

Gauging the Impacts and Externalities of Covid Pandemic in Marine Fisheries Sector of India: “Building Back Better”

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Abstract

The paper attempts to analyse and synthesise the findings from the various studies conducted across different sections and stakeholders pertaining to the fisheries sector across the world focusing specifically in the global south. While there have been studies on the immediate impact, the paper examined the direct and indirect impact of covid pandemic on the fisheries sector with particular attention paid to the externalities that have developed as unprecedented changes occurred. As a result of these changes, several adaptation and mitigation strategies have been implemented by stakeholders across the fisheries value chain which is presented in the paper. Keeping in mind the expanded scope, the current paper looked at over 65 peer reviewed research articles published during May 2020- March 2022 from Google scholar and Web of Science platforms. Additionally, reports from organisations such as FAO, Oxfam and World fish were examined. While it is certainly true that there have been devastating impacts of the pandemic across the fisheries sector, there are also lessons to be learnt in re-building the world better and therefore the paper also contributes to developing a framework of adaptation and mitigation strategies from the experiences of the countries in the global south.

Keywords: Covid pandemic; Externalities; Sustainable fisheries; Marine fisheries; India

Introduction

Status of fisheries sector: Global and India

The Status of Fisheries and Aquaculture Report 2022 brought out by the Food and Agricultural Organization (FAO) states that the total fisheries and aquaculture production reached a record 214 million tonnes in 2020, owing to the growth of aquaculture, particularly in Asia. This was a slight rise from the previous record of 213 million tonnes as of 2018. Structurally, even as there was 4.4 per cent decline in capture fisheries, the fast-growing aquaculture compensated for this. The per capita human consumption which has been growing steadily reached 20.2 per kg more than double the average of 9.9 kg per capita in the 1960s [1-5]. Further the importance of the sector is reflected through 58.5 million being engaged directly (either full time or part time) besides the 600 million employed in the post harvesting sector. Aquaculture continues to employ 35 per cent of the total workers [6]. The global reach and interconnectedness of the fisheries sector can be understood from the fact that the international trade generated around USD 151 billion in 2020 even as the pandemic ravaged the lives and livelihoods of the people (ibid).

On the capture side, India features among the top 7 producers in the world together accounting for 49 per cent of the global capture and produces 4.7 per cent of the total global capture fisheries. In the inland fisheries production, India became the top producer recording catch of 1.8 million tonnes via a vis 1.5 million tonne from China [6].

In India, considered a sunrise sector, the fisheries sector alongside horticulture has been an important contributor to the overall value added by the agriculture sector contributing 1.24 per cent to the country's GVA and over 7.28 per cent to the agricultural GVA. In addition to recording double digit annual growth for the past 5 years, the sector provides livelihood to 28 million people in the country and the export earnings from the sector was Rs 46,662.85 crores during 2019-20 [7].

Objective and Methodology

The main objective of the paper is to analyse and synthesise the findings from the various studies conducted across different sections and stakeholders pertaining to the fisheries sector. The thrust of the paper has been to focus on the direct and indirect impact of covid pandemic on the fisheries sector, accounting the externalities that have developed as unprecedented changes as a result of which adaptation and mitigation strategies have been implemented by stakeholders across the fisheries value chain. For this purpose, the current paper looked at over 65 peer reviewed research articles published during May 2020- March 2022 from Google Scholar and Web of Science platforms. Additionally, reports from organisations such as FAO and World fish were examined. The categories of scholarly work included for the review was selected from Web of Science and Google Scholar using the terms as key words in Table 1.

Rationale

While the paper focuses on the learning from across the world, specific attention is paid to the conditions in the global south particularly, India. The rationale for doing is the following:

(i.) The lack of a synthesised literature from the global south on the fisheries sector assumes particular importance in the light of the

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Table 1: Key search terms for Review Article Selection.

Key Search Terms	Inclusion Criteria	Exclusion Criteria
Pandemic and Indian fisheries AND Covid-19 and Indian fisheries	Peer reviewed Indexed in Web of Science Journals Pandemic specific impact on the sector March 2020- May 2022	Articles in language other than English No empirical observations No theoretical or conceptual link to externalities No policy implications January 2020- April 2020 and Articles published after April 2022
Pandemic and Marine fisheries sector And Macro Economic Impact And Global South	Peer reviewed Focus on macro economy of specific countries in the global south	Articles in language other than English Not accessible
Pandemic and gender implication in fisheries And Global South	Peer reviewed Ethnographic and/or empirical studies	Articles in language other than English Not accessible
Pandemic and small-scale fisheries	Peer reviewed Ethnographic and/or empirical studies	Articles in language other than English Not accessible
Pandemic and Fisheries and Externalities in global south	Focus on the changes and adaptation mechanisms and pathways within fisheries sector	Not Accessible
Covid-19 and fish consumption	Peer reviewed	Articles in language other than English Not accessible
Covid-19 and seafood consumption AND Covid-19 and international seafood consumption	Peer reviewed	Not accessible
Covid-19 and artisanal fisheries in India	Peer reviewed	Articles in language other than English Not accessible
Covid-19 OR pandemic and fisheries value chain		Articles in language other than English Not accessible
Covid-19 and role of state	Government reports on loss and potential disruption on the fisheries value chain	Articles in language other than English Fisheries focussed state policies that not by credible organisations / methodology Not accessible
Total Articles Reviewed–65 (After removing for duplication)		

