

Mangalore, Karnataka's Fisheries Coast

V. Basil Hans¹, Manjula Mallya M.^{2*}

Abstract

Mangalore, a major port city on India's southwest coast, is known as the Fisheries Coast of Karnataka due to its thriving marine business and historic fishing legacy. Mangalore's history, economy, and culture are tied to the fishing industry, making it a regional hub for fish landing, processing, and export. The city's Arabian Sea shoreline supports a large fisherfolk community and vital infrastructure, such as the Mangalore Fishing Harbor, ice plants, cold storages, and fish processing units sustainable fishing practices, the impacts of climate change, ongoing modernization, and various government initiatives, aimed at conserving marine biodiversity and uplifting coastal communities are all key areas of focus in today's fisheries sector. In this context, Mangalore stands out as a vital center for fisheries in Karnataka, thanks to its strategic coastal location, rich marine resources, and deep-rooted maritime heritage. The region not only contributes significantly to the state's seafood production but also plays an important role in the livelihoods of local fishing communities, making it a cornerstone of Karnataka's blue economy.

Keywords: Fisheries, Mangalore, Karnataka coast, marine economy, fishing industry, sustainable fishing

INTRODUCTION TO MANGALORE

Mangalore has a lengthy fishing history due to its closeness to the Arabian Sea. The administrative capital of South Kanara (now Dakshina Kannada) district is Mangalore (12°54' LN, 74°49' LE) on India's west coast. Mangalore is a significant seaport and commercial and industrial hub 375 kilometers south of Bangalore and 340 km north of Trivandrum. Mangalore City covers 170 sq km, but the district covers 10950 sq km southwest of the district is Mangalore. From the west coast to the east Western Ghats, it increases. The Western Coastal Plains and Western Ghats have diverse climates. Mangalore fish differ from Western Ghats fish.

Netravathi widens into a natural harbor in Mangalore as it rushes into the sea. Mangalore has a 30-km coast. This coastline has multiple creeks and two sheltered bays, Kadri and Panambur, near the Netravathi River mouth. Bay of Bengal is opposite Peninsula India. The Gulf of Kutch to Kanyakumari, where the Arabian Sea and Indian Ocean meet, is India's western coastline. Sea channels created around this time allowed international travel. Mangalore to the West Coast of India was connected by sea. Thus, Mangalore became a major West Coast harbor.

***Author for Correspondence**
Manjula Mallya M.
E-mail: vhans2011@gmail.com

¹Research Professor, Department of Humanities and Social Science, Srinivas University, Mangalore, Karnataka, India
²Head, Department of Economics, Govt College for Women, Balmatta, Mangalore, Karnataka, India

Received Date: July 31, 2025
Accepted Date: August 05, 2025
Published Date: September 03, 2025

Citation: V. Basil Hans, Manjula Mallya M. Mangalore, Karnataka's Fisheries Coast. International Journal of Marine Life. 2025; 2(2): 21–31p.

GEOGRAPHICAL OVERVIEW

The 309 km Karnataka coastline contains three fisheries districts: Dakshina Kannada, Udupi, and Uttara Kannada. Rivers and streams help freshwater and brackish water reservoir fishes and diadromous species migrate. The Thambe, Shambhavi, Varahi, Aghanashini, Gangavali, and Kali rivers are notable backwaters from south to north. In Dakshina Kannada and Udupi, Thumbe, Nandini, Sita, and Chakra rivers wind through coastal estuaries. Uttara Kannada's Kali River estuary is enormous.

The “Konkan coast” or “West coast”, which runs from the mid Sahyadri mountains to the sea, includes Karnataka's shore. The three Karnataka fishery districts are called “Karavali”. Karnataka's fisheries capital is Dakshina Kannada's coast, where Mangalore is located.

HISTORICAL BACKGROUND

Mangalore is on Karnataka's Arabian Sea coast. Netravati and Gurpur rivers, which run into the Arabian Sea, formed it. The capital of Dakshina Kannada, Mangalore, is a major port city in Karnataka. The city has almost 43 centuries of history. Mangalore was originally mentioned in the Sanskrit-Kannada Talagunda inscription. The city was called Kudla in antiquity.

Mangalore was Mangalapura under the Kadambas. Mangaladevi (the city temple) and Mangalore inspired by the name Mangaluru. The Kadambas and Alupas ruled the region. The region was part of Tulunadu before 1345. Vijayanagara Empire ports, like Mangaluru, flourished in the 14th century. Cultural riches attracted foreigners.

MANGALORE FISHERIES IMPORTANCE

Fisheries are vital to Mangalore's economy. Migrants from other parts of Karnataka, Kerala, and the Confederation of Indian Industry value the traditional (small-scale) fishing sector, which shapes the local economy by employing many people in boat building, fuel production, ice production, and fish supply to local and regional markets. The Western Ghats, Arabian Sea, and lagoon water offer several fish species for diversification. Cultural characteristics of the fishing business revolve around fishermen's lives.

