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THE USAID OCEANS AND FISHERIES PARTNERSHIP

LEARNING SITE: BITUNG, INDONESIA

OVERVIEW

The USAID Oceans and Fisheries Partnership (USAID Oceans) conducted a Rapid Appraisal of Fisheries Management Systems in early 2017 to assess the status of the capture fisheries subsector in the Indonesian Fisheries Management Area (FMA) or Wilayah Pengelolaan Perikanan (WPP) 716 (Fig. 1). The study assessed the tuna fishery sector, as well as the small pelagic fishery in that management area, as purse seine fishing is employed to catch small pelagic species. In recent years, two decrees have been established to support the Fisheries Management Plan (FMP) for WPP 716, the (i) Fisheries Management Plan for Tuna, Skipjack and Tuna-like species through Ministerial Decree No. 107/KEPMEN-KP/2015; and (ii) FMP for WPP-716 through Ministerial Decree No. 83/KEPMEN-KP/2016. The USAID Oceans study serves to update information, identify strategic issues and revisit fisheries management objectives, measures and interventions, as required, in support of implementing the cited FMPs. Consistent with the objectives of the USAID Oceans program, the study sought to identify potential points of intervention in the production and market chains and provide critical information from these leverage points. These outputs will contribute to strengthening the fisheries management system in order to address the issues of illegal, unreported and unregulated (IUU) fishing and the development of a sustainable Catch Documentation and Traceability (CDT) system.

FINDINGS

ATTRIBUTES

WPP 716 includes the waters of the Sulawesi Sea and part of Western and Central Pacific Fisheries Commission (WCPFC) Convention area. Its fisheries are complex and diverse, reflecting the region's extraordinary heterogeneous geography and species diversity. The estimated potential fish production that can be harvested sustainably from fish stocks in WPP 716 is estimated at about 480,000 tons, and consists of approximately 46.6% small pelagics, 32.2% large pelagics, 7.2% coral fish, 11.3% demersal, 1.8% penaeid shrimps, while 0.1% lobster, 0.4% mangrove crab, and 0.2 % blue swimming crab and 0.2 % squids (MMAF Ministerial Decree No. 47/KEPMEN-KP/2016).

In terms of volume, the artisanal sector brings in the majority of catch, while industrial fisheries contribute considerably more in terms of value, since they target high value catch, such as tuna and shrimp. Major species caught in WPP 716 include tuna and small pelagics such as round scads, sardines, mackerel and a range of reef fish. Fishing gear used includes purse seine (including 'pajeko' - mini seine), oceanic and coastal drift gill net, set gill net, pole and line, bottom long line, trap, squid jig, bouke ami and some types of hand lines.

Demersal, penaeid shrimp, mangrove crab and blue swimming crab are primarily caught in west 716, with pelagic fish located mainly in the east. Fishing grounds for coral fish, lobsters and squid span the whole of WPP 716, especially along the coastal areas and the small islands, such as in the District of Sangir and Talaud.

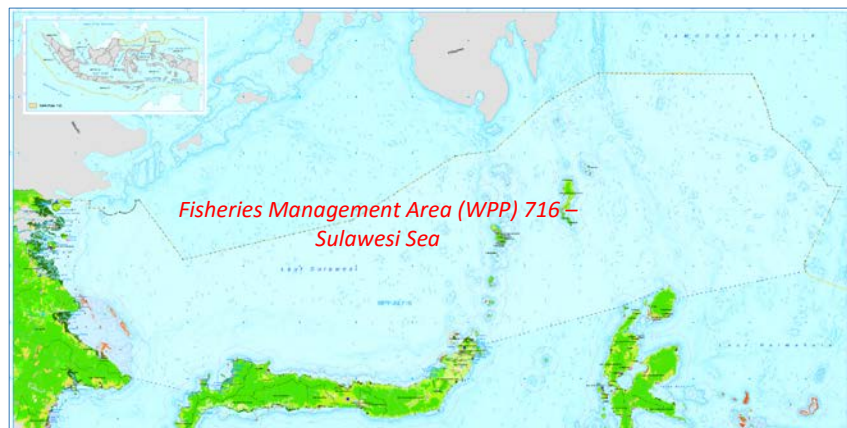
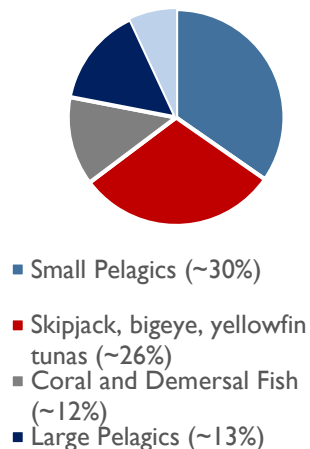


Figure 1. Map of Indonesia's Fisheries Management Area (FMA/WPP) 716.

