

Reliance of national economy on IOTC resources:
Case studies using Fishery Satellite Account [Draft]

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Background:

In terms of natural resource management, an integrated holistic approach that will take into consideration of every aspects of ecosystem, including human aspects, has been increasingly accepted as a basic principle for sustainable development. In the case of fisheries management, the concept of ecosystem-based fishery management was established quite long time ago and its actual ways of implementation have been explored by various countries as well as by international fishery management organizations. However, human aspects seems to cause a certain difficulty and either totally excluded or only utilized for general consideration, i.e. not integrated into direct decision making of fishery management in many such cases.

The basic text of the IOTC, in its Article V, clearly referred its responsibility to review the economic and social aspects of the fisheries based on the stocks covered by the Agreement, though so far no social and economic information has been systematically collected by its Secretariat. Corresponding to this situation, the 22nd session of the Commission in 2018 decided to conduct a scoping study on socio-economic data currently available and potential indicators to support the management of the IOTC fisheries¹. The result of scoping study² was submitted to its 23rd session in 2019 and indicated rather scarcity of relevant information. The Commission has not yet taken any follow-up decision after this.

In parallel, the IOTC-OFCF Collaborative Project in its Phase V (2017-2019) has examined a feasibility and potential utility of Fishery Satellite Account approach to evaluate social and economic contribution of the IOTC resource use. The project selected two case study countries, Indonesia and the Seychelles, based on data availability, an extent of reliance to the IOTC resources, and distinctive differences of their fisheries characteristics. Project proposal³ and progress of project implementations⁴ were reported to the Working Party of Data Collection and Statistics Working, together with the compilation result of Seychelles Fishery Satellite Account⁵.

This documents briefly overviews the project findings, obtained up to now, on potential strength and weakness of Fishery Satellite Account approach (FSA). Although the Satellite Account approach can also address social aspects, the project so far only examined an application to economic component. The report is still in an initial draft, reflecting only author's personal views, for further review, advices and revision by all stakeholders including country counterparts, co-

¹ Resolution 18/09 on a scoping study of socio-economic data and indicators of IOTC fisheries

² IOTC02019-S23-13_Rev1 "Scoping study of socio-economic data and indicators of IOTC fisheries

³ IOTC-2017-WPDCS13-40 "IOTC-OFCF Collaborative Project Phase V activity – Enhancement of capacity to evaluate socio-economic contribution of the IOTC tuna fisheries"

⁴ IOTC-2018-WPDCS14-INF02 "Progress Report of the IOTC-OFCF Collaborative Project, Phase V"

⁵ IOTC-2018-WPDCS14-29_Rev2 "Development of the Fishery Satellite Account in the Seychelles

workers, collaborators, data owners and the project team. It is strongly requested not to refer without a written agreement from the author.

Concept and Methods:

The UN System of National Account (SNA) introduced the concept of satellite account in its 1993 revision and further expanded in the 2008 revision⁶ with several examples, including one for tourism and another for environment both of which provide useful guidance in designing the satellite account for fishery-related activities. In general, the contribution of fisheries to the national economy is measured with the value of direct fishery production. However, quite substantial amount of economic gain, often larger than direct fishery production, is also obtained through processing, and marketing, in particular through foreign trade. Advantage of the satellite account approach is to grab all economic gain obtained through upstream (boat and engine building and repair, fuel, gear and bait supply, port services, etc.) and downstream (processing, marketing, wholesale, retails, storage, etc.) activities and administrative cost (license/registration fees, EEZ access fees, management and compliance cost etc.), relevant to fishery, into one picture without modifying the existing SNA. This will allow an evaluation of overall economic gain originated from a certain activity, i.e. fishery, in comparison with other economic activities and show an extent of reliance of national economy on the activity.

Table 1 indicated a list of economic activities potentially relevant to FSA. Table intends to show a general idea and far from exhaustive. Obviously quite variety of economic activities, in fact, heavily relies on, or is strongly linked with fisheries. Table also showed the economic activities incorporated in the historical compilation independently conducted by Indonesia⁷ and Seychelles⁸ together with the one conducted in the Seychelles in 2018 as a part of the project. The broader coverage of the last case reflects the additional information kindly provided for the analysis on cost and benefits of the Indian Ocean Tuna Ltd (IOT), the largest tuna processing company in the Seychelles.

