

# Role and Contributions of Fish Culture in Food Security and Poverty Reduction

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## Abstract:

Present studies deals with the role and contributions of fish culture in food security and poverty reduction. The study shows that fish culture contributes to nutrition and food security but the links between fish culture and poverty redressal is complex . Impacts of fish trade on food security and poverty alleviation are vague and confounded by a focus on international . The influences of major drivers like decentralisation, climate change, demographic transition are still poorly understood. The study also reveals that evidences, policy narratives and action are often irrelevant. The study shows that a lack of precise information remains about the role of fisheries at the individual and household levels and the means by which poverty relates to fisheries. Overall views on these different results, this paper identified key gaps facing policy- makers, development practitioners and researchers. Policy-makers and development practitioners seek consistency of results to advise their actions, whereas researchers can help resolve inconsistencies and reduce uncertainties. The poverty is not clearly conceptualised, articulated, or measured in fish culture studies. Addressing fisheries management issues in a developing country context, for instance, is not the same as addressing poverty per se in fishing communities, and fisheries research would greatly benefit from drawing on the wider knowledge on the nature of poverty that is discussed in the broader development literature. The study shows the contribution of fish-related activities to food security and poverty reduction.

**Key Words:** fish culture, food security, poverty reduction.

## I) INTRODUCTION

Food security and poverty reduction is the burning issues to the world development agenda but the main theme have changed with the population explosion, and changes in the world economy, technology, climate and the environment. In the global food production and distribution system, poverty reduction strategies have renewed the focus on the role of smallholders in agriculture, and identified the importance of upstream and downstream linkages, as well as non-farm activities. Fish concern to all these food security and poverty reduction like nutrition, supply and its sustainability, demand, access and the role of small scale workers. A huge part of the past and present fish research has focused on managerial issues driven by conservation and economic considerations. However new narratives that emerges the potential contributions of fish culture and aquaculture to food security and poverty reduction. Recent food security discourse stresses the need for multiple policy, economic and social actions addressing consumer demand, access, supply and nutrition. Fish is recognised as a huge nutrient-rich animal-source food with more focus on the nutritional

value of food commodities, for a important proportion of the nutritionally vulnerable people, overshadowing that of most of terrestrial animal foods. In 2010, of the 30 countries where fish contribute more than one-third of the total animal protein supply, 22 are Low Income and Food Deficient countries (Kawarazuka and Bene, 2011). In addition to animal protein, fish flesh contains unique long- chain poly-unsaturated fatty acids and highly essential micronutrients like vitamins-A,B, D and K, the minerals such as calcium, phosphorus, iodine , zinc and iron. These compounds, often not readily available in diets, have beneficial effects for adult health and child cognitive development.

In the global food systems, in addition to production, trade is a principle factor. Product's of fish, from fish capture presently about 10 percent of total agricultural exports, and the value of the global fish trade exceeds the value of international trade in all other animal source foods combined. Low and Medium Income Countries play a significant role as they supply 50 percent of all fish exports by value and more than 60 percent by quantity (World Bank, 2011). In some Pacific small island states dependent on fisheries, 25 percent of their GDP (Gillet, 2009). Despite the importance of fish to economic development and food provision, public debate in relation to fish is dominated by concerns over resources and environmental sustainability ( Worm, Barbier, Beaumont, et al. 2006; Pauly 2009). Discussions on steering fisheries beyond crisis sometimes invoke food security concerns ( Srinivasan et al., 2010) but are more typically focused on finding ways to ensure that fisheries are governed to maximise their monetary value (Cunningham et al. 2009).

Recent works in developing countries have challenged these views, however, highlighting the locally complex, diverse and dynamic nature of fish culture and aquaculture, play their role in providing food, income and employment, as well as a range of social and cultural values and benefits to the local populations. It is widely accepted that 90 percent of the households dependent on fish-related activities for their income, and the vast majority of the people who depend directly on fish as a major source of animal protein and micro-nutrient. While generally accepted, that fish-related activities effectively play a role in economic development, food provision and ultimately poverty r and malnutrition reduction.