Mangalore's maritime history begins in the 15th and 16th centuries under Vijayanagar's King Sri Krishnadevaraya, when commerce ships sailed to the Red Sea, Europe, and Africa. Major marine and freshwater fisheries sustain export trade and local uses in the area. The 150-km coast is 65% rocky and 35% sandy. The area has 7 estuaries and a lagoon. The 30 km coast from Mangalore to Talapady is reserved for marine and estuarine fishing.

Mangalore's large diversity of fishes supports its classification as Karnataka's fisheries coast. The Sitanadi, Netravati, Gurpur, and Thana rivers, which originate from the Western Ghats and flow into the Arabian Sea at various locations, make the shoreline ideal for fish spawning. Local markets receive freshwater fish in addition to large-scale production and export. Mangalore fish exports totaled Rs. 2349.95 crore in 2008–09. The fishing sector contributes 90% of the region's export trade and provides jobs for many [1].

FISHERY TYPES

India has coastal, inland, brackish water, aquaculture, and decorative fisheries.

Marine Fishing

Many Indian coastal residents depend on marine fishing. India has 8,118 kilometer coastline, including the Andaman and Nicobar and Lakshadweep Islands, and a 3,30,000 square-kilometer continental shelf. The fishing-allowed Exclusive Economic Zone of India covers 2.02 million squares kilometers. Gujarat (23.57%), Kerala (11.69%), Maharashtra (10.81%), Tamil Nadu (10.67%), and West Bengal (8.33%) fish, mostly. The 2016–17 marine fish landing was 3.63 million tons and worth Rs 52,873 crore, down 5.29% from the previous year. Of the total fish caught, 89.54% are finfish, 9.93% shellfish, and 0.44% are other kinds. In 2017–18, sea fish production was 3.65 million tons (mmt), while inland capture fisheries contributed 4.13 mmt. About 1,700 marine fishing communities with 3 million people exist along India's coast, and 0.88 million traditional fishermen fish [2].

Maritime Fisheries

Indian marine fishing resources in the Exclusive Economic Zone (EEZ) are estimated at 4.38 million tons (t) [1]. Mangalore is on the West Coast of India, bordering the Arabian Sea [3]. The Southwest

Coast of India anchovy fishery is seasonal and variable [4]. The Department of Fisheries, Government of Karnataka, enforces territorial water fishing restrictions.

Freshwater Fishing

Freshwater fishes in India are steady, with 253 species in 42 families – 21 of which are introduced species. Endangered, vulnerable, near threatened, and least concerned species are included. Brackish water has 58 fish and 11 crabs, whereas freshwater has 15 and 3. The Navy is always available for crises, cooperating with other agencies. They usually participate in or manage pilots and exercises. Development, human activity, fishery collapses, and a major international conflict are making the ocean increasingly sensitive, susceptible, and hazardous.

FISHING TECHNIQUES

Mangalore, on the Arabian Sea, is known for its fisheries. Here, diverse fishing methods utilize inshore and offshore pelagic and demersal resources [2]. Fish are harvested from nearby rivers, estuaries, and backwaters, while brackish water shrimp aquaculture farms boost shrimp and fish production. Fish, margarita, prawns and other seafood are prepared with skill, accompanied by large investments in tuna packing and canning. Mangalore drives the state's fishing economy with its dazzling fishery industry.

Mangalore fishermen choose mechanized and motorized sectors over traditional ones. The Mangalore coast's boats are called "panam," "pallam," and "paad." The mechanized sector uses "panam," while the motorized sector uses "pallam" and "paad," which are 12–30 feet long and can fish deep seas. Traditional fishermen use "paad".

One diesel engine, six-cylinder or eight-cylinder, produces 410 or 520 horsepower in mechanized boats. Fishing nets vary by operation: offshore and deep sea fishing uses shrimp trawls, ring-seals and purse seines; mechanized and motorized sectors use single and double day trawls, drift net, stake net and shore seine; and traditional sector uses gill net, cum cast net, cast net, stake net and hook and line. Bagnets, cast nets, scoop nets, hooks, and lines are used year-round in riverine and backwater fishing.

Traditional Ways

Years of experience have shaped coastal fishing methods worldwide. The designs and techniques of these methods show local people's cultural and social customs, environmental knowledge like target species behavior, fishing resource availability, socio-economic factors and history, age, skills, technology, and economy.

