

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

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Abstract: Capture fisheries are the most important contributors to global food and nutritional security, particularly in developing countries. This paper aimed to review the challenges and prospects of capturing fisheries and the ways forwards in developing countries. Throughout the developing world, the fisheries sector provides the basis for millions of people's livelihoods and nutrients, as well as a significant source of foreign exchange for many developing economies. Despite its massive contributions to progress, aquaculture is frequently no longer seen as a priority by policymakers or donor groups, and activities such as aquaculture are frequently viewed as having a low priority for the allocation of scarce resources such as water. This loss of interest in the arena is complicated further by the fact that seize fisheries are currently being fished at capacity, and that additional manufacturing will come from the enlargement of aquaculture. As a result, developing countries have an important role to play, both in managing capture fisheries to avoid inventory depletion and in regulating aquaculture development to ensure that it is environmentally sustainable and pro-poor. Under such conditions, fisheries can realize their full potential as a critical and growing source of economic development in rural areas.

Keywords: Capture, Fish, Prospect

1. Introduction

Fish farming has been practiced in many parts of the world, including Europe, Canada, East Asia, China, Africa, and developing countries. It has been practiced since Egypt and China's ancient civilizations. The total global capture production in 2011 was 93.7 million tonnes, which was slightly less than the 93.8 million tonnes produced in 1996. Furthermore, when the highly variable anchoveta (*Engraulis ringens*) catches are excluded, 2012 showed a new maximum production (86.6 million tonnes). Global marine fishery production was 82.6 million tonnes in 2011 and 79.7 million tonnes in 2012. Although its upward trend appears to be continuing, its share of total global capture production does not exceed 13%. The most difficult subsector to obtain reliable capture production statistics for is "inland waters." [12].

Fish culture is a high-yielding protein food production system derived from the aquatic environment, and it is a good 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.

2. 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 [27]. Here below are some of the challenges.

2.1. Problems of Overfishing

Overfishing is defined as the capture of a fish species from a body of water at a rate that the species could indeed replenish, causing the species to become sparsely populated or extinct in that area. Overfishing occurs when there are insufficient adults to breed and sustain a healthy population. MSY is that level of wealth of the population of a living resource that will assure maintenance and restoration of living resources [28]. Overfishing is caused by several interrelated factors.

2.1.1. Increase in Population Growth

The increase in the world population from about 5.2 billion in 1990 to 6.6 billion people in 2007 [31] 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 [5]. According to the FAO, an additional 37 million tonnes of fish per year will be required by 2030 to sustain current levels of fish consumption for a growing global population [11]. As the world's population grows, this disparity widens. Excessive pressure on captured marine fish is part of the solution to this problem.

2.1.2. 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 [31]. Second, an evident trend is that more individuals are shifting to the coast [21], and by 2025, 75% of the world's population is expected to live in coastal areas. Population shifts to the coast indicate that more low-income earners are entering the fishing industry, placing additional strain on fishery resources.

2.1.3. 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 are able to carry onboard 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 [11].

2.1.4. Non-environmentally Safe Fishing Methods

After drift nets were banned by the United Nations in 1992, commercial fishermen introduced longline nets and deep-sea bottom trawling [30]. Longline net fishing and deep-sea bottom sifting for shrimp are major non-selective and environmentally harmful methods of fishing that are causing serious concern. Whilst also longline nets increase the incidental capture of sea birds, deep-sea bottom trawling tears down and pulse rises the marine ecosystem and all the unique life within it, making it difficult for fishers to avoid non-target fish and other non-fish species. Bycatch is one of the highest causes of human-induced marine resource mortality [8].

2.1.5. Ghost Fishing

Fishing gear that has been lost, dumped, or abandoned in our vast bodies of water is referred to as ghost fishing. When not supervised, man-made devices designed to catch fish and marine animals, such as nets, long lines, and fish traps, are considered capable of ghost fishing. Because of the lack of profit from fish catches, ghost fishing contributes to the depletion of commercial fish stocks. Fish that are caught frequently die, attracting scavengers who can become entangled in the same net, creating a vicious cycle [4]. 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 [2].

