

GHANA: UPDATED CATCH RECONSTRUCTION FOR 2011-2018*

Ruby Polido^a, Simon-Luc Noël^b and Kofi Amador^c

a) Quantitative Aquatics, Inc., IRRI G. S. Khush Hall, College, Los Baños,
4031 Laguna, Philippines

b) *Sea Around Us*, Institute for the Oceans and Fisheries, University of British Columbia,
2202 Main Mall, Vancouver, BC, V6T 1Z4, Canada

c) Marine Fisheries Research Division, Ministry of Fisheries and Aquaculture Development, Tema, Ghana

Abstract

This contribution updates to 2018 a previous reconstruction of the catch of Ghana's marine and lagoon fisheries that initially covered the years 1950 to 2010. Here, some emphasis is given to the foreign trawlers operating illegally in the Ghanaian Exclusive Economic Zone, and to the conflicts this generates with local fishers. Details are also provided for the various sectors of Ghana's marine and lagoon fisheries.

Introduction

A thorough catch reconstruction for the marine and lagoon/estuarine fisheries of Ghana from 1950 to 2010 was carried out by Nunoo *et al.* (2014a, 2014b, 2016). The present update builds in part upon an update to 2014 performed by the last author (K. Amador, unpublished data).

Materials and Methods

FAO reported data were compared to data reported nationally by the MOFA (MOFA 2012, 2013, 2014) and MoFAD (2019). The FAO data were treated as the reported data baseline and subdivided into artisanal, industrial, and tuna fishery sectors according to nationally-reported proportions. Any excess national data in any of these sectors were assigned to unreported landings.

Subsistence and estuarine/lagoon fisheries

Subsistence consumption for Ghana was estimated by using the available per-capita fish consumption for 2010 (Nunoo *et al.* 2014a, 2014b) and 26 kg per person per year in 2016 (FAO 2016).

An average household size of 4 was estimated for 2010 (Nunoo *et al.* 2014a, 2014b) and 4.5 people per household for 2016 (Michael Bauer Research 2016). To estimate subsistence catches for 2011-2017, the average household size was multiplied by the number of fishers and the per-capita fish consumption. Because no other information was available, the values for lagoon fisheries and the overall taxonomic breakdown for the sector were held constant for 2011-2017.

Recreational fisheries

Recreational catch was updated for 2011-2017 the same way as in Nunoo *et al.* (2015) using the number of tourists reported by The World Bank (2018).

Artisanal fisheries

The number of artisanal fishers was estimated from the number of canoes in operation in Ghanaian waters multiplied by the average crew size per canoe, the latter of which was extrapolated from Nunoo *et al.* (2014b)

* Cite as: Polido, R., S.-L. Noël and K. Amador. 2020. Ghana: Updated catch reconstruction for 2011 – 2018, p. 40-45. In: B. Derrick, M. Khalfallah, V. Relano, D. Zeller and D. Pauly (eds). *Updating to 2018 the 1950-2010 Marine Catch Reconstructions of the Sea Around Us: Part I – Africa, Antarctica, Europe and the North Atlantic*. Fisheries Centre Research Report 28(5).

for 2011-2017. Given the available information, the number of active marine canoes for 2011 (11,231 canoes), 2016 (12,449 canoes; The World Bank 2017) and 2017 (11,583 canoes; The World Bank 2017, Lazar *et al.* 2018) served as anchor points. The crew size was extrapolated from the 2010 value, which was assumed to have increased due to the introduction of premix fuel subsidies that make artisanal fishing cheaper (Tanner *et al.* 2014).

Industrial tuna and bait fisheries

The FAO data corresponding to industrial tuna fisheries changed substantially between 1996 and 2010, mainly in the distribution of catch between taxa but sometimes increasing total tonnage. Catches of tuna and billfishes are not addressed here because they have been updated through a separate *Sea Around Us* study (Coulter *et al.* 2020).

The number of tuna bait boats in Ghana was available for 2011 and 2012 (14 bait boats; Chassot *et al.* 2014), 2014 (20 bait boats; Anon. 2015), and 2016 (20 bait boats; Defaux *et al.* 2018). The number of fishing trips per bait boat was derived from the 2010 data and carried forward to 2017 along with the 2010 CPUE to reconstruct bait catches from this fishery. The 2010 tonnage of discards per bait boat was carried forward to 2017 and used to estimate anchovy discards.