The case study also disaggregated the economic contribution obtained from the tuna and tuna-like resources, as well as those from the IOTC fisheries. The compilation is both for the year 2015 and no modifications were made on the SNA published by their National Statistical Office, except fishery production for the Seychelles as described below. Procedure used is as follows:

Indonesia:

Due to administrative constraint, the compilation was conducted as a desk-top study without direct involvement of Indonesian colleagues in the process. Indonesia compiled fishery satellite account in 2016 for the data of 2013 to 2015, by accumulating estimated gross value added (GVA) for “fisheries production”, “salt extraction”, “fish processing industries”, “construction”, “wholesale, trade, retails” and “water tourism”. Separately, catch quantity by species by Provinces were obtained from the Ministry of Fishery (KKP), which were translated into value using the published price information by species groups and Provinces⁹. Species groups of “tunas”, “skipjack”, “billfishes”, “sharks”, “neritic tunas”, and “seerfishes” are considered as tuna

⁶ UNSD “System of National Accounts 2008” <https://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf>

⁷ KKP, BPS “Pusat DataProduk Domestik Bruto Satelit Kelautan dan Perikanan 2016”

⁸ Hass, J.L. (2016): Final Report Improving economic information about fishing related industries in the Seychelles.

⁹ BPS “Agricultural Producer Price Statistics, Animal husbandry and fishery subsector, 2015”

and tuna-like large pelagics. Only those Provinces that are faced to the Indian Ocean were assumed to access to the IOTC resources. Considering the ocean characteristics, all tunas and tuna-like production value from those Provinces were assigned to the IOTC resources, which showed reasonable match with the reported IOTC catches in quantity. Economic contributions of tunas and tuna-like species as well as the components from the IOTC resources were calculated applying the same proportion to the “fish processing” and “fish trading” components. No contribution was counted in “Construction” and “Water tourism” for sake of comparison with the Seychelles case.

Seychelles:

The development of methodology and compilation was made with the participation of various organizations including National Bureau of Statistics, Ministry of Fishery and Agriculture, Fishing Authority, Central Bank and Indian Ocean Tuna Ltd, a major tuna processing company in the Seychelles. Although it intended to cover upstream and downstream activities and administrative cost as much as possible, due to information constraints, main components included were fisheries production, cost and benefits through the IOT fish processing, port services including food and fuel supply, and government revenue. More details of the methods are available in the WPDCS14-29. It should be noted that the fishery production value was revised by treating the production by the Seychelles flagged industrial fleets that were excluded from the SNA previously. All of the fishery production by semi-industrial and industrial fleets was considered relying on the IOTC resources. Due to lack of information, contribution through cost, processing and trading of artisanal fishing products was not incorporated, though overall impact was considered as minor.

Both cases, cost for fishing operation was not separated from production, except fuel supply to the Seychelles industrial fleets.

It should be noted that the SFA compilation methodology utilized in three cases in Table 1 are totally different. “Seychelles (2010)” allocated a factor indicating an extent of contribution/linkage with fisheries and fishery-related activities to each economic industrial category (SIC), based on expert judgment and stakeholders consultation, and then accumulated them. Although this method would be relatively simple and easy, allocation of factors tends to be arbitrary and not easy to reflect temporal and structural changes. In fact, the NBS Seychelles stopped to maintain this factor information due to difficulty in keeping an organizational memory on the theoretical and factual basis of those factors.

“Indonesia (2016)” accumulated the GVAs of fisheries related components. In this procedure, the cost in particular for the fish processing other than fishery (e.g. electricity, water, wages, package materials, ingredients) is excluded from the FSA, even though they were also considered as a part of economic gain obtained as a result of fishing. On the other hand, “Seychelles (2018)” allowed more complete picture of overall economic contribution of fisheries by allocating the cost in fish processing as an economic gain of relevant economic activities that produced inputs.

