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Charting a Path Towards Sustainable Seafood Resources in India: The Role of Voluntary Sustainable Standards

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Introduction

The rapid development and growth of the fisheries sector in India over the last couple of years has led to the sector playing an increasingly important role in the country's economy. Fisheries contribute to India's economy through increased employment, gross domestic product (GDP) and improved food security. The sector is, however, now faced with challenges to continued sustainability amidst concerns about overfishing, depleted stocks and illegal unreported unregulated fishing in the wild catch sector. In the aquaculture sector, concerns abound about landscape destruction,

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soil and water pollution, biodiversity loss, mangrove destruction, disease and chemical use (Mynar et al. 2013; Mishra et al. 2017).

Voluntary Sustainability Standards (VSS) are becoming important tools in efforts to ensure sustainability of seafood resources and ensure competitiveness of the sector in the global seafood market. Some of the more commonly known standards in the sector include the Marine Stewardship Council (MSC), the Aquaculture Stewardship Council (ASC) and the Global Aquaculture Alliance (GAA).

This chapter provides an overview of the emergence and use of VSS in the fisheries sector in India. It describes the contribution of India's fisheries sector to global fish production and trade, the sustainability issues associated with the sector, approaches to governance and management of fisheries resources, and the opportunities to scale up the impact of VSS as an increasingly important tool to support government, non-governmental organisations (NGOs) and industry efforts to promote a more sustainable approach to fisheries production in the country.

Capture and Aquaculture Production

India is one of the major fish producing countries in the world. It ranks second in global fish production and contributes over 3% of global marine and freshwater capture fisheries and about 6.3% of the world's total fish production (FAO 2016; National Fisheries Development Board 2016). Both wild capture and aquaculture (fish farming) are important to the fisheries sector in India and both sectors have seen significant development in the last few decades.

Wild Capture

India's Exclusive Economic Zone (EEZ) covers a total area of 2.02 million square Kilometre (sq. km). This is inclusive of 0.86 million sq. km on the west coast including the Lakshadweep Islands and 1.16 million sq. km on the east coast, including the Andaman and Nicobar Islands and a continental shelf of half a million sq. km (Sugunan 1997). This extensive coastline and the expansive continental shelf that can be found in some

parts of the country helps ensure India's role as a key seafood producing country. The annual marine capture is 3.59 million tonnes, making India the sixth most important country globally with respect to marine capture production (FAO 2018).

India's waters support a high diversity of marine species, of which several are of high commercial importance. Some of the more important species that dominate production in the marine capture sector include oil sardine, which makes up about 12.9% of total marine fish landings. Others are Indian mackerel, Bombay duck, penaeid prawn, ribbonfishes, threadfin breams and cephalopods. Some of the states with the highest seafood production in India include Gujarat, Karnataka, Kerala, Maharashtra and West Bengal (FRAD, CMFRI 2017).

In addition to its marine capture fisheries, the country also has important inland fisheries resources, comprising a network of rivers, reservoirs, flood plains, ponds, lakes and estuaries. Landings from inland waters amount to 1.46 million tonnes (ICAR-CIFRI 2017) with some of the most important inland capture species, including carps, catfish, trout and Indian shad.

Aquaculture

India's natural aquatic resources also provide the basis for the significant growth that India has seen in the aquaculture sector in the last couple of years. According to the Food and Agriculture Organization (FAO) (2018), total production from the aquaculture sector came to 5.7 million tonnes in 2016, making India the second most important country for farmed seafood products.

There is relatively little fish farming in the sea in India, and most aquaculture production comes from freshwater and coastal areas. The most important farmed species in India include carp, catfish, pangasius and prawns. Production systems range from extensive systems with little input beyond stocking with fish seed, to much more intensive forms involving feeding and fertilisation. Some of the most important states for aquaculture production include Andhra Pradesh and West Bengal. A more recent development in India is aquaculture of marine species of bivalves (mussels and oysters) and high value finfish such as Cobia and Pompano.

Growth and Development of the Sector

Fish production in India grew 11-fold in the last 60 years, growing from 0.75 million in the early 1950s to a production level of 9.6 million tonnes in 2012–2013 (FAO 2017). Its contribution to GDP amounts to 1.21%, and to 5.3% of agricultural GDP (Infantina et al. 2016).

The growth of the sector follows decades of technological innovation, year on year increases in fleet capacity, and increased private and public investment in the sector which has contributed to transforming the sector from the low input, highly traditional, subsistence production systems to the highly commercial and much more industrial approaches that typify a significant proportion of both the capture and culture sectors today.

In addition to its economic value, and its importance as a source of protein, the seafood sector is an important source of livelihoods in India. The population of marine fishermen in the country is estimated at 4.0 million, of which 0.99 million are active fishermen (CMFRI 2010). The sector also provides millions of related work opportunities in the post-harvest, aquaculture and trade, bringing the number of people directly and indirectly employed in the sector to an estimated 14 million people (National Fisheries Development Board 2016).

National policy on fisheries in the country has in the past largely focussed on growth and economic development. This meant a focus on increasing production and investment in capacity and infrastructure with clear dividends in terms of economic returns and global positioning as a major player in the seafood sector. The new national policy on marine fisheries places emphasis on sustainability, ecology and equity.

