32nd session and agreed to use the management of trawls as a model through directly managing trawl fisheries and indirectly on building capacity in the fishery management system and ecosystem approach at countries in the Asia – Pacific region.

The orientation for a responsible trawl fishery aims to balance the needs of human in using fish and aquaculture feed, ensure the sustainability of ecosystem functioning and improve the ecosystem quality. A general principle for sustainable development is understood as the combination of ecosystem, social, and economic aspects.

In addition, it is also setting out the policies and management measures by managers and other stakeholders. It is also noticed that the participation of fishermen is essential for the entire process of fishery management. At the same time, it is necessary to improve following issues: the conflicts between the fleets, overcapacity, an unprofitable trawl fishery, bycatch, impacts on ecosystem and ecosystem functioning, IUU fishing, monitoring, surveillance and control (MCS), science and monitoring needs, fishing on low valuable products, impact of the fishing industry, ghost fishing and other natural mortality and increase in the investment and subsidies.

On the global scale, many fisheries are also experiencing these problems. We need to manage the fisheries more carefully in order to reverse the downward trend and maintain the fish production in the future. The fish populations have a lower resilience than we think, and the recovery of fish populations will be much slower if overfished. Thus, stronger actions aimed at good trawling management are essential at the moment.

2.2. Overview of the trawl fishery in Vietnam

2.2.1. Vessel capacity

Trawl is one of the important tools in capture fisheries in Vietnam. In recent times, trawl fishery has played an important role in the economic development of the country. However, trawls are now considered as unfriendly to the environment due to many negative impacts on the resources, environment and ecology.

In 2015, there were approximately 20,000 trawlers, which accounted for a large proportion of the total vessels of the country. In particular, the number of vessels with a capacity < 20 HP accounted for about 10% of the total trawl vessels, those with 20-150 HP accounted for 48% and the remaining (42%) had a capacity of > 150 HP. Overall, the fleet structure changed in recent years where the number of trawlers with greater capacity tends to increase.

Some provinces having a developed trawl fishery are: Quang Ngai, Thanh Hoa, Nghe An, Khanh Hoa, Binh Thuan, Ba Ria - Vung Tau, Ben Tre and Kien Giang.

2.2.2. Trawl fisheries in Vietnam

Unlike many countries in the world, in Vietnam fishermen use only the bottom trawl for fishing in sea areas. There are many types and named based on ways of trawling in Vietnam such as: frame trawls, beam trawls, otter trawls, pair trawls, shrimp trawls, fish trawls, anchovy trawls, but in general, trawl fisheries are classified into two main types of trawls single trawl and pair trawls.

Single trawl fishery

Single trawls are one of the traditional fisheries, formed and developed around 1990s in Vietnam. Single trawling occurs widely in the coastal provinces/cities in Vietnam, and plays an important role in the fisheries structure and creates livelihoods for a part of fishermen in the coastal areas. Single trawl has diverse scales and structures, depending on the target species, practices and experiences of the people. Vietnamese single trawlers are very diverse and usually installed machines with capacity of from 20 to 1000HP, operate year-round. In addition to the main fishing resources such as shrimp, fish, and trash fish occupies a significant proportion (30-60%) in the catch of trawling. The management of the single trawlers (number of vessels, and catch,) has not been separated, but grouped into the general trawl fishery (including pair trawlers).

Pair trawl fishery

Compared with single trawls, the pair trawls was formed and developed later and flourished in the 90s in the southern provinces such as: Kien Giang, Ba Ria - Vung Tau, Quang Ngai. Due to the huge

advantages compared with single trawls, pair trawling was strongly developed and became one of the important fisheries in the structure of offshore capture fisheries in Vietnam. Up to now, the pair trawl is widely developed in the coastal provinces, cities and is applied by vessels with a capacity of 30 - 1000HP. Pair trawls are strongly developing in the southern provinces such as: Kien Giang, Ben Tre, Ba Ria - Vung Tau, Binh Thuan, Quang Ngai, Nghe An.

The main target resources of pair trawls are fish and squid; the proportion of trash fish accounts for about 30-40% of the total catch from a fishing trip. The main fishing grounds of pair trawls are located in offshore waters. A small number of pair trawlers operate in inshore waters. Similar to single trawls, pair trawls often operate year-round and the fishing trip usually takes 20-30 days. For some large vessels in Ba Ria - Vung Tau and Kien Giang, the fishing trip lasts up to 50-60 days. For some small vessels in Nghe An, Quang Ngai, the fishing trips usually lasts 7-10 days. The pair trawlers have a higher professionalism and rarely use other fishing methods concurrently. The pair trawlers are also organized into groups, teams with 2-10 units according to voluntary regulations.

3. Current status of the trawl fishery in Kien Giang province

3.1. Role and position of the trawl fishery in Kien Giang province

Kien Giang is a coastal province in the Mekong Delta with a great potential for fisheries economic development. In the past years, the province's fisheries has witnessed a rapid and fairly uniform development in the fields of capture fisheries, aquaculture, construction of infrastructure and fisheries services, processing and export-import of fisheries products, playing an important role in the stability and socio-economic development of the province.

Kien Giang sea has mild climate and weather, few storms and tropical depressions; the depth is not huge, the seabed is low-sloping; the marine resources are diverse and abundant, stable fishing productivity; many big and small islands with some fishing ports and fisheries logistics service areas which are conducive to capture fisheries, especially trawl fishery.

Kien Giang trawls started operating before the 1980s, on a small scale, with mainly coastal single trawlers having a capacity of less than 90 HP. After that, through the acquisition of fishing technology, fishing fleets with higher capacity (above 400 HP) appeared and operated in offshore areas, hundreds of miles from the shore. Especially since recent years, the trawl fishery of Kien Giang province has grown both in quantity and scale, leading to an increasing fishing pressure on marine resources and ecosystems.

By the end of September 2015, the province had 10,322 vessels engaging in fishery activities (including 10,045 fishing vessels and 277 logistics service vessels) with a total capacity of 2,077,887 HP, averaging to 277 HP/unit. The capture production of all species reached 493,824 tonnes, increased by 6.64% than the same period of 2014. The number of trawlers is 3,213 units, accounting for 31.1% of the province's fishing vessels. The trawling production accounted for above 80% of the province's fish production, contributing significantly to the GDP of the agriculture sector in particular and of Kien Giang province in general, ensuring the jobs, income life for more than 70,000 workers in - and outside the province.