Trawlers and other industrial fisheries

The activities of pair trawlers have been a common grievance for artisanal fishers in Ghana. However, there appears to be some confusion among fishers as to what exactly a pair trawler is, as well as evidence that even though pair-trawlers may be present in Ghana, most, if not all, are decommissioned (Teitelbaum 2009; Gyamfi 2014; Ampofo 2016). Based on recent evidence, however, it is entirely possible that pair trawlers continue to operate illegally in Ghanaian waters despite the 2008 ban. According to the Environmental Justice Foundation (EJF 2018), 90-95% of Ghana's trawl fleets may have some Chinese involvement. In 2015, over 95% of trawlers with active licenses (102 of 106 vessels) fishing in Ghanaian waters were captained by Chinese nationals (EJF 2018). Also, 90% of industrial trawl vessels licensed in Ghana in 2015 were built in China. Foreign entities are prohibited by law from engaging in joint ventures for industrial trawl fishing. To bypass this, countries like China maintain opaque corporate structures to conceal the identities of the beneficial owners, making it more difficult to detect illegal fishing activities (EJF 2018). The Chinese government also provides support to the majority of trawlers currently operating in Ghana in the form of fuel subsidies, loans and other funding for their operations (EJF 2018). This suggests considerable industrial trawling occurs in Ghana.

Based on this information, the minimum number of pair trawlers operating in Ghanaian waters was assumed to be 2 for 2011 to 2013, reduced to 1 for 2014 and kept constant to 2017. The 2010 catch-per-vessel was used to estimate catches for these pair trawlers.

South Korea, China and Japan are known to fish legally in Ghana. FAO tuna catch of *Auxis rochei* by South Korea and Japan in the Eastern Central Atlantic was used to update catch for 2011-2014. However, no catches of this species were reported by the FAO for 2015-2017. Reported Chinese landings were updated using the proportion of 'marine fishes nei' derived in 2014, which was applied to get catch for 2015-2017.

Illegal foreign fishing

Illegal fishing in Ghana was calculated as a ratio of nationally-reported tuna landings. The trend in the ratio of tuna catch used to calculate the illegal catches from 2008 to 2010 was carried forward to 2017 and used to estimate illegal fishing for those years, split evenly between China and Togo. Additional discard rates of 10%

and 20% were applied for Togo and China respectively, following the 2010 methods. Foreign fishing for commercially valuable catch of European anchovy (*Engraulis encrasicolus*) and Bonga shad (*Ethmalosa fimbriata*), and the proximity of Ghana to ports of convenience, puts Ghana's fisheries at greater risk of illegal, unreported, and unregulated fishing (Petrossian 2018). New methods to detect illegal fishing by non-cooperative vessels, such as the INSURE system presented by Kurekin *et al.* (2019) suggest illegal fishing continues to occur at significant levels (see also EJF 2018).

Saiko is the name for illegal transshipment by trawlers in Ghana to canoes out at sea (EJF and Mpoana 2019). Illegal *saiko* trade has a significant impact on Ghana's marine fishing sector, in particular the small-scale sector, by disincentivizing by-catch reduction due to the practice of encouraging trawlers to instead target species locals consume (EJF and Mpoana 2019).

Transition from 2017 to 2018

The reconstructed catch for 1950-2017 was forward carried to 2018 using the semi-automated the procedure in Noël (2020) using reported landings data provided by the FAO for 2018. Semi-automated catch data will later be replaced by a more detailed, research-intensive update.

Results and Discussion

Figure 1 shows updated reconstructed domestic catch for Ghana for 1950-2018.