WTO Ministerial Conference that argued for more careful scrutiny of fisheries subsidies. There is a need to highlight the particularities of fisheries in the developing countries, given the context of just transition.

(ii.) The global food crises and the concerns of inequality have been at the forefront with the pandemic. This has been highlighted in the Global Report on Food Crises 2022 which call for Joint Analyses for Better Decisions. This means that greater interaction both within-primary food producing sectors (which need to be studied further from the point of view of production, consumption and distribution) and across linkages with other sectors need to be analysed. The fisheries sector represents an ideal model and offers both the scope and scale.

Discussion

Fisheries sector and uncertainties

Cochrane and Garcia defines fisheries management as “the process that has evolved to ensure that fisheries operate in a manner that not only provides the immediate benefits but also does not result in excessive or irreversible damage to the exploited fish stocks or the diversity, integrity and structure of the ecosystem, so that the stocks and ecosystem will continue to provide the full range of benefits in the future” (2002:1). Building on the sustainability aspect, they point out that while fisheries management has been successful in certain cases, it has encountered failure more often [8]. Therefore, it is unsurprising that concern exists about the state of global aquatic ecosystems and their ability to continue to provide benefits including for human consumption. The uncertainty within the sector arises due to being constituted by factors, whether it is the ecosystem and biological, and/or the stakeholders including the market. This uncertainty makes prediction of long term trends difficult and consequently renders fisheries management less robust.

Further, fish stocks and communities are finite and biological production constrains the potential yield. However, biological production of stocks are as much the function of the size and structure of the stock as it is about the ecological environment with which it interacts and is influenced by natural and human-induced changes in this environment. Among these, there is considerable importance to be paid to the climate change.

Constanza reported that the goods and services provided by the oceans were valued at US \$49.7 trillion making up two thirds of the global GDP [9]. This was excluding the ‘unaccounted’ yet significant services such as the production of oxygen and the absorption of carbon dioxide due to human activities [10, 11]. Human activities have led to severe and in some cases irreversible damages such as habitat loss, pollution, overfishing and the collective consequences of climate change [12-15].

Covid and economy

Covid imposed restrictions and lockdowns across the world leading to near complete halt of economic activities. World Bank estimates that the global economy shrank by 5 per cent [16]. Transformed into a global village, the revolution in information technology has made the current world we inhabit is interconnected in more ways than ever before. Alongside, the rising inequality - both within and across the countries -, we need to be cognizant of the differential impact of covid across developed and developing countries. With 55 per cent of the population in developing countries not having social protection, the covid 19 prevention measures such as lockdown, stay at home orders, social distancing and transport halt pose enormous challenges. Thus, health and economic measures are inter twined in the fighting the impact of covid [17].

Covid and fisheries sector: With fish being traded more than ever,

the fisheries sector faces the challenges of being influenced by changes occurring in others sectors. There are also greater and growing risks associated with fisheries being inter connected to the sustainability aspect with the risks to extract the maximum of the fish stock from anywhere in the world to keep up with demand. The key activities along the fishing value chain range from capture fishing, aquaculture production, processing, and transportation of inputs, distribution and whole sale/retail trade. At each stage there is the vulnerability associated with being interrupted due to covid or covid associated restrictions. Further given that 45 per cent of the fish consumed are highly perishable, logistical challenges require quick resolution [6].

As far as capture fisheries is concerned, there was an overall fall in catches due to reduced fishing followed a period of recovery with ease in lockdown [18]. In addition to fall in catches, there have also been distressing incidents of human rights violations in the sector with many workers aboard the fishing vessels were debarred from deboarding vessels. Further adding the vulnerability, a large part of the workers were also migrants.

