

Role of fish & fisheries in national nutrition of Pakistan

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Fish and fish products have a vital role in nutrition and global food security, as they represent a rich source of proteins, healthy fats and vitamins. Fish contains certain essential dietary nutrients required for human health including omega-3 long-chain polyunsaturated fatty acids and some essential amino acids not readily available in many other foods. In addition, it contains good amounts of vitamins A, D, and minerals such as iron, zinc, iodine, magnesium, potassium, phosphorus and calcium. In low-income populations that depend heavily on a narrow range of calorie-dense staple foods, fish can represent a much-needed means of nutritional diversification that is relatively cheap and locally available (FAO, 2018).

Given its nutritional value, fish has an important place in agriculture- and food-based approaches to food security and nutrition (Kawarazuka and Béné, 2010). The United Nations General Assembly proclamation of the UN Decade of Action on Nutrition for 2016–2025 provides an opportunity to raise awareness about the role of fish and to ensure that it is mainstreamed in food security and nutrition policy. Greater weight is placed on the role of fisheries as source of livelihoods and a buffer against shocks for poor communities.

Fisheries and aquaculture have a lower environmental impact than ruminant meat production (Clark and Tilman, 2017). Inland fisheries have a particularly low carbon footprint in comparison with other food sources (Ainsworth et al., 2018 in (FAO, 2018). In 2016, global fish production was 171 million tonnes with an estimated value of USD 362 billion. Capture fishery production has been relatively static since the late 80s in comparison to aquaculture which is growing fast.

Importance of inland fisheries and aquaculture in nutrition

Although marine capture fisheries have the major share of fish production, inland capture fisheries and aquaculture are particularly important for many countries including Pakistan. Inland fisheries are critical for achieving sustainable development goals and can substantially contribute in alleviating and preventing poverty (Lynch et al., 2017). The contribution of aquaculture to global fish production has risen continuously, with an impressive growth in supply of fish for human consumption reaching 53% in 2016 with 110 million tonnes, valued at USD 243.5 billion. In 2016, 37 countries were producing more farmed than wild-caught fish. Globally, aquaculture growth rate 5.8% is faster than other major food production sectors (FAO, 2018).

High value fish and shellfish are produced in marine and coastal aquaculture. However, world production of farmed food fish relies increasingly on inland aquaculture, which is typically practiced in freshwater environments in most countries. According to the State of World Fisheries and Aquaculture 2018, inland aquaculture was the source of

51.4 million tonnes or 64.2% of the world's farmed food fish production in 2016. Among the top 20 fish species in aquaculture in the world, sixteen are from inland waters including silver carp (*Hypophthalmichthys molitrix*), grass carp (*Ctenopharyngodon idella*), thaila (*Catla catla*), rohu (*Labeo rohita*), morakhi (*Cirrhinus mrigala*), tilapia spp., common carp (*Cyprinus carpio*) and other fish species commonly found in Pakistan.

Scope of unfed aquaculture farms in nutrition

In contrast to terrestrial animals, fish and other aquatic organisms have a plus point that these can also be cultured without providing any feeds. In unfed systems, fish obtain their food from natural food organisms found in the water. Production in these farms could be increased by applying fertilisers and animal manure or compost to stimulate the food chain and improve productivity. This is a very common practice in warm climates such as that of Pakistan. Globally, 24.4 million tonnes of fish and aquatic organisms were produced in unfed farming systems during 2016. In Pakistan the majority of fish farms are producing fish without feeding.

Potential of saline aquaculture and rice-fish farming

Culture of fish in rice fields is also expanding rapidly in various Asian countries. In some countries, aquaculture with saline-alkaline water is carried out where soil conditions and the chemical properties of available water are inhospitable for conventional food grain crops or pasture. Pakistan has also a great potential of aquaculture development in these two areas, which are still untapped in the country.

Extent of fisheries resources of Pakistan

In Pakistan, in addition to 290,000 square km of marine waters, there are more than 8.6 million ha of area under water in inland areas, which includes more than 56,000 kilometer of what is the world's largest canal irrigation system (FAO, 2009) consisting of rivers, streams and canals covering collectively more than of 3.45 million hectares. There are an additional 1.6 million km of water courses and farm channels. There are several lakes of various sizes, reservoirs and dams that cover around 0.322 million hectares. Additionally, about 4 million hectares of waterlogged and flood water areas also exist. These are those natural depressions where water accumulates each year developing into seasonal or perennial lagoons. Data for drainage canals, which have higher fish production potential due to higher primary productivity, is

not be available. Fish farming is another sector where fish is cultured intensively or semi-intensively and is the most potent in fish production in comparison to all of the above. According to cautious estimates the area of fish farms in Pakistan exceeds 200,000 hectares contrary to available data of 60,230 ha.

