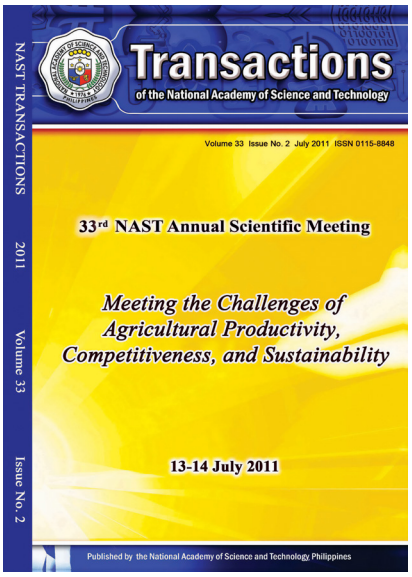
TRANSACTIONSNASTPHL
ISSN 0115-8848 (print)
ISSN 2815-2042 (online)
https://transactions.nast.ph
Vol. 33 Issue No. 2 (2011)
https://doi.org/10.57043/transnastphl.2011.3761

Transactions NAST PHL, is the official journal of the National Academy of Science and Technology Philippines. It has traditionally published papers presented during the Academy's Annual Scientific Meeting since 1979 to promote science-based policy discussions of and recommendations on timely and relevant national issues as part of its functions as a national science academy. Starting in 2021, this journal has been open to contributions from the global scientific community in all fields of science and technology.



Managing Our Marine Frontier: Challenges and Opportunities

Rafael D. Guerrero III

Citation
Guerrero RD III. 2011. Managing our marine frontier: challenges and opportunities. Transactions NAST PHL 33(2): 239-251. doi.org/10.57043/transnastphl.2011.3761

Trans. Nat. Acad. Sci. & Tech. (Philippines) Vol. 33 (No. 2) *239*
ISSN 0115-8848

MANAGING OUR MARINE FRONTIER: CHALLENGES AND OPPORTUNITIES

Rafael D. Guerrero III

Introduction

Planet Earth, the world we live in, is known as the "Blue Planet" (as seen from outer space) with more than 70% of its surface covered by oceans. The waters of our world are 97% salty (marine) and 3% fresh. A cross-section of the ocean shows the different zones at various depths from the shallowest and most productive (Light Zone) to the deepest and most unknown (Dark Zone). Aside from their biological (e.g., fisheries) mineral and energy resources, the oceans are also important for producing oxygen and absorbing carbon dioxide through the plants in them, for regulating climates, as a major means of transport of goods and people with ocean-plying vessels, and for their aesthetic value and recreation.

In the context of "Meeting the Challenges of Agriculture Productivity, Sustainability and Competitiveness," only the fisheries of our marine frontier (oceans) shall be discussed in this paper. Marine fisheries involve the capture, culture, processing, marketing and utilization of marine plants and animals.

World Fisheries Scenario

Globally, the total fisheries production in 2009 was 145.1 million metric tons with a value of US$199.9 billion. Marine fisheries (capture and culture) contributed 69% to such production while inland fisheries (capture and culture) contributed 31%. Fish (65%) constituted the bulk of production followed by invertebrates (25%) and aquatic plants (10%). Humans consumed 81% of the production which supplied 15.7% of the global population's annual protein intake. Fisheries provided income and livelihood directly and indirectly to 54 million people worldwide. The majority (85.5%) of fishers and fish farmers are in Asia (FAO, 2010).

With overfishing, only 15% of the marine fish stocks of the world are believed to be underexploited or moderately exploited. Most of the stocks have been fully exploited or overexploited. Worldwide, 99% of the annual

commercial ocean catch comes from coastal waters within 200 nautical miles of the coastline. Marine fish catching is expected to grow only by 0.7% annually until 2020.

Aquaculture, the farming of aquatic organisms, is seen as the hope of the future for fisheries. It is the fastest growing animal producing sector with an annual growth rate of 6.6%. In 2009, the sector provided 38 % of the total global fisheries production (**Table 1**) and is expected to contribute two-thirds of the world's fish supply in 2020 with an annual growth rate of more than 2.8%.

