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World review of capture fisheries and aquaculture insurance 2022



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by

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Preparation of this document

This *World review of capture fisheries and aquaculture insurance* was prepared by Raymon van Anrooy and Fabiola Espinoza of the FAO Fisheries and Aquaculture Division (NFI), together with fisheries insurance consultants David Japp, Diego Valderrama, Krishna Gopal Karmakar, Peter Lengyel, Shinoj Parappurathu, Suchitra Upare, Uwe Tietze, Timothy Costelloe and Zongli Zhang.

This review is an update of previous FAO publications on the state of world aquaculture insurance (van Anrooy *et al.*, 2006) and the state of world capture fisheries insurance (van Anrooy *et al.*, 2009). It analyses the developments in the insurance industry serving both sectors over the past decade.

The present review includes four national reports and five regional reports, which cover the top ten marine capture fisheries and aquaculture producers in the world. National reports are provided for China, India, the Russian Federation and the United States of America. Other major producers are covered in the regional reports: Asia (Bangladesh, Indonesia, Japan, the Philippines, and Viet Nam), Africa (Egypt, Morocco, Namibia, Nigeria and South Africa), Europe (France, Italy, Norway, Spain and the United Kingdom of Great Britain and Northern Ireland), Latin America (Brazil, Chile and Peru) and Oceania (Australia, New Zealand).

The reports are based on extensive desk research, complemented by responses to an online survey conducted by FAO in 2020 among underwriters serving the capture fisheries and aquaculture industries. The information collected resulted in a comprehensive overview of the state of insurance for both sectors. The results were presented at a webinar entitled “Guidelines for increasing access of small-scale fisheries (SSF) to insurance services”, which was held on 29 October 2021 with participation from more than 70 finance and insurance experts. The webinar was organized jointly by the Global Network for capacity building to increase access of small-scale fisheries to financial services (CAFI-SSF Network) and the Asia Pacific Rural and Agricultural Credit Association (APRACA).

The publication was edited by Edward Fortes, with formatting and design assistance provided by Magda Morales and Marianne Guyonnet of FAO’s Fisheries and Aquaculture Division.

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Acronyms and abbreviations

ABNJ	areas beyond national jurisdiction
AFZ	Australian Fishing Zone
APPIK	Asuransi Perikanan bagi Pembudidaya Ikan Kecil (Indonesia)
ARIA	All-Russian Insurance Association (Russian Federation)
BFAR	Bureau of Fisheries and Aquatic Resources (Philippines)
BMP	better management practice
CTA	Cape Town Agreement (IMO)
DWFN	distant water fishing nations
EEZ	exclusive economic zone
EMFF	European Maritime and Fisheries Fund
FCIC	Federal Crop Insurance Corporation (USA)
FISHCOPFED	National Federation of Fishermen Co-operatives Ltd. (India)
FMIS	Fisheries Mutual Insurance Scheme (Japan)
FVIA	Fishing Vessel Insurance Association (Japan)
GDP	gross domestic product
GRP	group risk plan (USD)
GWP	gross written premiums
HAB	harmful algae bloom
H&M	hull & machinery (insurance)
ICCAT	International Commission for the Conservation of Atlantic Tunas
IDRA	Insurance Development and Regulatory Authority (Bangladesh)
IG	International Group of P&I Clubs
IMO	International Maritime Organization of the United Nations
ILO	International Labour Organization of the United Nations
IUU	illegal, unreported and unregulated (fishing)
kW	kilowatt
LOA	length overall
MAT	marine, aviation and transit (cargo) insurance
MFI	microfinance institution
MMAF	Ministry of Marine Affairs and Fisheries (Indonesia)
NAAI	National Association of Agriculture Insurers (Russian Federation)
NGO	non-governmental organization
PCIC	Philippines Crop Insurance Corporation
PMSBY	Pradhan Mantri Suraksha Bima Yojana (India)
PMFBY	Pradhan Mantri Fasal Bima Yojana (India)
PSI	Principles for Sustainable Insurance (PSI) initiative (UN environment)

PTSLP	Post-Tsunami Sustainable Livelihood Progamme (India)
P&I	protection and indemnity (insurance)
RAS	recirculating aquaculture systems
RFMO	regional fishery management organization
RNRC	Russian National Reinsurance Company (Russian Federation)
RSHB	Russian Agricultural Bank (Russian Federation)
SAMSA	South African Maritime Safety Authority
SBC	Sadharan Bima Corporation (Bangladesh)
SERNAPESCA	National Service for Fisheries and Aquaculture (Chile)
SHG	self help group
SIFFS	South Indian Federation of Fishermen Societies
SIDS	small island developing states
SME	small and medium-sized enterprise
SSF	small-scale fisheries
TAC	total allowable catch
USA	United States of America
USDA	United States Department of Agriculture
USD	United States dollar
VLOPU	very large offshore production unit

Executive summary

This *World review of capture fisheries and aquaculture insurance* presents the findings of regional and national studies conducted in 2020. The studies included major capture fisheries and aquaculture producers in Asia (Bangladesh, China, India, Indonesia, Japan, the Philippines, and Viet Nam), Africa (Egypt, Morocco, Namibia, Nigeria and South Africa), Europe (France, Italy, Norway, the Russian Federation, Spain and the United Kingdom of Great Britain and Northern Ireland), the Americas (Brazil, Chile, Peru, and the United States of America) and Oceania (Australia, New Zealand).

The main conclusions on capture fisheries insurance are:

- The number of fishing vessels covered by marine hull insurance is estimated at around 450 000 worldwide. Some 61 percent of the insured fishing vessels are found in Asia, followed by the Americas (18 percent), Europe (14 percent) and Africa (6 percent).
- For large-scale industrial fishing fleets, the supply of marine hull and other insurance services meets demand. At least 90 percent of the estimated 67 800 large-scale fishing vessels operating worldwide (> 24 m in length) are covered by marine hull insurance.
- Between 50 percent and 60 percent of the semi-industrial fishing vessels (12–24 m in length) are covered by marine hull insurance. Of the estimated 430 000 semi-industrial fishing vessels operating worldwide, tens of thousands do not have insurance cover.
- Over 95 percent of the 2.3 million motorized small-scale fishing vessels (< 12 m in length) operate uninsured. Most small-scale fishers worldwide still do not have access to adequate insurance services that meet their specific needs and conditions.
- Underwriting experiences in fishing vessel insurance have generally been good over the 2009–2019 period. On average, 39 percent of the insurance and reinsurance companies and brokers who responded to the FAO survey reported “Good” to “Very good” underwriting experiences, and 41 percent reported “Neutral” results.
- Access to accident, life and health insurance services for crew on fishing vessels and small-scale fishers in developing countries has improved in recent years. In Asia, at least 4 million fishers are covered by specific insurance programmes.

The main conclusions on aquaculture insurance are:

- The number of aquaculture insurance policies in force in 2020 was estimated at over 40 000 worldwide. Indonesia and China were the largest markets for aquaculture insurance, with 15 000 and 12 000 policies in force respectively. Some 83 percent of aquaculture stock mortality insurance policies in Asia were issued in 2020. In Europe and the Americas around 2 700 and 2 500 aquaculture farms were reported to be insured, respectively.
- Large-scale aquaculture producers with well-financed operations are best served by the insurance industry. Medium- and small-scale farmers, on the other hand, continue to lack coverage, especially in developing countries, with limited insurance options and high premium rates. The gap between the supply and demand of aquaculture insurance worldwide is far from being closed. Overall, the provision of aquaculture insurance services is therefore inadequate, particularly in Asia.

- In various countries in the Asian region (e.g. China, Indonesia, Viet Nam, Japan), but also in the United States of America, aquaculture insurance is encouraged by government support through premium subsidies schemes, favourable legislation and/or pilot insurance programmes for small-scale producers.
- The range of species and culture systems covered by aquaculture policies worldwide is diverse and has increased in recent years, though most insurers continue to focus on insuring the aquaculture species and systems they are most familiar with.
- The underwriting experiences of aquaculture insurance companies largely vary depending on the year, the company and the country concerned. On average, 40 percent of the insurance and reinsurance companies and brokers who responded to the FAO survey reported “Good” to “Very good” underwriting experiences in the 2009–2019 period. Meanwhile, 36 percent reported “Neutral” results in the aquaculture stock mortality insurance business. The insurance industry therefore seems to have consolidated the market, finding ways to improve business and increase profitability.

This world review also offers in-depth discussion of key areas of the capture fisheries and aquaculture insurance market. These include supply and demand, market structure and conduct, underwriting practices, perils covered, fishing vessels, aquaculture species and the production systems insured, the policies in force, risk management, handling of claims, and the varying underwriting experiences in the five regions. Finally, it provides conclusions and recommendations to increase the provision of insurance services to fisheries and aquaculture stakeholders worldwide.



