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DEMOGRAPHIC CHANGE IN ASIAN FISHING COMMUNITIES

Drivers, outcomes and potential impacts

DEMOGRAPHIC CHANGE IN ASIAN FISHING COMMUNITIES: DRIVERS, OUTCOMES AND POTENTIAL IMPACTS

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Preparation of this document

This publication presents past studies and recent work on demographic change in selected fishing communities in Asia, including the highlights of a regional consultative workshop on the subject. The regional consultative workshop, co-organized by the FAO Regional Office for Asia and the Pacific and the Network of Aquaculture Centres in Asia-Pacific (NACA), was held on 6 and 7 November 2019 in Bangkok, Thailand. The case studies on Cambodia and Thailand were prepared under a Letter of Agreement with NACA.

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Chapter 4. Demographic change in marine fishing communities in India

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Introduction

Marine fisheries productively engage a vast majority of coastal populations across the globe, a significant proportion of which are small-scale fisherfolk who inhabit the developing world (FAO, 2018). With a coastline of about 8 129 km along its western and eastern borders, India is home to nearly four million coastal dwellers, for whom marine fisheries is the mainstay of livelihood, food security and income (CMFRI, 2012). Marine fisheries in India have undergone a dramatic change over the past seven decades in terms of the scale of fishing, energy and capital intensiveness as well as the socio-economic and demographic characteristics of the fisherfolk. Much of the transformation was driven by the "blue revolution" initiatives of the Government of India after independence (in 1947), that involved industrialization of the fishing fleet, the introduction of efficient fishing gears, the establishment of marketing and processing infrastructure as well as an emphasis on export-driven growth (Kurien, 1978; Salagrama, 2004).

The southern states of Tamil Nadu and Kerala were the epicenter of such initiatives, where mechanized fishing was introduced through foreign assisted programmes such as the Indo-Norwegian Project (INP) (Ghosh, 1998). The technological breakthrough achieved through the rapid adoption of trawl fishing during the 1960s and 1970s soon percolated to other parts of the country during the ensuing period. Capital investments in mechanized fishing fleet development, processing infrastructure and allied activities followed, leading to the entry of large business establishments to the sector by the 1980s and afterwards (Kurien, 1985). However, a substantial majority of the beach-dwelling coastal fisherfolk continued to engage in less capital intensive, traditional, non-mechanized fishing activities leading to the emergence of various groups of technologically polarized, mutually competing fisher groups. These small-scale fishers however managed to survive the intense competition through a series of low capital-intensive innovations that included the introduction of new vessel designs (propelled by outboard motors), gear types (purse seines and ring seines), and fishing practices (Bavinck, 2011; Bavinck and Johnson, 2008).

A large number of measures to regulate fishing, mainly in the form of a seasonal trawl ban and spatial zoning (demarcating the waters for mechanized and motorized fishing) was introduced to bring order to the fishing scene. The Government of India also commissioned several scientific and regulatory institutions to guide policies related to marine fishing during this period. Almost in parallel, major programmes were launched to utilize the fishery resources in

the offshore and deep sea areas that focused on importing commercial deep sea fishing vessels and forging international collaborations for developing deep sea fishing expertise (DADF, 2014). These efforts paid off in the form of steady enhancements in marine fish landings at the rate of 3.1 percent per annum between 1960 and 2018.

In contrast, the Indian marine fisheries sector is also facing a number of unprecedented challenges in recent times. Numerous studies have shown evidence of decline of several commercially important fish stocks and their vulnerability to external factors (Mohamed *et al*., 2010; Kripa *et al*., 2018; Rohit *et al*., 2018; Dineshbabu *et al*., 2020), overcapacity, destructive fishing practices and competition among fisher-factions leading to frequent conflicts (Bavinck and Johnson, 2008), vulnerabilities in fisheries governance system (Vivekanandan *et al*., 2003; Parappurathu and Ramachandran, 2017), rigidities associated with the fish value chains (Sathiadhas and Narayanakumar, 1994; Bino, 2015), low financial inclusion and liquidity constraints (Parappurathu *et al*., 2019), occupational hazards and limited coverage of risks and uncertainties (Suresh *et al*., 2018; Parappurathu and Ramachandran, 2017), ocean pollution (Glasby and Roonwal, 1995; Vikas and Dwarakish, 2015), climate change and associated extreme weather events (Roxy *et al*., 2017), to cite some of the most significant.