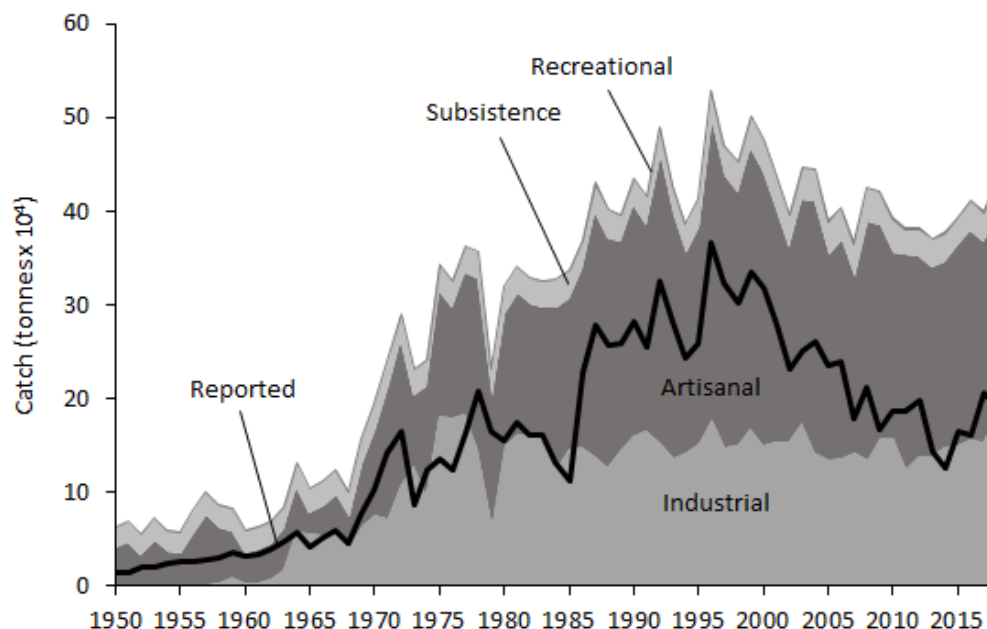


Figure 1. Reconstructed domestic catch for Ghana's marine fisheries for 1950-2018 by fishing sector.

Ghana's fisheries sector is still considered an essential part of its economy, not only due to the country's centrality in West African fisheries in general but also due to its substantial contribution to its population's domestic livelihoods (Aikin 2018). Declining catches, especially for artisanal fishers, continue to cause concern to the government and fisher communities, whose livelihood is already fairly precarious (Osei-Boateng and Ampratwum 2011). Likely, these concerns and the importance that artisanal fishing holds for much of the population may be seen as outweighing the risks of depleting fish populations (Akpulu 2011). A roadmap to address these challenges has been derived which includes boosting the aquaculture sector of the country (MOFAD 2014).

The Ghanaian government has also stepped up its efforts to gradually replenish its dwindling fish stocks by imposing an inshore fishing ban for May to June 2019 (Rufai 2019), along with a closed season for industrial trawling from August to October the same year (FCWC 2019). Ghana will need to consider enforcing serious reductions in industrial fishing, particularly by foreign beneficial ownership fleets, in order to better support its artisanal fisheries that are of crucial importance for domestic food security and livelihoods (Zeller and Pauly 2019).

Marine biodiversity protection

Ghana has agreed to protect its biological diversity through the international Convention on Biological Diversity (Aichi) and the Ramsar Convention on Wetlands of International Importance and the World Heritage Convention (Marine Conservation Institute 2020). In Ghana, conservation of marine ecosystems and resources is addressed through regulations, education and awareness programs (Amlalo 2006). “The main thrust and orientation of national policies on the protection, management and development of the marine and coastal environment is pivoted on the following three major areas: Integrated coastal zone management and sustainable development; Marine environmental protection, both from land-based activities and from sea-based activities; and Sustainable use and conservation of marine living resources (both of the high seas and under national jurisdiction)” (Amlalo 2006).

“In Ghana there are no marine protected areas yet so the country does not fully have an adequate portion protected by the PA network according to the level of biodiversity. There is commitment to protecting a viable and representative PA network, through government efforts and competent staff whose capacities are developed and strengthened by training and career development programmes. However, there are no restoration targets for under-represented and/or greatly diminished ecosystems, but there is a mangrove restoration programme from the coastal wetlands” (UICN/PACO 2010).

There are some discrepancies in the available data about Ghanaian MPAs; the MPAtlas states that Ghana supposedly has two MPAs and four marine managed areas (Marine Conservation Institute 2020). However, the two MPAs are further classified as ‘Forest Reserves’, which may also protect the surrounding waters. The four managed areas are Ramsar sites. On the other hand, the WDPA indicates that the MPAs’ extent is 221 km² (UNEP-WCMC and IUCN 2020), which would correspond to less than 1% of the entire EEZ (225,661 km²; Nunoo *et al.* 2014, Nunoo *et al.* 2016).

In the “short-medium” term (2016-2030), one of the national strategic goals is that at least “10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes”. However, the budget to preserve marine biodiversity including the establishment of marine protected areas and protection of important wetlands is just 1 million USD out of the 534.5 million USD of the total indicative cost (Republic of Ghana 2016).

“Work on diversity of organisms in marine and aquatic systems has concentrated mainly on those exploited for food (principally mammals, reptiles, fishes and large shelled invertebrates)” (Republic of Ghana 2016). Even though more research is required to confirm the status of marine mammals in Ghanaian waters, all marine mammal species appear to be threatened. This is because of their predisposition to being part of the by-catch of fisheries. Reports show that drift gill nets (DGN) are impacting dolphins in particular (Ofori-Danson *et al.* 2003). Moreover, three species of turtles are confirmed to be threatened (leatherback, olive ridley and green) and one species (hawksbill) is locally extinct (Republic of Ghana 2016). In the future, fishery

agencies and managers need to incorporate by-catch monitoring and by-catch reduction measures into management regimes (Republic of Ghana 2016). Some other threats that affect marine ecosystems are habitat loss, degradation, and developments of coastal protection infrastructures (Republic of Ghana 2016).