National report of India

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1. INTRODUCTION

India is endowed with a broad range of marine and aquatic resources, which support a thriving fish economy. Bounded by the Indian Ocean along its southern, eastern and western borders, India's exclusive economic zone (EEZ) extends over a distance of 8 129 km and encompasses an area of 2.02 million km². As well as the ocean, a variety of inland water bodies – rivers and canals, reservoirs, lakes, lagoons, floodplain wetlands, and brackish water ponds – all add to the diversity of aquatic resources in the country. India is the fourth-largest capture (marine and inland) fisheries and second-largest aquaculture nation in the world (FAO, 2020a). The Government of India estimates that the fisheries sector supports the livelihood of nearly 16 million people in India at the primary level, and almost twice that number along the value chain (Government of India, 2018). The sector contributed 1.10 percent (in current prices) to the country's total gross value added (GVA) during the triennium ending 2018–19. The inland sector contributed 72 percent of total fish production – estimated at 13.42 million tonnes – with the remainder provided by the marine sector. Fish and fishery products contribute substantially to the country's foreign exchange earnings through exports, which were valued at about USD 6.73 billion in 2018–19. Fishery exports accounted for about 2.5 percent of total exports, and close to 20 percent of agricultural exports from India (Government of India, 2019a).

Fisheries are a state concern in India, insofar as the primary responsibility for the governance and management of fishery production systems rests with state governments. From the mid-1980s to the early 2000s, technological advancements in vessel, navigation and gear operation allowed the expansion of capture fisheries (Ghosh, 1998; Salagrama, 2004). However, low economic viability and other constraints associated with offshore and deep-sea fishing programmes limited the sector's further expansion, thereby constraining its potential to meet a growing demand for fish (James, 2014; Parappurathu *et al.*, 2020). The latter, together with success in the mass production of freshwater carp and brackish water shrimp, resulted in a greater emphasis on the aquaculture sector. As a result, inland aquaculture production has almost tripled over the past two decades (Government of India, 2018).

However, the risks associated with capture fishery and inland production systems have also increased in recent years, and the growing frequency of extreme weather events in the Indian Ocean has had severe consequences for coastal inhabitants in terms of loss of life and property. In this light, over the past three to four decades the government has made efforts to strengthen fishery and aquaculture insurance in the country. These interventions have largely been carried out through public insurance companies, with low participation from the private sector. More specifically, over the past ten years capture fisheries insurance has been operated by government-administered schemes, while aquaculture insurance has mostly been demand-driven, offered by public insurance companies with little participation from the private

sector. This chapter provides an overview of the present state of capture fisheries and aquaculture insurance in India, with a particular focus on trends over the past ten years. The chapter is based on a literature review as well as insights obtained from an online survey involving some of the insurance sector's key stakeholders.¹

2. STATUS OF CAPTURE FISHERIES AND AQUACULTURE PRODUCTION

2.1 Capture fisheries

Capture fisheries, both marine and inland, provide income and employment to about 3.8 million resource-poor coastal inhabitants, and 1.2 million inland fishers. The sector contributes close to 40 percent of the country's fish production.

In 2019, marine fish production was estimated at roughly 3.56 million tonnes. Valued (ex-vessel) at USD 8.70 billion (CMFRI, 2020a), the sector's output comprised approximately 1 200 different species of fish and shellfish. Meanwhile, the inland capture fisheries sector contributes close to 2 million tonnes of fish every year.² After peaking at 3.9 million tonnes in 2012, marine capture production has shown signs of stagnation; this is mainly due to the pelagic resource crisis brought about by climate change and unsustainable fishing practices (Kripa *et al.*, 2018; Rohit *et al.*, 2018; Dineshbabu *et al.*, 2020). This is evident from the sharp fall in the growth curve of marine fish landings over the last decade (2010–2019). Growth is now estimated at -0.13 percent, compared to 2.94 percent in the previous ten years (2000–2009).

Pelagic resources supplied the largest share of marine fish landings in 2019, at 48 percent; this was followed by demersal (34 percent), crustaceans (12 percent) and molluscs (6 percent) (CMFRI, 2020a). The main fish species/groups landed include ribbon fishes (7.7 percent), cephalopods (7.5 percent), penaeid prawns (5.5 percent), non-penaeid prawns (5.1 percent), lesser sardines (4.8 percent), Indian mackerel (4.5 percent), threadfin breams (4.3 percent) and oil sardines (4.1 percent). Interestingly, a species once deemed less important – red-toothed triggerfish (*Odonis niger*) – has emerged as a major resource. Whereas it once contributed less than 1 percent to total marine fish landings, over the last two to three years this has increased to 3–7 percent (CMFRI, 2020a). A high variability in landings has also been observed over the last decade in important resources such as oil sardine, Indian mackerel, threadfin breams and penaeid prawns.

2.2 Aquaculture

Aquaculture evolved into a viable commercial farming practice from the traditional backyard activity it was in India three to four decades ago. The sector gained momentum in the 1980s with the introduction of scientific carp farming, aided by breakthroughs in breeding and culture technologies (Ayyappan, 2006).

In terms of annual fish production, aquaculture had surpassed capture fisheries by the mid-1990s, while over the past decade it has been growing at an annual rate of 7–9 percent. Total aquaculture production in India was estimated at 7.7 million tonnes in 2018–19, which accounts for about 80 percent of total inland fish production (Government of India, 2019b). In value terms (ex-farm), aquaculture production increased from USD 5.49 billion in 2009 to USD 13.18 billion in 2018 (FAO, 2020b). Nowadays, aquaculture in the country makes use of a variety of production systems including intensive pond culture, coastal aquaculture, cold water fisheries, integrated fish culture with poultry and horticulture, brackish water cage culture, and pen culture.

¹ Six responses from insurance companies servicing capture fisheries and five participants from aquaculture were received. Additionally, information was collected through telephone conversations with representatives from civil society and fisherfolk organizations engaged in facilitating insurance services.

² An official estimate of inland capture fisheries production is currently not available.

About 80 percent of farmed fish is made up of carps; these include major carps (rohu, catla, mrigal, etc.), minor carps and exotic carps (common carp, silver carp, grass carp, etc.). Catfish and other freshwater finfish constitute the rest of the production portfolio. On the other hand, crustaceans and molluscs such as prawns/shrimps, crabs, mussels and oysters, contribute only about 8 percent to total production. Total carp production has increased by almost 2 million tonnes over the last decade, through the intensification of culture practices. The ex-farm value of the production of major carps was estimated at USD 6.56 billion in 2018. In the 1990s and early 2000s shrimp production was mainly dominated by tiger shrimp (*Penaeus monodon*), Indian prawn (*P. indicus*), giant freshwater prawn (*Macrobrachium spp*) and scampi. However, severe incidences of diseases such as white spot syndrome (WSS) have led to a sharp fall in production. The sector was rebooted after 2009 with the introduction of vannamei shrimp (*Litopenaeus vannamei*), an exotic species (Salunke *et al.*, 2020). This species currently accounts for over 90 percent of total shrimp production in Indian aquaculture, which was estimated at 0.69 million tonnes and valued at USD 5.35 billion in 2018 (Government of India, 2018).

The aquaculture sector is supported by a thriving seed production industry that produced about 52 262 million fry in 2017–18. The seed requirement for the *vannamei*-dominated shrimp culture industry is mainly met through certified hatcheries that import the Specific Pathogen Free (SPF) brood stock, mostly from East Asian Countries (CAA, 2020).

3. THE INSURANCE MARKET

The insurance industry in India consisted of 58 companies in 2019, 24 of which were engaged in life insurance business, and 34 of which deal with general insurance (non-life insurance). Over the last decade (2009–2019), 2 new life insurance companies and 12 new general insurance companies have joined the sector. Both public-owned and private companies are currently active in the insurance business, with an overall insurance penetration of 3.7 percent (premiums as a percentage of GDP in 2017) and an overall business of approximately USD 280 billion in 2020 (IBEF, 2020). The sector is growing at a rate of 15–20 percent annually. Together with banking services, insurance services contribute about 7 percent to the country's GDP. In 2018–19 the value of life insurance companies' gross direct premiums was estimated at USD 70 573 million, while that of general insurance companies was USD 23 956 million. Non-life insurance, which includes marine and aquaculture insurance, constitutes about 25 percent of total premiums generated from the entire insurance business. Out of the gross direct premiums generated from all segments of general insurance, the marine segment made up only 2 percent, with the bulk of business concentrated in other segments such as motor, health and fire, among others (IRDAI, 2020a).

Since its inception in 2000, the Insurance Regulatory and Development Authority of India (IRDAI) continues to be the only statutory body invested with a regulatory role over insurance business in the country. Among life insurers, the Life Insurance Corporation (LIC) is currently the sole public-sector company active. On the other hand, there are five public non-life insurance companies engaged in general insurance business; these include: National Insurance Company Limited (NIC), New India Assurance Company Limited (NIAC), Oriental Insurance Company Limited (OIC), United India Insurance Company Limited (UIIC) and Agricultural Insurance Company Ltd (AIC). The latter administers most of the government-sponsored public insurance schemes in the crop sector. Other stakeholders in the insurance market include individual and corporate agents, brokers, surveyors and third-party administrators mainly servicing health insurance claims. Of the total gross premium income generated by non-life insurance business, public insurance companies account

for about 45 percent of the market share. The general insurance market is highly concentrated, with only a few companies, public and private. In 2018–19, 78 percent of premium income was generated by 11 major companies (IRDAI, 2020b).