The continuing developmental initiatives over the past seven decades in the realms of technology, policy and institutions, coupled with changes in resource structure and ecosystem health have nevertheless driven extensive transformations in the demographic and socio-economic profile of the country's coastal fisherfolk. Dominant narratives in this context include: (i) changes in population size and structure because of ageing and fertility rate changes; (ii) outflow of people towards the non-fishing sector because of the expansion of the non-farm sector; (iii) inflow of migrants from non-traditional sectors/regions to join the fishing and allied labour force; (iv) inter-generational occupational mobility; (iv) interactions within and between fishing communities and with the coastal environment; and (v) a variety of socio-economic dynamics leading to changes in the standard of living and the welfare of the fisherfolk. These assume significance as the future trajectory of growth of coastal fisheries and the welfare of the fisherfolk depend considerably on how well such demographic and social processes and their implications are understood and used to plan and manage fisheries for sustainable development. This chapter therefore, presents a brief overview of the fisheries sector in India, delves deeper into the demographic change happening in coastal fishing communities over the past few decades, identifies the underlying opportunities and threats, and suggests strategies to address emerging challenges.

Fisheries sector of India: a brief overview

India is endowed with a diverse set of marine and aquatic resources thereby enabling it to support a thriving fish economy. Fisheries in India are highly varied and include marine fisheries, coastal aquaculture, inland fisheries, freshwater aquaculture, mariculture, cold water fisheries and recreational fisheries. The sector contributed 1.10 percent of the total gross value added (GVA) of the country during the triennium ending (TE) 2017–2018 (Table 1). Of the total fish production, estimated at 12.59 million tonnes, 71 percent was contributed by the inland sector and the rest by the marine sector. GVA from the fisheries sector grew at an impressive rate of 8.54 percent per annum during recent years (2011–2012 to 2017–2018) particularly catalysed by the high performance of inland aquaculture. The sector also contributes substantially to foreign exchange earnings of the country, which was about USD 7 081 million in 2017–2018. Fish and fishery products accounted for about 2.5 percent of total exports and close to 20 percent of agricultural exports from India (GoI, 2019a).

Table 1. Key indicators of the fisheries economy of India

Particulars	India
Gross value added (GVA) in fishing and aquaculture, TE 2017–2018 (million USD at current prices)	23 729
Share of fishing and aquaculture in agriculture and allied sector GVA at current prices (%), TE 2017–2018	6.24
Share of fishing and aquaculture in GVA at current prices (%) TE 2017–2018	1.10
Trend growth rate in GVA from 2011–2012 to 2017–2018 at constant prices (%)	8.54
Total fish production, 2017–2018 (million tonnes)	12.59
Share of marine fish landings in total fish production (%)	29.3
Export of fish and fishery products, 2017–2018 (million tonnes)	1.38
Value of export of fish and fishery products, 2017–2018 (million USD)	7 081

Source: Computed by authors based on data from Government of India (2018).

Among the various segments within the fisheries sector, marine fisheries is particularly important for India as it provides livelihoods to a substantial number of coastal inhabitants, the majority of whom are resource poor with no alternative sources of income and employment. Presently, India is the sixth largest producer of marine capture fish in the world, with total landings estimated at 3.49 million tonnes in 2018 (FAO, 2018; CMFRI, 2019). There are three obvious subsectors in marine capture fisheries, viz., mechanized, motorized and non-motorized,[28] broadly classified based on the type of vessel propulsion, level of mechanization of fishing gears and their type and the resources targeted. The mechanized subsector that contributes to about 82 percent of total landings is the dominant one that employed about 33 percent of the 0.99 million (2010) active fishers and operates fishing crafts that mainly target resources such as cephalopods, Indian mackerel, ribbon fishes, penaeid prawns, *priacanthus* spp., threadfin breams and croakers. The motorized subsector engages the maximum number of active fishers (62 percent) who mainly operate ring-seiners, motorized purse-seiners and bag netters that contribute about 17 percent to the total catch that predominantly comprises sardines, tunas, anchovies and seer fishes. The non-motorized sector that largely defined marine fishing in India till the early 1990s (now a minority), presently contributes only about 1 percent of catch and engages about 5 percent of the marine fishing workforce (CMFRI, 2012).

Coastal fishing communities in India

Traditionally, marine fishing in India is carried out by members of particular fishing communities who reside along the coasts and are distinct from the mainstream agrarian communities. These communities are however not homogenous, but include a number of distinctive ethnic groups which differ from each other in terms of religious and caste affiliations, social and cultural practices followed, and governance structures adopted. Technological changes that swept through the fishing arena over the past few decades have resulted in further polarization of these communities in terms of ownership of fishing assets and access to different types of

[28] Mechanized vessels are those which use machine power both for propulsion and gear operation and include trawlers, gillnetters, *dol* netters, liners, purse seiners, etc. Motorized vessels are propelled by inboard or outboard motors, but gears are operated manually. They include ring seiners, fibre glass/plywood/plank built boats that use various types of fishing gears. Non-motorized vessels mostly include traditional canoes/catamarans that use manual labour for both propulsion and gear operation.