The rapid growth in the sector has led to increased employment, significant economic benefits and improved food security. However, the sector is now faced with challenges to the continued sustainability of this growth and threats to livelihoods due to growing concerns about over-fishing, depleted stocks, decreasing catch rates for some species, degradation of habitats and resources, illegal, unreported, unregulated fishing and stock depletion in the wild catch sector and in the aquaculture sector, concerns about landscape destruction, soil and water pollution,

biodiversity loss, mangrove destruction, and effect of chemical use (Bhavsar et al. 2016; Jayanthi et al. 2018).

The Seafood Industry and Trade

India plays a significant role in the global trade in seafood. It is the sixth largest seafood exporting country in the world, exporting seafood valued at 5.54 billion USD to over 70 countries, with key importing countries, including Japan, the USA, the European Union, China, Hong Kong, the UAE, Canada, Singapore and Thailand (Sam et al. 2015; FAO 2018). In addition to its contribution to the export sector, the industry also supports a vibrant domestic market.

The Domestic Sector

The bulk of fish produced in India is consumed domestically, of which the bulk is marketed fresh, while the remaining is sold as smoked, dried or is processed into fishmeal. The domestic industry is unorganised and considered to be inefficient with the presence of many intermediaries between the consumer and producer. Intermediaries in the chain provide a range of services, which include processing, preservation, packing and transportation. Key intermediaries include auctioneers who provide first contact for the producer, wholesalers, retailers and vendors, who then sell on directly to consumers.

Domestic seafood trade in India faces many challenges, including high perishability of seafood, but also the high cost of storage and transportation relative to domestic prices. These in turn lead to problems with quality, safety and guaranteed supply of seafood.

The Export Sector

India plays a key role in the global trade in seafood. Key export products include shrimp, squid and a diverse range of finfish. Frozen shrimp makes

up a significant contribution to the value of exports, contributing 19.24% by volume and 41.62% by value (Salim 2012).

The export sector is much better organised, compared to the domestic sector. Investment has been used to great effect to develop the infrastructure required to meet international food safety and quality requirements, and many coastal states are well served with Individually Quick Frozen (IQF) facilities, ice plants, cold storage facilities and processing factories to enable exporters to meet requirements of importing countries.

The key intermediaries in the export sector are factory or commission agents, who transport fish from fishers directly to the processor or exporter, who then exports directly to importing companies.

The seafood export sector in India is supported by an agency set up by the government—the Marine Products Export Development Authority (MPEDA). MPEDA was set up with a mandate to promote seafood trade, with a specific emphasis on exports. MPEDA supports the sector to ensure quality assurance, diversification and promotion through specification of standards, provision of training, inspections and marketing and promotion in international markets.

The export sector also has challenges of its own. These include irregularity in supply of raw material, competition for supply, high cost of production, low profit margins, low value addition and strict quality control requirements in key importing markets. A key challenge is the growing concern about the impact of fish production activity on fisheries resources and associated ecosystem and the implication this has for future seafood supply, food security and livelihoods.

The increasing interest in sustainability in top destination markets for seafood from India represents both a challenge and opportunity for the sector. A growing number of importers in the USA and the European Union request certification to sustainability standards to provide assurance about the environmental credentials of their products. While this development may be considered a constraint to trade, it also presents an opportunity through the possibility of certification leading to increased access to markets where there is interest in sustainability, and the consequent protection and improvement of the state of fish stocks in the country's waters.

Sustainability Issues

Globally, there continues to be concern about the status of the world's fish stocks. According to FAO, the proportion of stocks worldwide that are within biologically sustainable levels has been showing a downward trend in the last couple of decades. FAO estimates that 33.1% of fish stocks are fished at levels that are biologically unsustainable and that 59.9% of stocks are maximally sustainably fished with no room for further expansion (FAO 2018).

India is not exempt from the downward trend that has plagued global fisheries over the last few years. An emphasis across central and state governments on increased production through investments in improved technology and infrastructure has helped India increase its contribution to global seafood supply. However, in many instances, it has resulted in serious impacts on the state of fisheries resources. The fisheries sector in India faces many issues which have implications for sustainability of the resource. These include open access, overcapacity, which is estimated at 56% across different gear types and states (Mohamed et al. 2017), weakness of state and national level legal and policy frameworks, low capacity for monitoring control and surveillance and data gaps on sustainability of key stocks. While many tropical, short-lived species can withstand high fishing pressure to some degree, studies suggest that many important commercial stocks including perches, croakers, threadfin breams, seer, ribbonfish, skates and sharks may already be overfished, and some stocks are already in a severely depleted state and unable to withstand further fishing pressure (Korokandy 2008; Karnad and Karanth 2013; CMFRI 2017). In addition to the impact on commercial species, there is the effect of fishing activity on other species of importance in the ecosystem and habitat degradation consequences. Other issues include conflicts due to competition for dwindling resources and consequent disruptions to livelihoods and food security of those dependent on the resource.

The significant investment in aquaculture in India starting in the 1980s led to a major transformation of the aquaculture sector, which was previously traditional and low intensity. This growth, while contributing to economic growth, has led to significant environmental and social

impacts. Key issues faced in the sector over time included salt-water intrusion into freshwater bodies, release of contaminants into water sources, social imbalances and mangrove loss (Puthucherril 2016). Other issues that challenge the long-term sustainability of the aquaculture sector include disease outbreaks and collection of fry from the wild with the implications this has for wild capture stocks.