Table 1. World Fisheries Production in 2009

SOURCE	PRODUCTION (million tons)	%
Inland		
Capture	10.1	7
Culture	35.0	24
Subtotal	45.1	31
Marine		
Capture	79.9	54
Culture	20.1	15
Subtotal	100.00	69
Total	**145.1**	**100**

Source: (FAO, 2010)

Asia accounted for 52 % of global capture fisheries production and 89% of culture fisheries production. According to ecosystem, the fish production of selected Southeast Asian countries showed that the Philippines was the third largest in fish production after Indonesia and Thailand (**Table 2**).

Table 2. Fish Production (million tons) of Selected Southeast Asian Countries by Ecosystem

Country	Marine Capture	Culture	Brackishwater Culture	Freshwater Capture	Culture
Indonesia	3.8	0.20	0.43	0.30	0.99
Thailand	2.7	-	0.44	0.21	0.25
Philippines	2.03	0.92	0.25	0.19a	0.15
Malaysia	1.29	0.92	0.12	-	0.15
Vietnam	-	0.08	-	0.88	-

Source: Dey et al., 2008 aBFAR.2010

The Importance of Philippine Fisheries

In 2009, the Philippine fisheries industry produced 5,079,977 million metric tons of products with a value of PhP 215.58 billion (BFAR, 2010). Of this volume, 53% of the production was from capture fishing (inland and marine) and 47% from culture fisheries or aquaculture (inland and marine). The production from marine waters was 84% of the total compared to 16% from inland waters (**Table 3**).

Table 3. Fisheries Production of Philippine Inland and Marine Waters (2009)

Source	Production (mt)	% of Total Production
Inland		
Capture	188,722	4
Culture	616,777	12
Subtotal	805,499	16
Marine		
Capture	2,413,863	48
Culture	1,779,862	36
	4,193,725	84
Total	**5,079,977**	**100**

Source: BFAR, 2010

The fisheries industry contributed 2.2% to the country's Gross Domestic Product amounting to PhP170.3 billion at current prices and 24.4% of the Gross Value Added in the Agriculture Sector, the second largest to agricultural crops. It also provided direct employment to more than 1.6 million fishers and fish farmers who are mostly small-scale and poor. The fisheries exports of the country (mainly tuna and seaweeds) had a value of US$674,861. Filipinos consume about 38 kg/cap/yr of fish and fish products that comprise 42% of their animal protein supply (BFAR. 2010)

The Philippine Marine Frontier and Its Fisheries

As an archipelagic country, the Philippines has a marine frontier (oceans) consisting of 2,200,000 km^2 territorial waters that are 12% coastal or inshore and 88% oceanic or offshore. It also has a continental shelf area of 184,600 km^2 (from the shoreline to a depth of 200 m) and a coastline of 36,289 km

which is the third longest in the world next to Canada and Indonesia (BFAR, 2010).

The marine fisheries of the country include both the capture or catching and culture or farming of plants and animals in the oceans. Marine fisheries capture involves the catching of pelagic species (dwelling near the sea surface) and demersal species (dwelling near the sea bottom). The pelagic fishes consisting of the small pelagics (e.g., roundscad and sardine) and large pelagics (e.g., tuna and billfish) contribute 56% and l5%, respectively, to the total marine catch. Demersal fishes that contribute about 18% to the total catch are caught in hard bottoms (e.g., snapper and grouper) and soft bottoms (e.g., slipmouth and catfish). Aside from fishes, invertebrates like squids, shrimps and crabs are also caught in marine waters. Marine fishers are categorized into municipal fishers (without or with boats of 3 gross tons or less) fishing within municipal waters (up to 15 km from the shoreline) and commercial fishers (with boats more than 3 gross tons) fishing outside of municipal waters. Commercial fishers using active types of fishing gear such as ring nets, bag nets and purse seines land about 53% of the total marine catch while municipal fishers using passive types of fishing gear such as hand lines, gill nets and fish traps land 47% of the catch. In 2002, there were an estimated 1,371,676 municipal fishers and 16,497 commercial fishers in addition to 226,195 fish farmers (BFAR, 2010).