Average Annual Production, WPP 716, 2005-2015



THE STATUS OF FISH STOCKS AND FISHERIES

Large tunas in WPP-716, i.e. skipjack, yellowfin and bigeye tunas, are estimated to be part of the stock in the western and central Pacific Ocean, therefore USAID Oceans' stock assessment referred to the results of the WCPFC stock assessment. USAID Oceans reviewed the maximum sustainable yield (MSY), the maximum level at which a resource can be routinely exploited without long term depletion. Recent levels of the spawning biomass of skipjack tuna were found to be well above the level that will support the MSY. The fishing mortality, the loss of fish of all age-classes, of skipjack tuna was estimated to have increased significantly since the beginning of industrial tuna fishing, but fishing mortality still remains below the level that would result in the MSY, and was estimated to have decreased moderately in the last several years. Current catches of skipjack tuna were found to be lower than, but approaching estimated the MSY. Stocks of skipjack tuna are still estimated to be healthy (WCPFC-SCI2-2016/SA-WP-04), while yellowfin tuna stocks are most likely above the level which will support the MSY. Recent levels of fishing mortality of yellowfin tuna stocks are most likely below the level that will support the MSY, and latest catches marginally exceed the MSY (WCPFC-SCI0-2014/SA-WP-04). Recent levels of fishing mortality of bigeye tuna stock exceed the level that will support the MSY, and current catches exceed the MSY (WCPFC-SCI0-2014/SA-WP-01).

USAID Oceans' study also reviewed the fisheries' spawning potential ratio, which is based on the principle that certain levels of fish have to survive in order to spawn and replenish the stock at a sustainable level. Recent levels of spawning potential of yellowfin tuna stock were estimated to be above the minimum target for sustainability but lower than the optimal level targeted in 2012 (WCPFC-SCI0-2014/SA-WP-04). Recent levels of spawning potential of bigeye tuna stock were most likely below the level which will support the MSY, estimated in 2012 (WCPFC-SCI0-2014/SA-WP-01).

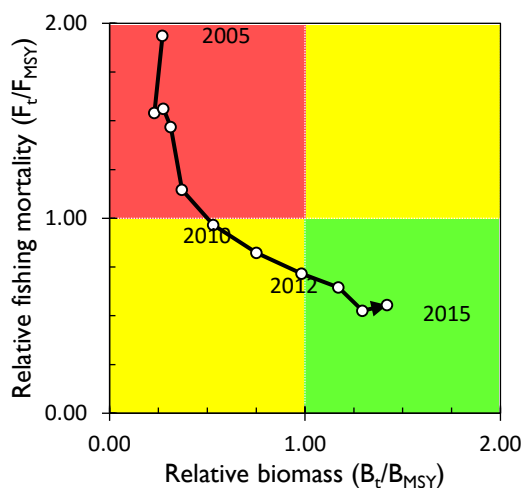


Figure 2. Kobe plot of the status of small pelagic fish stock in WPP-716

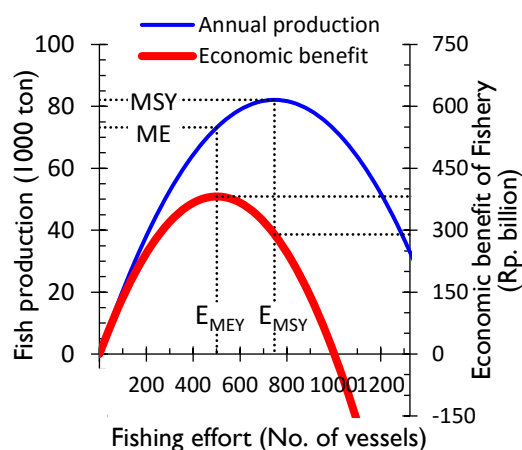


Figure 3. Production and economic profit of small pelagic fishery operated in WPP-716 at different levels of fishing effort.

