

Challenges and Prospects of Capturing Fisheries and the Ways Forwards in Developing Countries

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Abstract

Capture fisheries are the most important contributing sector for both developed and developing countries. Throughout the developing world, the fisheries sector provides the basis for the livelihoods and nutrition of millions of people and constitutes a significant source of foreign exchange for many developing economies. Despite its considerable contributions to development, however, it is often not seen as a priority sector by policy makers or donor agencies, and activities such as aquaculture are frequently seen as relatively low-priority for the allocation of scarce resources such as water. This lack of attention to the sector is particularly problematic given that capture fisheries are currently being fished at capacity, and that further production increases will have to come from the expansion of aquaculture. There is, therefore, an important role for developing country governments to play, both in managing capture fisheries to prevent further stock depletion and in regulating the development of aquaculture to ensure that it is both environmentally sustainable and pro-poor. Under such conditions, fisheries can realize their potential as an important and growing source of economic development in rural areas.

Keywords: Capture; Fish; Prospect

Introduction

Fish farming has been practiced in different parts of the world like Europe, Canada, East Asia, China, Africa, and developing countries. It has been in practice since the ancient civilization of Egypt and China. Total global capture production of 93.7 million tonnes in 2011 was the second-highest ever, slightly below the 93.8 million tonnes of 1996. Moreover, 2012 showed a new maximum production (86.6 million tonnes) when the highly variable anchoveta (*Engraulis ringens*) catches are excluded. Global fishery production in marine waters was 82.6 million tonnes in 2011 and 79.7 million tonnes in 2012 (74.3 and 75.0 million tonnes excluding anchoveta). And also, Global inland water capture production reached 11.6 million tonnes in 2012. Although its upward trend seems continuous, its share in total global capture production does not exceed 13 percent. "Inland waters" remain the most difficult subsector for which to obtain reliable capture production statistics.

Fish culture is an efficient protein food production system from the aquatic environment, and it is a rich source of animal protein. The primary role of fish culture is to help people improve their nutritional standards. Fisheries are divided into two categories: fin fisheries and non-fin fisheries. The former is true fisheries, whereas the latter is fisheries of organisms other than true fish, such as prawns, crabs, lobsters, mussels, oysters, sea cucumbers, frogs, seaweeds, and so on. Fin fisheries are divided into two types: capture fisheries and culture fisheries. Capture fisheries are the capture of aquatic organisms without seed stocking. Natural recruitment of the species occurs. However, due to indiscriminate catching of fish, including brooders and juveniles, fish yield gradually decreases in capture fisheries. Overfishing, overexploitation, population growth, climate change, and land degradation are all issues that must be addressed. Pollution and other environmental factors have an impact on fish yield in capture fisheries. As a result, the review's goal is to highlight the problem of capturing fisheries and their prospects.

The Challenges of Capture Fisheries

Natural and human factors are threatening capture fisheries.

Overfishing, environmental activities, and climate change are the three broad categories of human factors that pose threats to fishery resources. The magnitude of the climate change problem necessitates examining it separately from the broader context of the environment. Fishery resources are limited, as are other living resources. As a result, the resource should be conserved, managed, and used in a sustainable manner to ensure its long-term viability. Fisheries are currently under severe stress due to a variety of factors [1]. Here below are some of the challenges.

Problems of overfishing

Globally, overfishing is the primary human activity constituting a threat to fishery resources. Overfishing occurs when so many fish are taken from a population that the stock's capacity to produce MSY continuously is diminished [2]. MSY is that level of abundance of the population of a living resource that will assure maintenance and restoration of living resources (Walker, G. K, 2005). Overfishing is caused by several interrelated factors.