Covid and marine fisheries sector of India: In India, nationwide lockdown was enforced across all sectors for 21 days from 25.3.20 to 14.4.20 as the virus spreads fast through contact. The consequent impact in the fisheries sector was believed to be in two sub sectors (i) production (fish catch) and (ii) marketing (both domestic and export-which includes processing) and the associated secondary and auxiliary services. Initially not considered as an essential service, following protests by the fishing community the Indian government announced the Standard Operating Procedures on 10 April 2020 to include maritime and aquaculture, movement of fishers and fish workers across the value chain. Various studies have pointed out that persons involved in fisheries and allied activities such as fishers, hatchery owners, fish processors, sea-food exporters, traders, fish vendors, vehicles carrying fish-have been badly impacted [19-22]. Based on April data, Kurien estimated that the sector was functioning at one third its capacity and incurred a loss of Rs 6700 crores. CMFRI provisional estimates point toward higher loss of nearly Rs 10,000 crores and could be up to Rs 25000 crores for a possible sixty day shut down.

Stakeholders

The coronavirus pandemic has exposed the vulnerabilities and the strength of the world we inhabit. Given the increase in concerns around inequality in the world – both across and within countries, there is the need to correctly identify stakeholders and then build a framework that incorporates the diverse views of the stakeholders. Only then can we build a stakeholder driven approach to solving the crises facing us. There is a need towards understanding the key adaptation and mitigation strategies across all sectors in the world in having dealt with the impacts of the Covid 19 pandemic. Turning towards the fisheries sector, identifying the impact and the key stakeholders—who feature among the most vulnerable categories of population in the world-challenges assumptions, held on a societal level. For example, women feature among the most important stakeholder across the fisheries sector but there has been less recognition of the role of gender in fisheries. Over the course of the pandemic, however as women displayed exemplary leadership capacity, there was an important lesson to be learnt. This is true of the fisheries also. The focus on fisheries is relevant as fisheries constitute an important means of ensuring food security in addition to the millions of jobs provided. The paper envisages to contribute to scholarship on how to build back better, guided by “just transition” as put forward by US labour and environmental activist Tony Mazzocchi.

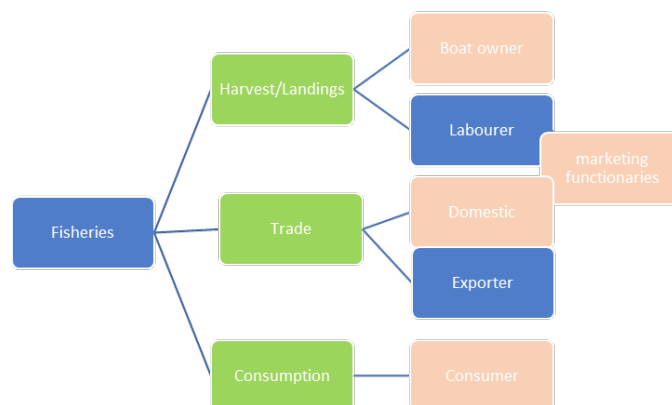


Figure 1: The three major acts in the fisheries sector alongside the main actors.

In order to understand the impact of covid on the fisheries sector as well as identify pathways through which impacts occur, it important that we identify the structures as well as the stakeholders or the key actors in the sector (Figure 1).

Labour: Marine fisheries sector is labour-intensive with multiple stakeholders, craft and gear combinations and varied fishing operations. There exists demand and supply gap in the availability of trained human resource in the harvest and post-harvest sectors. Specifically, the COVID-19 pandemic revealed crisis among labour migrants and, a holistic understanding on the dynamics of labour migration in the Indian marine fisheries is the need of the hour.

A. Migration: ILO estimates, 16.65 million of the global migrant workers worldwide, work in primary sectors such as agriculture, forestry and fishing [23]. Looking at the fisheries sector, the concept of labour mobility across and within has been studied in coastal countries including in India [3, 24, 25]. The studies assume importance because as countries transition from developing to developed, there is also withdrawal of labour from primary sectors such as agriculture and fisheries to industrial and services sectors. However, there has also been industrialisation of fisheries and therefore it is relevant to examine the aspect of mobility. The richness of the literature in this aspect have contributed to the understanding inter- generational mobility in fisheries.

In the Indian context, Shinoj reiterate the need for systematic studies that analyse the patterns and determinants of spatial and occupational mobility among the fisher community [26]. This assumes particular significance in the context of covid pandemic as there was temporary measures put in place to completely halt movement. Focusing on the marine fisheries, observes that as employment status and opportunities in fishing increased over the years, migrant workers were attracted to the sector visible clearly during the period (1961-2005) even as mechanization was changing the phase of fisheries drastically [27]. This continues to hold true across the east and west coasts. Further, fishers tend to migrate out due to various economic and non-economic reasons, and it was found that the migrants became better off than they were before but resulted in undesirable effects on the existing marine fishery resources and marine fishery economy of the native district.