Acknowledgements

Funding for the work presented here was provided by the Minderoo Foundation, by the Marisla, Oak, and David and Lucille Packard Foundations, and by the Bloomberg Philanthropies through Rare.

References

- Aikin, E.K. 2018. Challenges of sustainable marine fishing in Ghana. 2018. *World Academy of Science, Engineering and Technology International Journal of Animal and Veterinary Sciences*, 12(10): 337-348.
- Akpalu, W. 2011. Fisher skills and compliance with effort-limiting fishing regulations in a developing country. *International Journal of Social Economics*, 38(8): 9.
- Amlalo, D. S. 2006. The protection, management and development of the marine and coastal environment of Ghana, p. 148-157. In: FIG Commissions 4& 7 Working Group 4.3. *Administering Marine Spaces: International Issues*. The International Federation of Surveyors (FIG), Frederiksberg, Denmark.
- Ampofo, O.Y. 2016. If pair-trawling exist, ask the computers. Citi97.3 fm. Available at: citifmonline.com/2016/06/30/if-pair-trawling-exist-ask-the-computers-article/
- Anon. 2015. National Fisheries Management Plan of Ghana: A National Policy for the Management of the Marine Fisheries Sector 2015-2019. Republic of Ghana. Ministry of Fisheries and Aquaculture Development Fisheries Commission. 48 p.
- Chassot, E., S. Ayivi, L. Floch, P. Dewals, A. Damiano, P. Cauquil, L. Dubroca and P. Bannerman. 2014. Analysis of Ghanaian industrial tuna fisheries data: towards tasks I and II for 2006-2012. *Collective Volume of Scientific Papers of ICCAT*, 70(6): 16.
- Coulter, A., T. Cashion, A. Cisneros-Montemayor, S. Popov, G. Tsui, F. Le Manach, L. Schiller, M. Palomares, D. Zeller and D. Pauly. 2020. Using harmonized historical catch data to infer the expansion of global tuna fisheries. *Fisheries Research*, 221:105379. doi.org/10.1016/j.fishres.2019.105379
- Defaux, V., J. Gascoigne and T. Huntington. 2018. Action plan for the preparation of an Eastern Atlantic-Ghana based – pole and line Fishery Improvement Project (FIP). 53 p.
- EJF. 2018. China's hidden fleet in West Africa: A spotlight on illegal practices within Ghana's industrial trawl sector. Environmental Justice Foundation (EJF). 31 p.
- EJF and H. Mpoano. 2019. Stolen at sea. How illegal 'saiko' fishing is fuelling the collapse of Ghana's fisheries. Environmental Justice Foundation (EJF). 30 p.
- FAO. 2016. Fishery and Aquaculture Country Profiles. The Republic of Ghana. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. Available at: www.fao.org/fishery/facp/GHA/en
- FCWC. 2019. Ghana: Ministry imposes 2 months ban on industrial trawlers. Fisheries Committee for the West Central Gulf of Guinea (FCWC). Available at: fcwc-fish.org/ghana-ministry-imposes-2-months-ban-on-industrial-trawlers/.
- Gyamfi, A.A. 2014. No pair-trawling in Ghana says Fisheries Minister. PeaceFM 104.3. Available at: www.peacefmonline.com/pages/local/science/201406/202386.php
- Kurekin, A.A., B.R. Loveday, O. Clements, G.D. Quartly, P.I. Miller, G. Wiafe and K.A. Agyekum. 2019. Operational monitoring of illegal fishing in Ghana through exploitation of satellite earth observation and AIS data. *Remote sensing*, 11(293): 1-28.
- Lazar, N., K. Yankson, J. Blay, P. Ofori-Danson, P. Markwei, K. Agbogah, P. Bannerman, M. Sotor, K. Yamoah and W.B. Bilisini. 2017. Status of the small pelagic stocks in Ghana (2015). Scientific and technical working group of USAID/ Ghana Sustainable Fisheries Management Project (SFMP). Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island, 28 p.
- Marine Conservation Institute. 2020. MPAtlas [Online]. Seattle, WA. Available at: www.mpatlas.org
- Michael Bauer Research. 2016. Ghana average household size. Esri. Available at: www.arcgis.com/home/item.html?id=0a9a8c6ac48e4ae7ba7a32f7461beb74
- MOFA. 2012. Agricultural Sector Annual Progress Report. Ministry of Food and Agriculture (MOFA), Ghana. 84 p.
- MOFA. 2013. Agricultural Sector Annual Progress Report. Ministry of Food and Agriculture (MOFA), Ghana. xvi + 75 p.