The General Insurance Corporation of India (GIC), which was the sole public-sector entity dealing with non-life insurance business before 2000, was converted into a national reinsurer and renamed as GIC Re. Apart from GIC Re, there are ten foreign reinsurance companies that operate in India. They include: Munich Re, Swiss Re, SCOR SE, Hannover Re, RGA Life Re, XL SE, Lloyd's Re, General Re, Axa France Vie and Allianz Re. In 2018–19 the net written premium for all reinsurance companies combined was estimated at USD 6 397 million, of which 85 percent pertained to GIC Re alone (IRDAI, 2020b). However, reinsurance operations in agricultural and allied portfolios are rather limited. Over the past decade, the Government of India has made several attempts to enhance the penetration of various types of insurance products in the country. Some of the recent schemes include “Pradhan Mantri Jeevan Jyoti Bima Yojana” (PMJJBY) for life insurance; “Pradhan Mantri Suraksha Bima Yojana” (PMSBY) for general insurance; “Pradhan Mantri Vaya Vandana Yojana” (PMVVY) and “Varishtha Pension Bima Yojana” (VPBY), both of which provide special cover for senior citizens; “Pradhan Mantri Fasal Bima Yojana” (PMFBY) for crop insurance; and finally the “Restructured Weather Based Crop Insurance Scheme” (RWBCIS). In the 2019–20 national budget, 100 percent foreign direct investment (FDI) for insurance intermediaries was allowed, thereby easing the access of global corporations into the Indian insurance business.

4. SUPPLY AND DEMAND

4.1 Capture fisheries

Over the past three decades, the Indian government has undertaken several initiatives to cover the variety of risks associated with marine and inland fishing. These centrally sponsored insurance schemes operate primarily with the participation of public insurance companies.

The most widely offered insurance product in the capture fisheries sector is accident insurance, which covers the life or risk of disability for active fishers while involved in fishing operations. Until recently, accident risks (life and disability) were covered under the “Group Accidental Insurance Scheme for Active Fishermen”, which was launched in 1991–92. The premium under this scheme was heavily subsidized to encourage high uptake. Since 2015, the scheme has been part of the PMSBY umbrella scheme and covers a host of occupational sectors, including all types of general insurance for citizens in the 18–70 age group. The National Federation of Fishermen Co-operatives Ltd. (FISHCOPFED, established in 1980), an apex organization of fisherfolk cooperatives in India, has been spearheading the government's efforts to enhance the reach and penetration of life and disability insurance schemes. FISHCOPFED mostly operates through its subsidiary federations at the state and district levels and provides subsidy support to eligible beneficiaries. With regard to vessel insurance, this is provided by all four public sector insurance companies in India. Many of the policies issued are credit-linked, as banks often insist for insurance cover for the vessels they finance.

Alongside these central government schemes there have also been attempts to cover the specific risks of fisherfolk at the local level, with the intermediation of state governments, non-governmental organizations (NGOs) and fisherfolk organizations/societies. Some of the notable NGOs/fisherfolk cooperatives that have been facilitating insurance administration for fishers include the Kerala State Co-operative Federation for Fisheries Development Limited (Matsyafed), and the South Indian Federation of Fishermen Societies (SIFFS). Matsyafed has been offering specific insurance schemes (accident insurance as well as marine hull insurance) for more than a decade in partnership with public and private insurance companies. Elsewhere, SIFFS used to

play an active role in providing diverse life and non-life (including vessel, equipment and gear) insurance services to its members (Van Anrooy *et al.*, 2009). However, its activities are currently limited to facilitating government insurance schemes through its district federations. Similarly, the Trivandrum District Fishermen Federation (TDFF), which used to offer a wide-ranging set of insurance products to fishers, no longer retains its active presence in this realm.

Microinsurance schemes targeting vulnerable beneficiaries have been attempted in India, drawing on grassroots-level support from NGOs and fisherfolk self-help groups (SHGs). Only a few of such initiatives are in operation, however. The need to insure coastal assets – particularly immovable properties such as fishermen's houses and storage structures – became all the more necessary after the tsunami of 2004, which caused such large-scale destruction and death. Bajaj Allianz, in collaboration with CARE India, launched a microinsurance scheme in 2007 to cover over 75 000 fishermen in Tamil Nadu. The scheme proved to be a boon for the people affected by cyclone Nisha, which struck the Tamil Nadu coast in November 2008. Over 16 000 claims were submitted within a few months of the incident. However, due to the losses incurred by the insurance company, this scheme did not continue beyond 2010 (Allianz, 2010), and no such schemes are known to be operating in coastal areas at the time of writing. Since 2017, a comprehensive insurance scheme has been operating in six coastal districts stretching from Thiruvallur to Kanyakumari, under the aegis of the International Fund for Agricultural Development (IFAD) – the Post-Tsunami Sustainable Livelihood Programme (PTSLP). The scheme covers thousands of fisherfolk in the target areas and is run by a community organization, PTSLP Fishing Asset Risk Mutual Society (PFARMS), which was incorporated for this specific purpose. The organization operates insurance schemes in partnership with district-level fishermen federations (DLFSF) that are connected to the SIFFS and insurance companies (at present, UIIC). The scheme covers various risks such as life, health, personal accident and fishing assets (fishing vessels and equipment) (IFAD, 2020).

Private-sector involvement in fisheries insurance has been patchy, barring a few attempts by companies such as Bajaj Allianz and Reliance General Insurance Company Ltd in the past, with limited success. The private sector's general reluctance to enter the market can be attributed both to these previous, unsuccessful attempts, and concerns relating to profitability.

Apart from other inherent risks associated with capture fishing, mariculture and aquaculture, the demand for insurance in fisheries in India mainly stems from the recurrence of extreme climatic events along the Indian coast. The four states on the eastern coast of India (Andhra Pradesh, Odisha, Tamil Nadu and West Bengal) are particularly vulnerable, with over 308 cyclones (103 of which were severe) having hit the coast between 1891 and 2000. In recent years, 29 more have followed in quick succession, the latest being Amphan, a super-cyclonic storm that hit the coasts of West Bengal and Odisha in May 2020 (NCRMP, 2020). Other factors have also influenced the demand for insurance in the capture fisheries sector, such as: the number of active fishers, the number and type of fishing vessels, the level of risk insurers are willing to take on, and the increasing emphasis on fisheries infrastructure development by the Government of India.

Fisherfolk population

As per official statistics available from the Government of India for the year 2017, 5.4 million people are engaged in full-time fishing activities – this includes marine and inland fisheries as well as aquaculture of various types. That aside, 3.2 million people are involved on a part-time basis and 2.5 million on occasional basis. About 4.9 million people are then engaged in various activities along the fish value chain (e.g. marketing

of fish, input delivery, etc.) (Government of India, 2018). A profile of the marine fisherfolk population is provided in Appendix 1, based on the 2016 Marine Fisheries Census.

Size of the fishing fleet

As per the 2016 Marine Fisheries Census, the fishing fleet in India consists of about 164 302 vessels, which comprises 42 656 mechanized/semi-industrial vessels, 95 957 motorized vessels, and 25 689 non-motorized vessels (Appendix 2). The mechanized sub-sector is the main contributor to total fish landings (83 percent), whereas the motorized sub-sector engages the largest number of active fishers (62 percent) and contributes to 16 percent of landings. Compared to the 2010 census, the mechanized and non-motorized fishing fleet have shrunk by about 45 percent and 50 percent respectively, while the motorized fleet has grown by about 35 percent. Several reasons have been put forward for the shift away from mechanized fishing, such as concerns regarding economic viability and target resource decline. The general trend towards technological advancement in the sector has resulted in an increase in motorization and a reduction in non-motorized fishing vessels.

Fishing-related infrastructure

There are 7 major fishing harbours, 52 commissioned minor fishing harbours, and 181 commissioned fish landing centres across the coastal belt of India; this is where most fish are landed. There are also over 1 000 beach landing centres, where limited modern berthing and fish-handling facilities cater to the needs of artisanal fishermen (Government of India, 2019c). The Government of India has recently devoted considerable attention to infrastructural development in fisheries and aquaculture. Initiatives include the establishment of fishing harbours and landing centres, the technological upgrading of fishing fleets, and the development of market facilities and cold storage networks.

In 2018–19 the Indian Department of Fisheries created the Fisheries and Aquaculture Infrastructure Development Fund (FIDF), dedicated to catalyzing the development of fisheries and aquaculture (Lok Sabha Secretariat, 2019). Apart from this, various types of subsidies and technical assistance were extended, first under the ‘Blue Revolution Scheme’ (Neel Kranti Mission) and subsequently under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) umbrella scheme, which superseded the former from May 2020.

A consolidated summary of the various types of insurance schemes in the capture fisheries sector is provided in Table 1.

4.2 Aquaculture

Much like capture fisheries, aquaculture insurance has a long, albeit mixed history in India. The principal risks in India’s aquaculture sector had mainly been addressed through two public insurance schemes developed in the early 1990s: i) the brackish water shrimp insurance scheme; and ii) the inland fish insurance scheme. These schemes came in response to demand from entrepreneurs and were administered by the four public sector general insurance companies (van Anrooy *et al.*, 2006). The main focus was on covering the risks associated with shrimp farming, namely the incidence of disease and environmental pollution. The inland fish insurance scheme provided cover for the fry, fingerlings, grow-out fish and brood stock of a large range of freshwater species (including common carp, silver carp, Indian carps, tilapia and catfish). The above schemes operated successfully in the first few years after they were introduced, but were later discontinued as a result of the companies’ hesitation to handle the excessive risks involved.