For marine culture fisheries or mariculture, the dominant production was for seaweeds (94.6%) with *Kappaphycus alvarerzi* and *Eucheuma cottoni* as the main species which are utilized for industrial products. Marine fishes (mainly milkfish) cultured in cages and pens contribute 3.1% to production followed by mollusks (oysters and mussels) with 2.2% and crustaceans (crabs, lobsters and shrimps) contributing the least.

Challenges of Philippine Marine Fisheries

In the Comprehensive National Fisheries Industry Development Plan (CNFIDP) of the Bureau of Fisheries and Aquatic Resources (2008), the problems/issues (challenges) confronting the Philippine marine fisheries industry are: (1) depleted fisheries resources due to excessive fishing effort and open access regimes; (2) degraded fisheries habitats due to destructive fishing methods, conversion of fisheries habitats into economic uses and negative impacts from land-based activities; (3) intensified resource use

competition and conflict among fisher groups and other economic sectors; (4) unrealized full potential of aquaculture and commercial fisheries as there are still underutilized areas for industry development; (5) uncompetitive products due to inferior quality and safety standards; (6) post-harvest losses in terms of physical, nutritional and value losses; (7) limited institutional capabilities from the local up to the national levels of governance; (8) inadequate/inconsistent fisheries policies that promote conducive environment for sustainable development; and (9) weak institutional partnership among government agencies, civil society organizations and the private sector.

The CNFIDP projected that by 2025 with a population growth rate of 2.31% and per capita fish consumption of 31.4 kg/yr, the country will have a fish supply deficit of 585,538 metric tons. In addition, the negative impacts of climate change on fisheries resources also need to be considered.

Overfishing has resulted in the depletion of most of the marine fisheries stocks of the country. The demersal stocks are estimated to be only 10-30% of the levels in the late 1940s with an annual rent dissipation of US$130 million (Silvestre et al., 1986). The maximum sustainable yield (MSY), the biomass of fish that can be harvested from a fishing ground in a year without compromising its ability to replenish itself, for small pelagics was reached in the mid-1970s and the biomass of stocks today is only 17% compared to that in the 1950s with an annual rent dissipation estimated at US$290 million (Silvestre et al., 1986). The large pelagics have also been overfished with the catching of juveniles and the use of "payaos" (Babaran, 2004).

The critical marine ecosystems (habitats) namely, mangroves, sea grass beds and coral reefs that sustain marine life have extensively been degraded due to heavy human pressures. Only less than one-third of the 450,000 hectares of the mangroves that we had in 1918 are still available (Israel, 2004). Losses of extensive sea grass beds in the country due to pollution and other human impacts have been reported (Fortes and Santos, 2004). More than 70% of the coral reefs in the country are in poor condition and only 5% is in excellent condition (Gomez et al., 1994). Aside from supporting marine fisheries, such ecosystems also render vital ecological services such as conserving biodiversity, trapping sediments from land, protecting coastal areas from storm surges and providing eco-tourism opportunities.

Despite the enactment of the Fisheries Code of 1998 (R.A. 8550) that provides for the development, management, conservation and protection of fisheries and aquatic resources for food security, poverty alleviation of small-scale fishers and optimal utilization of offshore and deep sea resources, the intense competition and conflict among the municipal fishers and commercial fishers in coastal waters still persists. Up to now, commercial fishers continue to intrude into the municipal waters that are exclusively allotted to municipal fishers because of poor law enforcement by local government units which have jurisdiction over such waters. The definition of the extent of municipal waters in certain areas of the country has still to be resolved juridically.

Aquaculture, the fastest growing food-producing sector in the world today, is considered the main driver of growth for the country's fisheries industry provided that it is applied on a sustainable basis (within ecological limits). The potential for expanding mariculture or sea farming of fin fishes (e.g., milkfish and grouper), seaweeds and invertebrates in our extensive coastal waters is enormous. The fisheries resources in our EEZ have barely been assessed and exploited.

For improving the competitiveness of our fisheries industry, there is need for ensuring the quality and safety of its products that are traded locally and internationally in accordance with accepted standards. The problems of the industry for fish processing are poor quality products, inconsistent quality of products, lack of appropriate standards for traditional products, insufficient capital to improve the enterprise and the lack of infrastructure for chilling and cold storage facilities. The needs for upgrading the technology and quality standards for value-added products including hygiene and sanitation in processing plants are imperative (Espejo-Hermes, 2004).