Gobiidae mudskippers, which have two sets of pectoral fins for crawling on mudflats, are prevalent in sandy coastal mudflats, especially near mangroves. Mudskippers indicate fruitful mudflats in coastal lagoon fish biodiversity and abundance studies. The family Gobiidae has 31 genera and 104 species, while Periophthalmus has 19 species and accounts for 20.18 percent of the regional fish harvest. Marine and estuary fishermen utilize burrows, stick traps, and nylon-net trawls to catch mudskippers. Commonly used is the nylon net method. Five of the nine Indian mudskipper species are located along the Gujarat coast, while two are found on the sandy mudflats of Nada and Gandhar, making seven species in the Gulf of Khambhat. Netting, angling, spearing, rock striking, hammering, dynamiting, electro-fishing, poisoning, and other methods are also used, but explosives and poison are discouraged because they destroy breeding grounds and kill non-target marine species.

Modern Methods

Modern Mangalorean fishing methods use gillnets in specific fishing sites to be sustainable. Trawl measures include net twine size to reduce bycatch and comprehensive manual sorting of catch on deck to reduce discards. Unwanted catch is released alive after capture. In the 2018 pre-monsoon fishing survey, trawl landings were virtually entirely prawns, useful for local consumption and export [5].

Mangalore's mechanized boats, Karnataka's main fishing vessels, including shoonya, beton, kodi, and silver macks. About 300 to 400 mechanized boats operate from Mangalore and nearby landing locations. The Central Marine Fisheries Research Institute and the Karnataka University Marine Experimental Station have improved local machinery, gear, and storage methods by studying fish shoals, plankton population, and spawning ground buildup [6].

KEY FISHES

The east coast of India is largely along the continental shelf due to silt deposition from the Himalayan rivers, whereas the west coast is on the continental shelf and slope. Short-range and multi-gear fishing dominates the east coast, whereas multi-day fishing dominates the west coast. The EEZ covers 60% of the continental shelf [7].

Live bait gathering is crucial to Indian maritime fisheries. Live bait works well for tuna fishing due to its natural behavior. India uses *Sardinella*, *Harpodon*, *Engraulis*, *Stolephorus*, and *Scromberos* live bait.

Commercial Species

Shrimp are important commercial species of Mangalore. India's shallow waters are full of commercially significant penaeid shrimps. The edible penaeid shrimps are one of India's most valuable fisheries, contributing 5–6% to overall fish production. India landed 209,513 tons of penaeid shrimps from inshore and deep-sea seas in 2017 [8].

More than 70 penaeid prawn species have been found in India. The main genera are *Metapenaeus*, *Penaeus*, and *Parapenaeopsis*. *Metapenaeus dobsoni*, *monoceros*, *monodon*, *indicus*, *merguiensis*, *semisulcatus*, *brevicornis*, *stylifera*, *penicillatus*, and *sculptilis* are common commercial fisheries species. Penaeid shrimps live up to 150 m deep.

Life History

Indian penaeid shrimp burrow or travel. *Penaeus indicus* wanders and spawns at 7–30 m near the nursery grounds. Nocturnal *P. monodon* burrows beneath the ground during the day and emerges at night to find food. The demersal eggs hatch into planktonic nauplii, which undergo protozoa and mysis before becoming post-larvae. These planktonic stages become benthic after reaching PL6 via tidal currents. Some species, including *P. stylifera*, migrate from coastal to deep waters seasonally.

Endangered Species

Various species that prefer low-lying saline zones or coasts with residual clay, silt, and tidal deposits live in mangroves. Several species using mangrove settings, such as the Nilgiri Teak (*Mesua ferrea*), Kākā (*Guarouba guarouba*), Zosterops (*Zosterops palpebrosus*), Night Heron (*Nycticorax nycticorax*), and Estuarine Crocodile (*Crocodylus porosus*), are endangered or on the brink of extinction [9].

FISHERIES' ECONOMIC IMPACT

Capture fisheries produce 128 million tons of fish and 300 billion USD yearly, providing protein for 400 million people within 200 km of the coast. Globally, 169 million hectares of coastal wetland are lost every 15 years, reducing fishery production. Sustainable fishing requires land-ocean integration. Microbial organisms transport methylmercury in Arctic Ocean pelagic habitats, with fish species following trophic restrictions in other oceanic ecosystems. Subsistence fishing is a primary exposure pathway for Arctic human populations. Fishing employs 120 million people in India and accounts for 1.07% of GDP, alongside food and agriculture at 14.41%.

MANAGEMENT OF FISHERIES

Fisheries contribute to India's socioeconomic development. Government efforts have improved fishing technologies and facilities to boost production. Community-based management systems regulation of fisheries access is essential alongside effort and input-based regulation. Padu systems in

Kerala and Tamil Nadu, the Kadakodi system in northern Kerala, and traditional panchayat systems along Tamil Nadu's Coromandel coast are examples of similar systems in India. Detailed assessments of these arrangements show effective community control over access rights and prohibitions on harmful activities. Community-based fisheries management (CBFM) frameworks are essential for sustainable local fisheries resource use and participatory management [10].