USAID Oceans' study assessed the development of the Indonesian tuna fishery operating in WPP 716. Based on the distribution of the annual effort of the Indonesian fishing fleet, the optimum production level was surpassed between 2009 and 2010, with the respective effort of 2,294 and 4,407 mini-purse seine units, and an optimum catch per unit effort (CPUE) of about 20.2 tons/purse seine unit/year. The recent status of exploitation (2015) of 716's large tuna fishery, with the calculated CPUE equaling 12.2 tons, was below the optimum level. However, if effort is maintained at the 2015 level, it is likely that the fishery will be recovered. Looking at the CPUE data in 2013, 2014 and 2015—in which the lowest CPUE (10.2) occurred in 2014 but increased in 2015—it is likely that 716's large tuna fishery was in the process of recovery. Similarly to large tuna, the optimum skipjack production level was also surpassed in 2009 and 2010, with the respective effort of 1,788 and 3,435 pole & line units; the optimum CPUE was about 25.6 tons/pole & line/year. The recent status of exploitation (2015) of the skipjack tuna fishery in WPP 716 is below the MSY level, and the fishery is likely in the process of recovery, as indicated by the higher CPUE in year 2015.

The results of USAID Oceans' study, analyzing data from 2005 to 2015, show that fishing pressure from the small pelagic fishery has been at a safe level since 2010. The small pelagic group is dominated by round scads (50%), of which the 'malalugis' (*Decapterus macarellus*) makes up the majority (76%). Other dominant small pelagic species groups are anchovies and trevallies, 13.7% and 10.5% respectively. Mackerels, sardines, garfish, flying fish and mullets make up the remaining less than 5% of small pelagic catch. The stock of small pelagics was shown to be in healthy condition, recovering from its overexploitation in 2005 through 2012. Fishing mortality (F) and biomass (B) were estimated to be lower than F at MSY (FMSY) and larger than B at MSY (BMSY), respectively (Fig. 2). Therefore, there is an opportunity to increase fishing activities that target small pelagic species to optimize economic profit and fish production.

The study also found that, since the profit and production curves are bell-shaped, the optimum levels of profit and production (MSY) are achieved when the levels of fishing effort are equal to 501 units and 747 units, respectively (Fig. 3). (Note: 1 unit is equal to a unit of 20 m length vessel operating purse seine).

ENVIRONMENTAL ANALYSIS

The prevailing environmental/ecosystems components of the WPP 716 Sulawesi Sea are mostly deep-sea, with a narrow strip of continental shelf, some mangrove areas, estuaries and some coral reefs. A number of estuaries and mangroves areas with muddy bottom substrate and sea-grass, found in the East-North Kalimantan area, provide nursery grounds to some of the most economically important fish and shrimp. Some continuous spots of coral reefs are laid from the coastal areas of East-North Kalimantan to North Sulawesi, ending at the Bunaken National Marine Park and exhibit exceptional levels of coral species diversity. The richest locations host 25-30% of the reef-building coral species of the entire Indo-Pacific region. This lends strong support to the selection of Bunaken National Park as one of Indonesia's, and the region's, flagship MPAs (Turak and DeVantier, 2003). The Halmahera Eddy current, found in the Sulawesi and Halmahera Sea, may contribute to the area being a marine productivity hotspot compared to the surrounding regions. As such, during the northwest monsoon and La Niña events, skipjack tuna catch increases in the western tropical Pacific waters.

SOCIO-ECONOMICS OF BITUNG FISHERIES

The number of fishing vessel crew members varies with the type of gear and size of the vessel. Purse-seine vessels had an average of 25 crew members. Fishing operations with more vessels have more crew members on each boat, however an increase in number of vessels is also found to decrease the profitability per vessel. Since crew members are paid using a profit sharing system, increases in the number of vessels also results in a decrease in economic profit per fisher (Fig. 4). Fishers' income is highest when the fish stock is healthy and the fishery is operating at the optimum level.

Fish landed in North Sulawesi are both consumed locally and exported.