There are a range of efforts to mitigate the impact of seafood production on the environment. These include efforts by governments to improve the institutional framework for the sustainable management of resources. Non-governmental organisations also play a role in encouraging a shift towards a more socially and ecologically sustainable approach to sustainability through campaigns, awareness, capacity building and technical support. The scale of the threat and the immediacy and significance of the potential consequences calls for a range of tools and solutions to mitigate potential impact.

Resource Management

India's legislation and policy on sustainable management of seafood resources is framed within the context of a range of binding and non-binding international and regional instruments to which the country is a signatory. One of the most important instruments is the United Nations' FAO Code of Conduct on Responsible Fishing, which provides principles for conservation and management of fisheries and aquaculture resources. Other key instruments to which the country is subscribed include United Nations Fish Stock Agreement, United Nations Convention on the Law of the Sea and FAO's Voluntary Guidelines on Sustainable Small-Scale Fisheries.

Wild Capture Fisheries

Marine fisheries in India are regulated by both central and state governments. The state has jurisdiction over its territorial waters and the central government has authority up to the Exclusive Economic Zone, with

administration of fisheries in this zone lying with the Ministry of Agriculture of the Government of India.

The regulatory framework for marine fisheries management for states is provided by the Marine Fisheries Regulation Act (MFRA) (Infantina et al. 2016). The act provides guidelines to maritime states to enact laws for protection of marine fisheries by regulating fishing in territorial waters. The most important instrument under MFRA is the seasonal ban of mechanised fishing for 47 days. In 2010, a uniform fishing ban period was implemented along the west coast from 15 June to 31 July and from 15 April to 31 May along the east coast. In 2015, the government extended the fishing ban beyond 12 nautical miles to 61 days from 1 June to 31 July in the west coast and from 15 April to 14 June in the east coast (The Hindu 2015).

In 2017, the government adopted a revision of the 2004 Marine Fisheries Policy following an extended period of consultation. The overarching goal of the policy is to ensure the health and ecological integrity of the marine living resources of India's EEZ through sustainable harvests for the benefit of present and future generations (Government of India 2017). The policy is based on seven pillars, namely, sustainable development, socio-economic upliftment, subsidiarity, partnership, intergenerational equity, gender justice and the precautionary approach. Key provisions of the policy include management of fishing effort, species and area-specific management plans, conservation of ecologically and biologically significant areas and vulnerable marine ecosystems and the protection of iconic, endangered and threatened species. It also includes provisions for legislative support that will ensure that tenure rights of traditional fishermen are protected. Significantly, the revised policy acknowledges the growing importance of market-based eco-labelling programmes as a tool to ensure sustainability of fisheries and includes a commitment to create an enabling environment for environmental labelling of key fisheries that ensure benefits to stocks, the industry and fish workers.

Aquaculture

With respect to aquaculture, the regulation of brackish and coastal aquaculture falls under the central government, while freshwater and inland aquaculture is regulated by the states. Regulations are provided within the Coastal Aquaculture Authority Act of 2005, under which the Coastal Aquaculture Authority (CAA) is established. The CAA has the responsibility of regulating all activities related to coastal aquaculture and protecting the coastal environment from the impact of aquaculture. The CAA regulates the construction and operation of aquaculture facilities, develops standards for inputs and effluents and oversees the registration of aquaculture facilities (Coastal Aquaculture Authority 2006).

Non-Governmental Initiatives

NGOs in India play an important role in ensuring sustainable fisheries and aquaculture production. Several NGOs are working in India to tackle the emerging environmental issues that have accompanied India's rapid development over the last few decades. Many of these organisations have a focus on marine and other aquatic related issues. The role of these NGOs includes undertaking research to support policy development, building awareness of sustainability issues amongst the public and capacity building.

Key organisations include World Wildlife Fund India (WWF-India), which, amongst other things, works to encourage public participation in environmental protection through environmental education, awareness and capacity-building and to promote improved environmental governance through legislation, policy and advocacy (WWF 2017). WWF-India also works to spread the awareness of sustainable standards for fisheries and aquaculture and have been instrumental to the certification of the first fishery and farms to be evaluated against VSS in the country. Other organisations include Greenpeace India, which works to promote sustainability through advocacy and campaigns for co-management with fishing communities and strengthening of regulations and enforcement. The International Collective in Support of Fishworkers (ICSF) is another

important NGO with a specific programme for fisheries. ICSF focuses on social issues for fisheries and fair and sustainable management of resources for small-scale fisheries.

Voluntary Sustainability Standards for the Seafood Sector

VSS have emerged as an important tool to promote sustainable seafood production. Its growth and uptake in the sector has followed increasing public concern and awareness of the poor state of many fish stocks, depletion of iconic marine species, damage to important habitats, impact of fish farm wastes and escapes on the environment, use of pesticides and the effect of fishing activity on overall aquatic ecosystem health.

The use of VSS in the seafood sector is a more recent development compared to its use in other commodity sectors. The first seafood eco-labelling initiatives to come into existence focused on single issues and did not have a wider ecosystem approach. This included the dolphin safe label set up by the Earth Island Institute in 1990, which is centred on the use of a global standard on dolphin safe fishing practices.