Panchayats and traditional entities, like the Kadakkodi, help implement co-management ideas. Reactivating these governance mechanisms can improve inclusive resource management by facilitating community involvement. The Kadakkodi institution, found in Kasargod and certain Tamil Nadu and Karnataka centers, is an indigenous regulatory structure. The temple committee, elected democratically, manages access rights and resolves issues at temples dedicated to the Kurumba Bhagavathy deity, a protective mother figure. Karanavanmar as high priests, Achanmar as oracular assistants and adjudicators, and Kadavanmar as enforcers exercise magistracy.

Technical rules include effort limits, gear restrictions to reduce juvenile bycatch, mesh-size standards, minimum catch lengths and weights, restricted seasons, and spatial closures improve conservation. Synthetic gear materials, trawling in the 1950s, enhanced gear efficiency, and marine technology, like GPS navigation and fish-finding sonar, have transformed the sector. Traditional craft have been motorized and upgraded for storage and processing, expanding offshore fishing regions. Mini trawlers, crash boats, purse seines, ring seines, and deep-sea longlining are accompanied by surveys that define regulated mesh size, overall dimensions, and engine power requirements.

FISHERMEN COMMUNITIES' FUNCTION

A big inter-disciplinary study project examined Karnataka coastline fisheries and fisherman communities. Fish processing, environmental deterioration, and socio-economic and faunal issues in the river system, notably the Netravathy, were highlighted in the study. Besides surveys, documentary studies were done [9].

Over a fishing area of 0.24 percent, India's 8,118 km coastline sustains 14 million people, or 1.63 percent of the country's estimated 1999–2000 population. The narrow continental shelf along the Indian coast supports 1.5 million artisanal fishermen who fish near shore with almost 0.60 million motorized fishing vessels and country boats, catching 2.0 to 2.50 million tons [10].

Given the importance of its artisanal fisheries, Indian planners and politicians have prioritized their growth. Since artisanal fisheries account for 60% of the marine catch, it is crucial to national fish output. Increased awareness of the ecological impacts of unregulated fishing practices, pressure from international and national organizations to promote environmental protection, and government adoption of a code of conduct have made fisheries development a controversial issue, especially in resource management.

The fishing community is considered an "important and special class" economically and socially and is considered an indigenous national maritime community. The fishing community's socio-economic and cultural life is protected by the Indian constitution, and fisheries co-operatives have a well-organized sectoral development strategy. Fisheries co-operative societies are vital organizations for artisanal fishing community development, but their development is closely tied to the communities' socio-economic and cultural characteristics.

FISHING CULTURE

Dakshina Kannada's coastal fishing community is culturally and socially engaged. Fishermen and farmers have founded several cooperative and welfare organizations to enhance their lives. Social engagement increases with education, income, and landholding size. Fishermen are the most social. At least one organization represents them, and most belong to two or more. Cooperative and Janata bank membership is more common than other social organizations. Most fishing co-operative organizations

function better than those for other economic groupings. As fisherman's cooperative societies, farmers' cooperatives, creameries, banks, and credit societies improve, fishermen and farmers become active members.

Most fisherman buy food, clothes, and education for their families. Fishermen believe education can boost their economic status. Over 90% of them believe education improves career prospects and demands for their children. Education is often used for social and economic development. Fishermen only make a living from fishing, while people in other fields fish at other times. They make a lot during fishing season, stop, and then work in other trades [2].

ENVIRONMENTAL ISSUES

The Mangalore fishing industry confronts many environmental issues. Road damage from coastal erosion and monsoon flooding affects fishing communities and markets. Due to climate change and overexploitation, fish populations may be threatened by uncontrolled fishing. To promote sector expansion, infrastructure development for roads, transit, harbors, processing units, and storage facilities is crucial [9].

Pollution

Water contamination severely impacts coastal habitats. Marine pollution, the release of substances or energy into the sea that affect living resources and human health, is a global issue [11]. Pollution comes from urban runoff, sewage, industrial waste, oil spills, radioactivity, marine dumping, and coastal erosion. The Central Pollution Control Board monitors regional rivers and estuaries as part of the National Water Quality Monitoring Programme. Since there are three conflicting state plans, methodology and implementation are unclear. Karnataka's Action Plan on Climate Change calls for increased institutional capacity, clear financial allocations, and effective monitoring mechanisms to build on its strengths and mainstream climate change into development.