- MOFA. 2014. Agricultural Sector Annual Progress Report. Ministry of Food and Agriculture (MOFA), Ghana. xiv + 115 p.
- MOFAD. 2014. Sector strategic medium-term development plan (2014-2017). Ministry of Fisheries and Aquaculture Development (MOFAD), Ghana. 70 p.
- MOFAD. 2019. Fish production (in metric tonnes) by year (2010-2017). Ministry of Fisheries and Aquaculture Development (MOFAD). Available at: www.mofad.gov.gh/publications/statistics-and-reports/fish-production/
- Nunoo, F.K.E., B. Asiedu, K. Amador, D. Belhabib and D. Pauly. 2014a. Reconstruction of marine fisheries catches for Ghana, 1950-2010. Fisheries Centre Working Paper #2014-13, 25 p.
- Nunoo, F.K.E., B. Asiedu, K. Amador, D. Belhabib, V.W.Y. Lam, U.R. Sumaila and D. Pauly. 2014b. Marine fisheries catches in Ghana: historic reconstruction for 1950 to 2010 and current economic impacts. *Reviews in Fisheries Science & Aquaculture*, 22(4): 274-283.
- Nunoo, F. K. E., B. Asiedu, K. Amador, D. Belhabib, and D. Pauly. 2016. Ghana, p. 277. In: D. Pauly and D. Zeller (eds). *Global Atlas of Marine Fisheries: A Critical Appraisal of Catches and Ecosystem Impacts*. Island Press, Washington, DC.
- Noël, S.-L. 2020. Semi-automation procedure for catch reconstruction forward carry, p. 15-20. In: B. Derrick, M. Khalfallah, V. Relano, D. Zeller and D. Pauly (eds). *Updating to 2018 the 1950-2010 Marine Catch Reconstructions of the Sea Around Us: Part I – Africa, Antarctica, Europe and the North Atlantic*. Fisheries Centre Research Report 28(5).
- Ofori-Danson, P.K., K. van Waerebeek and S. Debrah. 2003. Survey for the conservation of dolphins in Ghanaian coastal waters. *Journal of the Ghana Science Association*, 5: 45-54.
- Osei-Boateng, C. and E. Ampratwum. 2011. The informal sector in Ghana. Friedrich-Ebert-Stiftung (FES), Ghana. 40 p.
- Petrossian, G.A. 2018. A micro-spatial analysis of opportunities for IUU fishing in 23 Western African countries. *Biological Conservation*, 225: 31-41.
- Republic of Ghana. 2016. National biodiversity strategy and action plan. Accra, Ghana. Available at: www.cbd.int/doc/world/gh/gh-nbsap-v2-en.pdf
- Rufai, N.A. 2019. Ghana bans fishing to rebuild stocks. TRT World. Available at: www.trtworld.com/africa/ghana-bans-fishing-to-rebuild-stocks-26854
- Tanner, T., A. Mensah, E.T. Lawson, C. Gordon, R. Godfrey-Wood and T. Cannon. 2014. Political economy of climate compatible development: artisanal fisheries and climate change in Ghana. IDS Working Paper 2014, Institute of Development Studies, Brighton, UK. 30 p.
- Teitelbaum, D. 2009. Tackling illegal fishing in Ghana. US Department of State, Accra, Ghana.
- The World Bank. 2017. Ghana – West Africa Regional Fisheries Program. Available at: documents.worldbank.org/curated/en/836461508795711024/pdf/Disclosable-Version-of-the-ISR-Ghana-West-Africa-Regional-Fisheries-Program-P124775-Sequence-No-11.pdf
- The World Bank. 2018. International Development Association project appraisal document on a proposed credit in the amount of SDR 27.9 million to the Republic of Ghana for a tourism development project. Available at: documents.worldbank.org/curated/en/161661531711822807/pdf/Ghana-Tourism-project-appraisal-document-pad-P164211-25Jun18-06252018.pdf
- UNEP-WCMC and IUCN. 2020. Protected Planet: Protected Area Profile for Ghana Island from the World Database of Protected Areas, June 2020. Available at: www.protectedplanet.net/country/GH
- UICN/PACO. 2010. Parks and reserves of Ghana: Management effectiveness assessment of protected areas. UICN/PACO, Ouagadougou, BF. Available at: portals.iucn.org/library/sites/library/files/documents/2010-073.pdf
- Zeller, D. and D. Pauly. 2019. Viewpoint: Back to the Future for fisheries, where will we choose to go? *Global Sustainability*, 2(e11): 1-8.