fishing techniques. Most of these ethnic groups have limited geographic presence, with each coastal state home to one or more of them. For instance, Pattinavars are the dominant fishing community who reside along the Coromandel coast of Northern Tamil Nadu and follow a strong traditional fishery governance system with a network of *ur panchayats* (village councils) that discharge an amalgam of village affairs including management of fisheries and resolution of disputes (Bavinck and Vivekanandan, 2017). In contrast, the fishing villages of the Kanyakumari region of Tamil Nadu are dominated by the Mukkuvars who are traditional seafarers and are believed to have migrated from the neighbouring island country, Sri Lanka (Samuel, 1998). The Thoothoor fishers famous for their distant-water shark fishing skills are predominantly Mukkuvars. On the west coast, Kolis and Kharwas form dominant seafaring communities with several subcaste groups within them. Whereas Kolis dominate the *dol* net (a type of bag net) fishing sector, the Kharwas mainly operate trawl units (Johnson, 2014). In the Lakshadweep group of islands where fishing is the main livelihood, almost everyone is a fisher, and hence the idea of a separate fishing community is irrelevant. An indicative list of the major fishing communities that inhabit the costal stretches of India is presented in Table 2.

Table 2. Major ethnic groups engaged in marine fishing in India

Coastal State/Union Territory	Major ethnic groups
Tamil Nadu	Pattinavar, Mukkuvar, Parava
Andhra Pradesh	Vadabalaji, Jalari, Pattapu, Palle
Odisha	Jalari, Vadabalaji, Kalibarta, Khandayat, Rajbhansi
West Bengal	Kaibarta
Gujarat, Daman & Diu, Dadra & Nagar Haveli	Kharwa, Koli, Macchiyara
Maharashtra	Koli, Dhiwar, Bhoi
Goa	Kharvi, Gabit
Karnataka	Mogaveera
Kerala	Mukkuvar, Dheevara, Anjootty, Pooislan

Source: ICSF (2020).

Socio-demographic profile of fisherfolk

India's coast spreads over nine coastal states and four union territories (UTs). The socio-demographic features of fisherfolk in these coastal regions are captured through the All India Marine Fisheries Census carried out by the Indian Council of Agricultural Research-Central Marine Fisheries Research Institute (ICAR-CMFRI) based at Kochi, Kerala, with funding support from the Department of Fisheries, Government of India. The first such comprehensive census was conducted during 1980, followed by subsequent rounds in 2005, 2010 and 2016.[29] The census covers a variety of information such as fisher population, size and structure at household level, their educational and socio-religious status, gender-wise occupation in fishing and allied activities, craft and gear in the fishery along with major infrastructure facilities in the fishing villages. The censuses, however, do not cover inland capture fisheries. As per the Marine

[29] Census of 1980 excluded the state of Maharashtra and the UTs of Lakshadweep and Andaman and Nicobar Islands. The subsequent two rounds included Maharashtra, but still did not cover the above two UTs. The Marine fisheries Census, 2016 covers all states and UTs, but the report is still awaiting its official release (estimates are provisional).

Fisheries Census, 2016, there were 3 477 fishing villages with a total of 893.3 thousand fisher families, of which 818.5 thousand (92 percent) were traditional fisher families[30] (Table 3). The total population of fisherfolk is estimated to be 3.77 million in 2016. Between 1980 and 2010, the fisherfolk population in India exhibited an increase of 111 percent, but thereafter declined by 5.6 percent over the six-year period from 2010 to 2016.[31] The recent dip in population is not just in absolute terms but also in terms of the relative share of the fisherfolk population in total as is evident from Table 3. It is indeed a matter that requires thorough probing and could have resulted from multiple factors such as decrease in fertility rate, urban migration, non-farm employment diversification and subsequent shift within the rural areas, and so on. Interestingly, the number of fish landing centres also declined from 1 511 to 1 265 over the latter period.

Table 3. Profile of fisher folk population and changes over time in India

Particulars	1980	2005	2010	2016
Fisher villages (no.)	2 123	3 202	3 288	3 477
Fish landing centres (no.)	1 438	1 332	1 511	1 265
Fisher households ('000)	333.0	756.2	864.5	893.3
Average family size (no.)	5.68	4.65	4.63	4.22
Traditional fisher households ('000)	NA	NA	789.7	818.5
Total fisherfolk population ('000)	1 892.9	3 519.1	3 999.2	3 774.6
Fisher folk population as a share of total (%)	0.27	0.31	0.32	0.28

Source: Marine Fisheries Census, 1980, 2005, 2010 and 2016.
Note: The figures for 2016 are provisional.

The state-wise profile of the fisher folk population in 2016 is provided in Table 4.

Although age is an important attribute that defines the demographic characteristics of a population, the Marine Fisheries Census of India does not cover this information. Therefore, no country-wide data is available on the age structure of active fishers in India to suggest whether the new generation in the fisher villages consider fishing as a desired livelihood option. India is presently experiencing a demographic dividend wherein its working-age population has numerically outstripped its non-working age population. Its population is among the youngest in the world with a median age of about 28 years. Estimates show that India's demographic dividend that commenced about 2005–2006 would last for close to five decades, which is a huge opportunity for the country (UNFPA, 2019). However, such a dividend does not seem to be favouring the marine fisheries sector as indicated by recent surveys conducted by ICAR-CMFRI.[32] Though not representative, these sporadic surveys point to an ageing workforce engaged in active fishing.