Increase in population growth: The increase in the world population from about 5.2 billion in 1990 to 6.6 billion people in 2007 [3] puts more pressure on all-natural resources, including fish. The world demand for fish is estimated to reach 186 million tonnes in 2030 or almost 90 million tonnes more than the 1999 demand; while the total world fish supply is more likely to be in the range of about 150 – 160 million tons [4]. The FAO predicts that by 2030 an additional 37 million tonnes of fish per year will be needed to maintain

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current levels of fish consumption for an expanding world population [5]. This gap continues to grow daily as the world population increases. Part of the efforts to address this problem is putting excessive pressure on marine captured fish.

Poverty and coastal settlement: Poverty and coastal settlement are inextricably linked to the world population problem. First, according to the World Bank, 2.1 billion people live on less than \$2 a day, and 880 million on less than \$1 a day. Most of them depend on agriculture, which includes fishing, for their livelihoods [6]. Second, the observable trend is that more people are moving to the coast, [7] and by 2025 it is expected that 75% of the world's population will live in coastal areas [8]. Coastward shifts in populations imply that more low-income earners are directly or indirectly moving into the fishing industry, thus increasing the pressure on fishery resources.

Improved technology: Technology has revolutionized fishing operations to such an extent that the actual fishing capacity is estimated to have increased four-fold since 1965. Many fishing vessels are factory trawlers with sophisticated methods of catching fish, and able to carry on board thousands of tonnes of fish. These trawlers now use radar to navigate in dense fog, sonar to detect schools of fish in deep ocean waters, and electronic navigation and image aids such as Global Positioning System, which helps vessels to return to a site Where fish gather and breed.

Non-environmentally Safe Fishing Methods: After drift nets were banned by the United Nations in 1992, commercial fishermen introduced long line nets and deep-sea bottom trawling [9]. Longline net fishing and deep-sea-bottom trawling for shrimps constitute major unselective and non-environmentally safe ways of fishing and are causing serious concern. While longline nets increase the incidental catching of sea birds, deep-sea bottom trawling uproots and pulse rises the marine ecosystem, and all the unique life within it, thereby making it difficult for fishers to avoid non-target fish and other non-fish species. This has led to an enormous volume of other species being caught incidentally as by catch [10] Davies *et al.* and Bache rightly argued that by catch is one of the highest causes of human-induced marine resource mortality [11].

Ghost fishing: Lost nets and those intentionally abandoned in the sea by fishermen continue to catch fish and non-fish species [12]. Although ghost fishing is under 1% of landed catches [13]. FAO and United Nations Environmental Programme's report, the problem is likely to escalate due to the increased scale of fishing operations, the introduction of highly durable fishing gear made of long-lasting synthetic materials, and the lack of serious concern shown by the international community to address the problem [14].

Over-capitalization/subsidies: Over-capitalization of the fishing industry is another factor causing overfishing. The total world fleet engaged in fishing rose in 1998 to about 1.3 million decked vessels and about 2.8 million undecked vessels [15]. According to Eichenberg and Shapson, the global fishing fleet doubled in both number and tonnage and is currently about 250% greater than needed to catch what can be sustainably harvested described the situation as one in which too many boats are pursuing too few fish. Over-capitalization of the fishing industry is closely linked to governments subsidizing the industry. Subsidies to the fishing industry were estimated at US\$30-34 billion annually [16]. Fisheries subsidies lead to greater fishing capacity and create economic incentives for overfishing, by making the fishing business far more profitable, even when fish stocks are in decline [17]. Subsidies promote other destructive fishing practices like deep seas

bottom trawling and illegal, unreported, and unregulated (IUU) fishing [18].

Poor management strategies: Failure to empower local people and the breakdown of traditional structures and regulations systems as drivers of overfishing [19]. Unfortunately, most literature on fisheries management neglects the effect of Western civilization on the traditional structures and their regulatory mechanisms, which for centuries successfully prescribed fishing standards for fishermen. The failure of management systems, which is often directed at obtaining the MSY and not towards ecological stability, has been identified as the cause of the collapse of several fisheries. Even though the ecosystem approach is becoming a common tool in fisheries management, most countries still rely on the traditional single-species management system. Such a system is incapable of taking into account spatial and temporal scales of variability in the marine environment and does not pay attention to the dynamics or behavior of the fishermen as an integral part of the system [20].