Though the contribution of migrant fishers to the marine economy is significant, they face numerous issues such as lack of proper housing facilities, unhygienic working conditions, long working hours, etc. [28]. Priyanka studied the extent and impact of labour migration in marine fisheries of Versova and Satpati fishing villages

in Maharashtra and inferred that that trawl sector attracted both skilled and unskilled migrants from both coastal and inland states [29]. This was necessitated to fill the demand gap created by urbanisation in some of the coastal fishing villages that resulted in many of the fishing households gradually shifting out of active fishing. Influx of migrants in urban areas like Mumbai has also led to disruption of the women dominated-fish retailing business since some of the migrants resorted to fish vending directly competing. Rajeshwaran in urban (Mumbai and Chennai) and rural (Palghar and Thoothukudi) fishing villages revealed different migration patterns in urban and rural areas and a more complex gendered impact due to changes in education levels and aspirations [30]. Salagrama assessed the migrant out flow from Srikakulam district of Andhra Pradesh to Veraval, Gujarat and stressed on the significance of recording migration flow and monitoring migrant condition towards policy support for the future [31]. Salagrama has described the long-term (permanent) migration and seasonal (short-term) migration in marine fishing in Orissa and found that it is mostly conducted by settlers from other areas including Andhra Pradesh, West Bengal, and Bangladesh and generated income gains over the years [32]. Migration is observed in the marine capture fisheries, and women migrant workers are the backbone of the fish processing industry.

As Marsche remark in their work on migrant fish workers in Thailand and Taiwan, migrant fish workers are often "invisible worker population" and due to the nature of their working and living conditions render them vulnerable to transmission of the virus [33]. This coupled with racism and marginality has heightened the fear and suspicion that they could be a source of infection. As travel restrictions were put in place, the precarious legal status and isolation at sea and in ports, alongside language barriers, undermined access to health care and emergency social security.

Consumers:

A. Food sovereignty and fisheries: Globally, fisheries are an important source of ensuring food sovereignty for several nations. FAO estimates that present per capita fish consumption at 20.3 kg as of 2016 to increase to 25 kg per capita by 2025-more than 20 per cent increase that calls for sustained fish production. With the devastating consequences of the covid pandemic, there are important consequences for consumption as well as production in fisheries.

B. The role of international trade in fish consumption: As far as fish consumption is concerned, there are two features to be noted: the role of international trade given the number of times the good is processed and how labour intensive the sector is-there is greater involvement of labour and at close quarters [27,34-36]. Fishing is extremely vulnerable to exogenous shocks such as the covid 19 pandemic-specifically given the precautionary measures such as social distancing that were put in place -and therefore urgent and concerted efforts were made to ensure that there are mechanisms in place to address the needs while the latter makes the position of the fishers extremely vulnerable in bargaining for a fair price. The structural changes that had been underway in fisheries-where the shift from capture to culture based systems- proved to be a resilient factor especially in the global south. However, there are significant cross country and within country variations in this aspect. As [5] showed in their study of ten countries that together account for 86 per cent of the global aquaculture and 60 per cent of all fish production, capture fisheries are either 2-4 times larger than or about the similar size in 8 of the 10 countries considered in the study.

As far as the effect on world trade is concerned it is estimated that

there has been a loss to the tune of USD \$50 billion across global value chains with an estimated fall in trade as high as 30 per cent [37] With contraction in world trade expected to be worse than that of the global financial crisis of 2008, there has been subsequent downward revision of growth rates of countries including India. Indian exports in March, April and May 2020 were of the order of 528.45, 27.96 and 57.19 showcasing negative growth rates of 1.36, 36.65 and 33.66 percent respectively vis a vis 2019 implying the scale at which the pandemic has had an impact on Indian exports. The import too witnessed a negative growth to the tune of 6.33, 47.36 and 48.31 per for the same period. Overall, in 2020-21, India had exported 11,49,510 MT of seafood worth Rs 43,720.98 crore (\$5.957 billion) this meant that in 2020-21, the Indian seafood industry which had in 2019-20, exported 12,89,651 MT of seafood worth Rs 46,662.85 crore (US\$ 6.68 billion), showed decline of 6.31 per cent in rupee terms; 10.81 per cent in dollar value in 2020-21 and registered a contraction of 10.88 per cent in volume [38].

However, in a surprising turn of events, India shipped 13, 69, 264 MT of seafood worth Rs 57,586.48 crore (\$7.76 billion) during 2021-22. In rupee terms, the exports improved by 31.71%; in US dollar terms the increase was of the order of 30.26%, and in quantity by 19.12% from the previous year as per the latest figures of the MPEDA.