Overfishing

Indian marine fish production rose to 3.94 million tons in 2016 due to conventional fishing vessel landings. However, overfishing remains a major issue for demersal and elasmobranch species. Slow-growing, late-maturing, low-fecundity sharks are towards the top of the aquatic food chain. Their movement habits enhance overexploitation risk. In several places of India, shark fishing became targeted in the 1990s, prompting sustainability concerns. Marine demersal landings – perches, croakers, silverbellies, lizardfishes, catfishes, elasmobranchs, flatfishes, and pomfrets – accounted for 8.7% of production in 2016. Gillnets and line gear supplement trawl fishing. The whale shark, Pondicherry shark, Ganges shark, and speartooth shark are protected by National law from hunting and commerce. As a signatory to CITES, India oversees commerce in scalloped, great hammerhead, oceanic whitetip, gigantic, and reef manta rays. Perch, which peaks on the southwest and southeast coasts, supports a commercial fishery based on hook and line, traps and gillnets. After catfish, the clupeoid group is the second greatest demersal resource, with 270 000 tons of perches and 42 grouper species documented. To promote resource conservation and sustainable fishing, community-based systems, like the padu system on the southwest coast of India, the Kadakodi system in coastal Kerala, and the traditional Panchayat system in parts of Tamil Nadu, determine access rights through lottery or other elaborate regulatory functions [3].

FISHING SUSTAINABLY

Sustainable fishing maintains or increases a fishery's long-term productivity while delivering acceptable economic returns. Padu in Kerala and Tamil Nadu, Kadakodi in northern Kerala, traditional panchayat systems along the Coromandel Coast, and alternate-day fishing in the Gulf of Mannar and Palk Bay are well documented indigenous systems. These systems govern access rights and regulate hazardous fishing activities to conserve resources and manage fisheries sustainably. Community decisions using specified criteria decide access rights; in the padu system, a lottery limits caste use of specific fishing sites. Kadakodi regulates resources, protects livelihoods, and mediates social disputes

through executive and legislative action. On the Coromandel Coast, traditional panchayats govern fishing access, use, and conflict settlement. There are also access-based, temporal, spatial, input/effort-based, and output/catch-based regulations and policies to sustain India's capture fishing sector. Under marine fisheries rules, these provisions have constraints and obstacles.

GOVERNMENT POLICIES ON FISHERIES

Fisheries regulation and policies play a vital role in bringing sustainability to the sector and pave the way for the development of the fishermen community, fishery products and ecosystem. India has currently chalked out its policy by adopting a community-centric approach [3]. Several traditional community-based systems, such as the padu system in Kerala and Tamil Nadu, Kadakodi system in Northern Kerala and the panchayat system along Tamil Nadu coast, aim at resource conservation and sustainable fishery management. Broadly, fishing communities follow resource conservation practices and fishery management practices by regulating access to fishing grounds through community norms and in some cases through lottery. Apart from regulating access, traditional institutions also perform resource regulation and conflict resolution and play a vital role in the management of fishing in the territorial waters.

MANGALORE FISHERIES FUTURE

Mangalore, Karnataka's fisheries coast, has 11,275 fishing boats, including 4,217 mechanized, 1,987 motorized, and 5,071 traditional. Two monsoons and oceanic occurrences, like upwelling, affect fish populations in the region. Neritic fish make up 75% of marine landings, pelagic 57% and demersal 18%. Since 1980, neritic fish resources have declined, but oil sardine and mackerel stocks – two important pelagic species – have improved. The complex Mangalore fishery of *Rastrelliger Kanagurta* accounts for 14% of the marine catch. Catfish make up 23% of landing center demersal fisheries. Coastal commercial fish including *Pomadasys olivaceum*, *Trichiurus lepturus*, *Upeneus spp.*, and *Decapterus russelli* account for 20% of landings.

FISHERIES AND TOURISM

India's tourism business is growing, earning the second most foreign exchange and employing 20 million people. Dakshina Kannada, Karnataka's cultural capital, has many natural and cultural attractions, but its tourism potential is underutilized. Although coastal regions make up only 8% of the planet, they account for 25% of global productivity and 70% of the population lives within a day's walk. Many of India's 7,525 miles of coastline is eroded. Three districts – Uttara Kannada, Udupi, and Dakshina Kannada – along the Arabian Sea in coastal Karnataka contain pristine beaches that could become tourist destinations with proper development [12].