Problem associated with the creation of EEZ: The creation of the EEZ also set into motion its dynamic system leading to compliance and enforcement problems. The majority of coastal states, especially developing states, cannot afford the sophisticated patrol vessels or satellite vessel monitoring systems (VMS) required for monitoring and surveillance of the vast and turbulent waters of the EEZ with less risk. The inability of coastal states to effectively monitor and enforce conservation measures in their EEZ to encourage IUU fishing in the area by foreign fishing vessels, thus exacerbating the depletion and collapse of marine fish stocks [21].

Globalizations and Non-compliance: Another factor exacerbating overfishing is globalization. Couper and Smith [22] argue that globalization encourages the redeployment of excess capacity from the European Union to African, South American, and Indian Ocean waters. In most cases, the transfer takes the form of foreign direct investment, but such investment contributes to overfishing when translated into fishing vessels [23]. Such vessels have no stake in the sustainability of the local fisheries [24] and they are mostly registered in the flag of convenience states to enable them to perpetuate IUU fishing. The main problem is the failure of the flag of convenience states to monitor and control what is significantly more than 51% of the total world's gross tonnage registered by them. A good number of the flag of convenience vessels are constantly reflagging to avoid compliance with international conservation and management measures [25]. According to Behnam, the implication of this is that half of the world fleet is *de facto* an international anomaly, stateless, and not subject to the jurisdiction of the state whose flag they fly [26]. These vessels perpetuate their activities more in the extensive fishing grounds of developing states that lack the financial and naval capability to monitor their waters.

Inadequate data and other factors: The foregoing problems are further compounded by the lack of relevant data and information on fishing vessels, catch landings, and fish stocks biomass, especially in developing countries. The total allowable catch (TAC), which has become the cornerstone of all conservation and management measures [27] is not of much assistance because it is either based on erroneous scientific evidence, or on distorted data provided by fishers, which does not reflect unreported discard and IUU fishing. What is more, politicians at times ignore the recommendations of scientists on what should be the sustainable TAC? Other factors rarely mentioned in most literature are the fiscal and economic policies of governments, for example, have high-interest rates that fishers are paying on loan Facilities. [28] Stated that using 40 percent out of 100 million tonnes of

marine fish caught annually as feed for farmed fish, and the inability of scientists to reach an early consensus on the deplorable state of world marine fisheries [29].

Climate change

Relevant current and future global climatic changes include an increase in mean air temperature, shifting precipitation patterns, and an increase in extreme weather events. The impacts of climate change and variability on inland fisheries and aquaculture production will be different [30]. Production of fish in Sub-Saharan Africa is important not only for domestic food security but also to community livelihoods and national economies. Climate change also poses threats to marine and freshwater species and habitats. Changes in global and regional climate will interact with many other factors which govern the distribution and ecology of the resources and influence the capacity and performance of the marine fisheries sector to meet future consumption rates. Unlike most terrestrial animals, aquatic animal species are poikilothermic (cold-blooded) and changes in habitat temperatures will more rapidly and significantly influence metabolism, growth, reproduction, and distribution, with stronger impact on fishing and aquaculture distribution and productivity. The interconnectedness of aquatic systems allows fish species to migrate with shifts in ecosystem conditions [31].

Fish diseases

One of the problems of the fishery sector in the wild population is parasites and disease conditions of fish. Parasitic diseases reduce fish production by affecting the normal physiology of fish and if left uncontrolled, they can result in mass mortalities or some cases, can be served as a source of infection for human and other vertebrates that consumed fish. In both natural environments and cultures, the disease has a serious impact on fish. Parasitic, bacterial, protozoan and viral diseases of fish are among those diseases which have great economic and public health importance, particularly in the tropics. In many cases, they have proved to be a serious problem causing economic losses in the fishing industry and aquaculture. In fish farming, they may lead to epidemics and mortalities, and as the culture of fish becomes more intensive and widely spread, fish parasite infection will be more liable to become more serious economic and health issues.