Since then, other VSS with a more ecosystem-based approach have emerged. Growth has been dynamic with total seafood certified to VSS across wild and aquaculture growing from 500,000 tonnes in 2003 to 23 million tonnes in 2015 (Potts et al. 2016).

FAO's decision to adopt a set of guidelines for the eco-labelling of fish and fishery products from marine capture fisheries in 2005 signalled the growing importance of eco-labelling in the fisheries sector. A revised version of the guidelines was released in 2009. This was followed with the adoption of a set of guidelines for eco-labelling of fishery products from inland capture fisheries and Technical Guidelines on Aquaculture Certification in 2011.

The FAO guidelines provide a baseline reference for how eco-labelling programmes should be implemented, but crucially, they also provide guidelines on the minimum criteria for standards for fisheries and aquaculture. The minimum substantive guidelines for marine and inland

capture fisheries cover several key features, which include management systems, stock health and ecosystem considerations. The guidelines also specify requirements for standard setting, certification and accreditation (FAO 2009, 2011). The FAO aquaculture certification guidelines specify minimum substantive criteria for animal health and welfare, food safety, environmental integrity and socio-economic aspects. In all cases the guidelines are aimed at ensuring that the set-up and use of VSS for certification and eco-labelling in the seafood sector are based on the principles of transparency, accountability, best scientific evidence, clarity, non-discrimination and accessibility.

In 2015, the Global Sustainable Seafood Initiative (GSSI), a tool to benchmark standards against the FAO wild capture and aquaculture guidelines, was launched. Five standards, the Alaska Responsible Fisheries Management Certification programme, the Iceland Responsible Fisheries Management Certification programme, the Marine Stewardship Council, Best Aquaculture Practices Certification and GLOBALG.A.P. Aquaculture Certification system have been recognised by the GSSI as conforming to FAO guidelines.

VSS for seafood have been developed by national and regional government initiatives and international non-governmental initiatives. However, while a few governments have initiated the development of national standards for seafood eco-labels, to date, there has tended to be a much higher uptake of independent, international, non-governmental standards compared to VSS set by national governments.

Some of the key VSS initiatives include the following:

Marine Stewardship Council

The MSC is the most well-known seafood eco-labelling programme. Since it was launched as an initiative in 1997, the MSC has seen 12% of the world's wild caught marine catch engage in its programme. This represents some 300 fisheries from over 34 countries including India (MSC 2017a).

At the heart of the MSC is an international fisheries standard which has three principles. The principles look at (1) the state of the stock, (2)

the impact of the fishery on the ecosystem and (3) the management system in place to ensure delivery of the first two principles. The three principles are further elaborated by 28 performance indicators.

If a fishery is successfully assessed against the MSC Standard, products from the fishery become eligible to use the MSC's eco-label.

In addition to the fisheries standard, the MSC also has a Chain of Custody standard. The Chain of Custody standard provides assurance that the product with the label came from a certified fishery.

The MSC has a range of initiatives and policies designed to increase access of small-scale fisheries and fisheries in the global south to the MSC standard and programme. Some of the initiatives include development of a risk-based framework, which is a tool utilised by certifiers where data to demonstrate sustainability is limited. There are other initiatives and tools to support fisheries that are working towards becoming sustainable and achieving certification.

In 2014, stakeholders celebrated the certification of the first fishery in India, the Ashtamudi Clam Fishery, to the MSC standard. Prior to its certification in November 2014, the fishery undertook a period of improvement, which involved the Central Marine Fisheries Research Institute, the Kerala State Fisheries Department and WWF-India. In addition, the Ashtamudi Clam Fishers formed Ashtamudi Clam Fisheries Governance Council to develop management measures and represent the fishery at regional and state levels (Mohamed and Malayilethu 2015). These measures enabled the fishery to meet the MSC's sustainable fisheries standard and demonstrate the role of VSS as a mechanism to contribute to sustainability.

The MSC identified India as a target country for increased focus in its 2017–2020 Integrated Strategic Plan. The strategic plan outlines the intent to establish partnerships with the government, NGOs and the industry to develop projects and work with partners to encourage fisheries to put in place improvements that are needed for them to achieve MSC certification (MSC 2017b).

There are several other fisheries in India going through a transition phase and working on improvements with a view to eventually qualifying for certification to the MSC standard. These fisheries started out with pre-assessments to understand their performance gaps in relation to the

standard, followed by the development and implementation of action plans in collaboration with partners including government, business and NGOs. Some of the fisheries in the improvement phase and working towards certification to MSC include the Lakshadweep tuna fishery and the Indian oil sardine fishery (Gopal and Boopendranath 2013). Areas of improvement that these fisheries are working on include improving bait management for the Lakshadweep tuna fishery and developing harvest control rules for the oil sardine fishery.

MSC's third-party certification programme involves the use of third-party certification or conformity assessment bodies, accredited by Accreditation Services International (ASI). ASI has accredited 27 bodies globally to undertake MSC assessments (ASI 2017). Several of these accredited bodies, including Bureau Veritas, DNV GL, SCS Global Services and SGS Nederland BV, have local offices and auditors in India that provide capacity for local services in India. These auditors provide expertise for the audits for the over 20 MSC Chain of Custody certificates that have been issued in India.