2.1.6. 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 [23]. 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 [20]. 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. 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 [12]. Subsidies promote other destructive fishing practices like deep seas bottom trawling and illegal, unreported, and unregulated (IUU) fishing.

2.1.7. Poor Management Strategies

Failure to empower local people and the breakdown of traditional structures and regulations systems as drivers of overfishing [1]. 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 considering spatial and temporal scales of variability in the marine environment and does not pay attention to the dynamics or behaviour of the fishermen as an integral part of the system [15].

2.1.8. Problem Associated with the Creation of EEZ

The establishment of the EEZ also set in motion its dynamic system, which has resulted in compliance and enforcement issues. The majority of coastal states, particularly developing states, cannot afford the sophisticated patrol vessels or satellite vessel monitoring systems (VMS) required for less risky monitoring and surveillance of the EEZ's vast and turbulent waters. The incapability of coastal states to monitor and enforce conservation measures in their EEZ encourages IUU fishing by foreign fishing vessels, aggravating the depletion and collapse of marine fish stocks [25].

2.1.9. Globalizations and Non-compliance

Another factor exacerbating overfishing is globalization. Globalization encourages the redeployment of excess capacity from the European Union to African, South American, and Indian Ocean waters [7]. In most cases, the transfer takes the form of foreign direct investment, but such investment contributes to overfishing when translated into fishing vessels [19]. Such vessels have no stake in the sustainability of the local fisheries [6] 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 [13]. 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 [3]. 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.

2.1.10. 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 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 [25]. What are 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. 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 [14].

2.2. Climate Change

Climate change affects food security in fishing communities through a variety of channels, including migration to coasts, impacts on coastal infrastructure and living space, and more easily observed biophysical pathways of altered fisheries productivity and availability. Indirect changes and trends in fish ecology may interact with, amplify, or even overwhelm biophysical impacts. Changes in global and regional climate will interact with many other factors that govern resource distribution and ecology, influencing the capacity and performance of the marine fisheries sector to meet future consumption rates. In freshwater ecosystems wild animals, unlike most terrestrial animals, are poikilothermic (cold-blooded), and adjustments in habitat temperatures will have a more rapid and significant impact on metabolism, growth, reproduction, and distribution, with a greater impact on fishing and aquaculture distribution and productivity. Because aquatic systems are interconnected, fish species can migrate in response to changes in ecosystem conditions [26].

2.3. Fish Diseases

One issue with the fishery industry is the presence of parasites and disease conditions in the wild population of fish. Parasitic diseases reduce fish production by interfering with the normal physiology of fish, and if left unchecked, they can cause massive fish mortality or even serve as a source of infection for humans and other vertebrates that consume fish [29]. 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 [24]. In numerous instances, they have shown to be a significant issue that results in financial losses for the aquaculture and fishing industries. Fish parasite infections have the potential to cause epidemics and fatalities in the fish farming industry, and as fish culture becomes more intensive and pervasive, they will likely pose more serious economic and health risks.

2.4. Inadequate Governance Systems

In many regions, inland fishery resources and the aquatic environment continue to deteriorate, and fisheries policies and regulations have generally performed poorly [10]. Current policies prioritize water allocation for irrigation, flood protection, navigation, or hydropower generation, and fisheries are rarely adequately considered. Current policies

and regulations cannot sustain the quantity and quality of water required for inland fisheries. Weak institutions and governance frameworks encourage destructive fishing methods and illegal fishing, as evidenced by the massive amount of illegal and unreported fishing that takes place around the world [2].

3. Prospects of Capture Fisheries

3.1. Global Fish Production

According to the model, the amount of fish used for human consumption would increase from 93.2 million tons in 1997 to 130.1 million tons in 2020. Capture fisheries were predicted to account for 59 percent of the total projected supply in 2020, increasing from 64.5 million tons in 1997 to 76.5 million tons in 2020. The predictions state that by 2020 developing countries will produce 79 percent of the world's food supply, while they will also account for 77% of the world's food consumption [32].