[30] Traditional fishers are those who hail from families that have been practicing fishing for several generations. They could be part of any of the three segments (mechanized/motorized/non-motorized) depending on the economic means at their disposal.
[31] These comparisons over time however overlook the differential coverage of states/UTs across census rounds.
[32] Socio-economic surveys conducted by ICAR-CMFRI during 2018–2019 in the fishing villages of India.

Table 4. Profile of marine fisherfolk population by coastal states, 2016

State	Length of coast (km)	Landing centres (No.)	Fishing villages (No.)	Fishermen families (No.)	Traditional fishermen families (No.)	Total fisherfolk population (No.)
West Bengal	158	49	171	81 067	56 447	368 816
Odisha	480	55	739	115 228	92 569	517 623
Andhra Pradesh	974	234	533	155 062	152 062	517 435
Tamil Nadu	1 076	349	575	201 855	196 784	795 708
Puduchery	45	22	39	14 347	14 328	50 270
Kerala	590	174	220	121 637	116 598	563 903
Karnataka	300	84	162	32 479	30 897	157 989
Goa	104	32	41	2 986	2 922	12 651
Maharashtra	720	155	526	87 717	80 906	364 899
Gujarat	1 600	103	280	67 610	64 395	354 992
Daman-Diu	21	8	12	3 163	3 094	15 836
Lakshadweep	–	–	10	4 163	3 003	27 934
Andaman & Nicobar	–	–	169	5 944	4 486	26 521
Total	6 068	1 265	3 477	893 258	818 491	3 774 577

Source: Marine Fisheries Census, 2016.
Note: The figures for 2016 are provisional.

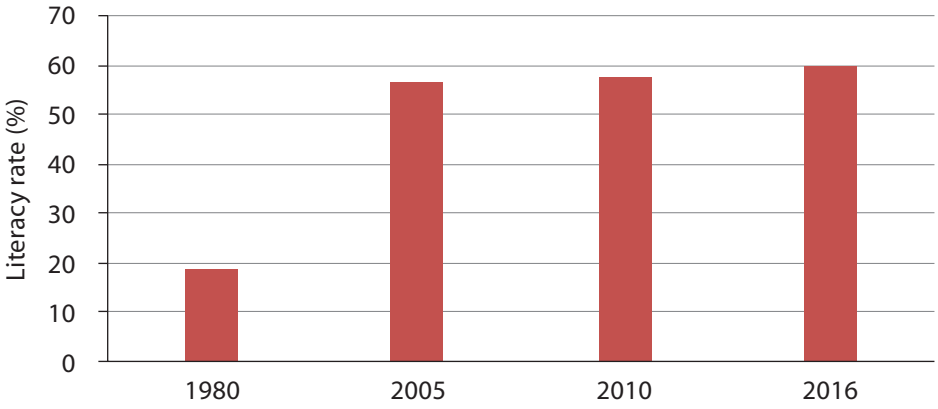
Table 5. Key socio-demographic attributes of fisherfolk population in India

Parameter	Fishing villages (2010)	All India (2011)
Average annual growth rate in population (%)	2.73	1.76
Average family size (no.)	4.63	4.91
Male literacy rate (%)	59.6	82.1
Female literacy rate (%)	55.8	65.5
Total literacy rate (%)	57.8	74.0
Percent of population below poverty line (%)[33]	61.0	29.5
Sex ratio[34]	928.0	943
Sex ratio among child population	944.0	914
Child population (%)	10.8	13.1

Source: Marine Fisheries Census, 2010; Rao *et al.*, 2016.

[33] As per the estimates of the 'Committee to Review the Methodology for Measurement of Poverty (2014)' chaired by C. Rangarajan.
[34] Sex ratio is defined as the number of female individuals per 1 000 numbers of male individuals.

A comparative assessment[35] of key socio-demographic attributes of the fisherfolk population with that of the general population indicates notable differences in terms of standard of living and other developmental indicators (Table 5). Out of all households enumerated in the year 2011, 29.5 percent were assessed to be falling below the poverty line. In comparison, 61 percent of fisher households were estimated to be poor in 2010, which is more than double the national average, and a clear indicator of the deplorable economic status of the fisherfolk in general. Excessive incidence of poverty in fishing communities could be the result of the predominance of smallholder fishers, fishing labourers and allied workers who get access only to a disproportionately lower share of the fishing pie because of the disparities existing in the sector in terms of scale and efficiency of operation. As is obvious from previous sections, about two-thirds of all fishers are employed in motorized and non-motorized segments which operate at much lower scales compared to their mechanized counterparts. Lack of alternative/ supplementary livelihood options because of a paucity of owned land and other assets, low credit worthiness, limited knowledge base, literacy and alternative skills and low institutional support, etc. are other major drivers of a high level of poverty among fishers. Moreover, lack of the habit of thrift, as is generally noticed, render these resource-poor fishers economically very insecure during lean seasons (Salagrama, 2006; Bene, Hersoug and Allison, 2010; Prathap, 2011). The literacy rate was another key indicator wherein fisherfolk fared less well compared to the general population. In 2011, the total literacy rate among the Indian population stood at 74 percent. In comparison, the overall literacy rate among fisherfolk was notably lower at 57.8 percent, with males (59.6 percent) marginally outperforming females (55.8 percent). The average size of fisher households in India was 4.63 in 2011, which is slightly lower than that of the general population (4.91). Sex ratio among fisherfolk was found to be skewed with 928 females for every 1 000 males, much more adverse than the all India estimate (943). Nevertheless, sex ratio among the child population within the fishing communities was found to be better (944) compared to that of all India (914).