EDUCATION AND RESEARCH IN FISHERIES

Fisheries education and research in Mangalore is growing because to organizations like the College of Fisheries and the Fisheries Research Station in Kundapur. The Mysore University postgraduate fisheries program has expanded to this college. Mangalore too has a CMFRI regional center. Fish Biology, Aquaculture & Aquatic Environment, Fisheries Resource Management, and Fish Technology are college departments. The college houses three research organizations: the ICAR-Directors' Discretion Fund Project, a juvenile pearl culture project, and a multidisciplinary one. On November 10 and 11, 2018, the Fisheries Department, Government of Kerala, ICAR-Central Marine Fisheries Research Institute, ICAR-Central Institute of Fisheries Technology, and Kerala University of Fisheries and Ocean Studies hosted a two-day conference of south Indian fisheries ministers at ICAR-CMFRI, Kochi. Kerala, Maharashtra, Andhra Pradesh, Goa, Karnataka, Tamil Nadu, Puducherry, Lakshadweep UT, and Andaman and Nicobar UT fisheries ministers and senior officials attended. Fishermen associations voiced concerns at the stakeholder conference. The institute pioneered mariculture in India and contributed to the development National Mariculture Policy. A national pompano broodstock facility and scale-up mussel hatchery at Vizhinjam aim to improve research and mariculture links. The institute regularly offers marine fisheries training and short courses. The institute translated the Kerala Marine Fisheries Act (KMFA) and the Hon'ble Fisheries Minister released it [1].

CASE STUDIES

A mangrove-fishery is defined by the sector engaged, the fisher's link to the mangrove, the purpose of mangrove-associated fishing for that individual, the location of fishing, and the timing at which fishers use or profit from the mangrove. This approach allows local mangrove-fisheries to be characterized, as shown in Bali's Perancak Estuary [13].

India has well-documented community-based fisheries management systems with legal status. Padu in Kerala and Tamil Nadu, Kadakkody in northern Kerala, and traditional panchayat in the Coromandel Coast are examples [3]. Community norms and collective decisions define access rights in these resource conservation and sustainable fishing management systems. Caste groups receive fishing areas via lottery in the padu system. Kadakkody regulates and mediates social tensions. The panchayat system regulates fishing resource access, use, and conflict. Traditional systems regulate fishing effort and ensure sustainable use, coinciding with India's fishery sector's spatial, effort-based, and catch-based management rules. A critical examination of these legislation emphasizes community participation and adaptive governance for fisheries sustainability.

Effective Fisheries Initiatives

Successfully managed fisheries include the Karnataka coast's Malpe artisanal fishery. In recent years, the coastal fishery has been affected by an increasing number of mechanized craft, trawling in the near shore zone, indiscriminate use of destructive gear, unregulated fishing two days a week, turbidity after the 2018 floods, high fishing pressure, constant ground shifts, heavy breeding fishing, and encroachments into the artisanal fishery's traditional fishing zone. The fishery has poor CPUE and unfavorable resource trends. To preserve the local fisheries, Malpe fishermen voluntarily banned bull-trawling and light fishing in August 2018. They also posted banners to remind other fishermen of these rules [13].

Impact of Climate Change

The Indian and Kerala fisheries sector faces socio-economic tensions, low income for fishermen, low catch per effort, overexploitation of marine resources, and climate-change-induced hazards. Fishermen are economically, socially, and physically vulnerable to natural disasters. Regulating exploitation, diversifying livelihoods, and sustainable capacity-building for stakeholders are solutions. Social, economic, topographical, and biological vulnerabilities exist. Climate change reduces fishing resource availability, stability, accessibility, and use. Fisheries feed billions, give nutrition, and boost the macroeconomy. Climate variability disproportionately affects coastal fishing communities, particularly the peninsular Indian artisanal sector, affecting employment and income and undermining the sector's national income [9].

COMMUNITY FISHERIES ENGAGEMENT

Top-down fisheries management in India has shown poor success. This has increased interest in decentralization, co-management, and community-based management. The Nautanki Sangh, a cohesive social society, promoted beach seine fisherman and demanded community participation in fisheries management. Authorities can engage intensively with Mangrol's organized fishing community. A local squad with four Mangrol and Veraval representatives received extensive training. Boat owners trained in the program were key change agents. They examined the fisheries situation and its links to female sex ratio reduction, school dropouts, high morbidity, and water contamination. Community organizations limit beach seine fishing to cast members. Despite diesel subsidies and government efforts to increase the export market, the fisheries is inefficient and pollutes the harbor. Diesel subsidies are being cut, and coastal resource development is prioritized by the Coastal Zone Management Authority and Marine Products Export Development Authority. Creating a coastal area management council, improving awareness of ocean-land-people relationships, and fostering fisheries co-management are being considered.

FISHERIES TECHNOLOGY INNOVATIONS

Kasargod and Kizhoor have community-based fisheries management institutions called Kadakkodies. Kadakkodis, usually seen in fishermen's temples, act like caste panchayats in rural India. As the elected governing body, the temple committee enforces regulations with community support. A community volunteer called the illisam or "messenger" distributes regulations and orders. Controls on fishing effort, gear types, mesh sizes, minimum legal catch lengths, and closed seasons or locations are typical [10].