It is estimated that 25-30% of the total marine catch is lost due to improper handling (Camu, 1991). Aside from physical losses, economic and nutritional losses are also incurred with the lack of icing, appropriate containers, processing, packaging and storage (Espejo-Hermes, 2004).

The Bureau of Fisheries and Aquatic Resources (BFAR) of the Department of Agriculture is tasked with the functions of policy and enforcement, fisheries industry development, regulation of commercial fishing and research. Aside from formulating and implementing the

CNFIDP, it is also expected to formulate and implement a Comprehensive Fisheries Research and Development Program and establish/maintain a Comprehensive Fisheries Information System, among others. With the lack of sufficient human and capital resources, the BFAR is unable to fully implement its role as "premier fisheries management agency" of the country. At the national level, the Department of Agriculture takes charge of the overall planning and policy-making for agriculture and fisheries. The Fisheries Code of 1998 provided for the position of Undersecretary for Fisheries in the Department of Agriculture to fully attend to the needs of the fisheries industry. While the position was filled for a while, it was relegated to the position of Undersecretary for Livestock and Fisheries and then unfilled until the present subject to the rationalization plan of the Department of Agriculture (Tabios, pers. comm.). There is low priority given to fisheries relative to other concerns of the government particularly under the Department of Agriculture (Luna et al., 2004).

The national and local institutions concerned with fisheries governance have inadequate capabilities to manage and effectively control the amount of fishing with the lack of a system to monitor fish stocks and determine sustainable catch levels on an annual basis. Such institutions lack sufficient manpower, funds and equipment to carry out their operations efficiently (Luna et al., 2004).

The inadequate/inconsistent fisheries policies in the Fisheries Code of 1998 and the lack of clear policies on capture fisheries make implementation impractical and confusing (Santos, 2004). For instance, while municipal waters are supposedly reserved for fishing by municipal fishers, small and medium-scale commercial fishers are allowed to fish in the same waters with certain conditions. Moreover, while the use of active fishing gear is banned in municipal waters, the use of the same gear is allowed for use by medium-scale commercial fishers in municipal waters.

The weak institutional partnership among government agencies, civil society organizations and private sector is brought about by the lack of effective coordination and participation of the said groups in the policy-making and implementation processes. While the Department of Agriculture through the BFAR is responsible for the overall policy and programs pertaining to fisheries, the Department of Environment and Natural Resources is responsible for the protection and conservation of natural

ecosystems including marine ecosystems, and the Philippine Coast Guard under the Department of Transportation and Communication is responsible for enforcement of maritime laws including those for illegal fishing. Frequent consultations and close coordination with concerned stakeholders such as local government units, civil society organizations and the private sector are needed for ensuring awareness, participation and cooperation of such groups.

Climate change will bring about extreme weather events as protracted droughts and strong typhoons in the country. Sea level rise and ocean acidification are also among the expected negative impacts. In the ENSO (El Nino Southern Oscillation) episode of 1997-98 losses of more than PhP 6 billion and PhP 1 billion were incurred by the country's aquaculture and capture fisheries industries, respectively (PCARRD, 2001). Coral "bleaching" caused by abnormally high sea surface temperature that kills the symbiotic dinoflagellates which live within the living coral polyps was observed in Bolinao, Pangasinan in 1998 (San Diego-McGlone et al., 2005).

Opportunities for Marine Fisheries

In meeting the challenges of our marine fisheries, there are opportunities that should be considered and acted on. These opportunities are: (1) reducing the fishing effort so as not to exceed the MSY of 1.9 million metric tons, (2) rehabilitating and conserving marine ecosystems, (3) improving post-harvest methods and practices, (4) providing alternative and supplemental livelihood to municipal fishers, (5) enhancing investment opportunities in mariculture and commercial fishing overseas, (6) strengthening the capacity and capability of institutions for science-based fisheries policy formulation and effective fisheries resources management, and (7) formulating a long-term response and action plan for cushioning the impacts of climate change.