The market in India for products certified to the MSC standard is less well developed, although a handful of eco-labelled products are available in some very niche outlets in the country. Currently, the greatest driver for MSC certification is from markets outside of India. However, a growing middle class in India with increased awareness of sustainability issues and the presence of transnational corporations with global commitments to sustainability points to the likelihood for an increased demand for sustainable seafood in India in the near future.

Friend of the Sea

Friend of the Sea is a non-profit, non-governmental organisation founded by the Earth Islands Dolphin safe project. The scope of the Friend of the Sea includes both fisheries and aquaculture. Two certification bodies, DNV GL and Rina Services S.p.A., have been accredited to carry out audits for Friend of the Sea.

The fisheries standard considers fish stocks, bycatch, seabed impact, compliance with regulation, carbon footprint reduction and social

accountability. The aquaculture standard covers critical habitat impact, escapes, water quality, Genetically Modified Organisms, social accountability and carbon footprint reduction.

Globally, about 100 aquaculture producers, based mainly in Europe, have been certified to the Friends of the Sea aquaculture standard. Globally 88 fisheries have been certified to the Friend of the Sea capture standard to date. This number includes two fisheries in India—the India oil sardine and yellowfin tuna. In addition to the wild capture sector, 517 metric tonnes of farm-produced fish in India are certified to the Friend of the Sea standard (Potts et al. 2016).

Naturland

Naturland is a non-governmental organisation which functions as a private certification body and an organic farmers association and has been operational since 1982. In 2006, Naturland started to operate a seafood standard called the Naturland wild fish standards for marine and inland capture fisheries. The standard outlines requirements for working conditions, protection of target stocks, protection of the ecosystem and stable business relationships along the seafood value chain (Naturland 2017). It also considers the methods by which products are processed and requires that these meet criteria for organic products. Globally, there are at least two fisheries certified to the Naturland standard. This includes the Lake Victoria Nile perch fishery and a herring fishery in the Bay of Greifswald on Rugen and Usedom. There are currently no wild caught Naturland certified fisheries in India.

Aquaculture Stewardship Council

The Aquaculture Stewardship Council (ASC) is an independent, international non-profit organisation that manages a certification and labelling programme for responsible aquaculture.

ASC has eight standards which cover 12 species including abalone, clams, mussels, oyster, scallop, freshwater trout, pangasius, salmon,

shrimp, tilapia, seriola and cobia. The standard covers environmental issues, which are inclusive of controls for the use of antibiotics and pesticides, use of sustainable feed, water quality and ecosystem impact. The scope of the standard extends to social issues and requires fair working conditions and contracts for farm workers. It also includes indicators that measure the impact of farms on the community.

Globally, there are 27 Conformity Assessment Bodies that are accredited to undertake assessments against ASC's standards. Some of them, including DNV GL and Bureau Veritas, have local branches in India.

There are 45 farms in India, mostly for white leg shrimp that are engaged in the ASC programme. Twenty-eight of these are already certified, and seventeen are undergoing full assessment.

ASC's strategic plan identifies increased output of certified seafood and availability of labelled products in Asia as a priority (ASC 2017). This can be expected to include India, given the current extent of ASC presence in the form of certified farms, and the importance of India to aquaculture in the region. To support its proposals to increase uptake, the ASC intends to operate an Aquaculture Improvement Program, which would be of significance in countries where a significant level of improvements may be required before farms are able to meet the standard.

Global Aquaculture Alliance: Best Aquaculture Practices

The Global Aquaculture Alliance (GAA) is an international non-governmental, industry-led organisation that was set up in 1997, with a mission to promote responsible aquaculture practices through education, advocacy and demonstration. GAA operates a standard called Best Aquaculture Practices (BAP). The standard covers environmental responsibility, social responsibility, food safety, animal welfare and traceability for almost all aquaculture finfish, crustacean and mollusc species and extends to the entire production chain including farms, processing facilities, feed mills and hatcheries.

Certification to the BAP standard involves third-party onsite audit against the appropriate BAP standard by an assigned certification body.

Worldwide, there are over 1600 facilities that are certified to the BAP standard. This includes 305 facilities in India, inclusive of farms, hatcheries, feed mills and processing plants that are certified to BAP standards. In terms of volume, India accounts for 0.5% of global tonnage certified to the BAP standard (Potts et al. 2016).

Auditing capacity for the BAP standard is represented in India through organisations such as SGS Nederland BV and Bureau Veritas.

GLOBALG.A.P.

GLOBALG.A.P. provides international standards for a range of farm products including aquaculture. GLOBALG.A.P.'s aquaculture standard includes criteria for legal compliance, food safety, workers' occupational health and safety, risk assessment for social practices, animal welfare and environmental and ecological care (GLOBALG.A.P. 2018). The scope of the standard extends through the whole production chain, including broodstock collection, seedlings, feed suppliers farming and processing, and applies to a wide range of finfish, crustaceans and molluscs. To become certified to the GLOBALG.A.P. standard, facilities are evaluated by a certification body on an onsite inspection. The first Indian aquaculture producer certification to the GLOBALG.A.P. aquaculture standard was in 2013 (GLOBALG.A.P. 2018).