The post-harvest industry has made many technological advances that could improve daily fishing operations and the economic conditions of Kerala and Malabar fishermen. Efficiency has increased since the early 1950s using synthetic fiber fishing gear. Trawling has surpassed shore seine fishing. Trawls, purse seines, ring seines, and gillnets improved in the 1960s and late 1970s, followed by eco-sounders, GPS systems, and internal combustion engines. These advancements allowed traditional vessels to fish beyond the nearshore area usually reserved for mechanized craft. In the early 1980s, ring seines transformed coastal fishing into southern Kerala, and micro trawl gear with a maximum cod-end mesh size of 20 mm and outboard engines over 20 horsepower became popular. This gear is popular in Malabar.

Menhaden fishermen in Kerala use dogs to contain fish and transfer baits and equipment from shore to boat. Though its origin is unknown, this practice is not old.

Many Malpe fishers have voluntarily restricted bull-trawling and fishing with lights since August 2018 to enhance sustainability and decrease small-scale fish overfishing. Malpe fishing harbors have warning banners to encourage compliance.

NUTRITION AND HEALTH

Bombay, Cochin, and Mangalore are home to big mechanized fishing trawler units that can deep-sea fish. The West Coast accounts for 30–35% of India's fish catch. With 7,516 km or 4,673 miles of coastline, so much water under its influence, a vast continental shelf, and a wide range of species, India should have a low fish-production compared to other countries. The main issue is fishermen and others' scientific ignorance. Mangalore, famed for its beaches and fishing industry, is Karnataka's Fisheries Coast due to its diverse marine food. Crab, crabs, pomfret, prawns and prawns are commercially valuable. Protein-rich, high in phosphorus, magnesium, and vitamins A and B complex, it could be one of the healthiest foods. The Kanara district coast's fisheries abundance provides a wide range of meals. A good fisherman knows each species' nutritional value and the best cooking methods for it. Local foods have evolved from scientific understanding and common sense.

An outsider unfamiliar with the district's marine foods may be amazed by the indigenous people's many sea food recipes. These ideas have their own traditions and are based on nutrition, exploration, and generational taste patterns. Every sensible, health-conscious European or American must eat fish and fish products. Prawns and shrimps can compete with beef, pork, and poultry for energy and body repair. Some nutritionists prefer fish muscle proteins to beef. Fish meat and fishery products include antibiotics that are often greater than in eggs and milk.

REGIONAL AND GLOBAL MARKETS

Dakshina Kannada's traditional fisheries can supply raw materials to local processing facilities and other meat and fish processing enterprises across India. Current human consumption-based processing units include fish filleting and canning, surimi-based goods with crab taste or pepper crab paste, fish meal preparation and fish powder and other sundried products. Controlled environment and vacuum packing plants are being built in limited quantities. Tuna fish is great, and Scombrids from these waters are available year-round. Jhansy Aqua Technologies Ltd., the only tuna canner in Dakshina Kannada, chooses fresh cathysa/skipjack and yellowfin tuna. Tuna lengthy lining will greatly impact this unit, but the species is enormous, and its flesh is excellent, so it may not be too awful. Mangalore is a hub for

fresh and frozen tuna exports. The Mangalore fishing harbors and fish landing stations receive large numbers of tunas, mackerels, sardines, anchovies, prawns, shrimps, crabs, lobsters, and squid year-round for the increasing export trade.

CHALLENGES IN FISHERIES

The fisheries sector in coastal South India, particularly Mangalore and Kerala, has many problems that endanger its viability and the livelihoods of its residents. Marine resource overexploitation is a major issue. Unregulated and excessive fishing has depleted fish stocks and degraded ecosystems. Climate change worsens this predicament by raising sea levels, changing water temperatures, and increasing extreme weather [9].

The marine fisheries department and other government agencies have addressed the sector's issues, but few have focused on climate change and resource depletion vulnerabilities. A comprehensive, integrated action plan is needed to solve these concerns. This design should include road, transit, boat-making, and fish-processing infrastructure. Fishers need training and adaptive capacity to adapt to changing environmental and economic conditions.

Erosion and flooding in coastal areas present additional concerns. These risks impede coastal access, undermine fishing community connectedness, and endanger people and property.

Government agencies must solve the difficulties of estimating storage capacity and predicting storage system production in diverse compartments. Logistics, such as timely and discounted fuel supplies, equipment maintenance, and financial support including subsidies, low-interest loans, and boat and engine capital grants, are essential to the business. Without proper care and support, the fishing sector risks unsustainable growth and the loss of food and jobs for millions.

