

Opinion paper

Human demographic considerations for the certification of seafood from developing countries: Food security and the tuna fishery in Indonesia, a case study

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Abstract

Indonesia is one of the countries with the biggest tuna captures globally. However, the country's large population, unmet domestic demand for fish, the fully fished or overfished status of over 81% of its fisheries, and the lack of robust management are worrying issues. Despite these concerns, the Marine Stewardship Council and Fair Trade USA have certified Indonesian pole and line and handline fisheries targeting tropical tuna species, specifically yellowfin tuna and skipjack. Here I will argue that donors, environmental non-governmental organisations, fishing associations, and seafood certification bodies should be prudent when seeking certification or certifying staple fish species for export from countries with these characteristics. They should deliberate whether the export of essential food species like skipjack and yellowfin tuna is in the best interest of Indonesia's coastal and vulnerable communities, explicitly because the country does not meet its internal demand for fish protein.

Keywords: certification; Fair Trade USA; food security; Indonesia; MSC; tuna

1. Introduction

Seafood certification has become the darling of some donors and environmental non-governmental organisations (eNGOs) (Seafood Source, 2020a; Walton Family Foundation, 2020). They propose to use it as a tool to improve management in the countries where fisheries attain certification. The Marine Stewardship Council (MSC) is the largest certification body of seafood products in the world. In 2019, MSC certified or assessed over 15% of the marine wild catch worldwide (MSC, 2019a). According to MSC, its "program is designed to create market incentives to reward sustainable fishing practices" (MSC, 2011). MSC works under three main principles: 1. Sustainable fish stocks, 2. Minimising environmental impact, and 3. Effective fisheries management (MSC, 2020a). Through these principles, MSC aims to economically incentivise fishers with increased monetary returns to improve their reporting and fishing methodologies, reduce environmental damage, and improve the fish stocks' condition.

The other fishery certification operating in Indonesia is Fair Trade USA (FT USA). It weighs "the effects of fishing activity on the environment; the method of fishing; the recording of fish catches; product traceability; the factory and its workers, social standards, safety in the workplace and more" (MDPI, 2019).

This paper will explore Indonesian demographics, internal fish demand and supply, and the status of local fish stocks. Finally, I will argue against the certification and export of Indonesia's tropical tuna species from a food security perspective.

2. Issues

2.1 Indonesia: population demographics and estimated domestic demand

Indonesia is an archipelagic country composed of over 17,500 islands and a large marine area of more than 5.8 million km² (Wikipedia, 2019). It has almost 275 million people and a growth rate of 1.07%, resulting in 2.73 million people added to Indonesia's population per annum (World Population Review, 2020). Most of its population (65-70%) lives near the coast (Dahuri,

2007; Harris, 2019) and is highly dependent on fish as one of its primary sources of protein (ca. 54%) (FAO, 2021). Indonesia's per capita consumption of fish in 2017 was 46.49 kg, with a target from the government of 54.49 kg for 2019 (Tempo, 2017). From these numbers, the country's annual fish protein internal needs are between 12.8 and 15 million metric tonnes (MT) (depending on per capita consumption), with around 150 thousand MT added annually due to population growth (Table 1).

Annually, Indonesia produces 3.4 million MT of finfish from aquaculture (FAO, 2018a) and 5.9 million MT from capture fisheries (FAO, 2016) for a total of 9.3 million MT. This value is 3.5 to 5.7 million MT below the estimated quantity of fish-derived protein needed nationally per annum (Table 1). Projections predict that Indonesia's population will reach its zenith of 337.4 million people by 2066 (World Population Review, 2020). Therefore, the country will require 15.7 to 18.4 million MT of seafood (around 17-20% of the current total world capture fisheries production), depending on per capita consumption (Table 1).

Table 1: Indicators for Indonesia

Indicators	Indonesia
a. Population (as of December 2020)	274.9 million
b. Projected population in 2066	337.4 million
c. Fisheries yearly production	5.9 million MT [#]
d. Aquaculture yearly production (finfish)	3.4 million MT
e. Subtotal supply of fish protein (c + d)	9.3 million MT
Current domestic demand for fish protein (a * per capita consumption)	
f. Per capita consumption of 46.49 kg	12.8 million MT
g. Per capita consumption of 54.49 kg	15 million MT
Surplus	
h. Per capita consumption of 46.49 kg (e – f)	-3.5 million MT
i. Per capita consumption of 54.49 kg (e – g)	-5.7 million MT
Projected domestic demand by 2066 (b * per capita consumption)	
j. Per capita consumption of 46.49 kg	15.7 million MT
k. Per capita consumption of 54.49 kg	18.4 million MT

[#] This value includes exports and non-staple items like shrimp, crabs, and others. Therefore, the supply of fish for domestic consumption is substantially lower than this number suggests.