In this paper evaluates the existing evidences of how and what extent fish culture contribute to food security and poverty reduction. Also evaluate the quality and scientific rigidity of that evidence. This study differs from a conventional literature review in the sense that is actually assess the scientific quality and consistency of that literature. For this, a scoping review was completed, that relate to fish and its contribution to food security, nutrition, human health, economic growth and poverty alleviation at both local and national levels. In addition the assessment considered four cross-cutting development issues: international trade, governance, scale, and gender, which are also often considered to be critical factors in relation to issues of food security and poverty reduction.

## II) METHODOLOGY

Assessment of present study is based on evaluation of the existing evidence related to fish culture activities and the contribute to economic growth, food security and poverty reduction. The aim was to compile and review existing literature,provide a drastic assessment of the scientific quality of the evidence

provided in this literature. For this a protocol drawing on methodologies found in the domain of scoping review ( Arksey and O'Malley, 2005) was developed upon a three-step approach.

### **Step 1 – Scanning**

Academic research documents, like journal articles, books and chapters, government and international institution studies, reports, working papers, and other sources were scanned. The literature related to fish culture in relation to food security and poverty reduction.

### **Step 2 - Scoring.**

Each of these documents was categorized based on the nature as primary or secondary data, case study-review and scale of the data like small or large data bases. The quality of the documents was then evaluated using a three-criterion assessment system ie.rigour, validity and reliability developed from existing assessment frameworks (Petticrew and Roberts, (2006).

### **Step 3 - Clustering.**

The retained documents were clustered thematically and the quality of evidence within each cluster.

## **III) RESULTS AND DISCUSSION**

The literature was evaluated for the contribution of fish culture to food security and poverty reduction. The overall literature is consistent and supports the well-established evidence of the high nutritional value of small fish in terms of essential nutrients and micronutrients fatty acids, vitamins D, A and B, minerals-calcium, phosphorus, iodine, zinc, iron and selenium, and the potential effective contribution that fish can offer to address multiple micronutrient deficiencies of people in developing countries (Kawarazuka and Bene, 2011). While fish intake will increase animal protein intake and perhaps also essential micronutrient and fat content of a person's diet, it does not necessarily mean that the nutritional status of that person will systematically improve or can always be measured . Global level the literature emphasises the increasingly critical importance of fish culture to fill the gap between fish demand and supply (Merino, Barange, Blanchard, et al., 2012). By supplying an increasing amount of fish on the world market, the fish culture sector has not simply increased the availability of fish, it has also prevented prices from rising as they would have if only wild fisheries were to meet the general increase in demand (World Bank, 2013), with the potential exception of forage fish, such as many small pelagic species, that serve as aquaculture and livestock feed. In addition to this direct effect on supply–demand, fish culture also has an impact through competition and lower price, substituting wild caught fish. At the same time, however, the growing importance of fish culture is not without issues. Earlier criticisms regarding ecological (Naylor et al., 2000) and social sustainability have continued (Martinez-Porchas and Martinez-Cordova, 2012) despite considerable progress. Although competition between fish for direct human consumption and fish for animal feeding may exist its impacts on overall human nutrition remain contested, sparking a more nuanced debate ( Cao, Naylor, Henriksson, et al., 2015).

At the household level, highlight that farmed fish are usually grown larger and consumed filleted, and may therefore be of lower nutritional contribution than wild small indigenous fish which are generally

consumed whole. There is also no clear evidence that an increased supply of farmed-fish has a direct effect on micronutrient status of the producing households and/or consumers (Kawarazuka and Bene, 2011). Fish is more expensive than grains, pulses or vegetables, and it is contended that economic access, and thus consumption, improves with consumers' increasing wealth and income. Consumption of animal source foods, including fish, also increases with urbanization, which improves geographic access by offering bigger, better served markets than rural areas. Urban culture also changes food consumption patterns through influencing patterns of leisure and work.