TABLE 1

Description of insurance schemes available in capture fisheries sector in India

Types of risks insurable	Present status	Specific schemes
Life/disability of fishermen/boat crew	Central government schemes available in all states but with different levels of penetration. Fairly well covered in the State of Kerala and the State of Tamil Nadu.	Accident insurance coverage available through the central scheme "Pradhan Mantri Suraksha Bhima Yojana" (PMSBY) (FISHCOPFED, 2020), the Fishermen Group Accident Insurance Scheme of Matsyafed and the KFWFB in Kerala (Matsyafed, 2020). Group accident insurance schemes are offered by state governments in Kerala and Tamil Nadu, while accident insurance is offered by the Post-Tsunami Sustainable Livelihood Programme (PTSLP) in Tamil Nadu. Microinsurance schemes available through the DHAN Foundation in Andhra Pradesh (DHAN Foundation, 2020).
Partial damage and total loss of fishing vessels	Damage to vessel hull/engine and loss of vessels are both covered. Scant coverage for inland fisheries.	Direct vessel insurance schemes and credit-linked schemes are offered by the public general insurance companies; Vessel insurance is offered by Matsyafed in Kerala for member fishermen on vessels purchased under their subsidized loan scheme. Subsidized vessel insurance schemes are offered by the State of Tamil Nadu government, while vessel insurance is available under the 'Fishing Asset Insurance' scheme of PTSLP in Tamil Nadu (IFAD, 2020). Special risk coverage against the damage of vessels is offered by boatowners' associations based in certain harbours (e.g. Neendakara harbour in the Kollam district of Kerala, Paradeep harbour in Odisha; Mangrol harbour in the Junagadh district of Gujarat) (Parappurathu <i>et al.</i> , 2017).
Loss of/and damage to equipment/ fishing gears	Very few independent schemes on offer.	Specific insurance policies offered by public insurance companies on demand. Certain vessel policies also cover gears, but with extra premiums, and they are not available for the inland sector.
Damage to fishers' coastal assets	In the recent past a few schemes have been offered by private companies, in partnership with NGOs.	A joint programme operated by Bajaj Allianz and CARE India was active in the coastal districts of Tamil Nadu in the 2007–2010 period. No other schemes are currently known to cover disaster risks for the immoveable coastal assets of fisherfolk.

Private companies are still adopting a cautious approach with regard to entering the aquaculture insurance market, as they have for some time. Some private insurance companies such as Universal Sompo General Insurance Company Ltd. provide insurance cover for freshwater and brackish water fish and prawn production systems, but on demand, and subject to specific underwriting requirements. Apart from these, no other notable attempts by the private sector to cover the risks in fisheries and aquaculture have recently been reported. Access to such schemes is extremely difficult due to the exorbitant premiums, which range from 5 to 7 percent of the sum insured and the stringent management requirements. These factors lead to a very limited number of subscriptions. Lesser enrollment results, *inter alia*, in a smaller risk pool, which only further increases premium rates.

Over the past two decades, the Indian government has stepped up its engagement in the aquaculture sector by extending the necessary infrastructural facilities, technical backstopping, and institutional and regulatory support. Various central government schemes have occasionally offered specialized components. Among other things, the schemes aimed to facilitate: the setting up of brood banks and hatcheries, the establishment of cage farms, the modernization of fish seed farms, fish feed mills/plants, the establishment of diagnostic laboratories for disease, and aquatic quarantine facilities (Lok Sabha Secretariat, 2019). The technical, financial and extension requirements of small-scale fish farmers were addressed through a network of 429 branches of the Fish Farmers Development Agency (FFDA) and 39 branches of the Brackishwater Development Agency (BFDA). These branches cover all potential districts in all of the country's coastal states and Union Territories (UT). Since its inception in 2006, the National Fisheries Development Board (NFDB) has played a key role in coordinating development activities in the fisheries sector. The Coastal Aquaculture

Authority (CAA), established in 2005, oversees the regulatory and promotional activities in coastal areas. Most recently, the Indian government created a new Ministry for Fisheries, Animal Husbandry and Dairying in May 2019, splitting the Ministry of Agriculture and Farmers' Welfare to give more focused attention to the sector's needs. With enhanced infrastructure, funding and technical support, aquaculture in India is gradually transforming into a highly intensive commercial enterprise with larger operations, a greater diversity of species and brighter business prospects. This has amplified the investment stakes, intensifying the associated risks and uncertainties, which in turn necessitates better insurance coverage.

Mariculture is an emerging sector in the country. Encouraged by the positive responses of entrepreneurs, several state governments are currently contemplating large-scale investments in this area (Gopalakrishnan *et al.*, 2017). Nevertheless, as in other aquaculture ventures, mariculture units are highly capital-intensive and susceptible to the risks posed by natural calamities such as cyclones and tsunamis, and other perils such as disease and HAB infestation. In 2017, the State of Kerala introduced an insurance scheme for mariculture farmers (green mussels) in the Padanna estuary region. The scheme was discontinued due to excessive claims. Besides this initiative, the insurance industry has limited underwriting experience for mariculture. However, given the potential for entry of new entrepreneurs into this lucrative activity, comprehensive insurance coverage for mariculture facilities must be introduced.

A consolidated summary of the various types of insurance schemes in the aquaculture sector is provided in Table 2.

5. UNDERWRITING

Insurance companies in India generally carry out underwriting formalities directly, with their own staff. However, in specific cases they may also involve insurance brokers and other financial intermediaries or institutions. Each company sets a gross underwriting limit for any specific risk covered, for each region where the services are

TABLE 2
Description of insurance schemes available in the mariculture/aquaculture sector in India

Sector/Enterprise	Types of risks insurable	Present status	Specific schemes
Mariculture/ cage culture in inland waters/sea farming	Loss/damage of marine/ inland cages. Loss of marine/inland fish crop in cages/ seaweed culture. Loss of farmed bivalve stock.	The insurance industry has limited underwriting experience in mariculture as it is an emerging sector in the country. Only selective coverage available.	No central schemes currently available. Public and private insurance companies are yet to develop specialized insurance products for mariculture.
Freshwater aquaculture	Loss of finfish crop. Damage to farm structures.	Several public as well as private insurance schemes available. Generally priced high due to high risk. Not readily available.	No central schemes currently in operation. Schemes offered by public insurance companies and certain private insurance companies are available on demand. No central schemes currently in operation.
Brackish water aquaculture	Loss of brackish water fish/shellfish crop. Damage to farm structures.	Several schemes on offer for shrimps and finfishes grown in alternative culture systems. Not readily available.	No central schemes currently in operation. Schemes offered by public insurance companies and certain private insurance companies are available on demand.
Fish/shellfish hatcheries/brood banks	Loss of fish fries/ fingerlings/brood stock. Damage to hatchery/ brood bank equipment/ machinery.	Only selective coverage available. Only selective coverage available.	No central schemes currently in operation. Public and private insurance companies extend coverage based on specific requests considering economic viability and other underwriting requirements.

offered. However, such limits vary widely across companies, depending on the capacity of reinsurers, and the target production systems covered. The formal involvement of fishery institutions, cooperatives and NGOs, is ensured when the insurance products require larger community involvement and to respond to the specific needs of a particular production system.

5.1 Capture fisheries

Accident insurance covering the life/disability risks of active fishermen is the most widely offered insurance product in the capture fisheries sector in India. The “Group Accidental Insurance Scheme for Active Fishermen” covers up to INR 200 000 for accidental death and full disability, and INR 100 000 for partial disability.³ A nominal subsidized premium of INR 12 per annum is deducted from the beneficiary’s bank account through the auto-debit facility, in a single instalment. The Matsyafed runs a similar scheme through which compensation of INR 1 million (approximately USD 13 500) can be paid to the dependents of fishermen who die in accidents. This same scheme also covers partial disability and hospital expenses for injured fishermen, with payments varying from case to case. To make the scheme affordable for fishermen, only a nominal annual premium of INR 448 per person is charged. In this case the insurance coverage is provided by the companies, but the procedural formalities such as underwriting, risk assessment and claim settlement are facilitated by Matsyafed employees. Similarly, the Kerala Fishermen’s Welfare Fund Board (KFWFB) administers a group accident insurance scheme for active fishermen aged between 18 and 70 who are enrolled in one of their welfare schemes. An accident death/permanent total disability coverage of INR 1 million is provided for an annual premium of INR 446 per person, which is fully subsidized by the state government (GoK, 2020). As the policy term is limited to one year in both schemes, Matsyafed and KFWFB adopt a competitive bidding process every year to determine the insurance company partners.

The asset insurance programme run by PFARMS, as part of the Post-Tsunami Sustainable Livelihood Programme (PTSLP), is an innovative hybrid model based on a mutual risk-sharing mechanism, which compensates small-scale fishermen for the loss of fishing equipment. The PFARMS collects a premium of 1 percent of the value of the fishing asset(s) insured every year, adjusted by 20 percent annually for depreciation. The individual claims of fishermen (less than ten at a time) are settled by PFARMS, while in the event of massive losses resulting from disasters, the insurance company takes over claim settlement responsibilities. Recently, the claims of about 330 fishing vessels lost in the Gaja cyclone were settled by the UIIC under the scheme (FAO, 2019).

No information could be obtained on the net and gross capacity (with reinsurance) of any single risk for capture fisheries insurance in value terms (i.e. at any single location or with respect to an aggregation of locations). The insurers contacted were not prepared to divulge this information as they considered it commercially sensitive.

5.2 Aquaculture

The underwriting criteria of the few private companies who offer aquaculture insurance (on demand) include:

- farmers’ ability and willingness to maintain stringent pond-management conditions, including regular liming, manuring, feeding, de-weeding, de-silting, etc.;
- ensuring proper water movement through inlets/outlets/sluides;
- maintaining proper water quality;

³ As per the OECD (2021) the average INR–USD exchange rate in 2020 was IND 74.105 = USD 1.