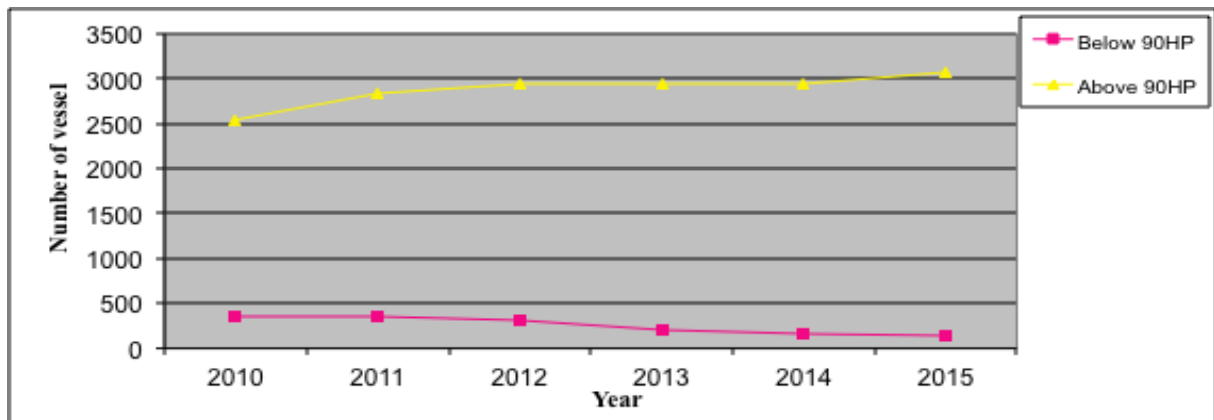
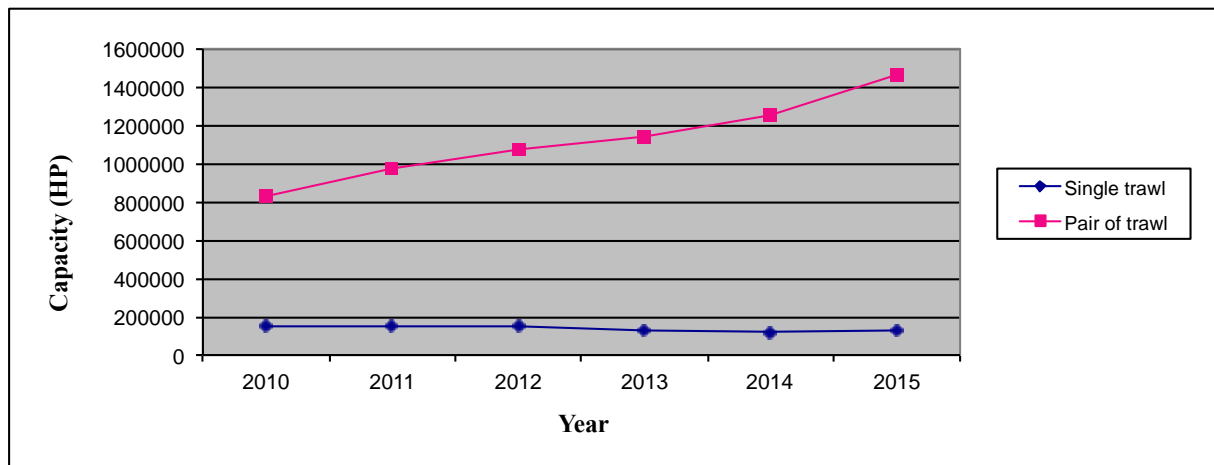
3.2. Structure of the trawling fleet

According to statistics by the end of September 2015, the number of trawlers was 3,213 with a total capacity of 1.585.627 HP, accounting for 31% in number and 76.3% in engine capacity respectively of the total fishing vessels. The number of vessels with a capacity of over 400 HP was 2,389 units, accounting for 68.2% of the total trawlers (Table 1), as follows:

Table 1: Statistics of trawler number and capacity in 2015 (sources: Kien Giang DARD, 2015)

No.	Fishery	<90HP		90 - <150HP		150 - <250HP		250 - <400HP		≥400HP	
		Nu.	Cap.	Nu.	Cap.	Nu.	Cap.	Nu.	Cap.	Nu.	Cap.
1	Single trawls	137	6.239	41	4.858	185	31.246	127	40.280	70	37.690
2	Pair trawls	1	74	10	1.249	56	9.564	394	141.660	2.192	1.273.715
	Total	143	6.550	51	6.107	241	41.634	521	178.225	2.192	1.314.327

- Single trawls: 560 unit, capacity 123,288 HP, averaging 220 HP/vessel.
- Pair trawls: 2,653 unit, capacity 1,462,339 HP, averaging 551 HP/vessel.


Figure 1: Number of trawler in the period 2010 – 2015 in Kien Giang province (Source: Kien Giang DARD 2015).

Figure 2: Chart of structure of single - and pair trawler capacity in the period 2010 – 2015 (Source: Kien Giang DARD 2015).

The charts above show that single trawls tended to decrease and pair trawls tended to increase both in number and capacity in the period from 2010 to 2015.

3.3. Fishing ground and season

3.3.1. Fishing ground

The trawl fishery is diverse in scale with respect to fishery resources, gear size and fishing depth. This fishery occurs both in coastal and offshore areas. Thus, the South western Sea of the Gulf of Thailand is a year-round fishing ground for trawlers. However at present, the trawl fishery is extending farther into the Southeast Sea and contiguous zones with other countries in the region such as Malaysia, Indonesia, and Cambodia (Figure 3).