2.2 Current fisheries status

Most of Indonesia's fisheries are fully exploited or overexploited (81.8%), according to the Ministry of Marine Affairs and Fisheries (MMAF) (Table 1) (KKP-RI, 2017). However, MMAF calculated that the fishing potential in Indonesian waters is more than double its current catches (note that the reported catches include fish captured in domestic and international waters). MMAF estimated productivity for all Indonesian waters in 2017 was 12.5 million MT or 14% of the world's fisheries production for 2016 (FAO, 2018b). Considering that Indonesian waters are tropical and not the most productive, only account for 1.6% of the world's oceans (Wikipedia, 2019), and have most fish stocks fully exploited or overexploited (KKP-RI, 2017), it is very likely that the estimated potential catch is a serious overestimate and almost certainly unsustainable..

The Ministry proposes, in my opinion, unrealistically high estimates of productivity in Indonesia for large pelagic fish, small pelagic fish, and demersal fish (KKP-RI, 2017). For example, when we add all FMAs, the total potential for large pelagic species (theoretically without the three tropical tuna species) comes to over 3.2 million MT, or 136% of the total world production of billfish, neritic tuna and seerfish in 2018 (2.3 million MT) (FAO, 2019). Similarly, Indonesia proposes a total potential for small pelagic species (sardines, anchovies, herrings, and others)

of 4.9 million MT or 25% of the total world production for the same year (19.8 million MT) (FAO, 2020).

Additionally, the calculation of biomass for demersal fish species (estimated at 3 million MT) cannot be estimated from hydroacoustic surveys because they reside within the acoustic dead zone (Mello and Rose, 2009; Ona and Mitson, 1996).

3. Discussion

Various organisations propose seafood certification as an incentive to achieve sustainability in fisheries. However, given that economic incentives are often used to encourage certification at the expense of fulfilling domestic needs, I question the soundness of these policies in developing countries where domestic utilization of these fishery products play a key role in the nutrition of the communities involved. In recent years, donors, eNGOs, fishing associations, and companies have promoted certification for Indonesian small and medium-scale fisheries (MDPI, 2020; MSC, 2021a; Seafood Source, 2020a, 2020b). Duggan and Kuchen (Duggan and Kochen, 2016) posited that these fisheries should become an essential fish source for certification. They state that "implementing certification schemes in such countries, like Indonesia, can help towards maintaining global food security and meeting the market demand for increased sustainable production for future fish consumption". However, the certification can create better conditions for export of staple fish species from developing countries like Indonesia, and have detrimental consequences for the domestic protein demands. The issues include the deficit of fish protein for internal consumption (Table 1) from its large and still growing population (World Population Review, 2020), the difficulties faced by the fisheries management (Atuna, 2021a, 2021b; IOTC, 2018a; Moreno, 2011; Moreno et al., 2012; Moreno, 2013, 2014a, 2014b, 2015; Utama et al., 2021; WCPFC, 2018; Yuniarta et al., 2017), and a significant number of overexploited fisheries (KKP-RI, 2017). Therefore, donors and eNGOs should not use certification as an argument to maintain "global food security" at the expense of domestic food security.

Furthermore, I propose that food security and sustainability start after government manages the fisheries adequately and keeps stocks around their target reference points. Certification should not be used as a tool to drive fisheries to achieve their management objectives, as proposed by the MSC through its *Theory of Change* (MSC, 2019b). In Indonesia, an increase in certification will result in amplified exports from a country that already cannot supply fish to its population and where fish are estimated to provide up to 54% of animal-based proteins (FAO, 2021). Critics of MSC have cited signs of overfishing, negative impacts on ecosystems, and ineffective management as valid objections to certification. However, these arguments have rarely resulted in the non-certification of a fishery (Christian et al., 2013), and Indonesia is probably the most extreme example.