ADVICE ON POLICY

Fishers used illegal methods such trawl-motors on traditional crafts, fine-meshed, nylon and mosquito net destruction, and crab and shrimp mesh-net encroachments. Increasing trawlers in the last two decades and mechanized boats at the start of the 21st century would increase operational and capital costs by many folds, diminishing fishermen's net income. Successful development programs require fishermen to form societies, co-operatives, and fish-workers' unions.

Avoid Padu-type regulations that give government-set exclusive access rights and enforcement capabilities that can lead to fisheries overexploitation. With trawlers and other commercial ships, a major concern, open access through common property at minimal commercial yield is best. The destruction of mono-specific beds of *Chaetomorpha linum* in the rocks along "Big Bogan" has had rippling impacts on the ecology, including the fall of zooplanktivorous fish like grey mullets and scads and fishery production and variety. In-poling zone bottom protection should be relaxed, and sea-weed culture should be encouraged in suitable regions. Both are impossible without severe bottom profile changes or disturbances of essential organisms' life stocks.

Institutional changes for prudent long-term fishery development should optimize per unit fishery yield, increase overall fishery production, decrease exploitation of all conservation concern species, implement integrated fisheries principles, reduce if not eliminate structural over-capacity, improve the plight of artisanal fishermen, and minimize the social and economic effects of the transition [14].

CONCLUSIONS

The robust Karnataka fish-eating culture and heritage have shaped Mangalore's development. Mangalore is renowned as the fish tube of Karnataka, and Mangalorean Bangude is one of India's 75 signature foods. Lokmanya Tilak Nagar, which began in small-scale agricultural and fishing a century ago, is now a bustling commercial area, and Hoige Bazaar has expanded into a major fishing seaport that supports increased fish output. The fishing sector has created many jobs, especially for artisans and

fishers, and supplied a second income for many. Despite modernization and economic advancement, fish dominates coastal Karnataka dishes, proving that “food thou art and food thou wilt be”. In Gujarat, “When life is perilous and short, people seek consolation, joy, hope and virtues in food”; Mangaloreans share this idea. The 2014 BJP landslide victory in the Lok Sabha and Karnataka Assembly elections strengthened and illuminated the fishing sector.

REFERENCES

1. Bapat SV, Kurian A. Present status and role of small scale fisheries of India. CMFRI Bull. 1981;30:13–21.
2. George PC. Experience and plans for rationalization of small-scale fisheries in India. J Fish Board Can. 1973;30(12):2172–7.
3. Mini KG, Kumaran M, Jayasankar J. Use of post-stratification for estimating the marine fish landings. Indian J Mar Sci. 2009;38(4):464–9.
4. Srinath M, Kuriakose S, Mini KG. Methodology for the estimation of marine fish landings in India. CMFRI Spec Publ. 2005;86:1–57.
5. Srinath M, Kuriakose S, Ammini PL, Prasad CJ, Ramani K, Beena MR. Marine fish landings in India 1985-2004. CMFRI Spec Publ. 2006;89:1–61.
6. Etim LA, Olele FN, Udo MT, Brownson II. The reproductive characteristics of mudskipper *Periophthalmus barbarus* (Linnaeus 1760) (Teleostei, Gobiidae) in the estuarine swamps of the Imo River, Nigeria. Glob J Pure Appl Sci. 2010;16(4):395–400.
7. Ninawe AS. Blue economy is the economic activities that directly or indirectly take place in the ocean and seas, use outputs, goods and services into ocean and land based activities. Exam Mar Biol Oceanogr. 2017;1–3.
8. Chakraborty RD, Kuberan G, Purushothaman P, Radhakrishnan EV, Maheswarudu G, Sarada PT, et al. Deep-water marine shrimps from the Indian coast: A review. Indian J Geo-Mar Sci. 2023;52(11):517–30.
9. Brahma G, Mukherjee SK. Studies on mangrove diversity of India with special reference to Lothian Island Wildlife Sanctuary. Plant Science Today. 2015;3(1).
10. Brahma G, Mukherjee SK. Studies on mangrove diversity of India with special reference to Lothian Island Wildlife Sanctuary. Plant Sci Today. 2015;3(1).
11. Priyadarshini P, Abhilash PC. Climate action-based policy administration in India: Developments and challenges. Clim Change Environ Sustain. 2019;7(1):102–7.
12. Ramos K, Cuamea O, Galván-León JA. Wine tourism: Predictors of revisit intention to micro, small and medium wineries on the Valle de Guadalupe wine route, Mexico. Int J Wine Bus Res. 2020;32(1):22–40.
13. Quinn K. Balancing climate, culture and human rights: Insights from La Oroya, Fosen and the Torres Strait Islanders case. Christ ULJ. 2024;13:25.
14. Alaie SA. Policies as instruments in promoting sustainable development: Limiting the climate change issues in India. In: Politics of Climate Change: Crises, Conventions and Cooperation. 2023. p. 201–15.