The contribution of fish culture to national economies is generally examined through four different pathways (Allison, 2011). That generates of revenues to national accounts from access payments, exports, taxation and license fees. Also by economic rents, and more generally net economic benefits that can include consumer welfare and allow for shadow pricing. It also increases wages and income received by those employed in the sector and effect of multipliers and economic linkages within the regional and national economy. The evidence generated from studies using global and national data sets is usually employed to highlight the opportunities for governments to maximise wealth in the fisheries sector. Fisheries can in theory be a means to generate rents that can be extracted and used to address poverty. While a consistent message is often advocated, the evidence is weak due to problems inherent to national and global data sets. Although opportunities for poverty reduction through utilisation of rents, job and income opportunities are often discussed in the literature, these elements are rarely rigorously substantiated, and power dynamics in the creation and distribution of rent are often downplayed (Campling and Havice, 2014). Evidence for the actual practice of rent extraction and its reinvestment in the fisheries sector or in poverty alleviation interventions and resultant impacts is currently lacking.

In addition to the financial value of fisheries production, a number of authors have considered the employment contribution of fisheries to national economies. Within the context of developing countries, evidence suggests that in conditions of chronic unemployment or when there are limited alternatives to fishing, the level of employment in the fishery that maximises the national revenue in the rest of the economy and that contributes most to the balance of trade is larger than the employment that maximises resource rent. The evidence is that fisheries, in particular more labour-intensive ones, can also provide important additional seasonal employment, support agricultural livelihoods, and may also provide a 'labour buffer' function as people can move in and out of fishing activity depending upon other opportunities (Jul Larsen, Kolding, Overa, et al., 2003).

The literature remains unclear how changes to increase efficiency and increase rents, including certification schemes, actually benefit the poor. As with the wider literature on economic growth and poverty, it is not the aggregate wealth that matters as much as the distribution of this wealth. As with all of this section, the lack of evidence suggests that it may be misleading to rely only on global figures to infer conclusions about impacts on poverty at the local level. The study shows that a lack of precise information remains about the role of fisheries at the individual and household levels and the means by which poverty relates to fisheries. What has been established is that fishers are not always among the "the poorest of the

poor” and poverty can be both a consequence as well as a cause of resource degradation (Bene and Friend, 2011). People tend to be poor for reasons that extend beyond the fisheries sector, and tackling poverty amongst fishers will require more than sectoral interventions (Allison et al., 2012). At the same time, the retained literature highlights the important roles that fisheries can play within household economies and the contributions that they can make to local livelihoods. Fisheries also have a role in supporting relationships and well-being within communities, often through reciprocal arrangements, access to fisheries, and collective action (Weeratunge et al. 2014).

Fish culture accounts for an increasing proportion of global fish supply, and is widely considered to have an important role in meeting increased future demand for fish. The diversity of fish culture systems is one of the challenges to conclusive statements about how the sector impacts poverty, but what is recognized is that, as with capture fisheries, aquaculture generally contributes to poverty reduction directly and indirectly by providing food, income and employment for both producers and other value chain actor households. There is a medium to large literature discussing how export-orientated aquaculture benefits national economies contributes to poverty reduction though its contribution to export revenues and national economic growth. Studies on the scale of domestic trade and its effect on income and employment multipliers are also generally lacking. Thus, how much and in what way fish culture contributes to national economic development remains unclear. Commercial fish culture has developed rapidly in a number of developing countries. Some systems, such as shrimp and catfish industries across Asia, have had transformational impacts on households and communities supporting a wholesale escape from poverty rather than incremental declines.