In order to completely understand the impact of covid on the seafood industry, there is the need to understand on what the scenario was prior to the pandemic. In this aspect, examining the work by [39-41], one can understand that there has been a consistent growth of the sector especially post 2000 and seafood export constitutes an important source of earning for developing countries such as Vietnam, Indonesia, Bangladesh in addition to India. Further features of the seafood industry are that of long and often informal sector dominated value chains, monopolistic power across certain actors in the value chain as well presence of middlemen. The informal nature of the seafood industry means that there has often been lack of access to credit, lack of protection to workers within the fisheries industry as well as lack of redistributive efforts to ensure equity along the value chain. These features also get amplified during an event such as the covid pandemic. For example, Mukherjee observe that there has been 'destabilization of India's basket of seafood exports' given the significance of the sector in employment and in order to avoid a global food crisis, it is therefore important to focus on the market potential especially domestically [42] all point towards the domestic markets acting as shock absorbers especially in the event of a sizable fish consuming population [42-44]. In India schemes such as Pradhan Mantri Matsya Sampada Yojana is a step in the right direction and can be leveraged to meet this endeavour.

Gender relations: The gender component- or rather the missing gender component- in fisheries has been highlighted in the literature over the decades specifically with respect to small scale fisheries [45-51]. The work of scholars in the global south deserves special mention in this regard [52-57]. However, it has become apparent with studies that focus on the value addition in the fisheries sector that the role of women is not restricted to processing alone as had been traditionally considered. By examining the role of women in fisheries during the covid 19 pandemic, what has been brought to the fore is the strength in having a gender diverse work force-particularly in the light of the adaptation and resilience showcased by women in fisheries by performing a variety of roles [58]. Thus, survival of fishing as an activity and fishing dependent households across the world but particularly in the global south is greatly dependent on women. Therefore, it is more important than ever that there be due recognition of work done by women. An important component towards recognising women's work

in fisheries has been structural in nature with the way that work itself is organized within fisheries i.e., informality within the sector. With the onslaught of the pandemic, there have been significant disruptions on work and working environments across all cross sections of the community around the world. In this regard, recognition of work being done at home is an important change and hopefully leads towards a better recognition of what constitutes work and workers as well as how essential the work performed by women is.

A. Political empowerment and decision making: While the focus of this review article is on the fisheries sector, there have certainly been important externalities of the developments in the political sector. Chief among these has been the stellar leadership displayed by women leaders across the world from Health Minister KK Shailaja in Kerala, India to New Zealand Prime Minister Jacinda Ardern. In this context, one can say that there has been a positive impact and a renewed confidence in the leadership displayed by women in fisheries as well. In Brazil for instance, Silva documents how the perception of covid as viewed by women was considered as more expansive and therefore under women's leadership, better and more expansive measures were considered and the systems and communities displayed better resilience [57]. This also corroborates with the findings on small scale fisheries and the role played by women in mitigating climate change as has been documented across the world [59-64]. Therefore, one can conclude that even though gender is embedded within each of the processes, there is a need to specifically mention women as a stakeholder in fisheries.

Externalities

Externalities refer to the indirect and often intended costs or benefits that accrue from an economic activity. Based on the impact these are termed positive externality if there has been an unintended/indirect benefit and negative externality if there has been an unintended/indirect cost. An example for positive externality would be the sights and smells from a garden in front of a household which is available for all passers-by to enjoy. The most common example of a negative externality is that of pollution which causes harm not just to those engaged in the activity but also to those in the surroundings. In the case of the pandemic, the review paper looked at unintended/indirect benefits as well as costs to the fisheries (Figure 2).

Positive externalities of the pandemic: building back better: Though much of the news is dire, there have been some positive

outcomes such as food sharing, the revival of local food networks, increases in local sales through direct marketing and deliveries, collective actions to safeguard rights, collaborations between communities and governments, and reduced fishing pressure in some places.

An important challenge over the course of the pandemic has been that of averting a global food crisis. As Oxfam warned in their 2020 report, we cannot be succumbing to a hunger pandemic in addition to the covid pandemic [65]. Even prior to the pandemic, the State of Food Security and Nutrition report [66], pointed towards nearly two billion people who were faced with food insecurity at moderate to severe level. Further, structural factors such an inequality has meant that the number of under nourished have been climbing, rising by 60 million over the period 2014-2019. In such a situation, the COVID-19 pandemic is undermining efforts to achieve SDG 2. In this context it is worthwhile to remember Amartya Sen's Hunger and Public Action to re-iterate the role of state in not just production but also in distribution of food grains. Further, in this endeavour, there is a role to be played by empowered communities and it is heartening to note that there has been an active role played by the communities in ensuring adequate food availability to vulnerable households in places such as Brazil especially among the small-scale fishers. The nutritional security afforded to the small-scale fisher households has been emphasised in the literature [67]. In addition this, food consumption behaviour has been documented moving towards more mindful eating [68, 69].

