

Action 2.6 Status and management of ecosystem structure and function

Task: Learn more by gathering information to determine impact of the fishery on the ecosystem and define mitigation measures as inputs into the development of the FMP.

CONTEXT

Collaboration and information sharing between stakeholders is a significant obstacle when implementing a multi-stakeholder project such as the Vietnam mixed species - trawl FIP (hereinafter referred to as the FIP Vung Tau). It took quite a long time for the FIP Vung Tau coordinator to access scientific research reports in the field of seafood (fisheries and aquaculture), collected from special publications of the Journal of Agriculture and Rural Development. The Journal is under the management of the Ministry of Agriculture and Rural Development of Vietnam, its publications are usually not widely distributed and printed copies are only distributed during symposium sessions.

The findings presented in this report, along with the results of other Actions, will be used as inputs in coming meetings with inter-fishery management agencies of Ba Ria - Vung Tau province, the South Research Sub-Institute for Marine Fisheries and NGOs developed a trawl management plan appropriate to the current state of the province's fisheries.

OUTCOMES:

PI 2.5.3 Ecosystem information:

Research of the stock and species composition in the Southeast water has been carried out by the Research Institute for Marine Fisheries through 3 stages: 1996-1997; 2000-2005 and 2012-2018. The ecosystem over the time can be described as follows:

Stage 1996-1997: high economic value species (high trophic level) dominate. A total of 10 main the dominant species found in this group include: yellow stripe trevally (*Selaroides leptolepis*), goatfish (*Upeneus japonicus*), lizardfish (*Trachinocephalus myops*), redtail scad (*Decapterus kurroides*), spotted lizardfish (*Saurida undosquamis*) and threadfin bream (*Nemipterus tambuloides*).

Stage 2000-2005: economic species in this group include: goatfish (*Upeneus japonicus*), red bigeye (*Priacanthus macracanthus*), Indian squid (*Loligo duvauceli*), lizardfish (*Trachinocephalus myops*), *Synodus variegatus*, *Saurida undosquamis*, cá đù (*Johnius belangerii*), cuttlefish (*Sepia esculenta*) and squid (*Loligo chinensis*).

Stage 2012-2018: this period reflects the current status of the species structure in the Southeast region in the most recent time. High trophic level species decreased, trash fish increased in the ratio of catches. This stage also observed the increase in the ratio of the pelagic fish and decreasing of the demersal fish group. The main species include: lizardfish (*Saurida undosquamis*, *Trachinocephalus myops*); squid (*Loligo singhalensis*, *Loligo chinensis*) and cat tiger shrimp (*Metapenaeopsis barbata*).

PI 2.5.1 Ecosystem outcome:

In the Southeast sea, research was conducted very early (1989) by Japanese scientist Kohei Kihara with 420 nets carried out by the investigation vessel Kyoshin-maru showing differences in the structure of dominant species between different trips. During the period 1968 - 1969, demersal resources were dominated by species red bigeye, snappers, lizardfish, Indian pomfret. In the 2011-2018 research period, these species were encountered but only accounted for a small proportion of the haul, which is the most concrete evidence showing the impact of fishing activities on the structure of resources with the decrease

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in productivity of high economic value species. By 2018, the quality of resources in Vietnam was at an alarming level, not only declining in fishing productivity but also in fish size. The fishing productivity and average volume of species encountered over the years tend to decrease. The fluctuations are not only due to changes in the structure of resources over the years but are also accompanied by a decline in density and size (due to the increase of trash fish species). Analyzing biodiversity indicators, it can be seen that the level of biodiversity does not differ much between periods, but the richness, abundance and size of fish species all tend to reduce.