WPP 716's fishing fleet includes small, medium and large-scale vessels, with small vessels holding the majority.
Photo Credit: USAID Oceans/Fini Lovita



A fisherman repairs his nets onboard a vessel in Bitung Port.
Photo Credit: USAID Oceans/Fini Lovita

Traditional processing, such as smoke-fish, is undertaken to

preserve the catches. Tuna is sold fresh, processed in cans or is packaged as frozen whole fish, fillet, loin and other forms. Only 31% of tuna production from Bitung is exported, the rest is sold to domestic markets. Tuna landed in Bitung Port is exported to Asian markets, including Thailand and the Philippines, as well as the US, the European Union (EU) and other international markets. USAID Oceans' rapid assessment of the tuna value chain revealed that Bitung experienced a production drop of 59% in 2015, causing significant economic impacts in the region and changes in trading dynamics. Adding to production pressures are increasing preferences for sustainable and traceable products from buyers in the US, EU, and Australia.

FISHERIES GOVERNANCE

Article 33(3) of the Indonesian Constitution stipulates that the land, waters and natural resources therein are basic assets for the people's prosperity and should, therefore, be utilized to the greatest benefit of the people. Marine fish stocks are classified as natural resources, with the management of marine fish stocks inside of provincial waters is under the responsibility of provincial government, and those beyond the boundary of provincial waters the responsibility of central government, i.e. the Ministry of Marine Affairs and Fisheries (MMAF). WPP 716

is one of the most important fishing areas in Indonesia. Its fishing fleet consists of small, medium and large-scale fishing vessels. 95% of the fleet are small scale vessels, consisting of non-power and outboard motor boats, and small fishing vessels of <5GT.

Members of the small-scale fishing fleet are not required to have a fishing license to operate. Only 4.8% of Indonesia's fleet, ranging between 5 to <30GT, are required to have fishing licenses issued by the Provincial Fisheries Services to operate. Fishing vessels greater than 30 GT (only 0.3% of the total fleet) must obtain a fishing license from MMAF to operate.

To manage fisheries in WPP 716, MMAF has issued the (i) FMP for Tuna, Skipjack and Tuna-like species through Ministerial Decree No. 107/KEPMEN-KP/2015; and (ii) FMP for WPP-716 through Ministerial Decree No. 83/KEPMEN-KP/2016. USAID Oceans aims to support the crafting of the fisheries management implementation plan for the North Sulawesi province with MMAF, and for the FMP for WPP 716 to achieve its sustainable fisheries and biodiversity goals. Currently, the MMAF is in the process of establishing "WPP-based fisheries management authority."



USAID Oceans' assessment combined desk research with in-field data gathering that included interviews, focus group discussions, and a consultative stakeholder workshop to validate findings.

Photo Credit: USAID Oceans/Fini Lovita

METHODOLOGY

This study was conducted using the Rapid Appraisal of Fisheries Management Systems (RAFMS) framework to complement the EAFM planning process. The RAFMS method consists of four sequential but overlapping steps: (1) secondary data analyses that includes a comprehensive review of existing literature on capture fisheries and tuna industry assessments; (2) reconnaissance surveys to validate the data/information collected from secondary data analyses and site visits to initiate stakeholder engagements; (3) field data gathering to collect data on fishing practices and production, fishing-related business activities, cost and earning and other data/information on socio-economic (which included analysis using biomass dynamic, bioeconomic models, statistical analysis and mathematical optimization methods); and (4) a community/stakeholder workshop, conducted to validate the initial analyses and implications as well as develop scenarios on the future of capture fisheries and fisheries management in the region. Under this process, group discussions were also undertaken to identify broad objectives and issues, prioritize issues, formulate operational objectives and identify indicators and performance measures and required management measures/intervention.

The USAID Oceans and Fisheries Partnership (USAID Oceans), a partnership between the U.S. Agency for International Development and the Southeast Asian Fisheries Development Center (SEAFDEC), is working to strengthen regional cooperation to combat IUU fishing, promote sustainable fisheries, and conserve marine biodiversity in the Asia-Pacific region. The backbone of the program is the development and implementation of country-specific, financially sustainable Catch Documentation and Traceability (CDT) system. This CDT system will be integrated with existing government systems, will also incorporate human welfare data elements, and will be demonstrated within an Ecosystem Approach to Fisheries Management (EAFM) framework.

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