Several communities and companies received MSC and FT USA certification for their pole and line and handline tuna fisheries in Indonesia because adequate private and highly localised monitoring occurred (MDPI, 2019; MSC, 2018, 2021a). These certifications took place despite excessive growth overfishing for yellowfin tuna (Nurdin, 2017) and local depletion of skipjack in some areas (Novianto et al., 2019). The Conformity Assessment Bodies (CABs) of the MSC used the status of the tuna stocks in the Pacific Ocean instead of considering their condition in archipelagic waters, where the fisheries operate. MSC says it uses the precautionary approach to estimate "stock status for fisheries that do not have data to assess the impact of a fishery on target species and on factors such as bycatch and habitats" (MSC, 2021b). Because of this claim, MSC should require local assessments with local data to determine the status of stocks considered for certification. The pervasive capture of juvenile yellowfin tuna in Indonesia is of particular concern. They are born and stay in archipelagic waters for at least the first 4-6 months of their lives (Anon, 2019), ages when

fishers exert considerable fishing pressure on them (Moreno, 2015, 2014b, 2014a, 2011; Moreno et al., 2012).

Also, deficient monitoring, control and surveillance (MCS) of Indonesian fisheries is an issue of concern (Atuna, 2021a, 2021b; Utama et al., 2021). For example, the pole and line fleet was not allowed to fish associated with FADs from 2014 until the end of 2020, when the legislation was changed (KKP-RI, 2020, 2016, 2014). Therefore, the fleet fished illegally for over six years, and also for the first three years of its MSC certification from 2018 to late 2020 (Atuna, 2021a, 2021b). Not only did the industry not know (or ignored) the regulation, but the government did not penalise a single illegal fishing event of thousands that occurred in the archipelago in those six years, including the 2019-2020 period when the Ministry was made aware of the infractions.

In addition, other MCS issues persist with this and other fleets. Personal observations by the author include:

1. transshipments at sea without the presence of observers or cameras
2. not using the required vessel monitoring system
3. use of multiple gears (Indonesian vessels get a license to fish with one gear and may not carry or use others)
4. capture and landing prohibited species (turtles, thresher, and hammerhead sharks)
5. underreporting of the catch
6. use of destructive fishing methods (explosives)
7. deployment of FADs too close to each other (they must be at least 10 nm apart)
8. deployment of unregistered FADs
9. fishing associated with unregistered FADs
10. medium and large-scale fleets fishing in conservation areas
11. medium and large-scale fleets fishing in areas restricted to artisanal fishers

The Ministry identified all of Indonesia's fishery management problems to be related to illegal fishing by foreign fleets, but this might be only one of the various issues that contribute to the fully exploited or overexploited status of many fish stocks in the country. Some examples of impacts that are not exclusively attributable to foreign actors include:

1. use of poisons and explosives to catch fish
2. pollution
3. pervasive capture of undersized animals
4. use of non-selective gears
5. excessive fishing effort
6. overcapacity
7. extensive and unmanaged deployment and use of FADs
8. damage to sensitive habitats
9. lack of compliance with fishery regulations
10. detrimental fisheries regulations (e.g. mesh size of 1 mm for the capture of small pelagic species)

They are the result of insufficient control by the Ministry and other entities responsible for surveillance and enforcement within the Indonesian government. To blame Indonesia's overexploitation of fishing resources on foreign fleets alone is disingenuous.

The methodology used to estimate the potentials does not consider that the species within each of these fish groups may have widely different life-history characteristics and stock status. Furthermore, hydroacoustic methods alone are not able to distinguish species, particularly in mixed and diverse ecosystems (Horne, 2000; Simmonds and MacLennan, 2005). Additional issues with these potentials include the calculation of biomass for demersal

fish (estimated at 3 million MT) that cannot be estimated from hydroacoustic surveys because they reside within the acoustic dead zone (Mello and Rose, 2009; Ona and Mitson, 1996).

Indonesia's archipelagic waters have been identified as a centre of the unsustainable harvesting of commercial as well as ETP species (see Figure 1 from Di Minin et al., 2019), Ainsworth et al., 2008; Imran and Yamao, 2014) therefore the conclusions drawn here should not come as a surprise. Thus, the Indonesian government should start applying scientifically-sound criteria to determine the real potential of the various stocks based on their condition and not on an incorrect, inflated measure of MSY.