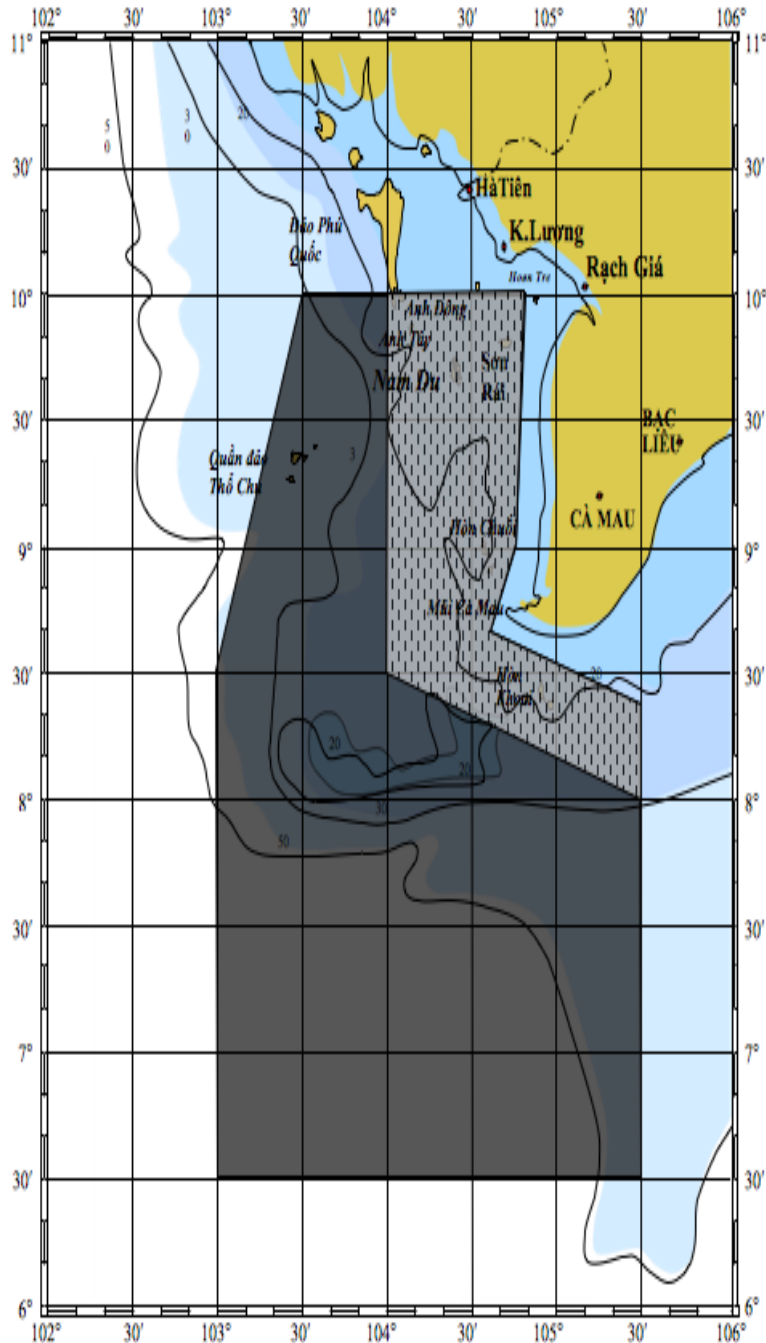


Figure 3: Fishing ground of the trawl fishery in Kien Giang province (Source: Kien Giang DARD 2015).

According to the Report on data collection results from logbook and biological data of the trawl fishery in Kien Giang province in 2014 through the REBYC-II CTI project conducted by Research Institute for Marine Fisheries (RIMF), in general, the pair trawlers operated in a wider range and at lower latitudes than the single trawlers (Figure 4). The key fishing grounds of pair trawlers are concentrated in the

offshore waters, including: fishing grounds C14, C15 with coordinates 8°N-10°N, 103°E-104°E and the fishing grounds C16, D16, E16 with coordinates 7°N-8°N, 103°E-105°E 30'E. In the single trawls, the key fishing grounds are concentrated in the offshore areas C14, C15 with coordinates 8°N-10°N, 103°E-104°E and the coastal areas D14 with coordinates 9°N-10°N, 104°E-105°E.