3.1.1. Productivity of Capture Fisheries

Long-term effects of productivity increase capture fisheries when fisheries around the world allow fish stocks to recover to levels that allow for the highest sustainable yield (MSY). Effectively managed global capture fisheries can sustain harvest at a 10% increase over current levels. According to this scenario, the global harvest will gradually increase, peaking in 2030 with 13% more wild-caught fish available worldwide. The World Bank found in a report from 2013 that increasing the production of small pelagic and other fish for fishmeal and fish oil would relieve the pressure on the feed market brought on by the rapid expansion of aquaculture production, which is anticipated to continue while reducing capture fisheries. Particularly, the baseline scenario predicted that fish consumption in Sub-Saharan Africa would increase by 13% in 2030. This is because it's more likely that the bigger crop will be used locally rather than exported [22].

3.1.2. 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 [16]. 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 per cent 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 [17]. 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.

3.2. Export Opportunities

Major fishing companies have a history of exporting fresh fish to Europe, and they have developed reputable brands and connections with customers. The most well-known premium product in Asia, South African abalone enjoys a steady and expanding market due to China's robust economic growth and rising personal wealth. However, due to their low volumes and relatively high local production costs, trout, tilapia, mussels, and oysters have poor export prospects [9].

3.2.1. 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 [3].

3.2.2. 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 polyunsaturated 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 [30].

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 [18].

3.2.3. Future of Inland Capture Fisheries

The world's fisheries, particularly those in developing countries, are severely overexploited, with little room for improvement in management. And, while fishing pressure is growing, it is still lower in Africa than in Asia, implying that there is still room for expansion. Simply by improving post-harvest processing methods, the economic value of Africa's small-scale fisheries could be increased by a factor of two or three [16]. As a result, the production of food is declining.

A greater appreciation for the value of inland fisheries resources may alter the direction of general aquatic

development policies, particularly in terms of additional hydropower and irrigation investments. The greatest risk is the alteration of flow regimes caused by water abstraction and power generation, primarily through damming, particularly in rivers, coastal lagoons and estuaries, and river-driven lakes. Other types of environmental damage, such as draining of seasonal riparian wetlands and river channelization, increase the risk of losing catches. So far, the assumption that better identifying the role of inland fisheries in livelihoods and food security would result in the sector's needs being considered when planning new civil works on rivers has been unjustified. As a result, inland fishery production losses in many rivers, lakes, and wetlands can be expected.

3.2.4. Future Management of Capture Fisheries

Currently, stock depletion in some lakes, a twofold increase in fish demand, and further price increases for fish are all being seen [32]. The demand for fish products could significantly rise with increased marketing efforts and population growth. The population's demand for fish will not be able to be satisfied in the present or the future, even if the available stocks are fully utilized. For instance, the global demand for fish is expected to increase beyond the capacity of our water bodies, from about 67 thousand tonnes in 2003 to almost 95 thousand tonnes in 2015 and 118 thousand tonnes in 2025 [23, 12, 31]. 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 [12].

4. Conclusion

Both developed and developing countries rely heavily on capture fishing. The fisheries sector provides a foundation for millions of people's livelihoods and nutrition throughout the developing world, as well as a significant source of foreign exchange for many developing economies. Despite its significant contributions to development, it is frequently not regarded as a priority sector by policymakers or donor agencies, and activities like aquaculture are frequently regarded as relatively low-priority in terms of the allocation of scarce resources like water. This lack of interest in the sector is particularly concerning given that capture fisheries are currently at capacity and that any additional production increases will have to come from aquaculture expansion. Given that capture fisheries are currently overfished and that expanding aquaculture will be required to increase manufacturing even further, this lack of attention to the sector is extremely difficult to explain. As a result, governments in developing countries must play an important role in managing capture fisheries to prevent further stock depletion, as well as regulating aquaculture growth to ensure that it is both environmentally sustainable and beneficial to the poor. Under such conditions, the potential of fisheries as a significant and expanding source of economic growth in rural areas can be realized.

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