Indonesia is the fourth most populous country globally. Currently, it needs anywhere between 12.8 and 15 million MT of seafood annually to feed its population but only produces around 9.3 million MT from capture fisheries and aquaculture (Table 1). As the demand for MSC-certified tuna soars (MSC, 2020b), the conundrum is whether developing countries with unmet and increasing domestic demands will choose to feed their populations or export the fish to more profitable markets.

Although it is laudable and necessary to improve coastal communities' living standards, certification will likely lead to further overexploitation of local fish stocks. Increased earnings from fisheries may result in increased fishing effort locally, as shown by studies on coastal communities in the Philippines (Selgrath et al., 2018) and the deployment of a fish aggregating device (FAD) in north Buru (Province of Maluku, Indonesia). The community bought this FAD with money from the FT USA certification (Anhalzer et al., 2020) despite fishery stakeholders considering the overabundance of FADs in Indonesia as one of the two most important problems for managing skipjack and yellowfin tuna stocks (McClellan, 2017).

The incentives earned through certification do not resolve overfishing but encourage it. Now communities fish not only to feed themselves and their growing populations locally and nationally but also fish for an expanding international market that increases its demands for "sustainable" or "fair" fish.

The Walton Family Foundation (WFF), one of the donors supporting certification in Indonesia, proposes to "engage the international supply chain to build support for healthy fisheries practices". It proposes to "support FIPs [Fishery Improvement Projects] and other fisheries improvements with the intent of moving towards MSC certification" (Walton Family Foundation, 2018). However, WFF does not address that the proposed fisheries for certification, and thus export, target fish species that are essential foods for coastal and vulnerable communities and from stocks that suffer from local overfishing. MSC certification will likely exacerbate these problems due to increased exports of certified fish to foreign markets while internal demand also escalates. Precautionary examples in Indonesia show that external demand for fish can lead to depleted fisheries (McDonald et al., 2018). Furthermore, WFF, other donors, and eNGOs may be overestimating the impacts of FIPs in developing world fisheries (Bush et al., 2013; Micheli et al., 2014; Mills et al., 2013; Sampson et al., 2015). These fisheries "appear less likely to generate actual environmental improvements once preferential market access is granted" (Roheim et al., 2018).

An Indonesian handline fishery was certified by MSC (Seafood Source, 2020a), complementing a previous FT USA certification (Harta Samudra, 2021). The certification and export of adult yellowfin tuna will exacerbate this size class's targeting, thus removing the spawners that provide the juveniles that comprise most of this species' catch in archipelagic waters.

There is pressure on MSC to certify artisanal and developing countries' fisheries. The arguments include the lack of opportunities and the high prices for certification. Despite this pressure, however, MSC should not ignore basic facts. First, data collection and reporting in

Indonesian fisheries are deficient (IOTC, 2018b; Moreno, 2015, 2014b, 2014a, 2013, 2011; Moreno et al., 2012; WCPFC, 2018; Yuniarta et al., 2017). The collection and analysis of data by companies, fishing associations, or eNGOs for a portion of one of the various fleets targeting a species should not be considered an adequate sampling of the total fishing effort or catch. Secondly, there are compliance issues with the certified and uncertified fleets (Atuna, 2021a, 2021b; Utama et al., 2021) (personal observations). Thirdly, tuna species are essential, highly desired food items by coastal communities. Finally, numerous coastal communities in Indonesia are isolated and rely on their catches for their daily sustenance (Gibson et al., 2020; McClean, 2017).

Government, fishing companies, and fishing associations should reconsider the export of tuna species, particularly from semi-industrial and industrial fleets (pole and line and purse seine), when there is a significant deficit of fish protein for domestic consumption. Existing legislation gives the government the power to stop the export of important fish species like skipjack and yellowfin tuna through its *Government's Guarantee on the Availability of Primary Needs* law (JDIH BPK RI, 2015). Government, however, does not seem to exercise this right.

Moreover, the Indonesian government encourages certification and export of important food fish species (Nusa Daily, 2021), despite the evident and worrying deficit of fish protein for internal consumption. Even though Indonesia has made improvements to meet global nutritional targets, anywhere between 34% (FAO et al., 2018) to 50% (Gibson et al., 2020) of children in some areas exhibit stunted growth due to the lack of an appropriate diet. The number of undernourished people in Indonesia from 2017-2019 was 24.1 million (9%) (FAO, 2021).