Inadequate governance systems

Fisheries policies and regulations have generally shown poor performance and in many regions inland fishery resources and the aquatic environment continue to degrade [32]. Existing policies generally focus on the allocation of water for irrigation, flood protection, navigation, or hydropower generation, and rarely consider fisheries in an adequate manner. Current policies and regulations are largely ineffective in sustaining the quantity and quality of water necessary for inland fisheries. Weak institutions and governance arrangements facilitate illegal fishing and the use of destructive fishing practices as is demonstrated by the globally large amount of illegal and unreported fishing.

Prospects of Capture Fisheries

Global fish production

The model projected that the global food fish supply would grow from 93.2 million tons in 1997 to 130.1 million tons by 2020. Of those, capture fisheries were projected to grow from 64.5 million tons in 1997 to 76.5 million tons in 2020, to represent 59 percent of the total projected supply in 2020. According to the projections, by 2020

developing countries would be responsible for 79 percent of world food fish production, while 77 percent of global fish consumption would occur in developing countries [33].

Productivity of capture fisheries: The impacts of productivity increase capture fisheries in the long run where fisheries around the globe let the fish stocks recover to the levels that permit the maximum sustainable yield (MSY). In the Sunken Billions, it is estimated that effectively managed global capture fisheries are assumed to sustain harvest at 10 percent above the current level. In this scenario, a gradual increase in the global harvest is assumed, achieving this augmented level in 2030 and the world would have 13 percent more wild-caught fish by 2030. According to a world bank report in 2013 increase in the production of small pelagic and other fish for reduction into fishmeal and fish oil would reduce the pressure on the feed market, which results from the rapid expansion of aquaculture production that is expected to continue and however, capture fisheries will be reduced. In particular, Sub-Saharan Africa would achieve fish consumption in 2030 that is 13 percent higher than under the baseline scenario. This is because the increased harvest is likely to be consumed within the region, rather than being exported.

Prediction of climate change on capture fisheries: The impacts of global climate change on the productivity of marine capture fisheries will be predicted. Changes in the global fish markets are simulated based on the maximum catch potentials (maximum sustainable yield, MSY) predicted by Cheung and others (2010). One with mitigation measures in place so that no further climate change would occur beyond the year 2000 level and the other with the continuing trend of rising ocean temperature and ocean acidification. The mitigation scenario yields a 3 percent reduction in the global marine capture fisheries production in 2030 relative to the baseline scenario, while the no-mitigation scenario would result in marginal additional harm to the capture fisheries at the global level (reduction of harvest by 0.02 percent in 2030). While the aggregate impact is negligible, the distribution of the expected changes in catches widely varies across regions. In principle, high-latitude regions are expected to gain while tropical regions lose capture harvest. Imports and exports will likely smooth the additional supply-demand gap caused by the changes in capture harvest, and fish consumption levels in 2030 are not expected to change in any region due to climate change.

Export opportunities

Major fishing companies have a track record of exporting fresh fish to Europe and have established respected brands and relationships with buyers. South African abalone is the well-established premium product in Asia with a firm and growing demand linked to the strong economic growth rate and increasing personal wealth in China (DTI & Enviro-fish Africa, 2007). In contrast, the export prospects for oysters, mussels, trout, and tilapia are poor; due to relatively high local production costs and small volumes [34].

High price predictions: Fish product prices are projected to rise strongly over the coming decade as a result of strong demand, rising production costs, and slowing production growth with continuing price volatility associated with supply swings [35].

Population growth projection and capture fisheries: World population growth, together with urbanization, increasing development, income and living standards, all point to increasing demand for seafood. Capture fisheries provide high-quality food that is high in protein, essential amino acids, and long-chain poly-unsaturated fatty acids, with many benefits for human health. The rate of increase

in demand for fish was more than 2.5 percent since 1950 and is likely to continue [36].