International Fishmeal and Fish Oil Responsible Supply

The International Fishmeal and Fish Oil Responsible Supply (IFFO RS) is a third-party certification and auditing programme, operational since 2009 and owned by the International Fishmeal and Fish Oil (IFFO) organisation. IFFO RS operates three standards and includes the IFFO RS standard for responsible supply, IFFO RS Chain of Custody and IFFO RS Improver Programme. The IFFO RS responsible supply standard includes fisheries and factories within scope. The themes addressed by the standard include responsible sourcing of raw material, traceability, manufacturing practices, social accountability and community

engagement. There are currently no fisheries in India certified to the IFFO RS standard.

Other Voluntary Sustainability Standard Initiatives

There are a range of other VSS initiatives which are potentially important to India. These include seafood rating initiatives such as sustainable seafood guides provided by WWF and the Monterey Bay Aquarium. There are other initiatives that are national in terms of their scope, but they may become more important to the fisheries sector in India if the use of such initiatives becomes significant in the retail sector of countries that are of export interest to India. Examples of national VSS include the Iceland Responsible Fisheries Management Certification, which is applicable to Icelandic vessel fisheries operating in Icelandic EEZ and to shared pelagic stocks on the high seas targeted by Icelandic vessels (Iceland Responsible Fisheries Foundation 2016). Another example is Marine Eco-Label (MEL) Japan, a national eco-label in Japan, which is an important export country for India. MEL Japan is an initiative that was formed for Japanese fisheries through a partnership of the Japan Fisheries Association and the government (Swartz et al. 2016).

Voluntary Standards and Seafood Sustainability Governance in India

Compared to other parts of the world, specifically Europe and North America, the use of VSS in the seafood sector in India, either as a supplier or in the domestic market is low. The main driver for certification to VSS in India currently appears to be international markets, particularly markets where there is higher public awareness about sustainability issues in the seafood sectors. There are, however, emerging trends backed up with research that suggest that changing economic, social and psychographic attributes of India's consumer class is leading to a growing interest in ethical and sustainability attributes of products (Pande 2017). If this extends

to interest and concern about sustainability of fisheries resources, it would enhance the incentives for fisheries to comply with VSS.

As with many other developing countries, there are a range of factors that constitute a barrier to mainstream use of VSS in the capture fisheries and aquaculture sector. Some of the typical constraints include cost of certification, difficulty meeting certification requirements, limited data availability to demonstrate compliance with requirements, lack of awareness and understanding of VSS and how they operate (Ramachandran 2010; Oloruntuyi 2010; Washington and Ababouch 2011; Stratoudakis et al. 2016).

While the actual uptake of VSS for seafood product in India is low, there is clearly recognition within India, including by the government, of the role that VSS can play in encouraging social and environmental responsibility and sustainability.

In 1991, the government, through the Ministry of Environment and Forests, set up a scheme to provide a voluntary eco-label—ECOMARK—to products from a set of product categories certified as meeting specified environmental criteria. The initiative, to be managed by the Bureau of Indian Standards, was introduced for up to 16 product categories, although it did not include the seafood sector.

In 2012, the National Academy of Agricultural Science (NAAS), a government agency, proposed that India should formulate principles and criteria for certification of fisheries and recommended the implementation of pilot projects in India in collaboration with other VSS (NAAS 2012).

Another institution, the Quality Council of India, set up by the Ministry of Commerce and Industry, is the secretariat for the Indian National Private Sustainability Standards Platform (Indian PSS Platform). The platform has several objectives, which include fostering sustainability across all business, trade and production sectors, to bring transformative change to production and consumption patterns in India and to promote sustainable public procurement either through voluntary or private sustainability standards. An indication of the growing importance of VSS to government is that the Quality Council of India is currently working with the United Nations Forum on Sustainability Standards (UNFSS) to provide a dialogue platform to address issues on leveraging trade,

standards and value chains as tools for sustainable development in a range of sectors, including fisheries (ICSTS-QCI 2018).

Further evidence of the growing interest in VSS for seafood in India comes from a recent commitment made by a group of stakeholders in India to initiate and implement Fishery Improvement Projects for ten fisheries. The ambition is for the fisheries to eventually attain MSC certification (Intrafish 2018).

Conclusion

The uptake and engagement with VSS in the seafood sector in India is still in its early stages and the proportion of certified tonnage of seafood from India compared to global tonnage is still low. As such, it is too early to draw overarching conclusions of the impact of VSS at a national level.

There are, however, individual case studies that demonstrate sustainability improvements that have resulted from the use of VSS (WWF 2014; Mohamed and Malayilethu 2015). These have often followed collaboration between government, NGOs and business organisations, with these collaborations leading to a range of outcomes such as improvements in management and improvements in information and data to support management. The role of VSS in these early stages has therefore been to provide a framework within which to chart out progress towards sustainability, to facilitate collaboration required to support fisheries progressing towards certification and to signal the market benefits available to fisheries that are managed in a sustainable manner.

These examples, and the growing global market in the use of VSS, explain the growing interest in VSS in India. These developments are also consistent with the direction of fisheries policy in India, with its increasing focus on sustainable management of resource through management of fishing effort and biodiversity conservation in production processes. More specifically, India's new fishery policy, which commits the government to creating an enabling environment for the promotion of eco-labelling of key Indian fisheries that benefits fish stocks, the seafood industry and fishers, is a recognition of the role that VSS can play in promoting sustainability.