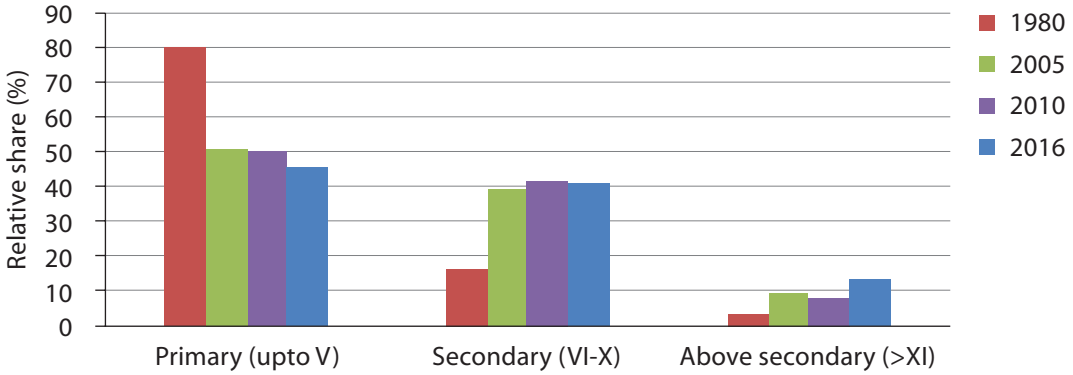


Source: Marine Fisheries Census, 1980, 2005, 2010 and 2016.
Note: The figures for 2016 are provisional.

Figure 1. Changes in literacy rate among fish folk in India over time

[35] The comparison is made based on the estimates from Marine Fisheries Census, 2010 and National Census, 2011 as these are the closest in time.

Notwithstanding this, it is indeed inspiring to note the improvements in literacy as well as educational attainments within the fishing community over the years. Literacy among fisherfolk in 1980 was as low as 18.6 percent and this gradually improved over time to reach 56.5 percent in 2005 and at 59.7 percent by 2016 (Figure 1). The educational attainments of fisherfolk also improved in tandem with the greater share of literates attaining higher educational qualifications in the later years (Figure 2). Evidently, 45.8 percent of the literates completed primary education, 41.1 percent completed secondary education and the rest (13.1 percent) qualified beyond secondary education by 2016.



Source: Marine Fisheries Census, 1980, 2005, 2010 and 2016.
Note: The figures for 2016 are provisional.

Figure 2. Changes in educational attainments of fisherfolk in India over time

Amenities in fishing villages

This section takes a peek at the availability of basic amenities in the fishing villages in India. The Marine Fisheries Census, 2016 shows that 69.7 percent of fisher families resided in *pucca* houses that are designed to be solid and permanent, which means that still close to 30 percent of families live in vulnerable dwellings (*kutcha*) close to the shores (Table 6). In this context, it is worth noting that only 15.1 percent of all houses in the country were *kutcha* according to the All India Census, 2011. However, the share of *pucca* houses increased by about seven percentage points between 2005 and 2016, indicating gradual progress. Nearly 94 percent of the houses have electricity and 37 percent have three or more rooms. Only 59 percent of

Table 6. Housing and other amenities in fishing villages, India, 2016

Particulars	Number	Share (%)
Pucca houses	622 182	69.7
Houses with 3 rooms or more	330 505	37.0
Electrified houses	837 996	93.8
Houses with toilet	529 702	59.3
Total number of households	893 258	100.0

Source: Marine Fisheries Census, 2016.
Note: The figures for 2016 are provisional.

houses had access to toilets indicating that over 40 percent of households depended on common facilities or open spaces for their basic sanitary and hygiene requirements. Tap water served as the source of potable water for over half (51.6 percent) of fisher households in 2016 and the rest depended on wells, hand pumps, bore wells and other sources (Table 7).

Table 7. Households' access to different sources of potable water in fishing villages, India, 2016

Particulars	Number of households	Share (%)
Tap water	460 578	51.6
Well	85 148	9.5
Hand pump	177 859	19.9
Bore well	177 859	19.9
Other sources	78 755	8.8
Total number of households	893 258	100.0

Source: Marine Fisheries Census, 2016.
Note: The figures for 2016 are provisional.