- maintaining strict sanitation in and around the water body;
- ensuring safe stocking;
- taking measures to avoid the introduction of infected seeds;
- preventing diseases/infestations from neighbouring fields;
- taking immediate steps to eradicate any diseases and other infestations if noticed;
- ensuring the timely provision of extension services to the farm for risk management; and
- maintaining proper records of all management activities undertaken.

Aside from the above, it is mandatory for farmers to arrange for the relevant farm registration from the Coastal Aquaculture Authority (CAA)/State Fisheries Department/Marine Products Export Development Authority (MPEDA)/National Centre for Sustainable Aquaculture (NACSA).

6. PERILS COVERED

6.1 Capture fisheries

The majority of capture fisheries insurance policies and schemes currently available in India cover only “named perils”. However, certain companies offer “all-risks” cover. Based on survey responses, the perils generally covered in the capture fisheries sector include:

- natural disasters such as cyclones, storms, lightning, tsunamis, earthquakes, floods, etc.;
- accidents due to technical/mechanical failure;
- accidents due to human error such as stranding, sinking, collision;
- accidents caused by a third party;
- damage caused by marine debris;
- theft and damage by vandalism; and
- fire and explosion.

Only a few policies cover risks such as war, hostile actions, piracy, acts of terror, capture, seizure, detention, etc. The insurers generally follow the Institute Fishing Vessel Clauses as a base,⁴ but with suitable adaptation/customization.

6.2 Aquaculture

In aquaculture, none of the companies that responded to the 2020 survey offered “all-risks” cover. The commonly covered named perils include: (i) natural disasters; (ii) extreme weather events such as high/low temperature, frost; (iii) environmental pollution; (iv) summer kill/incidence of specified diseases; (v) harmful algal blooms; and (vi) theft or other similar disturbances.

Common exceptions included: the malicious/willful destruction of fish stock (crop) due to negligence, error, omission or improper management; the partial loss of any kind; losses due to natural mortality/under-growth/overcrowding; any lack of compliance with statutory government orders; and destruction caused by nuclear accidents/weapons.

7. POLICIES IN FORCE

7.1 Capture fisheries

Insurance products in the capture fisheries sector cover the following risks: (i) life/disability of fishermen/vessel crew; (ii) partial damage and total loss of fishing vessels; and (iii) loss/damage of equipment/fishing gears.

⁴ A description of these clauses is available in Hudson *et al.* (2012).

Accident (life and disability) insurance

The life and disability insurance cover for fishers, provided under the central government scheme facilitated by FISHCOPFED, had over 3 million beneficiaries in 2019 (Appendix 3). The highest number of beneficiaries came from the State of Odisha, followed by the State of Tamil Nadu.

The Fishermen Group Accident Insurance Scheme operated by Matsyafed in Kerala covered the risks of 96 704 fishers in 2019–20. The premium collected was INR 43.3 million (approximately USD 584 000) at the rate of INR 448 per subscriber. Out of the total 48 claims sent to Matsyafed in 2019, only 19 were settled in the same year, with a total disbursement of INR 1.5 million.

Vessels (hull) insurance

Survey responses indicated that the number of independent vessel insurance policies in force in India is quite low. Taken together, the four public insurance companies currently hold less than 1 000 active policies. Including those insured through non-governmental organizations, it is estimated that the total number of vessels insured in India is in the range of 5 000–7 000; this is about 3–4 percent of all crafts in the fishery. As there is no official information on the number of vessels (hull) insured, this estimate should be seen as a close approximation of the total number of policies active in the country.

The most commonly insured vessel types include trawlers, purse seiners, gillnetters and longliners. Most of these small-scale, fisher-operated craft in India are made of wood or fibre-reinforced plastic (FRP) and have relatively low longevity. An age limit is therefore generally prescribed for vessels to be eligible for insurance coverage. This varies between a maximum of 10 and 25 years depending on the company. A recent study by Parappurathu *et al.* (2017) also highlighted the low adoption of vessel and gear insurance products in India. The study attributed the observed pattern to a variety of factors including high insurance premiums, a poor record of claim settlement, hassles with policies and claims, and low financial literacy and risk perception among fishermen, among others. As subscription is low, insurance companies are hesitant to develop other products that are affordable. Companies are also concerned about past experiences of malpractice, such as the intentional dumping of old and less energy-efficient fishing vessels to secure claims.

Equipment and gears insured

Certain vessel insurance policies disbursed by public insurance companies are available with additional coverage of fishing gears and on-board communication, as well as navigation equipment for an extra premium. No independent, standalone schemes exclusively covering damage to fishing gears and equipment are currently on offer. The insurance companies generally insist on the total loss of vessels, gears and equipment, in order to admit claims.⁵

Under the PTSLP fishing asset insurance scheme that covers small fishing vessels, gears and other fishing equipment, a total of 7 538 policies were disbursed in the year 2018–19 with a gross premium collected worth INR 5.3 million.⁶ Of the 194 claims settled in the same year, 7 were admitted by PFARMS against a disbursement worth INR 0.34 million; the remaining 187 claims (worth INR 2.7 million) were met by the United India Insurance Company (UIIC).

⁵ Total loss refers here to “a damaged state wherein cost of repairing the asset to its pre-damaged condition exceeds its present value before accident, adjusted for depreciation”.

⁶ A detailed breakdown of policies into different categories of assets insured (vessel, gear, equipment, etc.) was not available.

7.2 Aquaculture/mariculture

Risks in the aquaculture sector mainly include: (i) loss of farmed fish stock due to disease incidence and extreme weather; (ii) loss/damage to farm structure/cages; and (iii) damage to hatcheries and nurseries, equipment and machinery, primarily due to natural disasters leading to shortage of seed supply.

Species insured

A variety of finfish species commonly raised in inland production systems are covered, including Rohu, Catla and Mrigal, Pangasius and Tilapia. Insurance products covering the risks of brackish water culture shrimps and prawns – such as *Vannamei* spp. shrimp, Indian prawn, tiger shrimp, scampi, etc. – are also available on the market. However, the supply of insurance policies for other shellfish species (crab, oyster, etc.) is relatively low.

Growing systems insured

Based on demand, companies currently underwrite insurance policies for a variety of growing systems, including ponds, green water tanks, hatcheries and on-growing units, aquarium systems, and recreational fisheries systems.

In 2017, an attempt by the Government of Kerala's department of fisheries made green mussel farming in backwater systems eligible for insurance cover for the first time in the country. Other systems such as marine and brackish water cages, longline culture systems, and recirculation aquaculture systems (RAS) are not eligible for cover at the time of writing. There are no clear estimates available on the number of aquaculture policies currently in force in India.

8. RISK MANAGEMENT

Underwriting of insurance policies in India is subject to a set of guidelines issued by the IRDAI, which is revised from time to time. Apart from this, insurance companies follow their own guidelines, terms and conditions. They assess the risks and hazards involved in every production operation based on extensive data collected, before developing a suitable insurance product.

The risk assessment process is carried out in both capture fisheries and aquaculture, using pre-acceptance surveys conducted by designated/independent risk management surveyors and evaluators. The surveyor then issues a pre-acceptance certificate upon completion of the evaluation. In the case of schemes facilitated and managed by community organizations or NGOs, separate risk assessment protocols and procedures are followed with the help of their own staff/risk assessment surveyors. For instance, the district federations of SIFFS in Tamil Nadu assist the PTSLP in assessing the risks before issuing policies to the target beneficiaries. The long-term experience of community organizations, together with their close ties to local fishing communities, help ensure better assessments of the risks involved, thereby improving a programme's chances of success. In capture fisheries, insurance companies generally insist on specific technical criteria/pre-conditions such as: a maximum age limit, the vessel's type and specification, the status of its registration, and the vessel owner's ability to undertake optimum management practices to minimize risks.

9. HANDLING OF CLAIMS

Generally, standard guidelines and procedures for availing claims are stipulated when policies are issued. Damages and losses need to be reported immediately after

an incident in a prescribed format, and with supporting documents.⁷ The insurance companies undertake loss adjustment either using their own staff or independent loss adjusters.

In cases where insurance products are administered with the intermediation of community organizations such as Matsyafed and SIFFS, these organizations facilitate the loss adjustment process. The policies often come with a “deductible percentage” ranging from 10 to 20 percent of the amount of the assessed claim, a cost which the insured party must bear. Additional deductions are also applicable in the case of non-compliance with policy terms. The cost of loss adjustment is generally borne by the companies, but a service charge (1–2 percent) is deducted on certain policies. For almost all insurance products currently available in capture fisheries and aquaculture in India, claims are only admitted in the event of the total loss of the insured property.⁸ This often creates resentment among the insured, as even genuine claims with significant damages are not compensated. However, in the case of fishermen’s accident insurance there are provisions to cover partial disabilities, either by meeting hospital expenses or by paying a previously agreed sum based on certificates issued by registered medical practitioners.

In aquaculture, stringent underwriting requirements relating to crop management involve subjective judgments on the part of insurance surveyors at the time of the claim settlement process. This leaves room for dissatisfaction for the insured party. For example, Parappurathu *et al.* (2017) reported that fishers and fish farmers’ lack of confidence in claim settlement procedures is a major reason for the low uptake of insurance in fisheries and aquaculture in India. However, the study adds that insurance companies are equally concerned about fraudulent claims, based on their past experiences, notably in the capture fisheries segment. A major reason for this is a lack of adequate technological solutions in place to assess the veracity of incidents that mostly happen at sea. Interventions are therefore needed to strengthen the institutional mechanisms for risk management and the handling of claims, in order to boost customer uptake of insurance products.