The recognition of the role of eco-labelling by the government, the important role of India in seafood trade and production, budding consumer interest in ethical issues and the initial, albeit still nascent, successes with certification to VSS in the country to date, signal the opportunities that exist within India to include VSS within the armoury of tools to promote a more sustainable approach towards utilisation of aquatic resources for fish production in India. The actual outcome and impact will depend very much on commitment from stakeholders both within and outside of India, inclusive of government, businesses and NGOs. However, many of the key ingredients for success, including awareness of VSS, market pull, NGO engagement in transition initiatives and government support for seafood sustainability initiatives are steadily coming into place and provide the basis for optimism about prospects for seafood VSS in India.

Key Takeaways

- India plays a significant global role in the trade and production of seafood.
- The rapid development of the sector has been accompanied with sustainability concerns.
- There is growing recognition in India of the role of VSS as a marketing and conservation tool.
- Sector-wide uptake of VSS is faced with a range of challenges; however, recent trends and development, both locally and internationally, indicate a likely increase in uptake of VSS in the future.
- Continued collaboration and partnerships amongst stakeholders, and particularly partnerships with the government, are required if seafood VSS are to have any significant impact as a tool to deliver sustainability of fisheries resources in India.

References

ASI. 2017. Find a CAB. Accessed September 12, 2017. <http://www.accreditation-services.com/about/asi>.

- ASC. 2017. Aquaculture Stewardship Council 2017–2018 Strategic Overview. Accessed June 25, 2018. <https://www.asc-aqua.org/wp-content/uploads/2017/07/ASC-STRATEGIC-PLAN-2015-2017.pdf>.
- Bhavsar, Dhara O., Himanshu A. Pandya, and Yogesh T. Jasrai. 2016. Aquaculture and Environmental Pollution: A Review Work. *International Journal of Scientific Research in Science, Engineering and Technology* 2: 40–45.
- Central Marine Fisheries Research Institute. 2010. The Marine Fisheries Census, India. Accessed August 12, 2017. http://eprints.cmfri.org.in/8998/1/India_report_full.pdf.
- Central Marine Fisheries Research Institute. n.d. Quinquennial Review Report—Fisheries Resources Assessment Division. 2017. <http://www.cmfri.org.in/uploads/files/Achivementss.pdf>.
- Coastal Aquaculture Authority. 2006. *CAA Compendium of Acts, Rules, Guidance and Notifications*, 132pp.
- FAO. 2009. *Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries*. Revision 1. Rome: FAO.
- . 2011. *Technical Guidelines on Aquaculture Certification*. FAO Rome, 122pp.
- . 2016. The State of World's Fisheries and Agriculture. In *The State of World Fisheries and Aquaculture. Contributing to Food Security and Nutrition for All*. Rome: FAO, 200pp.
- . 2017. National Aquaculture Sector Overview. India. National Aquaculture Sector Overview Fact Sheets. Text by S. Ayyappan In *FAO Fisheries and Aquaculture Department* [online]. Rome. Updated 4 April 2014. Accessed September 15, 2017. http://www.fao.org/fishery/countrysector/naso_india/en.
- . 2018. The State of World Fisheries and Aquaculture 2018—Meeting the Sustainable Development Goals, Rome. Licence: CC BY-NC-SA 3.0 IGO.
- FRAD, CMFRI. 2017. Marine Fish Landings in India 2016. Technical Report, CMFRI, Kochi.
- GlobalG.A.P. 2018. India Embraces the GLOBALG.A.P. Aquaculture Standard. Accessed August 20, 2018. <https://www.globalgap.org/de/newsartikel/India-Embraces-the-GLOBALG.A.P.-Aquaculture-Standard/>.

- Gopal, T.K., and M.R. Boopendranath. 2013. Seafood Ecolabelling. *Fishery Technology* 50 (2013): 1–10.
- Government of India. 2017. National Policy on Marine Fisheries, Ministry of Agriculture and Farmers Welfare (Department of Animal Husbandry, Dairying and Fisheries) F. No. 21001/05/2014-FY (Ind) Vol. V.
- ICAR-CIFRI. 2017. *Annual Report 2016–17*. ICAR Central Inland Fisheries Research Institute, Barrackpore, 232pp.
- Iceland Responsible Fisheries Foundation. 2016. Responsible Fisheries Management Standard: A Tool for Voluntary Use in Markets for Products of Marine Capture Fisheries. Accessed June 26, 2018. <https://www.responsible-fisheries.is/files/pdf-skjol/certification/irfm-standard-revision-2.0-final.pdf>.
- ICSTS-QCI. 2018. International Convention on Sustainable Trade and Standards. Accessed August 14, 2018. <https://icsts.qci.org.in/>.
- Infantina, J.A., R. Jayaraman, T. Umamaheswari, B.S. Viswanatha, and L. Ranjith. 2016. Governance of Marine Fisheries in India: Special Reference to Tamil Nadu. *Indian Journal of Geo-Marine Science* 45 (10): 1225–1233.
- Intrafish. 2018. India's Stakeholders Prioritize 10 Fisheries for MSC. Accessed August 14, 2018. <http://www.intrafish.com/fisheries/1467675/indias-stakeholders-prioritize-10-fisheries-for-msc>.
- Jayanthi, M., S. Thirumurthy, M. Muralidhar, and P. Ravichandran. 2018. Impact of Shrimp Aquaculture Development on Important Ecosystems in India. *Global Environmental Change* 52: 10–21.
- Karnad, D., and K. Karanth. 2013. Perceptions Matter: How Fishermen's Perceptions Affect Trends of Sustainability in Indian Fisheries. *Oryx* 48 (2): 218–227.
- Korokandy, R. 2008. *Fisheries Development in India the Political Economy of Sustainable Development*. Delhi: Kalpaz Publications, 400pp.
- Mishra, S.S., R. Das, P. Choudhary, J. Debbarma, S.N. Sahoo, et al. 2017. Present status of Fisheries and Impact of Emerging Diseases of Fish and Shellfish in Indian Aquaculture. *Journal of Aquatic Research and Marine Sciences* 2017: 5–26.
- Mohamed, K.S., and Vinod Malayilethu. 2015. Ashtamudi Clam Fishery—An Example of Sustainable Management and Biodiversity Conservation. In *Biocultural Heritage and Sustainability*, 69–76. Thiruvananthapuram: Kerala State Biodiversity Board.
- Mohamed, K.S., K. Vijayakumaran, P.U. Zacharia, T.V. Sathianandan, G. Maheswarudu, V. Kripa, R. Narayanakumar, et al. 2017. *Indian Marine*