To address the key issue of overfishing, the number of fishers in depleted fishing grounds should be reduced to sustainable levels (MSY). For small pelagics, for instance, the fishing effort needs to be decreased by 50-65% (Dalzell et al., 1987). Other means of reducing the pressure on natural stocks include fishing gear restrictions and seasonal closures of depleted areas (Trudeau, 2004).

The rehabilitation and conservation of marine ecosystems such as mangroves and coral reefs can be done through the establishment of marine fisheries reserves and protected areas. In Section 81 of the Fisheries Code of 1998, the designation of at least 15% of municipal waters for fish refuges or sanctuaries is provided and 25-40% of fishing grounds for mangrove reserves is allowed. For coral reefs, at least 10-15% of the area should be managed for intensive protection (Alino et al., 2004). Marine reserves are the best option for protecting and managing marine fisheries and biodiversity. The protection of at least 20% of marine habitats is the minimum to avoid ecosystem failure (Alcala, 2001).

Post-harvest losses can be reduced by improving handling and processing methods such as the use of sufficient ice, appropriate containers for chilling and the application of improved packaging and storage methods (Espejo-Hermes, 2004)

Mariculture or sea farming can be an alternative and/or supplemental livelihood for impoverished small fishers. There are now more than 100,000 coastal fishing families engaged in seaweed farming throughout the country. With only 60% of the available coastal water area identified to be suitable for such enterprise being utilized, there is still a lot of room for expansion. However, there is need for more seaweed nurseries and credit support to the fisherfolk (Pagdilao, 2011).

Aside from seaweeds, the culture of high-value invertebrates such as abalones and sea cucumbers and finfishes (e.g., milkfish, grouper, siganid and salt-tolerant tilapia) in pens and cages can now be done commercially in designated mariculture parks. Likened to agricultural estates and industrial parks, mariculture parks are set up with infrastructure and other incentives provided by the government to attract private investors. There are now more than 50 mariculture parks in 13 regions of the country established by the BFAR in collaboration with local government units with an area of over 50,000 has and a total investment of PhP950 million, 84% of which was from the private sector (Adora, 2011). Considering the country's extensive coastal waters, tropical climate, strong technological base and the increasing demand for fish here and abroad, the deficit for fish in the coming years can be met by sustainable aquaculture.

There are also opportunities for commercial fishers to catch tunas and other large pelagics in the EEZ and overseas. Some Filipino fishing companies have already engaged in joint ventures with tuna-rich countries like Papua New Guinea in the West Pacific and Indonesia in the Indian Ocean (Barut, 2011).

Capacity building at the national and local levels for fisheries resources assessment, management and law enforcement is imperative. The capability of national agencies such as the BFAR and local government units are limited by inadequate funds because low priority is given to fisheries by the national government through the Department of Agriculture (Luna et al., 2004). There is also need to improve fisheries statistical information systems and for more biological studies on the country's marine stocks (Barut, 2011).

To strengthen the national institution for more effective policy implementation and management of fisheries resources, the establishment of a Department of Fisheries and Aquatic Resources to replace the present BFAR has been proposed. There are now seven bills in the House of Representatives and two parallel bills in the Senate being deliberated on to this effect. Revision of the Fisheries Code of 1998 to thresh out inconsistencies and deficiencies is also on-going (Tabios, pers. comm.).

In cushioning the impacts of climate change on the country's marine fisheries, risk and vulnerability assessment studies need to be done. Such studies on coral reefs are now being conducted by researchers of the Marine Science Institute of the University of the Philippines in collaboration with other institutions. The Philippine Climate Change Commission is preparing an action plan for adaptive and mitigating responses to the phenomenon. An awareness and information drive for all stakeholders of the fisheries sector is essential.

Conclusion

The marine resources (e.g., fisheries) of the Philippines contribute significantly to its people and economy in terms of food security, livelihoods, exports and ecological services. Despite the challenges (problems/issues) confronting the sector, there are opportunities (appropriate actions) that should be considered and done for addressing them.

For the sustainable development of our marine frontier, high priority should be given it by the government considering that it can provide valuable social, economic and environmental benefits to the present and future generations of Filipinos if it is rationally and efficiently managed.

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