Occupational profile

Out of the total fisherfolk population of 3.77 million in India, over 1.53 million were employed, mainly in capture fisheries, coastal aquaculture and allied activities in 2016 (Table 8). A visible decline in the number of people occupied in most of the above activities was noticed in 2016 over 2010. The majority of the occupationally active fisherfolk (60.7 percent in 2016) were engaged in fishing and fish seed collection. Whereas 13.8 percent of the occupied fishers were involved in marketing of fish, about 7.6 percent of them had livelihoods based on fishing and allied labour. A variety of other activities such as making and repairing of nets, post-harvest processing and peeling provided employment to the rest of the working fisherfolk. It is worth noting that only about 5.2 percent of active fisherfolk residing in the fishing villages were occupied in non-fishing and allied activities in 2016. Apart from these, recent estimates of CMFRI suggests that about seventy thousand coastal dwellers are presently engaged in various types of mariculture activities such as mussel and oyster culture, cage farming of fish, seaweed culture, marine ornamental fish culture and other auxiliary enterprises.

As in most other fisheries, only men are engaged in active fishing in India. This is because a woman engaging in active fishing is considered taboo among all fishing communities in the country. However, women constitute the major workforce in several of the allied activities such as fish seed collection (58.2 percent), marketing (86.4 percent), making and repairing of nets (52.2 percent), and post-harvest operations such as curing (90.3 percent) and peeling (94.6 percent) (Table 9). Even among labourers who engage in manual operations such as sorting, grading, weighing, loading and other logistic activities, women formed a majority (53.7 percent). Overall, nearly three-fourths of the total workforce in the sector is constituted by women who in terms of number dominate all activities except active fishing. Further, a combined assessment based on Tables 8 and 9 suggests the increasing feminization of the sector, wherein employment in peeling and other activities, which are dominated by women, have increased between 2010 and 2016.

Table 8. Occupational profile of marine fisherfolk population in India

Activity	2016		2010	
	Number	Share (%)	Number	Share (%)
Fishing and fish seed collection	927 081	60.7	990 083	59.5
Marketing of fish	210 237	13.8	223 306	13.4
Making/repairing of nets	54 663	3.6	86 704	5.2
Curing/processing	48 292	3.2	53 467	3.2
Peeling	46 158	3.0	31 699	1.9
Labourer	116 481	7.6	199 146	12.0
Other activities in fishing and allied sector	45 914	3.0	17 374	1.0
Non-fishing and allied	79 583	5.2	63 563	3.8
Total occupied	1 528 409	100.0	1 665 342	100.0

Source: Marine Fisheries Census, 2010 and 2016.
Note: The figures for 2016 are provisional.

Table 9. Gender-wise occupational profile of marine fisherfolk in India, 2016

Activity	Number		Share (%)	
	Male	Female	Male	Female
Fishing	902 447	0	100.0	0.0
Fish seed collection	10 298	14 336	41.8	58.2
Marketing of fish	28 551	181 686	13.6	86.4
Making/repairing nets	26 135	28 528	47.8	52.2
Curing/ processing	4 669	43 623	9.7	90.3
Peeling	2 514	43 643	5.4	94.6
Labourer	53 971	62 512	46.3	53.7
Others	19 726	26 187	43.0	57.0
Total	135 566	386 179	26.0	74.0

Source: Marine Fisheries Census, 2016; Note: "other than fishing" category is omitted.
Note: The figures for 2016 are provisional.

Fishing crafts in the fishery

The total number of fishing crafts in the fishery exhibited a steady increasing trend between 1980 and 2010 before showing the opposite in the subsequent years registering a 15 percent drop between 2010 and 2016 (Table 10). The decline in the total number of crafts seems consistent with the overall decline in the fisherfolk population and the number of fishers as well as a drop in the number of landing centres over the same period. This could be considered an indication of people migrating to urban areas or other parts of the rural-urban continuum in search of better opportunities in non-fishing/non-farm sectors but needs further analysis at the grassroots level to be more certain. There also have been considerable changes over time in the composition of fishing crafts. The most notable one is an overwhelming shift from the non-motorized segment to motorized and mechanized segments, which is quite obvious and

steady over time. However, the general pattern of an overall increase in the number of fishing crafts and a shift from non-motorized to motorized and mechanized crafts does not apply after 2010 as is indicated by the relative composition of crafts in 2016. One of the quite obvious observations is a shift away from mechanized fishing during the past decade which could be attributed to a host of reasons such as concerns regarding economic viability, resource decline, and so on, which again necessitates detailed inquiries.