- Fisheries Code: Guidance on a Marine Fisheries Management Model for India*. CMFRI Marine Fisheries Policy Series No. 4.
- MSC. 2017a. *MSC Annual Report 2016–2017*, 48pp.
- . 2017b. *Teeming with Life: A Summary of the Marine Stewardship Council's Strategic Plan, 2017–2020*.
- Mynar, Babu, Jai Sankar, and V. Sreenivasulu. 2013. Impacts of Aquaculture on Water Resources Utilization and Land Resources of Krishna District Using with Remote Sensing and GIS Techniques. *International Journal of Engineering Trends and Technology (IJETT)* 4 (7): 3201–3206.
- NAAS. 2012. *Ecolabelling and Certification in Capture Fisheries and Aquaculture*. National Academy of Agricultural Sciences Policy Paper 53.
- National Fisheries Development Board. 2016. About Indian Fisheries. Accessed September 7, 2018. <http://nfdp.gov.in/about-indian-fisheries.htm>.
- Naturland. 2017. Naturland Standards for Sustainable Capture Fishery Version 5/2017.
- Oloruntuyi. 2010. *Winning with Certification*. Samudra Report, No. 56, 26–31.
- Pande, M. 2017. *The India Story: Impact of Private Sustainability Standards on Market Access and Sustainable Development*. United Nations Conference on Trade and Development Research Paper No. 9, UNCTAD/SER.RP/2017/9.
- Potts, J., A. Wilkings M. Lynch, and S. McFatrige. 2016. *State of Sustainability Initiatives Review: Standards and the Blue Economy*, 206pp.
- Puthucherril, T.G. 2016. Sustainable Aquaculture in India: Looking Back to Think Ahead. In *Aquaculture Law and Policy: Global Regional and National Perspectives*, ed. Nigel Bankes, Irene Dahl, and David L. Vander Zwaag, 289–312. Cheltenham: Edward Elgar Publishing.
- Ramachandran, A. 2010. Ecolabeling and Green Certification for Effective Fisheries Management—An Analysis. World Academy of Science. *Engineering and Technology* 41: 763–775.
- Salim, S. Shyam. 2012. Indian Seafood Industry and Post WTO—A Policy Outlook. In *World Trade Agreement and Indian Fisheries Paradigms: A Policy Outlook*, 17–26 September 2012, Kochi.
- Sam, S., M. Maheswaran, and B. Gunalan. 2015. Indian Seafood Industry Strength Weakness, Opportunities and Threat in the Global Supply Chain. *International Journal of Fisheries and Aquatic Studies* 3 (2): 199–205.
- Stratoudakis, Y., P. McConney, J. Duncan, A. Ghofar, G. Gitonga, K.S. Mohamed, S. Samoilys, S. Keith Symington, and L. Bourillon. 2016. Fisheries Certification in the Developing World: Locks and Keys or Square Pegs in Round Holes? *Fisheries Research* 182 (2016): 39–49.

- Sugunan, V.V. 1997. *Fisheries Management of Small Water Bodies in Seven Countries in Africa, Asia and Latin America*. FAO Fisheries Circular No. 933 FIRI/C933, 149pp.
- Swartz, W., L. Schiller, R. Sumaila, and Y. Ota. 2016. Searching for Market-Based Sustainability Pathways: Challenges and Opportunities for Seafood Certification in Japan. *Marine Policy* 76: 185–191.
- The Hindu. 2015. 61-Day Fishing Ban Beyond 12 Nautical Miles Stays. Accessed June 12, 2018. <https://www.thehindu.com/todays-paper/tp-national/tp-kerala/61day-fishing-ban-beyond-12-nautical-miles-stays/article7199967.ece>.
- Washington, S., and L. Ababouch. 2011. *Private Standards and Certification in Fisheries and Aquaculture: Current Practice and Emerging Issues*. FAO Fisheries and Aquaculture Technical Paper 553. Rome: FAO, 181pp.
- WWF-India. 2014. *Annual Report 2014*, 40pp.
- WWF-India 2017. Seafood. Accessed September 18, 2017. https://www.wwfindia.org/about_wwf/making_businesses_sustainable/seafood/.