The period 2012-2018 recorded the dominance of trash fish species in the similarity analysis (SIMPER) between each group. In particular, the species abundance with high economic value in catch such as red bigeye (*Priacanthus macracanthus*), goatfish (*Upeneus japonicus*), squid (*Loligo duvauceli*), croakers (*Johinus belangerii*, *Pennahia pawak*), threadfin bream (*Nemipterus bathybius*, *Nemipterus marginatus*), pink shrimp (*Metapenaeus malaccaensis*) gradually decrease in abundance, instead, there are species small in size, short life-cycle, and fast regeneration ponyfish (*Leiognathus bindus*, *Leiognathus berbis*, *Secutor insidiator*), yellow citharid (*Brachypleura novaezeelandiae*), cat tiger shrimp (*Metapenaeopsis barbata*) coastal mud-shrimp (*Solenocera crasicornis*), shallow-water Swimming Crab (*Portunus hastatoides*), rifle cardinalfish (*Apogon kiensis*, *Apogon amboiensis*) increase. The dominance of trash fish species in the ecological structure can be explained by the negative impact of fisheries on the ecosystem, especially the overfishing of bottom trawling. Changes in structure can be caused by many factors such as global warming, El Nino, but changes due to these causes often change after a long period of decades. Vietnam's fisheries have developed strongly since the policy of developing offshore fisheries and the number of fishing vessels increased significantly between 2000 and 2018, leading to overfishing in these waters. In 1996-1997, the total catch in the Southeast Sea was only about 200 thousand tons, but by 2019 it had increased threefold. The number of vessels within 10 years increased by 200%, total capacity increased by 300% while total catch only increased by 40%.

Conclusion: The changes in demersal fishery resources in the southeastern sea of Vietnam were examined using the bottom trawl survey data collected by the Research Institute for Marine Fisheries in periods 1996 to 2018. Cluster analysis with the species composition as the independent variable and the mean number of individuals per one hour of trawling as the dependent variable was used to differentiate the difference in demersal community structure between the surveys. The results indicated a significant change in demersal fishery resources and could be categorized into three different periods as 1996-1997, 2000-2005 and 2012-2018. It is noted that the fraction of the low-value species increased whilst the economically important species as Bigeye fish (*Priacanthus macracanthus*), Goatfish (*Upeneus japonicus*), and Croakers (*Pennahia macrocephalus*, *Pennahia pawak*, *Johnus belangerii*), Lizardfish (*Saurida tumbil*, *Saurida undosquamis*, *Synodus variegatus*, *Trachinocephalus myops*), Cephalopod groups (*Loligo chinensis*, *Loligo duvauceli*, *Loligo singhalensis*, *Sepia recuvirostris*) were significantly decreased. This study also indicated a 74% dissimilarity in the demersal community structure for the period 2012-2018 in comparison to that in the 2000-2005 period.

PI 2.5.2 Ecosystem management:

Overfishing is said to be the main cause leading to changes in the ecosystem structure of the Southeast sea in particular, and in the entire Vietnam sea in general. In addition, the management of the trawl fishery still has many shortcomings, leading to the fact that trawlers are said to still carry out fishing activities in areas that are spawning grounds and habitats of juveniles of high value fish.

Along with the National marine spatial planning for the period 2021 - 2030, vision to 2050, the People's Committee of Ba Ria - Vung Tau province has also approved actions to reduce fishing intensity and establish more important habitat areas, details as follows:

- a. Protect and restore habitats and ecosystems: seagrass beds along the coast of Vung Tau city; mangrove ecological landscape in estuary and coastal areas of Thi Vai River, Dinh River, Rang

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River, and Ray River (the coast of Xuyen Moc district and Phu My town, Ba Ria - Vung Tau province). Maintaining Con Dao National park.

b. Restructuring and reducing fishing effort in accordance with resource reserves:

- Reduce the number of fishing vessels by 2030 to 5,000, specifically:
- Upgrade and stabilize the offshore fishing fleet at 3,100 units;
- Reduce inshore fishing vessels to 750 units;
- Reduce coastal fishing vessels to 1,150 units.

c. Change the structure of fishing vessels by occupations accordingly:

- Convert trawl: reduce to 1,350 units
- Develop purse seine and hooklines: 1,400 units
- Maintain gillnet vessels at 550 units
- Fishery logistics services: 250 units
- Other occupations: 1,450 units

REFERENCES

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3. [The draft of GENERAL REPORT: NATIONAL MARINE SPATIAL PLANNING FOR THE PERIOD 2021 - 2030. VISION TO 2050](#) (pages 264-269)
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