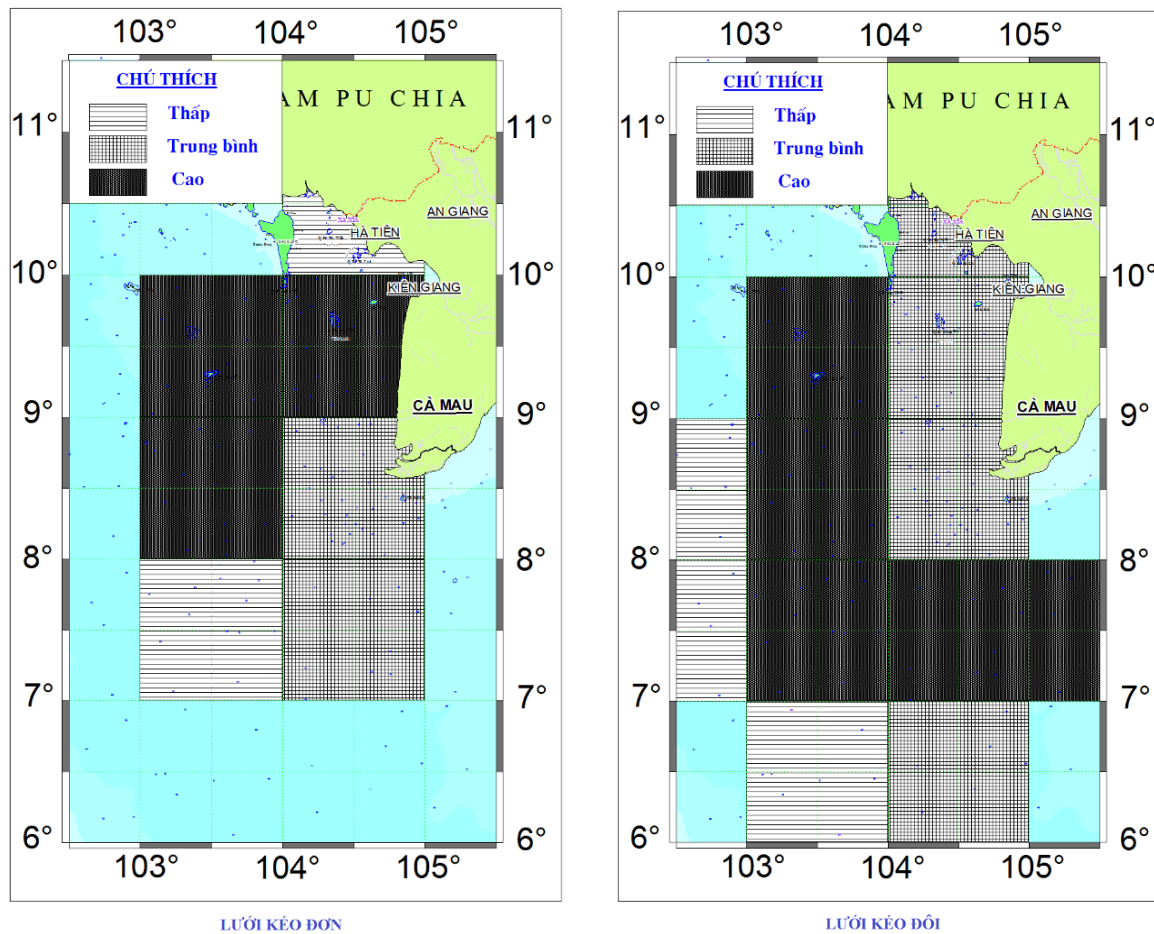


Figure 4: Fishing grounds of the single trawls (left side) and pair trawls (right side) in Kien Giang province (Source: RIMF 2014).

This indicates that fishing grounds of trawlers of Kien Giang spread very broadly, including the West and the South East seas and also the waters adjacent to other countries in the region, so it is difficult to manage and control the operation of trawlers at sea.

3.3.2. Fishing season

The trawl fisheries in Kien Giang usually operate year-round, without any clear seasonality. However in general, the operation of the capture fisheries in Kien Giang is divided into two seasons according to the two monsoon modes, which are the southwest and northeast monsoon.

North season (North fishing season): is the season when fishing vessels push off in the period from October to March of the next year.

South season (South fishing season): is the peak season when fishing vessels push off in the period from April to September. This is the main fishing season of Kien Giang fishermen due to the favourable weather conditions, less storms. So the fishermen can expand the fishing grounds farther (greater fishing depth), the number of fishermen at sea are also more and the number of fishing trips are higher than in the North season. The fishing season lasts year-round, which leads to an enormous pressure on the marine resources, being one of the reasons for declining in marine resources.

3.4. Marine resources and catch composition

3.4.1. Marine resources in the Southwest Sea

The Southwest sea of Vietnam is a part of the Gulf of Thailand. This is a shallow sea; the bottom is muddy, sandy and relatively flat. The natural resources in the Southwest Sea clearly reflect the diversity of tropical marine biology, including mangrove ecosystem, coral reef ecosystem, seagrass ecosystem, covering almost the tidal estuary area, providing areas for the residence and reproduction of many marine species. The marine resources in this sea are quite diverse with 341 species belonging to 192 varieties and 97 families of seafood identified in the period 2011-2013. There are 120 bottom fish species, 79 reef fish species, 60 pelagic species, 20 crustacean species and 23 cephalopod species.

The capture fisheries production in the waters of Kien Giang mainly focuses in some groups, including: Carangidae, anchovy, sardine, croaker, cuttlefish and squid. The typically popular fish are normal sardine, striped sardine, flattail croaker, silver croaker, goatfish, yellow goatfish, goldband goatfish, threadfin bream, Indo Pacific mackerel, shorthead anchovies, *Encrasicholina devisi*, buccaneer anchovy, herring and hard tail scad.

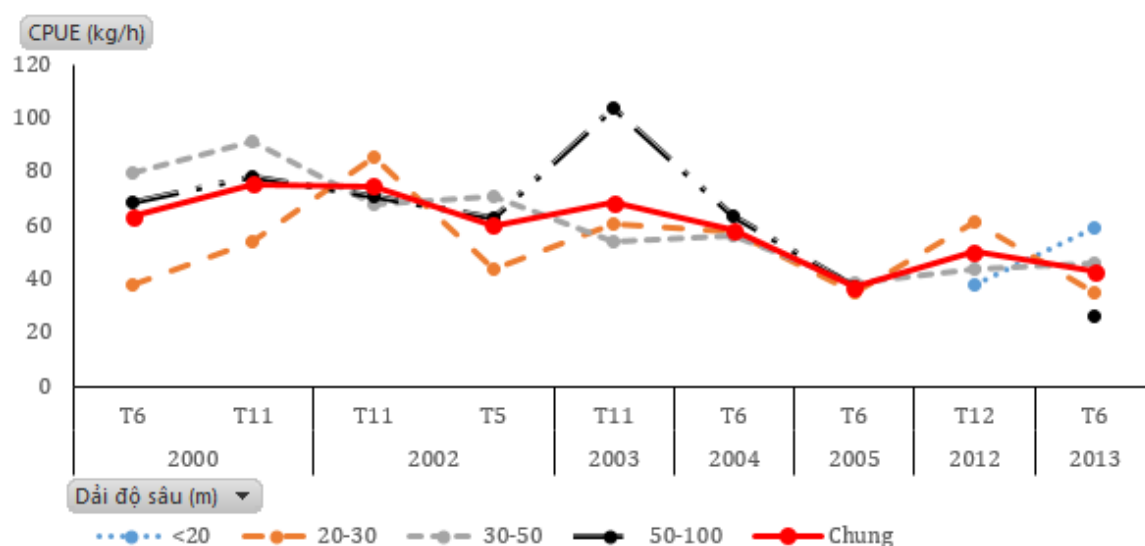


Figure 5: Chart of the fluctuation of fishing productivity (kg/h) of single trawls in the Southwest Sea by strata in the period 2000-2013 (Source: RIMF 2014).

Based on a survey on marine resources in the Vietnam sea, the fishing productivity of commercial fish tend to decline and is replaced by a group of low-value species. The average fishing productivity surveyed by single trawl was around 60 kg/h in 2000-2003, which dropped to approximately 40 kg/h in 2013.

Reasons leading to the decline of marine resources in recent years as follows:

- Impacts of human interventions on coastal ecosystems.
- Pressure from the subsistence needs of fishermen which leads to finding ways of violating the law in order to fish as much as possible.
- The development of auxiliary industries, which use all the products from fishing (e.g. processing fishmeal, fish cakes).
- Increase of fishing capacity.

Although the total seafood production of each year is higher than the previous year, the quality does not increase, and the fishing productivity decreases, the economic efficiency is not high, the bycatch occupies a high proportion in each haul (trash fish), which affects the recovery of marine resources.