Value chain in the fishing: Food miles, food democracy and measures of sustainability: It has been extensively covered in the literature the exploitation along the supply chain of primary products such as food grains and the fish and the seafood industry in India is unfortunately not an exception [19, 41, 63, 70-73].

Constituting an elaborate network of intermediaries, a predominant share of the price spread between what is paid to fishermen and what is paid by consumers has been accruing to the middlemen. MOFPI report 2017 pointed out that such a condition leads to the situation of high prices as well as losses as high as 10 per cent in marine fisheries and 5 per cent in inland fisheries. Therefore, it is considered to be equitable and beneficial for both consumers as producer if there were internal capacity within firms to perform functions of the intermediaries. Rajeev and Nagendran point that there needs to adequate incentive for the firms to undertake the activities [74]. As policies linking farmers to processing units exist in the agriculture sector, there is all the more reason that one can ensure such policies being brought to the fisheries sector. In this regard, there have been positive developments along the fisheries supply chain—although not in the scale one would envision—due to the pandemic induced supply chain disruption. For example, the concept of food miles has been gaining momentum in Europe and United States with the countries setting intentions to measure how much the food has travelled from the farm to the plate. Bjorndal states that the concept of food miles has been adopted by the environmentally conscious communities [75]. As the world becomes a global village, extended supply chains have resulted in increasing accessibility of food and other products from any part of the world. While on the one hand, this meant that there is an expanded market for goods and services, it has in turn increased the food miles of goods including fish and fish products. Thus, producers have been banking on economies of scale, and been able to reap dividends in the form increased profits there has also been increase use of fossil fuel for transportation. In the wake of the pandemic, supply chains underwent severe and prolonged disruption resulting in the development of alternative food networks including seafood networks. This has subsequently been reflected in the conscious consumer's diets. With reliability and health consciousness,

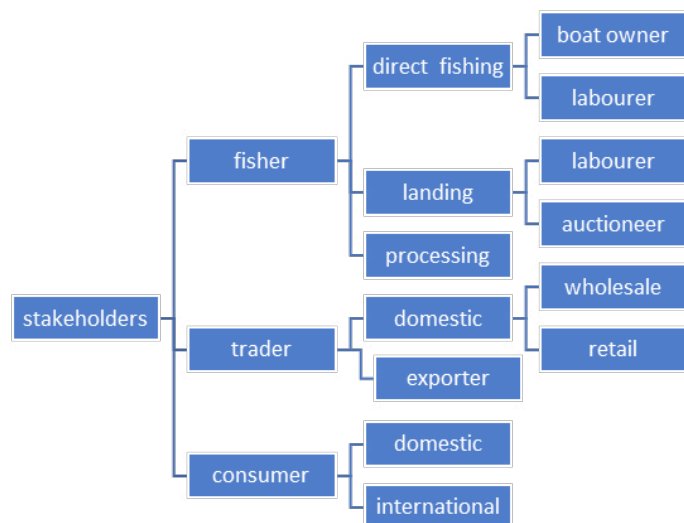


Figure 2: The chief stakeholders in the fisheries sector in India.

assuming importance, community supported fisheries and local catch network has gained traction. Therefore, one can conclude that there has been both supply and demand driven changes in the food value chains that has resulted in a more sustainable food.

As Petetin remarks, there is an opportunity to rethink food democracy and to integrate spirit of the concept into the local food supply chains [76]. By food democracy, Petetin refers to envisioning a model with active citizen participation in how one can construct food systems sustainably. Coined by Tim Lang in the 1990s, food democracy is "a framework that is aimed at building a transformative, alternative food system to empower citizens through choices and to allow them to find greater satisfaction in a food system that reflects shared values underpinning societies and that sells sustainable produce that people want" (2020:332-333). Food democracy therefore, is influenced by ideals of justice in production, distribution and consumption and importantly focuses on the broader citizenship aspect rather than on the consumer driven approach alone. In a world marked by inequality, it is important that we focus on aspects beyond the market i.e., define the end user as more than having the willingness and ability to pay.

Underpinning this idea are three features as remarked by 1) better food, 2) more information and choices, and 3) preference for local action and personal involvement [77]. One can ascertain that there has been sufficient interest in all three features in a post pandemic world [78-82]. Small family farms have been thriving in the pandemic period [76]. And solidarities have been seen across organisations such as the Nature Friendly Farming Network (NFFN) to help connect farms to households. Hopefully, a conceptualisation of our food systems in terms of social justice issues [83].