	Economic Activities [ISIC]	Indonesia (2016)	Seychelles (2010)	Seychelles (2018)
A	Agriculture, Forestry and Fishing			
	<i>Fishing and aquaculture [031, 032]</i>	Y	Y	Y
B	Mining and Quarrying	Y (salt extraction)		
C	Manufacturing			
	<i>Processing and preserving of fish, crustaceans and molluscs [102]</i>	Y	Y	Y
	<i>Building of ships and boats [301]</i>		?	
D	Electricity, gas, steam and air conditioning supply			
	<i>Electric power generation, transmission and distribution [351]</i>			Y, only for fish processing
E	Water supply; sewerage, waste management and remediation activities			Y, only for fish processing
F	Construction	Y		
G	Wholesale and retail trade; repair of motor vehicles and motorcycles			
	<i>Wholesale of solid, liquid and gaseous fuels and related products [4661]</i>		Y, partial	Y
	<i>Wholesale of other machinery and equipment [4659]</i>			
	<i>Retail sale in non-specialized stores [471]</i>	Y		
	<i>Retail sale of food, beverages, and tobacco in specialized stores [472]</i>	Y		Y, export products only
H	Transportation and storage		Y	
	<i>Tankers, air transportation</i>			
	<i>Port authority</i>			Y
	<i>Sea and coastal water transport (e.g. ship cargo, supply vessels) [501]</i>		Y	
	<i>Passenger air transport (e.g. crews & foreign workers supply) [511]</i>			Y, only for fish processing
	<i>Freight air transport [512]</i>			
	<i>Warehousing and storage [521]</i>			
	<i>Service activities incidental to water transportation (e.g. port services) [5222]</i>			
	<i>Cargo handling [5224]</i>			
I	Hotels, Restaurants & Beverage serving activities, Other food service activities			Y, only for fish processing
J	Information and communication			
K	Financial and insurance activities			
L	Real estate activities, Residential rentals, Owner Occupied dwellings			Y, only for fish processing
M	Professional, scientific and technical activities			
	<i>Research and experimental development on natural sciences and engineering [721]</i>			
N	Car hire, Other Tourism related, Administrative and support service activities-Other			
O	Public administration and defence; compulsory social security			Y
P	Education			
Q	Human health and social work activities			
R	Arts, entertainment and recreation			
S	Other service activities			
T	Activities of households as employers and undifferentiated producers			

Table 1. List of economic activities that may have relevance with Fishery Satellite Account, and examples of activities covered by fishery satellite account compiled by Indonesia and the Seychelles, respectively.

Results and initial findings:

Table 2 showed the compilation results shown in local currencies. Table only contained the results of three main fishery-relevant economic activities, i.e. “fishing”, “manufacturing of fish and fisheries products”, and “wholesale, trade, retails of fish and fisheries products”, together with national total. Since the national total also included economic contribution in other economic activities, total did not match with the sum of tabled figures.

Economic Activities	Indonesia (billion IDR)		Seychelles (million SCR)	
	Total	IOTC	Total	IOTC
A. Production of Agriculture, Forestry and Fishing	1,555,207*		2,499	
<i>Fishing and aquaculture</i>	288,917*		2,276	
Capture fisheries	128,563			
Large pelagics	32,394	10,337	2,098	2,098
Main tunas (SKJ, YFT, BET, BFT, ALB, SBT)	15,450	3,144		
C. Manufacturing	2,418,891*		2,382	
<i>Fish and fisheries products</i>	28,544		1,630	
Large pelagics	3,165	1,010	1,613	1,613
Main tunas (SKJ, YFT, BET, BFT, ALB, SBT)	1,510	307		
G. Wholesale and retail trade; repair of motor vehicles and motorcycles	1,419,239*		1,268	
<i>Fisheries related components</i>	82,870		517	
Large pelagics	9,189	2,932	325	325
Main tunas (SKJ, YFT, BET, BFT, ALB, SBT)	4,383	892		
Overall contribution by fishery related activities**	405,437	18,623	5,010	4,832
<i>Exported value of tuna and tuna-like fish and their products</i>	8,179	2,228	4,718	4,718
Gross Value Added for all industries	11,163,206*		18,608	
Gross Domestic Production	11,526,333*		21,748	

* Extracted from the BPS Statistical Yearbook of Indonesia, 2018. Figures did not exactly match with the disaggregated parts of fisheries.

** Reflecting the estimate of total contribution of fisheries-related activities, including those other than A, C, and G components, and therefore higher than the sum of contributions by those three components.

Table 2. Estimates of economic contribution in 2015 derived from the utilization of large pelagics (tunas, billfishes, bonitos, and sheerfishes) as well as form that of main tuna species, based on disaggregation of existing fishery satellite account results (Indonesia 2015, Seychelles 2018). Contributions of total catch and of catch in the IOTC areas were shown separately.