For waters of Kien Giang, the reserves and fishing potential have not been assessed accurately. However, these can be assessed based on the research materials of FAO, Vietnam Institute for Sea and Island Research and the actual fishing situation of fishermen in the past year as indicated in Table 2.

Table 2: Biomass and maximum sustainable yield of demersal and pelagic fishes in Kien Giang waters (Source: Kien Giang DARD 2015).

Depth (m)	Area (km ²)	Pelagic fish		Demersal fish		Wide area	
		Biomass (tonnes)	Maximum sustainable yield (tonnes)	Biomass (tonnes)	Maximum sustainable yield (tonnes)	Biomass (tonnes)	Maximum sustainable yield (tonnes)
Under 20m	15,440	77,200	30,880	61,760	39,880	138,960	70,760
20-50m	33,960	127,350	50,940	135,840	67,920	263,190	118,860
Above 50m	13,890	34,730	13,890	27,780	13,890	62,510	27,780
Total	63,290	239,280	95,710	225,380	112,690	464,660	217,400

The average annual marine production of Kien Giang is above 400,000 tonnes (in 2015 it was 493,824 tonnes), which shows the fishing production has exceeded the sustainable allowable fishing capability of resources.

3.4.2. Catch composition of the trawl fishery

According to the results from the report on data collection from log book and biological data of the trawl fishery in Kien Giang province in 2014 through the REBYC-II CTI project, the catch composition of trawl fishery is very diverse, but focused in around 9-10 major commercial fish groups such as: trash fish, commercial fish, squid, shrimp, in which the trash fish and mixed fish groups are the two groups that occupy the highest proportion in the catch. The seafood groups with high economic value such as squid usually occupy low proportions (Table 3).

Single trawls:

In single trawlers, the commercial groups include trash fish, mixed fish groups and shrimp account for a significant share in the total production. Overall for the year, trash fish accounts for 39%, shrimp accounts for 28% and mixed fish species accounts for 18% of the total production. The economic commercial groups account for lower rates, including: mixed squid (3%), mixed shrimp (3%) and cuttlefish (1%). The number of species in catches is relatively abundant, about 135 trash fish species and 147 mixed fish species. Overall for the entire single trawls in Vietnam, the proportion of trash fish accounts for 30-60% of the total catches (national guidelines on the management of trawls).

Pair trawls:

The composition of catch from pair trawls fluctuates seasonally over the year and there is a rotation between commercial groups. Overall for the year, the trash fish and bucket fish groups occupy the main proportions, corresponding to 60% and the 19% of the total catch. The squid group including squid (7%), mixed squid (6%) and cuttlefish (1%) has a much higher proportion than other groups, and particularly higher in comparison with single trawls.

According to a study on trash fish conducted by Nguyen Van Lung in 2008-2009, the proportion of trash fish in the single trawls was 48% and in the pair trawls was 43%. Overall for the entire pair trawls

in Vietnam, the proportion of trash fish accounts for 30-40% in the total catches (national guidelines on the management of trawls).

Table 3: Catch composition according to commercial groups, captured from the trawl fishery in Kien Giang in 2014 (Source: RIMF 2014).

Fishery	Commercial group	Proportion %
Single trawls	Trashfish	39.3
	Mixed fish	17.9
	Stingray	2.5
	Goatfish	2.4
	Mixed squid	3.4
	Cuttlefish	1.1
	Mixed shrimp	3.1
	Shrimp	28.0
	Other	2.2
Pair trawls	Trashfish	56.9
	Mixed fishes	19.2
	Threadfin breems	3.4
	Lizardfish	1.7
	Grouper	1.8
	Red bigeye	1.4
	Squid	7.1
	Mix squid	6.3
	Cuttlefish	1.1
	Other	1.1

3.4.3. Catch and landing

It is true that trawler fishery has made a crucial contribution to the total catch in the province. However, according to the statistics, there is only total number of catch, which is not divided by species or gears.

Based on the logbook and port sampling data collected under REBYC-II CTI project, the total catch of trawl fishery in Kien Giang province is about 444,000 tonnes (Table 4) in 2014. The catch of pair trawlers, which is the major portion of 422,000 tonnes, accounts for 95% of total catch. The total catch of bottom trawls was only about 22,000 tonnes, making up for 5% of the total. The fishing vessels whose engine is from 250-400 HP to over 400 HP catch most of the total catch.

Table 4: The total catch of trawl fishery in Kien Giang 2014 (Source: RIMF 2014).

Gear	Horse power	Catch (tonne)	Proportion (%)
Pair trawl	< 45	-	0.00
	45 - 90	79	0.02
	90 - 150	6,312	1.42
	150 - 250	86,293	19.43
	250 - 400	786	0.18
	> 400	328,660	73.99
	Sub Total	422,130	95.04
Otter trawl	< 45	1,284	0.29
	45 - 90	3,679	0.83
	90 - 150	4,917	1.11
	150 - 250	7,049	1.59
	250 - 400	1,946	0.44
	> 400	3,172	0.71
	Sub Total	22,047	4.96
Total		444,177	100.00

3.4.4. Catch preservation and post-harvest loss

Together with the increase in number of fishing vessels, the catch ranged from 305,565 tonnes to 493,842 tonnes, in years 2005-2015. The annual catch gradually increased including high economic species, especially squid. However, just about 50% of the total catch is processed, of which 20-30% is fishmeal. The rest of the catch is either consumed or sold as trash fish with low price due to low quality.

The reasons for the low quality product are numerous. However the biggest problem is poor fish preservation technology. The fishers are less concerned about the investment on improving fish storage facilities on the boats. There are about 10,000 fishing vessels in Kien Giang province in which 4000 units are over 90 HP. Finely crushed ice is used to preserve their catches on board and to transport fish to the shore. Therefore the quality of these products is not high and the benefits are decreasing as well. Although several studies on this case have been conducted, their results are not applied yet.

According to statistical data, the post-harvest loss is around 20% of the total catch, even 30% of trawl fishery. It is caused by the poor preservation on board. The post-harvest loss is still at risk of being high.