10. UNDERWRITING EXPERIENCES

10.1 Capture fisheries

The underwriting experiences of insurance companies in India have been mixed and enormously varied in recent years.

The experience of personal accident insurance schemes, operated with the intermediation of community organizations such as FISHCOPFED, SIFFS/PTSLP, Matsyafed and KFWFB, has been encouraging. High enrollment rates in these programmes have ensured that claim ratios are considerably lower than the premiums collected. However, not all vessel insurance schemes have yielded positive results for the insurance companies associated with them. For instance, the underwriting experiences of NIC and NIAC on the east coast have been difficult over the last few years because of several cyclones, which have wrought severe damage to fishermen’s assets. A further dissuading factor in the past has been the moral hazard associated with vessel insurance, with several instances of fishers sinking their old vessels to fraudulently secure claims. Parappurathu *et al.* (2017) identified this as one of the several constraints associated with vessel insurance. However, respondents to the FAO survey made no specific reference to moral hazard as an immediate limiting factor.

⁷ Supporting documents vary from case to case and include the First Information Report (FIR) registered by the police in the case of an accident; a postmortem report/death certificate issued by a local health agency in the event of the death of a crew member; photographs and other proof of incident such as lab reports in the case of aquaculture losses due to disease, HAB, natural calamities, etc.

⁸ The Matsyafed vessel insurance scheme is an exception, as there is provision to meet repair charges in the event of accidents.

By contrast, the PTSLP's "Fishing Asset Insurance" scheme in Tamil Nadu has been quite satisfactory in recent years, despite lower premium rates charged from the insured fishers. The mutual insurance mode under which PFARMS operates helps to evaluate a claim properly before settlement, thereby minimizing the moral hazards associated with such schemes. Moreover, a revolving fund – maintained with member contributions as well as a state government grant – acts as a cushion to absorb claims that are higher than normal (FAO, 2019).

10.2 Aquaculture

The underwriting experience in aquaculture insurance is closely related to the high risks faced by farming operations, including a high probability of disease incidence, harmful algal blooms (HAB) and other eventualities. In 1995–96, the white spot syndrome (WSS) outbreak severely affected shrimp farms, which had disastrous consequences for most of the industry's entrepreneurs (Government of India, 2002; Balakrishnan *et al.*, 2011). Freshwater farms also encountered several problems with the outbreak of diseases such as viral haemorrhagic septicaemia, spring viremia, argulosis, epizootic ulcerative syndrome (EUS) and viral nervous necrosis (VNN) (Sahoo and Goodwin, 2012). This resulted in an exponential increase in claims. Regrettably, the public-sector companies operating the two insurance schemes could not handle this increase effectively, and this forced them to discontinue the insurance programmes.

Since then, public insurance companies have become more reluctant to operate in the sector. Despite exercising caution when underwriting aquaculture insurance schemes in major culture hubs, public-sector companies were discouraged by adverse experiences involving a high incidence of disease and a low implementation of risk management practices by fishermen. The feedback received from public company executives in the survey suggests that while there were a few pockets of success, the past ten years have seen poor underwriting experiences in most regions.

The poor outlook for the segment, coupled with low demand from entrepreneurs (due to high costs), has forced companies to withdraw their schemes altogether in several parts of the country where aquaculture operations are particularly risky. Lack of government support through centrally sponsored schemes or a premium subsidy programme has also had an adverse impact on the general appetite for underwriting aquaculture.

11. CONCLUSIONS

Despite the fact that fisheries and aquaculture in India have shown vibrant growth in the recent past, the risks associated with the sector and its diverse stakeholders have only been modestly addressed. Public-sector insurance companies continue to be at the forefront of providing insurance coverage to coastal fisherfolk and aquaculture entrepreneurs in the country, as they have for the past three to four decades. They have mainly been active in implementing central government schemes for life and disability cover for fisherfolk, as well as providing vessel and aquaculture insurance on demand. However, these companies are yet to develop viable insurance packages to cover fishing gears/equipment and fisheries infrastructure. Private insurers, while active in agriculture and its associated portfolio, have still not been able to build a stable presence in the sector, despite having made a few attempts in the past decade. Conversely, several non-governmental organizations such as SIFFS and PTSLP, as well as fisher/producer cooperative societies such as FISHCOPFED and Matsyafed, have proved their enduring presence by facilitating insurance administration in association with the service-providing companies. These organizations have played a wide-ranging facilitation role, starting with the provision of risk assessment and underwriting assistance, to effective claim handling and the distribution of a beneficiary's compensation.

In the capture fisheries sector, fishermen's accident insurance schemes have performed quite well, with high subscription rates and forward-looking underwriting experiences. Lately, group accident insurance schemes have shown that they have wider customer acceptance than personalized individual accident insurance schemes; this is largely due to the greater flexibility they offer. In this environment, both the government and independent schemes offered by fishermen societies have performed well, with more effective coverage, relatively speaking, in southern coastal states such as Kerala and Tamil Nadu. On the other hand, fishing asset insurance and coastal immovable asset insurance, which are intended to protect fishers from extreme weather events and freak accidents at sea, have remained more or less a non-starter. Estimates suggest that only 3–4 percent of all craft in the fisheries sector hold vessel insurance. This figure includes the total active policies provided by public insurance companies as well as those insured through quasi-government/co-operative/non-governmental organizations.

The case of aquaculture insurance is similar. Insurance companies have still not proved successful in improving the level of underwriting in major culture hubs. Several factors including a low-risk financing culture among fishermen/entrepreneurs, a lack of awareness, unaffordable schemes, problems with the claim settlement process, and reservations regarding the timely receipt of compensation, have all kept fishers away from such risk management solutions. The insurance companies have approached the sector with caution due to concerns relating to moral hazard, high risk perception, poor customer acceptance and dwindling profitability. In a nutshell, aquaculture insurance in India is languishing in a vicious cycle of high risk and low affordability, such that only large players in the sector can access it; this leaves out the majority of small aquaculture farmers. Considering this, appropriate technological and institutional interventions are required to bridge the trust deficit between the service providers and beneficiaries.

The insights developed through this review suggest that prospects for risk management solutions in fisheries and aquaculture would brighten only if customized, and affordable products were developed to suit the specific needs of the target group in each region. This mainly involves developing a clear understanding of the risk profile, levels of affordability, income stream patterns, borrowing and repayment behaviour. It also requires an understanding of attitudes towards risk management solutions, as well as the value systems and morality of the target population, which differ substantially across regions and cultural settings. In this context, the working experience of cooperative organizations and civil society organizations are crucial. Microinsurance has the potential to capitalize on the group dynamics of fishing communities and the 'social capital' developed by community organizations in dealing with systemic risk(s). Another promising alternative is "mutual insurance", which has replaced traditional insurance in fisheries and aquaculture sectors in several East Asian countries. Here, instead of transferring the risks to a third-party insurance company, the members of the community act as insurers themselves, pooling risks and generating funds through regular contributions that are in sync with the collective performance of the risk pool group (Xinhua *et al.*, 2017; Skogh, 1999). However, the economic viability and practical feasibility of scaling up microinsurance and mutual insurance in India's fisheries sector is yet to be fully understood, and therefore waiting to be explored.

12. RECOMMENDATIONS

Proactive measures are necessary to turn the tide on fisheries and aquaculture insurance in India. Changes must involve the government, public and private insurance service providers, as well as due participation from civil society organizations and the fishing community at large. Based on the above discussion, some specific recommendations to achieve this objective are presented below:

- i. There is a general lack of awareness regarding risk financing culture and insurance solutions among fishermen and aquaculture farmers. This gap may be bridged through appropriate extension efforts and popular campaigns. The insurance industry should collaborate with local-level extension services operated by states/NGOs/the private sector/farmers and fisher organizations such as FISHCOPFED, the network of Aqua Club Societies for shrimp farmers, the State Fisheries Seed Corporation (SFSC), Aqua Chaupal, etc. Furthermore, insurance companies should recruit personnel or outsource the services of local insurance agents to facilitate the marketing of insurance products at the grassroots level, along with additional advisory/extension services.
- ii. The risks involved in fisheries and aquaculture are highly diverse and vary significantly across types of fishing fleet, fishing techniques followed, type of fish culture, source of inputs, culture practices adopted, and so on. More importantly, the sensibilities of target populations vary considerably across ethnic groups within a given community and across regions. A general, 'one-size-fits-all' approach does not augur well in terms of enhancing the adoption of fisheries insurance in India. The insurance industry therefore needs to take proactive steps to develop customized risk solutions that suit the specific requirements of fishers and aquaculture farmers in each region. For this, alliances could be forged with suitable community organizations and cooperatives that have more grassroots-level experience of working with the fisher communities.
- iii. It may be desirable to gradually introduce legal coercion to enhance the adoption of fisheries insurance. As a first step, necessary legislative provisions may be incorporated into the Marine Fisheries Regulation Acts (MFRAs); this would ensure mandatory insurance coverage for mechanized vessels beyond a certain size or catch capacity.
- iv. One of the primary reasons for the low adoption of fishing vessel and asset insurance in the coastal regions is the prohibitive cost of the policies currently on offer. Moreover, no options are available to pay premiums in installments, or in a way that matches fish landing patterns. Innovative solutions whereby the payment of insurance premiums is linked to catch revenues, or more broadly with seasonal incomes, could significantly alter the way fishermen approach insurance packages. A similar scheme operated by Matsyfed in Kerala, whereby the interest on loans is paid back on a daily basis through deductions made on fishing revenue (Parappurathu *et al.*, 2019) could be emulated for this purpose.
- v. Compensation for the partial loss of insured assets/crops is currently not covered in most insurance policies. Considering the high demand from fishers and aquaculture farmers for such a feature, partial losses could be admitted as an add-on feature with additional premiums. Even though the risk involved with such a feature would be high, it could be surpassed by virtue of the possible higher subscription of fishers interested in securing their vessels from small incidents, and a subsequent enlargement of the risk pool.
- vi. Risks associated with mariculture enterprises are currently not covered. New insurance packages covering the risks of mariculture units/marine and inland cages, sea farming /bivalve units, brood bank/hatchery units, and seaweed farming units, need to be introduced on a priority basis to contain risks in emerging sectors. In this regard, the government could introduce specific policies and programmes to bring emerging as well as hitherto underexplored enterprises under the risk management net.