It is important to keep in mind that while innovation and technological advancements have traditionally been considered as the forte of the large firm (and farm), the small farms have always been hubs of innovations. This can be understood as more control over supply operations by small firms can translate into quickly adaptation and bringing the desired changes in the food supply chains. One also needs to pay attention to institutional support and policies that need to be in place before we arrive at a conclusion. In this regard, the 'farm to fork' policy that has been envisioned as part of the European Green New Deal holds promises in implementing a carbon neutral and efficient food system. In the fisheries sector there has been fisher driven development of technology in processing and marketing and this has been a welcome change. This is especially true of the small scale fisheries sector which has been characterised by strong collective action. Indeed, the recognition to fishing as an essential activity began with strong collective action and therefore there seems to a promising development as far as the sector is considered.

The halt in human activities led to the coining of the term anthropause whereby the notion of temporary stoppage of human interference in the environmental activities was believed to have contributed positively. One can term the pandemic period when people were not engaged in fishing as a fishing holiday. Reports of rejuvenated fish stocks and less harm to rare species were also available. Producers and traders realised greater price for the fish owing to the properties of freshness and increase in size. In certain cases, greater diversity of the fish caught was found.

Recognition of the informality/precariety of food sectors: As much as it is important to realise the material benefits of a fishing holiday owing to covid, the intangible but nevertheless valuable positive externality has been that of knowledge and a return to values. This

meant that greater attention was being paid to perishable food items which include fish and indigenous methods of less resource intensive and less resource extractive practices were being employed. Therefore, the recognition of the nature of the sector has been an important positive externality. One also posits the hope that this would result in the medium to long term on better fisheries resource management practices.

Better monitoring and enforcement of capture fisheries: An important requirement for better resource management practice has been the need for quality and disaggregated data at the macro and micro levels. This has been a missing component in the discussion of fishing stock depletion or rejuvenation and has been pointed by scientists before. In India we have the Marine Fisheries Census that provides a holistic picture of the fisheries sector including community profile in the marine fisheries sector in the country. It is time perhaps to maintain consolidated data base across states and regions so that resources as well as livelihoods are counted correctly keeping in mind the saying "What gets counted, counts" this would also in the future make for robust empirically sound policies for fisheries resource management and governance.

Fisheries and the role of state

Pradhan Mantri Matsya Sampada Yojana is a flagship program of the government of India intended to combine nutritional security of the population with the sustainability concerns in fisheries production. One could consider it as scheme that envisages consumption and production without compromising either. This is an important facet as India is a developing economy and needs to build a strong and healthy population as a human resource while maintaining the momentum of high growth. Even as the debates on the role of the state exist, there has been a consensus developed on what can be accepted as the relevance of the state [84]. In a covid ravaged world there is no doubt that there is a scale at which the recovery needs to take place and the roadmap to the recovery requires the scale and ambition of the state. In such a scenario, it is therefore important that there be policies and infrastructure in place—whether new or existing—in order for faster recovery as the pain inflicted on the most vulnerable needs to be taken care of without time lapses. The PMMSY showcases the skill and scale of the state in the right direction by focussing on the fish production, productivity, post-harvest infrastructure, management, technology, and value chain and fishers welfare. The scheme has an investment of Rs 20050 crores over a period of 5 years with the objective of increasing the share of fisheries to agricultural GVA to 9 per cent, generation of 55 lakh employment including harvest and post-harvest sectors, increase domestic consumption to 12 kg per capita from 5 kg per capita, export earnings of Rs 1, 00, 000 lakh crores and increase production to 22 million metric tonnes and double farmers and fisher income by 2024-25.

Fisheries and the small-scale fisheries sector

Small scale fisheries sector is important contributor of food security as well as nutritional security. Given the large number of people employed in SSF, it is important to focus specifically on the sector. Further, from an analytical point of view, it is important to consider SSF because it provides the framework to examine supply chain disruptions and measures to cope i.e., adaptation strategies interlinking social considerations—an often missing feature when one studies the literature on supply chain management as stated by Bassett [85]. Bassett et al in their study of SSF sector across 6 counties point out that Small scale sector can no longer be considered as an isolated part of the fisheries sector because macroeconomic shocks such as the

pandemic have re-iterated the fact that through multiplier effects or ripple effects the impact has been felt across all the actors. Arguing for a case study approach, they state the need to consider the unique characteristics of the Social Ecological Systems within which SSF is located. In Indonesia for example, commonly consumed species reported a price reduction of 20% and due to loss of employment, there was a fall in demand leading to a glut in the market. This was exacerbated by exports sector stagnation. But, consumer reliance on mobile fish merchants who were able to provide fish at credit did not witness the proportionate decline in demand. While many mobile traders themselves sought alternate employment, few were able to shift upwards in the value chain by setting up food stalls or even restaurants. The experience from Philippines showed that organisation was another important coping mechanism in the SSF.