Traditional methods are used to preserve the catch in most fishing vessels in Kien Giang are the use of mill ice, salt and drying. Ninety percent of fishing boats use the isolated sponge materials for preservation. With this way of preservation, the temperature is unstable; thus the quality of fish as well as the profit of the trip goes down. In addition, the duration of trip, which lasts for 20 days, is another reason for poor quality of products.

3.5. Status of trawl fishery management in Kien Giang

Currently, there are 3 methods applied in the world including input control, output control and technical method. In Kien Giang in particular and Viet Nam in general, fishermen are applying input control, but other methods are still under consideration.

3.5.1. Input control

Currently, all fishing activities are managed by Law of Fisheries and regulations of Viet Nam government. On a local scale, People's committee of Kien Giang issued the Decision No 23/2015/QĐ-UBND dated 25/6/2015 regarding the management of capture fisheries and conservation of fisheries resources in Kien Giang province.

In general, fishing license can control input of capacity. However, licensing now is only being considered as administrative procedures without being used as a measure to limit fishing effort for trawl fisheries.

3.5.2. Technical measures

Circular No. 02/2006/TT-BTS and Circular No. 62/2008/TT-BNN regulated mesh sizes and fish sizes, zoning, closed areas/seasons.

Kien Giang stipulated decision No 23/2015/QĐ-UBND dated on 25/6/2015 to regulate fisheries management in Kien Giang waters in order to integrate all national measures into provincial measures. However, enforcement still is a problem due to lack of coordination and cooperation mechanisms.

3.5.3. Monitoring, Control and Surveillance (MCS)**Monitoring system**

At the moment, in the entire country, there have been 3000 vessels installed with Vessel Monitoring System (VMS) and of those 407 vessels belong to Kien Giang province. However, this system is not working very well and need to be revised in the future.

Controlling system

To control fishing activities, the Government issued Decree No. 33/2010/ND-CP dated 31/3/2010 of the Government on management of fishing activities for Vietnamese individual and organizations at sea; Circular No. 25/2013/TT-BNN dated 05/10/2013 of the Ministry of Agriculture and Rural Development guiding some articles of Decree No. 33/2010/ND-CP; Article 3 of Decree No. 53/2012/ND-CP dated 20/06/2012 of the Government on amending and supplementing some articles of the Fisheries Decrees which requires local authorities to make monthly reports to the Ministry of Agriculture and Rural Development; all fishing vessel captains with higher than 20 HP must submit logsheets to the competent authority. However the implementation of fishing logbook program also encountered many difficulties.

Before 2000, the data collection system had been established; however, this system was interrupted in the period from 2005 to 2013 due to lack of financial and human resources as well as a mechanism for coordination between management agencies.

3.6. Strengths, Weaknesses, Opportunities and Threats analysis (SWOT) on trawl fisheries in Kien Giang

A SWOT analysis considering economic, social, fisheries, resources and ecosystem was conducted during a Round table Meeting from 25-26 February 2016. The meeting is also in the framework of REBYC-II CTI project. During the meeting, representatives of provincial management agencies including Kien Giang province were required to develop the SWOT analysis in their trawl fisheries. Summary of the SWOT analysis in Kien Giang trawl fisheries is indicated in Table 5.

Table 5: Analysis of SWOT for trawl fisheries of Kien Giang

Strengths	Weaknesses
<p>S₁: Trawl fisheries are the most important gear in the province.</p> <p>S₂: Trawl fisheries are traditional fishing gear and fishers have many experiences.</p> <p>S₃: High investment.</p> <p>S₄: Many fishing vessel.</p> <p>S₅: High biodiversity and large fishing grounds.</p> <p>S₆: Many existing legal framework on trawl fisheries.</p>	<p>W₁: Lack of labor and educated persons.</p> <p>W₂: high fishing cost.</p> <p>W₃: Low level of infrastructures and fisheries logistic in the province.</p> <p>W₄: Many trawl fishing vessels.</p> <p>W₅: Lack of fishing and preservation technologies.</p> <p>W₆: High bycatch level.</p> <p>W₇: Lack of cooperation and coordination among stakeholders.</p> <p>W₈: Low level of enforcement (MCS).</p> <p>W₉: Lack of consideration of fisheries extension.</p> <p>W₁₀: lack of fisheries management measures specified for trawl fisheries.</p>
Opportunities	Threats
<p>O₁: Investing a large landing site.</p> <p>O₂: Considered by provincial management leaders.</p> <p>O₃: Kien Giang has potential for offshore fisheries.</p> <p>O₄: Ability to approach advanced fishing technologies.</p> <p>O₅: Very high abundance of anchovy, crab, coral reefs...</p> <p>O₆: Many policies of Government for offshore fisheries development.</p>	<p>T₁: Fish price and fuel price unstable.</p> <p>T₂: Fishing ground conflicting.</p> <p>T₃: High demand on resources.</p> <p>T₅: High demand on fishmeal.</p> <p>T₆: More strict rules on sanitation and quality control.</p> <p>T₇: High negative impacts on seabed.</p> <p>T₈: Many countries and regions want to reduce fishing capacity of trawl fisheries.</p> <p>T₉: Reduced resources.</p> <p>T₁₀: Large fishing grounds, difficulties for controlling.</p> <p>T₁₁: Common fishing grounds and thus difficult for managing.</p>

3.7. Shortcomings and challenges of trawl fisheries in Kien Giang

As indicated in the above SWOT analysis, the trawl fisheries in Kien Giang are encountering following problems/shortcomings:

- There is no management legal framework specified for trawl fisheries and if available then these have not been updated to suit with current status;
- Insufficient scientific data;
- MCS activities are not implemented effectively and sufficiently;
- Low understanding of fishing communities;
- Post-harvest loss very high; and
- High bycatch proportion.

4. Provincial trawl fisheries management plan in Kien Giang (PTFMP)

In compliance with the national management strategies to manage trawl fisheries in Viet Nam effectively and sustainably and within the framework of the REBYC-II CTI project, the Department of Agriculture and Rural Development in Kien Giang (Kien Giang DARD) was asked to develop their Provincial Trawl Fisheries Management Plan. On 5 June 2014, Kien Giang DARD had established a steering committee to develop their PTFMP. The steering committee includes representatives of Kien Giang DARD, Sub-Department of Fisheries in Kien Giang, fishing port authorities, and fisheries association. Three workshops of the committee and some small working group meeting were conducted to develop the PTFMP with full participation of all stakeholders in trawl fisheries in and outside the province. The final draft of the PTFMP will be submitted to the Provincial People Committee for official approval and implementation. The final draft of PTFMP includes following contents:

4.1. Principles of the PTFMP

The intention of the provincial trawl fisheries management plan is to enhance effective fisheries management in general and trawl fisheries management in particular with more suitable strategies, goals, objectives and policies, also to develop the socio-economic situation. This is extending from central to local levels and in line with international and regional intentions.