- vii. Parametric, index-based insurance schemes that apply payouts based on pre-set weather or climatic threshold levels could be introduced on a pilot basis to cover damages incurred by fisheries infrastructure, coastal and inland aquaculture units and mariculture units.
- viii. Private insurance service providers could be encouraged to enhance their involvement in fisheries so that the overall competitiveness and efficiency of service delivery in the sector is boosted. As a preliminary step, the government may consider involving interested private insurance companies as partners in ongoing public insurance schemes. This in turn could improve their experience and pave the way for new alliances with community organizations active elsewhere in the sector.
- ix. There is an imminent need to simplify the claim-handling procedures associated with fisheries/aquaculture insurance products. Technological advancements in the realms of satellite-based monitoring technology/ICT could be used to provide simple but foolproof mechanisms for verifying insurance claims. Further measures are also needed to minimize delays in the claim settlement process.
- x. Emerging platforms such as microinsurance have proved successful in several coastal regions in the country. Given the strong network of microfinance institutions (MFIs) and self-help groups (SHGs) in the fishing communities in India, bundling disaster risk insurance packages with existing microcredit schemes – covering household assets or personal accidents, for example – could prove a viable option. Insurance could also be bundled with savings programmes for these groups, with financial assistance from the banking sector.
- xi. Mutual insurance has proven potential, especially in cases where it is expensive and cumbersome to assess the risk profile of participants and manage it in a cost-effective manner. It is particularly relevant in the case of disaster risks pertaining to immovable coastal assets, where an individual member of a community would have little interest in adopting expensive, personalized insurance solutions. The government could encourage stakeholders involved in the sector (fishery cooperatives/NGOs/autonomous bodies) to launch pilot projects in this segment with the commensurate institutional, economic, policy and logistical support. The consequent risk pools could be assured with adequate reinsurance support from public/private insurance/reinsurance companies.

REFERENCES

- Allianz. 2010. *Learning to Insure the Poor: Micro-insurance Report* [online]. Munich. [Cited 6 November 2021] www.allianz.com/en/press/news/studies/news-2010-06-29.html
- Ayyappan, S. 2006. *National aquaculture sector overview: India*. National Aquaculture Sector Overview Fact Sheets. FAO, Rome. (also available at: www.fao.org/fishery/countrysector/naso_india/en).
- Balakrishnan, G.S., Peyail, R.K., Theivasigamani, A., Anil, K., Jithesh, S. & Srinivasan, N. 2011. First report on White Spot Syndrome Virus (WSSV) infection in white leg shrimp *Litopenaeus vannamei* (Crustacea, Penaeidae) under semi-intensive culture condition in India, *AAFL Bioflux*, 4(3): 301–305.
- CAA. 2020. *Coastal Aquaculture Authority* [online]. Chennai, Tamil Nadu, India. [Cited 1 June 2020]. www.caa.gov.in/index.html
- CMFRI. 2010. *Marine Fisheries Census 2010. Part I*, New Delhi: Ministry of Agriculture and Kochi: Central Marine Fisheries Research Institute.
- CMFRI. 2020a. *Marine Fish Landings in India 2019*. Technical Report. Kochi, ICAR-Central Marine Fisheries Research Institute.

- CMFRI-DoF.** 2020b. *Marine Fisheries Census 2016-India*. Central Marine Fisheries Research Institute, Indian Council of Agricultural Research, Ministry of Agriculture and Farmer' Welfare; Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India.
- DHAN Foundation.** 2020. Integration of Insurance Linked Disaster Risk Reduction in Development Programs of Marine Fishing Community. In: *DHAN Foundation* [online]. Madurai, Tamil Nadu, India. [Cited 1 July 2020]. <http://dhan.org/acedrr/proj-integration-of-insurance-linked-drr.html>
- Dineshbabu, A.P., Zacharia, P.U., Sujitha, T., Shoba, J.K. et al.,** 2020 Assessment of stock vulnerability of Indian marine fishes to past changes in climate and options for adaptation. *Climate Research* 79: 175–192. <https://doi.org/10.3354/cr01586>
- FAO.** 2019. Report of the Expert Workshop on Guidelines for Microfinance, credit and insurance for small-scale fisheries in Asia, Bangkok, Thailand, 7–9 May 2019. FAO Fisheries and Aquaculture Report No. 1280, Rome. (also available at: www.fao.org/3/ca6482en/ca6482en.pdf).
- FAO.** 2020a. *The State of World Fisheries and Aquaculture 2020: Sustainability in Action*. Rome, FAO. <https://doi.org/10.4060/ca9229en>
- FAO.** 2020b. *FAO yearbook. Fishery and Aquaculture Statistics 2018/FAO annuaire. Statistiques des pêches et de l'aquaculture 2018/ FAO anuario. Estadísticas de pesca y acuicultura 2018*. Rome/Roma. <https://doi.org/10.4060/cb1213t>
- National Federation of Fishers Cooperatives Ltd. (FISHCOPFED).** 2020. *National Federation of Fishermen Co-operatives Ltd.* [online]. New Delhi. [Cited 1 July 2020]. www.fishcopfed.in/
- Ghosh, S.** 1998. Fisheries sector and traditional fish workers of Kerala. Paper presented in the State-level Convention organized joint by the WWF celebration committee and Kerala Fisheries Society, 16 November 1998, Trivandrum.
- Government of India.** 2002. *Aquaculture Authority News, Vol. 1*, Chennai: Ministry of Agriculture, Government of India and Coastal Aquaculture Authority, pp. 1–6.
- Government of India.** 2016. Report of the Taskforce on Use of Technology for Agriculture Insurance, Sub-group 5: Livestock and Aquaculture. NITI Aayog, Government of India.
- Government of India.** 2018. *Handbook on Fisheries Statistics 2018*, Ministry of Fisheries, Government of India.
- Government of India.** 2019a. *Agricultural Statistics at a Glance 2018*. Directorate of Economics and Statistics, Ministry of Agriculture and Farmers' Welfare, Government of India.
- Government of India.** 2019b. *Pocket Book of Agricultural Statistics at a Glance 2019*. Directorate of Economics and Statistics, Ministry of Agriculture and Farmers' Welfare, Government of India.
- Government of India.** 2019c. *Report of Blue Economy Working Group – 3 on Fisheries, Aquaculture and Fish Processing* submitted to Economic Advisory Council to the Prime Minister, Government of India.
- Government of Kerala.** 2020. *Directorate of Fisheries – Government of Kerala* [online]. Thruvananthapuram, India. [Cited 1 July 2020]. <http://fisheries.kerala.gov.in/home-2>
- Gopalakrishnan, A., Ignatius, B. & George, G.** 2017. India's largest fisheries research body turns 70 – CMFRI's legacy and few recent achievements. *Fishing Chimes*, 37(1): 38–44.
- Hudson, G.N., Madge, T. & Sturges, K.** 2012. *Marine Insurance Clauses*. Fifth Edition. London & New York, Routledge.
- IBEF.** 2020. *India Brand Equity Foundation* [online]. New Delhi. [Cited 1 July 2020]. www.ibef.org/industry/insurance-sector-india.aspx