Table 10. Fishing crafts in marine capture fishery in India: 1980 to 2016

Type of crafts	1980	2005	2010	2016
Mechanized	9 289	35 806	72 559	42 656
Motorized	134 741	52 971	71 313	95 957
Non-motorized		96 661	50 618	25 689
Total	144 030	185 438	194 490	164 302

Source: Marine Fisheries Census, 1980, 2005, 2010 and 2016.
Notes: The 1980 census does not provide separate estimates for motorized and non-motorized categories of fishing crafts. The figures for 2016 are provisional.

Fishery related infrastructure

The fish landing facilities in India presently include seven major fishing harbours (two in West Bengal and one each in Odisha, Andhra Pradesh, Tamil Nadu, Kerala and Maharashtra), 52 commissioned minor fishing harbours and 181 commissioned fish landing centres. Other than these, there are over 1 000 beach landing centres that mainly cater to the needs of artisanal fishermen. Except for the large fishing harbours, landing centres along the coastal belt in general have a dearth of modern facilities such as safe mooring areas, provision for utilities (water, fuel and workshops), fish handling infrastructure (ice supply, cold storage, sorting areas, processing facilities) marketing infrastructure and associated connectivity (GoI, 2019b). The fishing villages house a variety of fishery related infrastructure apart from fishing harbours and minor fish landing centres. These include ice factories, curing and drying yards, freezing plants, peeling sheds, processing units, fishmeal plants and oil extraction units. The majority of the post-harvest infrastructure is concentrated in certain coastal cities such as Kochi, Mumbai, Mangalore, Chennai, Tuticorin, Paradeep, Vishakhaptanam and Veraval, which have specialized over the years as major processing and exporting hubs. During recent times, the food processing industries have been stepping-up their investments to comply with mandatory food safety and quality requirements of high-end markets by placing emphasis on traceability and product certification.

India is one of the leading exporters of marine fish and fish products globally. Out of the total seafood exports, which is pegged at 1.38 million tonnes and valued at USD 7 081 million in 2017–2018, about 70 percent in terms of quantity and 44 percent in terms of value are contributed by marine capture fish. This translates to about 0.96 million tonnes in quantity and USD 3 115 million in value (MPEDA, 2019). However, it is worth noting that about 90 percent of all exports are either in live, fresh, chilled or frozen forms. This indicates that only about ten percent of seafood exports are in higher order value added forms. Because of this, the unit values realized on exported products are much lower, and many times lower than prices realized in domestic markets (Salim, Safina and Athira, 2015). The government presently

emphasizes augmenting processing capacity of export processing units towards tertiary processing (ready to eat products, heat and serve products, re-heated airline meals, canned/tinned products, etc.) that match the requirements of importers in high-value markets.

Labour mobility in fishing communities

Labour mobility has been a major driver of demographic change within fishing communities in India. In the marine fisheries sector, it is varied in nature and needs to be understood based on the broad concepts of spatial and occupational mobility. Spatial mobility is manifested in the forms of commuting, circulation and migration characterized by fishers moving to other places for employment, such categories based on the duration and type of movement. Occupational mobility could be intergenerational, intrasectoral or intersectoral and involves mobility from one type of activity to another driven by better income prospects, changes in technology, or other attractions (Rajan, 2004). A thorough understanding on the entire gamut of labour mobility in India's marine fisheries sector is possible only through a comprehensive and systematic assessment and is not attempted here. Instead, the dominant forms of spatial and occupational mobility prevalent in India's coastal belt are discussed based on the findings from recent studies.

One of the most notable cases of seasonal interstate migration of labour is one observed along the northwestern coast in the State of Gujarat, for over the past two to three decades. The majority of these migrant fishers hail from the coastal districts of Vizianagaram, Srikakulam and Vishakhapatnam of Andhra Pradesh State, and migrate to the Veraval town of Gujarat district, one of the largest fishing hubs in India. They are hired by Gujarati vessel owners on annual contracts and payments are generally made in lump sum before commencement of the work. Most of them work in the trawlers as deck hands and skippers for about eight months in a year and return to their hometowns by the end of the fishing season, only to return in the next season. Poverty, lack of employment opportunities at home and guaranteed payments from the employers at Gujarat are the main drivers of such migration, which is of great significance for the Gujarat fisheries economy at present (Roshan, 2017). The state of Kerala has been another major destination for migrant fishers from eastern states such as West Bengal, Bihar, Andhra Pradesh, Odisha and Assam over the past two decades. Driven by conspicuously higher wage rates in Kerala, such seasonal migration has caused a significant amount of substitution of local fishing labour in the mechanized trawl sector by the migrant labour. The migrants mostly hail from coastal areas such as Sunderbans, Puri, Korda, Cuttack, Baleswar, Srikakulam and Vizhianagaram. However, there have been several cases of men migrating from the interior villages of West Bengal and Assam with no prior fishing experience. Most of them shift from low-paying farm jobs in search of better alternatives in other sector such as fishing (Peter and Narendran, 2017).