Climate change is expected to have substantial and unexpected effects on the marine environment as detailed throughout this Assessment. Some of these impacts may not negatively impact fisheries and indeed may result in increased availability for capture fisheries in some areas. Nevertheless, there will certainly be an increase in uncertainty concerning effects on stock productivities and distributions, habitat stability, ecosystem interactions, and the configuration of ecosystems around the globe. Whether © 2016 United Nations 16 these effects on the resources will be “mild” or “severe” and will require prudent fisheries management that is precautionary enough to be prepared to assist fishers, their communities, and, in general, stakeholders in adapting to the social and economic consequences of climate change [37].

Future of inland capture fisheries: Fisheries all over the world, particularly in Asia are very heavily exploited and have very little apparent room for expansion by better management. In Africa fishing pressure, although increasing, is still below the level experienced in Asia so there still may be some potential for expansion. The economic value of small-scale fisheries in Africa could be doubled or tripled simply by improving post-harvest processing techniques. In Latin America, fisheries appear relatively less heavily exploited than in Asia, with few signs of fishing down at the community level, although some individual stocks are under pressure. Inland fish resources in Europe, North America, and Australia are exploited more for recreational than consumptive purposes and often managed to meet conservation objectives [38]. As a result, the production of food is declining.

The significance of currently reported catches is difficult to assess. It is assumed that actual catches have been at a maximum level for some time, although real increases are still occurring in some fisheries. Increases in reported catch are mainly because of improved reporting of hitherto unrecorded sources of inland fish, such as small-scale artisanal and subsistence yields, or yields from rice fields. It is impossible to predict at what level reported and actual catches will merge, if ever, although it is clear that present actual production exceeds the 10 million tonnes estimate by a large margin.

A better understanding of the significance of inland fisheries resources may influence the direction of general development policies for aquatic systems, in particular concerning further hydropower and irrigation investments. The greatest risk, particularly in rivers, coastal lagoons and estuaries, and river-driven lakes, is a modification of flow regimes by water abstractions and power generation, principally through damming. The risks of losing catch are also increased by other forms of environmental damage such as draining of seasonal riparian wetlands and river channelization. The assumption that better identification of the role of inland fisheries in livelihoods and food security would result in the sectors needs being considered when planning new civil works on rivers has so far been unjustified. As a result, losses of inland fishery production can be anticipated in many rivers, lakes, and wetlands.

Future management of capture fisheries: Currently, stock depletion in some lakes, a double increase in the fish demand, and further upward movement of fish prices are observed. With increased marketing efforts and population growth, the demand for fish products could be tremendously increased [39]. Even if the available stocks are fully exploited, both current and future demand for fish by the population cannot be met. For example, the total demand for fish in 2003 was about 67 thousand tonnes, which is envisaged to grow nearly

to 95 thousand tonnes in 2015 and 118 thousand tonnes in 2025, which is greater than the production potential of our water bodies [39]. Given this, the present water bodies are unable to meet the demand. This calls for an increasing focus on stocking and enhancement of artificially made water bodies and the development of aquaculture to meet future demand for fish [39].

Conclusion

Capture fisheries are the most important contributing sector for both developed and developing countries. Throughout the developing world, the fisheries sector provides the basis for the livelihoods and nutrition of millions of people and constitutes a significant source of foreign exchange for many developing economies. Despite its considerable contributions to development, however, it is often not seen as a priority sector by policy makers or donor agencies, and activities such as aquaculture are frequently seen as relatively low-priority for the allocation of scarce resources such as water. This lack of attention to the sector is particularly problematic given that capture fisheries are currently being fished at capacity, and that further production increases will have to come from the expansion of aquaculture. There is, therefore, an important role for developing country governments to play, both in managing capture fisheries to prevent further stock depletion and in regulating the development of aquaculture to ensure that it is both environmentally sustainable and pro-poor. Under such conditions, fisheries can realize their potential as an important and growing source of economic development in rural areas.

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