- IFAD. 2020. *Post-Tsunami Sustainable Livelihoods Programme for the Coastal Communities of Tamil Nadu* [online]. International Fund for Agricultural Development (IFAD). Rome. [Cited 10 November 2021]. www.ifad.org/en/web/operations/-/project/1100001348
- IRDAI. 2020a. *Insurance Regulatory Authority of India* [online]. Hyderabad, India. [Cited 1 July 2020]. www.irdai.gov.in/ADMINCMS/cms/NormalData_Layout.aspx?page=PageNo4&mid=2
- IRDAI. 2020b. *Handbook on Indian Insurance Statistics, 2018–19*. Hyderabad, Insurance Regulatory Authority of India.
- James, P.S.B.R. 2014. Deep sea fishing in the exclusive economic zone of India: resources, performance and new approaches to development. In: S.A.H. Abidi & V.C. Srivastava, eds. *Marine Biology: The National Academy of Sciences*, pp. 100-123.
- Kripa, V., Mohamed, K.S., Koya, K.P.S., Jeyabaskaran, R., Prema, D. *et al.*, .2018. Overfishing and climate drives changes in biology and recruitment of the Indian oil sardine *Sardinella longiceps* in Southeastern Arabian Sea. *Frontiers in Marine Science*, 5: 443.
- Lok Sabha Secretariat. 2019. *Fifth Report of the Standing Committee of Agriculture (2019–20)*. Ministry of Fisheries, Animal Husbandry and Dairying, Government of India.
- Matsyafed. 2020. *Kerala State Co-operative Federation for Fisheries Development Ltd.* [online]. Thiruvananthapuram, India. [Cited 1 June 2020]. <http://matsyafed.in/>
- OECD. 2021. Exchange rates. In : *OECD Data* [online]. Paris. [Cited 3 November 2021]. data.oecd.org/conversion/exchange-rates.htm
- NRCMP. 2020. Cyclones & their Impact in India. In: *National Cyclone Risk Mitigation Project* [online]. New Delhi. [Cited 1 June 2020]. <https://ncrmp.gov.in/cyclones-their-impact-in-india/>
- Parappurathu, S., Ramachandran, C., Gopalakrishnan, A., Kumar D., Poddar, M.K., Choudhury, M., Geetha, R., Koya, M.K., Kumar, R.N., Salini, K.P. & Sunil P.V. 2017. What ails fisheries insurance in India? An assessment of issues, challenges and future potential. *Marine Policy*, 86: 144-155.
- Parappurathu, S., Ramachandran, C., Baiju, K.K. & Xavier, A.K. 2019. Formal versus informal: Insights into the credit transactions of small-scale fishers along the South West Coast of India. *Marine Policy*, 86: 144-155.
- Parappurathu, S., Ramachandran, C., Menon, M., Baiju, K.K., Rohit, P., Kumar, N.R., Padua, S. & Kumar, S. 2020. Harnessing artisanal prowess in offshore fisheries: The case of Thothoor fishers from India. *Marine Policy*, <https://doi.org/10.1016/j.marpol.2020.104174>
- Rohit, P., Sivasdas, M., Abdussamad, E.M., Rathinam M.A., Koya, S. K. P. *et al.*, 2018. *Enigmatic Indian Oil Sardine: An Insight*. CMFRI Special Publication 130. Kochi, ICAR-Central Marine Fisheries Research Institute.
- Sahoo, P.K. & Goodwin, A.E. 2012. Viruses of freshwater finfish in the Asian-Pacific region. *Indian Journal of Virology*, 23(2): 99–105.
- Salagrama, V. 2004. *Policy research: implications for liberalization of fish trade for developing countries - a case study for India* [online]. Project PR 26109. [Cited 6 November 2021]. www.academia.edu/719652/Policy_research_implications_of_liberalisation_of_fish_trade_for_developing_countries_A_case_study_for_India
- Salunke, M., Kalyankar, A., Chandraprakash, D., Shingare, M. & Khedkar, G.D. 2020. A review of shrimp aquaculture in India, historical perspective, constraints, status, and future implications for impacts on aquatic ecosystem and biodiversity. *Reviews in Fisheries Science and Aquaculture*, 28(3): 283–302. doi: 10.1080/23308249.2020.1723058
- Skogh, G. 1999. Risk-sharing institutions for unpredictable losses, *Journal of Institutional and Theoretical Economics*, 155 (3): 505–515.
- Van Anrooy, R., Secretan, P.A.D., Lou, Y., Roberts, R. & Upare, M. 2006. *Review of the current state of world aquaculture insurance*. FAO Fisheries Technical Paper. No. 493. Rome, FAO. (also available at www.fao.org/3/a0583e/a0583e.pdf)

- Van Anrooy, R., Ahmad, I.U., Hart, T., Hotta, M., Ping, Y., Yang, W., Shipton, T., Benoit, C., Ruchismita, R., Upare, S. & Siar, S.V.** 2009. *Review of the current state of world capture fisheries insurance*. FAO Fisheries and Aquaculture Technical Paper No. 510. Rome, FAO. (also available at www.fao.org/3/i0744e/i0744e.pdf).
- Xinhua, Y., Pongthanapanich, T., Zongli, Z. Xiaojun, J. & Junchao, M.** 2017. *Fishery and aquaculture insurance in China*. FAO Fisheries and Aquaculture Circular No. 1139. Rome, FAO. (also available at www.fao.org/3/i7436e/i7436e.pdf).

APPENDIX 1

Profile of marine fisherfolk population by state, 2016

State/UT	Fishing villages (No.)	Fisher families (No.)	Number of marine fishers occupied				Total fisherfolk population (No.)
			Active fishers	Allied activities	Other than fishing	Total occupied	
West Bengal	171	81 067	92 341	32 620	291	125 252	368 816
Odisha	739	115 228	118 953	68 673	6 876	194 502	517 623
Andhra Pradesh	533	155 062	136 078	88 713	15 128	239 919	517 435
Tamil Nadu	575	201 855	218 694	77 308	17 692	313 694	795 708
Puduchery	39	14 347	12 493	6 820	1 197	20 510	50 270
Kerala	220	121 637	137 248	64 747	9 672	211 667	563 903
Karnataka	162	32 479	35 502	24 792	5 912	66 206	157 989
Goa	41	2 986	2 758	2 743	782	6 283	12 651
Maharashtra	526	87 717	76 928	94 852	12 042	183 822	364 899
Gujarat	280	67 610	77 943	54 899	6 821	139 663	354 992
Daman-Diu	12	3 163	3 867	632	131	4 630	15 836
Lakshadweep	10	4 163	6 488	2 553	1 848	10 889	27 934
Andaman & Nicobar	169	5 944	7 788	2 393	1 191	11 372	26 521
Total	3 477	893 258	927 081	521 745	79 583	1 528 409	3 774 577

Source: Marine Fisheries Census, 2016 (CMFRI-DoF, 2020b).

APPENDIX 2

Fishing crafts in coastal states of India by type

State/UT	Trawlers	Gill-netters	Dol netters	Liners	Ring seiners	Purse seiners	Others	Total mechanized	Motorized	Non-motorized	Total
West Bengal	2 004	1 764	191	31	0	0	24	4 014	6 564	476	11 054
Odisha	1 390	358	0	0	0	0	0	1 748	5 678	1 256	8 682
Andhra Pradesh	1 176	0	0	0	0	0	0	1 176	12 078	6 965	20 219
Tamil Nadu	5 022	441	0	16	219	0	7	5 705	31 279	6 115	43 099
Puduchery	223	0	0	0	78	0	0	301	1 362	656	2 319
Kerala	2 654	417	0	2	646	81	0	3 800	13 868	4 016	21 684
Karnataka	3 071	40	0	0	0	669	0	3 780	5 879	2 225	11 884
Goa	600	0	0	0	0	209	49	858	942	182	1 982
Maharashtra	3 408	584	1 637	0	0	230	8	5 872	6 788	2 865	15 525
Gujarat	9 875	2 556	1 552	0	0	0	0	13 983	11 123	756	25 862
Daman-Diu	1 063	342	14	0	0	0	0	1 419	396	177	1 992
Total	30 486	6 502	3 394	49	943	1 189	88	42 656	95 957	25 689	164 302

Source: Marine Fisheries Census, 2016 (CMFRI-DoF, 2020b).

APPENDIX 3

Coverage of fishers under the PMSBY scheme by state

State	Number of fishers insured in 2018–19
Bihar	58 277
Chhattisgarh	205 897
Goa	11 840
Himachal Pradesh	12 650
Jammu & Kashmir	15 961
Jharkhand	37 856
Karnataka	40 641
Madhya Pradesh	131 451
Maharashtra	46 900
Odisha	1 150 000
Punjab	3 416
Rajasthan	11 220
Tamil Nadu	481 386
Telangana	265 236
Uttarakhand	1 324
Uttar Pradesh	103 333
West Bengal	132 995
North-Eastern states	144 436
Union Territories	67 614
Total	3 039 374

Source: FISHCOPFED, 2020.

This *World review of capture fisheries and aquaculture insurance* presents the findings of five regional and four national studies conducted in 2020. An estimated 450 000 fishing vessels worldwide are covered by marine hull insurance. Nearly all of the estimated 67 800 large-scale industrial fishing vessels are covered by marine hull insurance, as well as 50–60 percent of the estimated 430 000 semi-industrial fishing vessels. However, over 95 percent of the 2.3 million motorized small-scale fishing vessels operate uninsured. Most small-scale fishers do not have access to adequate insurance services. Between 2009 and 2019 underwriting experiences in fishing vessel insurance were generally reported as “Good”. What is more, access to accident, life and health insurance services for crew on fishing vessels and small-scale fishers in developing countries has improved in recent years.

In 2020, the number of aquaculture insurance policies in force was estimated at over 40 000 worldwide, with China and Indonesia the largest markets for this type of insurance. While large-scale aquaculture producers are well served by the insurance industry, the provision of insurance is inadequate for medium-and small-scale farmers, particularly in Asia. Underwriting experiences for aquaculture stock mortality insurance were reported as “Good” to “Very good” (40 percent), or “Neutral” (36 percent) in the period 2009-2019. The insurance industry has consolidated the market and increased profitability in aquaculture insurance.

This world review also contains information on the capture fisheries and aquaculture insurance market, the prevailing underwriting practices, perils covered, policies in force, risk management and claim handling procedures. Finally, it offers a series of recommendations for increasing insurance service provision to the fisheries and aquaculture industries.