Table 3 showed the same information in relative term again the production value of capture fisheries. [It should be noted that this include inland capture production for the case of Indonesia. Originally, it was planned to use marine capture production as a unit, though due to technical difficulty and lack of time, the total capture production was tentatively accepted as a unit.] This will give an idea on expected economic impacts in various related economic activities, corresponding to a change in production value of fishing, either through management decision, market changes, or natural stock fluctuation, and there is called as impact factors.

Economic Activities	Indonesia		Seychelles	
	Total	IOTC	Total	IOTC
A. Production of Agriculture, Forestry and Fishing	12.1		1.10	
<i>Fishing and aquaculture</i>	2.25		1	
Capture fisheries	1		1	
Large pelagics	0.25	0.08	0.92	0.92
Main tunas (SKJ, YFT, BET, BFT, ALB, SBT)	0.12	0.02		
C. Manufacturing				
<i>Fish and fisheries products</i>	0.22		0.72	
Large pelagics	0.025	0.008	0.72	0.72
Main tunas (SKJ, YFT, BET, BFT, ALB, SBT)	0.012	0.002		0.72
G. Wholesale and retail trade; repair of motor vehicles and motorcycles				
<i>Fish and fisheries products</i>	0.64		0.23	
Large pelagics	0.071	0.022	0.14	0.14
Main tunas (SKJ, YFT, BET, BFT, ALB, SBT)	0.034	0.007		
Overall contribution by fishery related activities**	3.15	0.14	2.20	2.12
<i>Exported value of tuna and tuna-like fish and their products</i>	0.17	0.06	2.07	2.07
Gross Value Added for all industries	86.8		8.18	
Gross Domestic Production	89.7		9.56	

Table 3. Impact factors corresponding to unit economic output of capture fisheries.

Quick examination of those two table would give quite fundamental differences of tuna fisheries of two case study countries, which includes:

Indonesia:

IOTC resource represented 8 % of capture fisheries production and 3.5 % of total fisheries production. Their contribution to overall national economy remained low as only 0.1%, while the fisheries and fisheries activities contributed 3.5 % of national GVAs as a whole. One unit of fishery production led to about 3 times of economic contribution, while the corresponding value for IOTC resources was 1.4 times. This extremely high impact factor was due to inclusion of construction component in the FSA.

Only less than quarter of production with the IOTC resources was composed with tunas and skipjack. Non-tuna production from the IOTC resources was mostly consumed domestically, and contributed to food security of the country.

Seychelles:

Economic activities relying on the IOTC resources contributed more than 25% of the national economy. In addition to the industrial and semi-industrial fleets and fish processing, port services including food and fuel supply and fishing access fees provided substantial economic gain. The majority of products originated from the IOTC resources was exported to earn foreign currencies and domestic consumption seemed quite low. Substantial parts of workers employed in the industrial fleets, fish processing and port service activities were reported as foreign labors. This indicated that while the national economy heavily relied on the IOTC fisheries, those were not necessarily converted into the national net profit.

Impact rate was higher than two, which is quite high comparing global average.

Discussion:

The case study found it possible and feasible for the FSA to disaggregate the economic contribution obtained from a certain resource use, such as the IOTC resources. The FSA is quite powerful for understanding overall structure and economic flow of benefits originated from fishing activities within the country. It can be used to analyze potential impacts before new management scheme to be introduced.

At the same time, the nominal comparison of figures obtained between different countries has less meaning. For example, the greater the national economy with multiple economic industries, their reliance to fisheries related activities tends to become less. Careful consideration and discussion would require in order to determine how to utilize the information obtained through FSA to support fisheries management decision making in the international organizations.

It is not possible to incorporate all economic activities into the FSA, mainly due to lack of key information. Although non-full coverage of economic activities always results in underestimation of overall economic contribution of fishery, the impacts are considered to be relatively minor as long as major activities would be covered. Utilization of the fixed set of economic activities would allow inter-annual as well as international comparison.

The case study found that various simplified methods have been utilized for quick compilation of fishery satellite account. Most of those simplified methods would not allow analysis of actual linkages among multiple economic activities. In the other words, with such simplified methods, it is not possible to evaluate potential impacts, for example, by increasing or decreasing TAC/ license fees, or by modifying access arrangement. For the purpose to support decision-making in fishery management, it is essential to develop a full Supply Utilization Table, even with extremely rough and qualitative information.