Bavinck (2011) throws light on a similar demographic transformation, attributable mainly to immigration, that is underway along the Palk Bay and Gulf of Mannar coasts of Tamil Nadu wherein, significant numbers of non-fisher people have joined the trawl fishing workforce inspired by the economic prosperity achieved by the fisherfolk of this region in recent times. The Paradeep fishing harbour on the Odisha coast is another preferred destination for migrants from Bihar, West Bengal and Assam because of the employment opportunities offered by a large fishing fleet operating from there. Similarly, fishers from Kanyakumari and Ramanathapuram districts of Tamil Nadu work in large numbers in the trawlers, gillnetters, long liners and ring seiners operating from the major landing centres in Kerala. However, these men

are not strictly migrants as they return quite frequently to their hometowns after coming back from long fishing trips in the offshore waters (Rajan, 2004). Over time, many of them have become business partners with local fishermen thus enhancing their economic stakes and involvement in the occupation.

Apart from fishing, migrant workers, many of them women, are also employed in the primary and secondary processing units along India's coast. For instance, the fish processing units in Veraval, Porbunder, Mumbai, Mangalore, Vishakhapatnam, Kollam and Kochi employ a considerable number of female migrants from almost all parts of the country who assist in pre-processing and processing activities. The majority of the women workers are drawn from Kerala because of their specialized skills, although women from Tamil Nadu, Andhra Pradesh, and Karnataka have also found employment in this segment (Jeyanthi *et al*., 2015; Warrier, 2001; Nishchith, 2000). Some of them find work in other allied sectors in the value chain as well (Sathiadhas and Prathap, 2009).

The above account mostly presents migration to the coasts from other regions and from other sectors. In parallel, there has been considerable movement of labour taking place away from the coasts as well, as is obvious from the discussion in the previous sections. Systematic studies that analyse the patterns and determinants of such occupational mobility are however scarce. Though most of such mobility is limited to within the country, as Sathiadhas and Prathap (2009) point out, numerous coastal fishers from Tamil Nadu migrate to overseas destinations, which include the coasts of Qatar, Saudi Arabia, United Arab Emirates and other Near Eastern and Caribbean nations mostly to work in the fishing vessels there. The trend is however not restricted among Tamil Nadu fishers alone, but prevalent along the coast, though not much is written about it. Certainly, more detailed studies are needed to fill the information vacuum on this topic.

Conclusions and policy implications

This chapter is primarily focused on understanding the nature of demographic transformation taking place in the coastal fishing communities in India over the past four decades. Broad patterns of change with respect to key socio-demographic parameters such as the size and structure of population residing in the marine fishing villages, number of fisher households, average family size, poverty status, sex ratio and literacy rate are analysed based on four rounds of the marine fisheries census. Furthermore, other auxiliary details such as the availability of basic amenities in the fishing villages, trends in occupational profile of fishers, gender-wise variations therein, changes in the number of fishing crafts and other fishery related infrastructure are assessed in detail. The predominant pattern of labour mobility, which is a key driver of demographic changes as well as socio-economic transformation within the fishing communities, is discussed based on evidence from recent studies.

The exercise yielded some noteworthy inferences and pointers, which could be useful in charting out the future development priorities for the target population. The major ones include: (i) a steady increase in coastal fisherfolk population over the period 1980 to 2010 followed by a sharp dip during the subsequent period until 2016, not just in absolute terms, but also as a share in total – this might be indicative more of an outflow of people from the coastal belt to urban areas and other parts of the rural countryside rather than an abrupt change in the vital parameters of the population; (ii) an observed decline in the number of fishing crafts and fish landing centres that further underscores an outward movement of labour force away

from the coasts; (iii) markedly lower economic status of fisherfolk compared with that of the general population as indicated by a near double poverty rate within the fishing community compared to the all India level in 2010/2011; (iv) that the fisherfolk are socially less empowered with a strikingly low literacy rate and adverse sex ratio compared to the rest of India; (v) on a positive note, however, visible progress in the state of fisherfolk can be seen over time as evidenced by improvements in literacy and access to housing and other amenities; (vi) greater participation of women in all fishing and allied activities, except in active fishing; (vii) overall trend of motorization and mechanization of fishing crafts over time, which however is somewhat offset by an abrupt decline in the number of mechanized fishing vessels post-2010; and (viii) continuing labour mobility within and across sectors and regions bringing about significant changes in the composition of the labour force engaged in fishing.

The above inferences are self-explanatory in outlining the need for placing a particular emphasis on and giving priority to designing programmes for catalysing growth and development in the coastal fishing economy in India. This is particularly true because the fishing communities are far more vulnerable to loss of livelihoods and habitat destruction given the deepening resource crisis in the coastal waters and incidence of frequent extreme weather events that hit the country's coasts on a recurrent basis. As is obvious from the nature of problems the community is presently grappling with, the solutions need to be comprehensive and all-encompassing with a specificity that matches local realities. The interventions should not only be multipronged, but also based on the broad pillars of sustainability, resource efficiency, gender-sensitivity, social justice, social security as well as good governance with community participation.

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