This result suggests that the trend within fish culture towards increasingly intensive production systems does not necessarily threaten efforts to reduce poverty. Commercial fish culture systems have been shown to limit price increases of fish, leading to their increased consumption by both extremely and moderately poor consumers (Toufique and Belton, 2014). Thus, considering the relationship between the nature and scale of production and other key characteristics of fish culture value chains becomes critical to understanding governance structures, including power and benefit sharing mechanisms, and thus eventually to understanding their impacts on poverty alleviation and sustainable economic development. Only a few case studies evoke the possibility that income and employment created by aquaculture can benefit low-income households participating in specific, often rural, aquaculture activities in both Asia and Africa (Haque, Little, Barman, et al., 2010; Jahan, Ahmed and Belton, 2010). Overall, it appears that peri-urban fish-farmers are more likely to generate higher incomes, net returns, and longer-term financial viability than similar producers in more remote rural areas.

The literature shows that access to and distribution of the benefits from capture fisheries and aquaculture are typically mediated through a range of institutions, both public and private, which emerge from the continuous interactions between individuals and groups within a given social and cultural context. Economically rational actors leads to a focus on the design of improved property regimes, institutions and standards to increase efficiency and aggregate wealth. This approach identifies the observed outcomes as the result of poor policy and practice, highlighting a need to introduce new arrangements focus on technical

inputs - property rights in the case of capture fisheries and improved production standards in the case of aquaculture. The approach also notes that a focus on improved property rights reifies a particular interpretation of overfishing and overcapacity as commons problems (Sutinen, 2008).

#### IV) CONCLUSION

The aim of this paper was to evaluate the contribution of fish culture to food security and poverty reduction. The objective was to evaluate the quality and scientific rigour of that evidence, identify the key conclusions that emerge from the literature, and assess the consistency of these conclusions across the sources. Overall views on these different results, this paper identified key gaps facing policy-makers, development practitioners and researchers. Policy-makers and development practitioners seek consistency of results to advise their actions, whereas researchers can help resolve inconsistencies and reduce uncertainties. The poverty is not clearly conceptualised, articulated, or measured in fish culture studies. Addressing fisheries management issues in a developing country context, for instance, is not the same as addressing poverty per se in fishing communities, and fisheries research would greatly benefit from drawing on the wider knowledge on the nature of poverty that is discussed in the broader development literature. A consequence and a major weakness identified by this review is the lack of concrete evidence of how fish production, trade and consumption translate into developmental benefits and their distribution, and ultimately reduce poverty. The poverty reduction is not attributable to aggregate fish production alone, these metrics remain dominant. This scoping review suggests that a greater emphasis and more evidence are required on the distributional aspects of benefits, recognising differentiated access and entitlement to fish resources across a range of scales.

Thus, the first conclusion of this review is that locale-specific case studies could be given more credence at the international level. Arguably these studies are better able to capture the complex and multi-dimensional nature of the pathway through which fish culture effectively contribute to poverty reduction, economic growth and food and nutrition security, and the distributional aspect of these contributions. Fine grained studies such as these would need to be designed to enable comparisons across cases and to build cross-scale analyses of the contribution of fish culture to poverty reduction, food security and improved nutritional quality, spanning both national and household levels. Assuming the extremely rapid growth of fish culture, relates to the causal relationships either positive or negative between fish culture development and food security, economic growth, and impacts on poor people. The area of nutrition where problems persist in demonstrating the impact of fish availability on micronutrient status or other functional outcomes. More studies are needed on how fish contribute to the diets of the poor, as part of their food strategies. The urgent need for more studies in fish culture to explore the local level impacts of global drivers on food security such as civilization, urbanization and climate change.

The second conclusion from the review came from observations on the influence and uptake of the information in the literature and in policy. The review shows a tendency for domains of research with the most consistent and rigorous science to be least effective in influencing policy agendas in the development community. The areas of research such as those documenting the link between fish culture and national

economies, or fish and international trade and food security appear to be amongst those that are systematically advocated by national or international institutions and development agencies, to 'promote' fish culture in relation to development.

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