Production potential

As documented by FAO, the average production of fish from oceans is less than 2 kg/ha/year. However, fish production of flood plain rivers varies between 43 and 1,000 kg/ha depending on the climatic conditions. Productivity of lakes ranges between 27 to 329 kg/ha/year (Kawarazuka and Béné, 2010). The fish production from irrigation canals may reach up to 50–100 kg/ha (Chizhik, 1969). In a study in Sudan, an average of 660 kg/ha fish biomass was estimated in minor irrigation canals (Coates, 1984). In Bangladesh it was estimated that road and rail side irrigation channels could potentially produce 500 kg/ha/year (Marr, 1986 in (Redding and Midlen, 1990). A recent study in India has shown that fish yield of more than 4.5 t/ha was achievable through proper management of derelict waterbodies (Dash et al., 2008). These studies underscore high potentials of fish production from 8.6 million hectares of inland water bodies in Pakistan, as detailed above. Obviously, these water bodies are being harvested with full fishing effort around the country. However, the figures pertaining to fish catch do not reflect in official fish production statistics due to a variety of reasons (Hornby et al., 2014). If we ignore all the above studies and assume a minimal fish production potential of merely 50 kg/ha, there should be a gross production of 425,179 tonnes of fish from inland capture areas only, as compared to available data of 132,500 tonnes, plus reported 151,000 tonnes from fish farms (Patil et al., 2018), representing a combined total of 576,179 tonnes. This would be comparable to major inland fisheries producers in the region and will bring Pakistan among the world top countries in this category. This is in addition to the marine fisheries production of 376,266 tonnes (Khan, 2017). The statistics system pertaining to marine fisheries also needs reforms. It is noticeable that a review report published in 2014 evidently suggests actual marine fish catches are 2.6 times higher than the official data (Hornby et al., 2014).

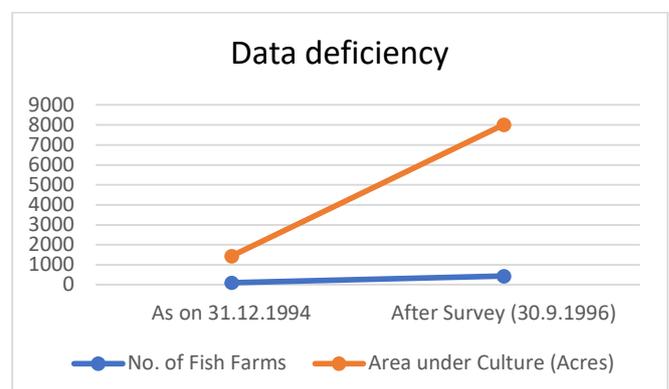
The quantity of harvested fish may be estimated from the fact that there are hundreds of wholesale fish markets (machhli mandi) in the country. Millions of kilograms of fish are handled on larger mandis every year. One month data of fish traded at fish wholesale mandi at Sukkur was collected from 20-1-2018 to 18-2-2018. According to these statistics more than 60,000 kgs of fish are traded in a single day during peak season at this mandi alone. It is understandable that the actual data may be more than that what is reported by fish dealers (CSF, 2008). There are 10-15 such large mandis in Sindh and Punjab each. Small wholesale markets exist in each potential town in these provinces alone. The quantity of fish sold locally by fish venders as purchased directly from fish farms or other inland water bodies is in addition to the fish brought to wholesale markets.

Off-the-record extent of sale and consumption of fish in Pakistan

Subsistence fish catches also need to be accounted for a complete picture of fish production (FAO, 2005). The author has rural background and can witness widescale fish catches by rural population. People in rural areas, whether young or old, often go fishing using local gadgets and fishing nets and it is a common sight in areas around canals, drains, lakes, flooded and waterlogged areas which offer abundant fish free of cost. In these trips handsome amounts of fish are caught. During childhood and teenage years, the author also used to catch fish with his buddies from nearby irrigation canals and waterlogged areas. Contrary to the urban areas where only large sized commercial fishes belonging to few species are preferred, the rural people have no preference for a specific size or kind. They consume even small fishes of unpopular varieties. Often, these fishes are eaten whole with head and spines. These non-commercial small fish species are rich in micronutrients required to address hidden hunger and child stunting (Patil et al., 2018). These subsistence fish catches provide a key food source for animal protein for most local communities living near lakes, canals and other water bodies (FAO, 2018).