Unfortunately, the discussion on certification and export has centred exclusively on fishing communities and companies that capture the fish but has ignored the local consumers. As a result, it has not addressed the possible consequences of exporting these staple fish species (e.g., food insecurity, fish shortages, and increased prices).

The seafood deficit for internal consumption does not mean that there should be a ban on exports of fishery products from Indonesia. Exporting non-essential species like crab, shrimp, octopus, bluefin tuna, and others should occur because they will command much higher prices and bring needed foreign exchange. Also, fisheries that work in international waters should choose whether to export their catches because they have higher operating costs. If forced to sell locally at a lower price, these fleets would likely stop fishing operations, or worse, concentrate them in archipelagic waters. However, neritic and tropical tunas species comprise the single largest fish group harvested in eastern Indonesia (Pauly and Budimartono, 2015) and contribute significantly to food security (McClean, 2017). Because many coastal fisheries in the country suffer from overexploitation, tunas form an indispensable portion of the diet of these communities. An increase in international demand for staple food items like skipjack and yellowfin tuna will further compromise the already precarious food security of coastal and vulnerable communities, and the local conditions of said species in Indonesian waters.

The short-term goal of donors and eNGOs of helping communities earn monetary premiums from certification (Duggan and Kochen, 2016; MSC, 2018; Seafood Source, 2020b, 2020a; Walton Family Foundation, 2018) has superseded the long-term aim of attaining sustainable fisheries and food security. This perversion in priorities defeats the purpose of the certification. Additionally, "there is a general consensus that certifications do not work well in small-scale fisheries or developing world contexts" (Stoll et al., 2020).

I question the motivation to certify seafood in Indonesia by the Walton Family Foundation and the various eNGOs and institutions they fund. The commitment from Wal-Mart Stores (owned by the Walton family) to achieve 100% certification of its seafood purchases (Wal-Mart, 2006) appears to be a more critical driver behind the push to certify and export Indonesian fishery

products with MSC or Fair Trade than the nutritional security of communities, or the solid management of fisheries in the country.

Finally, although many researchers mention social issues associated with seafood certification, these centre around social equity, stakeholder co-decision, and labour conditions (Parkes et al., 2010); interestingly, they do not address food security. I propose that this critical oversight be remedied, particularly in countries with seafood shortages for internal consumption like Indonesia.

4. Recommendations

The Indonesian government, donors, eNGOs, fishing associations, MSC, and Fair Trade, should carefully consider the certification (and therefore export) of staple seafood products from a country with a deficit of fish for internal consumption. For export to occur, these groups should consult fishers and local consumers to investigate supply and demand to ensure that the export of these fish species will not create food insecurity.

The export of essential fish food species should not be allowed unless the communities (including those that consume fish) have appropriate alternatives. Artisanal, semi-industrial, and industrial fleets in Indonesia capture a suite of species suitable for export because they are not crucial to food security (e.g., shrimp, crab, octopus, bluefin tuna). If the export of essential species is viable, proponents should present food production alternatives to the communities. These options may include the rearing of marine or land-based sources of protein. Aquaculture and other types of animal and plant husbandry may successfully replace wild fish protein if done correctly.

Certification should only occur after clear and definitive proof that the government is appropriately managing its fisheries. Plans, laws, and harvest strategies that the government does not fully or successfully implement are not proof of proper management.

CABs should have extensive experience in the countries where they assess fisheries. A bird's view of the issues in fisheries as complex as those found in Indonesia will likely miss existing problems as observed with the certification of the illegally-fishing pole and line tuna fleet in Indonesia.

The diversification of the economy and diet of coastal communities should be a priority. eNGOs and governments should consider the condition of many fish stocks (KKP-RI, 2017) and the effects of warming waters on wild fisheries (Chaudhary et al., 2021; Lam et al., 2020) and aquaculture operations. This problem will be particularly relevant for tropical developing countries where many people fish close to shore, the same areas where they rear marine animals. They should also address other problems commonly related to aquaculture, including mangrove deforestation, coral reef and seagrass degradation, pollution, antibiotics, sedimentation, diseases, and parasites.

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