4.2. Development principles

- The trawl fisheries in Kien Giang is managed sustainably, environment friendly and in the light of strategies, goals, objectives and policies to develop socio-economic status of the province and in the light of the National Master Plan.
- The trawl fisheries are modernly developed with modern approaches focusing on advanced and selective fishing technologies and improved post-harvest product quality to ensure the accession on international markets.
- The trawl fisheries management must be ensured to integrate other sectors and in combination with provincial socio-economic development potentials to harmonize and balance with other sectors in terms of inter-sectoral management as indicated in the ecosystem approach to fisheries management and in conjunction with resource conservation purposes.
- The trawl fisheries are managed effectively and efficiently to ensure all actors in the supply chain are managed systematically to maintain livelihood, food security and sovereign defending.

4.3. Goals of the PTFMP

Trawl fisheries managed sustainably to balance socio-economics and ecosystem, in Kien Giang by 2020, and management effectiveness is enhanced for trawl fisheries in particular and fisheries in Kien Giang in general.

4.4. Objectives of the PTFMP

- **Objective 1:** Reduced loss of port harvesting in trawl fisheries to lower than 10% (currently of 20-30%) and maintained fishers' income and sustainable livelihoods.
- **Objective 2:** Reduced bycatch proportion to 30% in total catch of trawl fisheries (currently 40-60%) and reduced negative impacts of trawl fisheries on related ecosystems (coral reef, sea grass and benthic habitats).
- **Objective 3:** Enhanced and improved monitoring, control and surveillance system on trawl fisheries and enhanced stakeholders' roles and responsibilities to cooperate among management agencies.

4.5. Scope and objects of the PTFMP

The PTFMP is to be applied for inshore and coastal areas managed by Kien Giang management authorities. In the offshore areas, there is a need to obtain cooperation by central management agencies under the Ministry of Agriculture and Rural Development (MARD).

The PTFMP is to apply for all individuals and organizations involved in trawl fisheries from fishing, purchasing, transshipping, processing and consuming trawl fisheries products.

4.6. Detailed activities of the PTFMP (appendix attached)

- **Activity 1:** Developing and implementing actions to reduce loss of post harvesting on trawl fisheries; enhancing competitive ability of trawl fisheries products in Viet Nam in the international markets.
- **Activity 2:** Developing and implementing appropriate mechanisms and solutions to minimize negative impacts of trawl fisheries on marine resources and related ecosystems.
- **Activity 3:** Developing and completing MCS system on trawl fisheries management and establishing and maintaining data collection system for trawl fisheries stock assessment and management.
- **Activity 4:** Enhancing legal and policy frameworks on trawl fisheries management to improve roles, responsibilities, rights and actions on cooperation of relevant stakeholders on trawl fisheries management.

4.7. Solutions to implement the PTFMP

4.7.1. Legal and policy solutions

- Review and propose to Government, MARD to amend and add Circulars or Decrees regarding trawl fisheries management.
- Review and propose legal framework and policies in relation to financial mechanisms to establish and implement trawl fisheries data collection systems.

4.7.2. Raising awareness

- Enhance raising awareness activities and propagation of legal documents and policies on trawl fisheries management. Enhancing full participation of all stakeholders including fisheries associations to involve effectively and actively trawl fisheries management actions.
- Using flexible forms of propaganda in line with tradition, qualifications and conditions of each area; developing and maintaining regular propagation channels on radio, television, newspapers; compilation and distribution of publications and legal inquiry documents.
- Investigating and producing appropriate propagation materials for protecting and managing aquatic resource and provide these materials into in regular studied programs at universities and other learning levels.

4.7.3. State management solutions

- Strengthen the capacity of State management agencies in charge of the marine resource conservation and management at provincial, district and commune levels.
- Establish a mechanism for data collection for example, on the species composition of catches and landings of trawlers at the fishing ports and landing sites in the province.
- Develop a mechanism for coordination between the relevant units: Marine Coast Guard, marine police and fisheries surveillance to inspect, monitor and control trawl fisheries operations to ensure full compliance.
- Develop mechanisms to coordinate and promote the participation and strengthen practical responsibilities of the stakeholders in fishing, processing and sale of trawl fisheries products.
- Application and trial implementation of co-management model for trawl fisheries management as a basic model to expand to other areas in the province.

- Establishment of MPAs, in conjunction with expanding and strengthening the role of the existing MPAs to better protect marine resources and marine ecosystems.

4.7.4. Financial mechanisms

- Integrating trawl fisheries management fund into the existing program or plans of the province such as Plan 101/KH-Committee on Project Provincial People Committee about reorganizing fishing operations and Plan 107/KH-provincial People's Committee on marine resources conservation and management program by 2020 in Kien Giang province.
- Coordinate with the departments concerned, the Ministry of Agriculture and Rural Development to review and propose supports on the implementation of management activities as authorized.

4.7.5. International cooperation

- Cooperation with international organizations to enhance capacity on managing, fishing, and trading of trawl fisheries.
- Propose foreign support to introduce environmental friendly and selective fishing methods/gears and advanced technologies on preservation of post harvesting to minimize loss of post harvesting quality.
- Conduct study tours and exchange information on trawl fisheries management with regional countries and international fisheries management organizations.

4.8. Implementation organization

4.8.1. Department of Agriculture and Rural Development

- Coordinate with the departments and agencies, People's Committees of districts, towns and cities to implement PTFMP in Kien Giang province.
- Disseminate and introduce all contents of the plan to management authorities, related organizations and individuals involved in the management of trawl's fishing activities within Kien Giang Province.
- Develop and implement the proposed programs and projects to implement the plan; and best reconcile with international organizations to receive and using funds (if any) in order to cater for the implementation of this plan effectively.
- Regularly monitor and review the plan to report periodically with PPC to adjust and supplement accordingly.