The various adaptation and mitigation strategies relied on measures such as solitary fishing in Peru to strengthening hygienic and safe practices in countries such as Canada, US and Indonesia. Among livelihood strategies, diversification as opposed to single source of income emerges as an important coping mechanism [85]. This is significant in the face of severe structural issues such as stagnant production in fisheries, climate change, and depletion of fish stocks as well political pressure on government to remove fisheries subsidies in the wake of the recent WTO round of negotiations.

Proper dissemination of information was another important strategy to manage the uncertainties of covid. This included accurate and timely knowledge of restrictions in place in markets as well as knowledge about how the disease spread. The latter assumed particular importance as the initial unverified news on fish being a carrier of virus had devastating consequences for the sector.

Responding to the call of looking at fisheries food systems holistically by including the social relations in examining the features of the sector, Arthur examine the small scale fisheries from an equity perspective [86]. Viewed this way, they point at the food systems perspective that is relevant to examine issues of production, distribution and consumption alongside providing multiple entry points for policy interventions. Bennett point at the 'twin disasters' of reduced species accompanied by collapse of prices [87].

However, there has also been several important adaptation strategies adopted by the SSF like food sharing. As Bennett reports citing Ramirez 2020 small scale fishermen contributed 50-60 of tonnes of free fish to the local community investing not just their time and efforts but also putting themselves at risk during the pandemic in Oaxaca, Mexico. This has been echoed across several countries and in the context of Hawaii, where the small scale fishers contributed to local food banks. It should be kept in mind that this has happened in the context of the extreme vulnerabilities of the fisher communities themselves. This can also be seen in the context of the growing momentum across the world for local movements. Consumption of locally produced goods and services especially food is one of the basic tenets of a zero carbon economy. Market disruption as well as associated logistical difficulties has led to renewed commitments of partaking in locally grown and locally sourced food networks and this has had important positive impact on the small scale fishers' livelihoods. The reinforcement of the sector's contribution to providing food security to the people has been witnessed again, therefore recognition is long overdue. The SSF guidelines-The Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication provide the pathway to get this process started. There is also need for collective and collaborative actions from all stakeholders for effective

implementation of these guidelines. As we envision a carbon neutral future, it is important to capitalise on the traditional knowledge and indigenous methodologies and therefore the small scale fishers need to be considered as active agents of the climate activism rather than as passive victims.

Emphasising on the slogan "small in scale big in value" John Kurien writes about moving to incorporate the artisanal spirit in fishing. In this regard, he speaks of three important features 1) skill of body and mind; 2) judicious use of human and renewable energy; and 3) freedom of work and expression. Citing the calibrated response of using thermocol boats during covid in Kerala, India Kurien points to how the race to the bottom of the sea by using higher power engine irrespective of the stock of fish in the sea is a return to the values and knowledge that have been always part of the artisanal and small scale fisher communities [88]. While not the solution to the overfishing crises in Kerala or elsewhere in the world, one can certainly agree that this is the step in the right direction.

Conclusion

Over the course of the pandemic, there has been sustained interest in charting a growth pattern that overcomes the logic of the Kuznets curve i.e., increase in growth rates without worsening the levels of inequality. This has become the underlying focus of the paper in looking at the impact of covid across the fisheries sector. Understanding the differential impact of covid within the fisheries sector, the paper/chapter aimed to view the impacts on the sector across different key stakeholders. Important stakeholders were considered including Labourer, Consumer, Trader, Women and the role of state. The identification of the stakeholders also brings in the three important broad processes in fisheries—harvesting/landings, trade and consumption. Therefore, effort has been made to cover the literature that has focussed specifically on each of the stakeholder as well as the respective process. The impact of covid is aptly captured in the saying that "We are all facing the same storm, but we are not in the same boat" meaning that we need to be mindful of differential impacts of the pandemic and that when we embark on rebuilding the post pandemic world, we do so with equity and justice as cornerstones. In the review, the differential impacts are taken into account through the concept of externalities generated across processes and stakeholders. Externalities take into account not just the direct cost or benefit of an economic process but also the indirect cost or benefits. For example, in the process of harvesting/landings, changes in landings in terms of number, type of species would constitute the direct effect of covid while an increasing awareness on sustainable fishing would be the indirect benefit from covid pandemic. It has been noted that has been increasing awareness and concern expressed for re-thinking the concept of fishing holidays as well as embarking on a greener blue economy ensuring not only increase in landings but also catching using more sustainable measures. Therefore, there is a movement towards an artisanal value in fishing. This would constitute externality in production as far as fisheries is concerned and has important implications on future practices of fishing. Similarly, conscious consumption as opposed to conspicuous consumption has been documented by several studies across the world. Therefore, externalities—across harvest/landing, trade and consumption as important as the direct benefits and costs that been incurred by the people.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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