Survey results on fish farms in one of the districts

As District Head of the Fisheries Department, the author surveyed fish farms in Shikarpur District in Sindh back in 1996 which revealed a striking deficiency in fish farms data alone. A difference of more than 500% was found in the data available from the year 1994 and the survey conducted in 1996. During the survey 8,008 acres were recorded as compared to 1,436 acres previously recorded in the District Fisheries Office. The number of fish farms increased from merely 91 to 427 (Jarwar, 2008). Similar differences were found in other districts also. This could be a satisfactory argument that the data of fish farms and the fish production both are much lower than actual on the ground. If we take such data deficiency into consideration, 40-60% of fish production seems to be missing from the record.



According to the World Bank, Pakistan has a potential of producing 560,000 tonnes from aquaculture alone and could annually produce more than 2.0 million tonnes in next few years if aquaculture growth trajectory matches that of its neighbours i.e. India and Bangladesh (Patil et al., 2018). Bangladesh has similar fish fauna and level of economic development, but produces about ten times more fish from inland sources despite having fresh water resources that are around half the size of Pakistan's (Patil et al., 2018). Yields in Pakistan are typically 2,400 to 3,000 kg per hectare per year (Khan and Chatta 2015 in (Patil et al., 2018), while yields in Bangladesh averaged 4,600 kg across all pond-based systems in 2015-16 (FRSS, 2017) and were substantially higher in intensive-input systems. It is strange to note that small countries like Uganda, Nigeria, Cambodia and Tanzania are producing more fish from inland capture and aquaculture than Pakistan.

Gaps in fisheries statistics collection, assessment and reporting (regional countries vs Pakistan)

According to FAO, people in developing countries have a higher share of fish protein in their diets than those in developed countries. The world per capita fish consumption has grown to more than 20 kg. The lowest levels, just above 2 kg, are in Central Asia and some landlocked countries such as Afghanistan, Ethiopia and Lesotho. Even in low-income food-deficit countries (LIFDCs) it is 7.7 kg. It is hard to believe that per capita fish consumption in Pakistan is 1.9 kg only, which indeed is much lower than many small countries, despite the fact that there are thousands of Fish Points throughout the country which serve tonnes of fried fish every day and fish vendors are a common sight almost in every town. If the true fish production potentials of Pakistan are considered, the real per capita fish consumption might be much above the current 1.9 kg. A report in the Dawn in 2013 indicated considerable rise in fish consumption in the country (Dawn.com, 2013).

Many Asian countries are among top fisheries producers today including India, Indonesia, Vietnam, Myanmar, Philippines, Bangladesh, Malaysia and Thailand. Even Egypt, Morocco, Nigeria, Iran and Cambodia are doing well. A few years back some of these ranked much lower and were not in the top list. According to FAO, India reported additional 0.54 million tonnes in 2010 in comparison to 2009. Similarly, total fish production of Bangladesh grew by 67% between 2004 and 2009. Production of Myanmar quadrupled in last decade with 18% yearly growth thus jumping 11 positions to the top list. India reported dramatic growth of 179% in inland fish production between 2004 and 2010. Thanks to improvements in fisheries statistics collection, assessment and reporting they achieved this landmark as endorsed by FAO. Despite the fact that Pakistan has the largest canal-based irrigation system in the entire world; nearly 1,000 km long fertile coast and suitable agro-climatic conditions for fish growth and aquaculture development, stands 33rd in world ranking in fisheries production with a total of 669,586 metric tonnes in 2016, much below its Asian counterparts. Viet Nam, Thailand and India have climbed to be the top six fish exporters with annual exports of 7.3, 5.9 and 5.5 billion USD respectively. While the volume of Pakistan's Fisheries exports in last fiscal year was \$451 million (The News, 2019). According to

(TDAP, 2019), Fish and fish products are 3rd among primary commodity exports after rice and fruits; and have potential for substantial increase.

A ray of hope

It is lightening that, feeling the enormous potential of marine resources and bringing focus to their contribution to the national economic development agenda, the prime Minister of Pakistan has recently declared the year 2020 as the "Year of Blue Economy" in Pakistan.

Conclusion

The author is of the view that fish and fisheries are playing an important role in providing nutritious animal protein in the country. There is a need for transformation within the sector by paying greater attention to sustainability; strengthening of extension services; introduction of high-yielding farming systems and new aquaculture technologies; improved economic efficiency and benefits to fish farmers; strengthened business along the value chain; product diversity and value addition; and by optimising the processing industry. However, based on the potential as discussed above, there is no doubt that the scale of production and consumption of fish in Pakistan is underreported and is much higher than the current numbers. There is a need for taking necessary steps to ascertain the real contribution of fisheries sector to the national economy. A recent article in 'The Economist' says that "the world's most valuable resource today is data, as used to be oil and other sorts of wealth in the last century" (The Economist, 2017).

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