4.8.2. Fisheries Associations

- Coordinate with the State management agencies to implement activities such as collecting information and data of trawl fisheries; providing raising awareness to fishing communities to implement the contents of this plan.
- Strengthen Association's operations to ensure that the organizations actually bring practical benefits to the fishermen in the following activities: advocacy, promotion, technical advice, technology transfer, insurance and loans.
- Participate in activities management, consulting and policy decisions of the provincial fisheries management.

4.8.3. The Department of Planning - Investment, Finance

Collaboration with the Department of Agriculture and Rural Development to propose sufficient budget to implement the plan on schedule and efficiently.

4.8.4. The departments and agencies; People's Committees of districts, towns, cities

As authorized on the function and their duties in coordination with the Department of Agriculture and Rural Development to implement provincial trawl fisheries management plans as assigned.

Copied to:

- MARD;
- D-FISH;
- Related DARDs;
- PPC at district level;
- KTCN.

CHAIR

Appendix I Proposed actions of the Provincial Trawl Fisheries Management Plan

(To be implanted by local management authority namely Department of Agriculture and Rural Development (DARD))

No	Activities	Current status	Output	Implementation/cooperation agencies	Period
I	Developing and implementing actions to reduce loss of post harvesting on trawl fisheries				
1	Improve preservation cooler system on board using Polyurethane materials	Not been considered much.	<ul style="list-style-type: none"> - Most of trawlers equipped this method using Polyurethane materials. - Reduce 3-5% of loss rate of post harvesting 	Department of Agriculture and Rural Development (DARD)/Directorate of Fisheries (D-FISH), fishers	2016 - 2020
2	Application of circulated cooling system on board of trawlers.	Most of traditional approached used is the use of ice.	<ul style="list-style-type: none"> - The circulated cooling system is trial and applied in some selected trawlers. - Reduce 5-10% of loss rate of post harvesting 	DARD/D-FISH, fishers	2017 - 2020
3	Educate fishers to improve their working skill to use and operate advanced technologies.	Limited working skill.	<ul style="list-style-type: none"> - Fishers are educated and trained on board. - The advanced technologies on post harvesting preservation used and operated. 	Department of Labour, Universities, D-FISH and fishers	2016 - 2020
4	Update and well organize fisheries logistics	Existing but not effectiveness	<ul style="list-style-type: none"> - Integrated model in fisheries logistic performed (established mother and child boat system). - Time to transfer fisheries products into landing sites shortened (cost of fishing reduced). 	DARD/ Fisheries Associations.	2016 - 2020

5	Establishing auctions at the landing sites to make transparency on trading business among stakeholders.	Not existing	- A trial of auctions established. - A cooperation/ agreement model between buyers, processing companies and fishers established	DARD and other related stakeholders	2019 - 2020
6	Establishing national standards/guidelines in how to set up post harvesting preservation holders	Not existing	The standards/guidelines in how to set up post harvesting preservation holders established	D-FISH	2017 - 2018
II	Developing and implementing appropriate mechanisms and solutions to minimize negative impacts of trawl fisheries on marine resources and related ecosystems				
1	Review and supplement policies on financial and human mechanisms for fisheries surveillance activities	Not suitable at the moment since all penalty fees are transferred to provincial budget holder without keeping any by surveillance section.	New policies on financial and human mechanisms for fisheries surveillance activities established.	DARD, D-FISH, Financial Department	2018 - 2019
2	Investigating to upgrade trawlers to reduce negative impacts of these trawlers into the benthic habitats	Non existing	Model of mid-water trawl trialed	Research Institute, Universities, DARD and vessel owners.	2019 - 2020
3	Establishing legal framework on trawl fisheries management including updating mesh size regulations	Existing regulation is not updated and impractical	A Circular on trawl fisheries management established	D-FISH and other stakeholders	2017 - 2018

4	Restocking of coral reefs in the MPAs	Non existing	- Coral reefs and sea grass areas protected. - Reef associated resources managed and protected	DARD and international organizations	2017 - 2020
5	Enhancing inspection activities to sanction of the violations on mesh size, fishing closing areas/seasons	Limited enforcement	100% trawlers managed legally	DARD, D-FISH, Fisheries Surveillance Department and Marine Coastguard	2016 - 2020
III	Developing and completing MCS system on trawl fisheries management and establishing and maintaining data collection system for trawl fisheries stock assessment and management				
1	Review, amend and supplement of legal and policy frameworks for inspection activities to manage trawl fisheries	Inappropriate current mechanisms Only officials can make sanctions without authorization to other management agencies	Legal and policies established or integrated on other legal documents (e.g. management system, technical measures and monitoring and surveillance regimes)	Provincial Department of Agriculture and Rural Development (DARD) and Provincial Department of Financing	2018-2019
2	Review, amend and supplement of legal and policy frameworks for trawl fisheries data collection system	Not sufficient	- Financial and human resource mechanisms for trawl data collection established systematically from provincial, district and village levels. - Trawl fisheries data collection established and implemented to regularly update trawl fisheries data	DARD, D-FISH and Department of Financing	2017 - 2018
3	Development and updating of a national database	Existing but not comprehensive	A national database established	DARD and D-FISH	2016 - 2017

IV	Enhancing legal and policy frameworks on trawl fisheries management to improve roles, responsibilities, rights and actions on cooperation of relevant stakeholders on trawl fisheries management				
1	Review and supplement policies on financial and human mechanisms for fisheries surveillance activities	Not suitable at the moment since all penalty fees are transferred to provincial budget holder without keeping any by surveillance section.	New policies on financial and human mechanisms for fisheries surveillance activities established.	DARD, D-FISH, Financial Department	2018 - 2019
2	Review of legal frameworks for decentralization of zoning management to enhance cooperation among national stakeholders on trawl fisheries management	Existing but very limited cooperation	<ul style="list-style-type: none"> - Regulations on zoning and decentralization established - Cooperation among stakeholders enhanced. 	DARD, D-FISH and Fisheries Associations	
3	Establish policies to develop co-management	Some co-management sites established without being implemented effectively and efficiently	<ul style="list-style-type: none"> - Co-management established and effectively implemented. - Awareness of fishing communities enhanced. 	DARD, D-FISH and Fisheries Associations	2017 - 2020

