

MATSYA SAMPADA

NEWSLETTER

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सत्यमेव जयते

Department of Fisheries
Ministry of Fisheries, Animal Husbandry and Dairying
Government of India
2024

राजीव रंजन सिंह उर्फ ललन सिंह
RAJIV RANJAN SINGH ALIAS LALAN SINGH



पंचायती राज मंत्री एवं
मत्स्यपालन, पशुपालन एवं डेयरी मंत्री
भारत सरकार
Minister of Panchayati Raj and
Minister of Fisheries, Animal Husbandry and Dairying
Government of India
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MESSAGE

I am delighted to learn that the Department of Fisheries is releasing the fifth edition of the newsletter "Matsya Sampada" on the occasion of 'Fisheries Summer Meet 2024'.

The fisheries sector in India is witnessing a tremendous growth since last ten years through the initiatives of Government of India especially under Pradhan Mantri Matsya Sampada Yojana (PMMSY). Today, India is among the top countries in capture fisheries and second largest aquaculture producing nation in the world. The sector is marching ahead with increased pace and has played an instrumental role in ensuring the food and nutritional security, employment generation and has immense potential. In this juncture, we as a Nation need to concentrate more on the conservation of its vast and diverse aquatic resources which is not only essential for food security but also to maintain ecological and socio-economic equilibrium.

This publication aims to provide valuable insights into the current state of our fisheries industry, including innovative practices, sustainability efforts, and policy developments. We believe this publication will serve as an essential resource for stakeholder, policymakers, researchers, and enthusiasts alike, offering comprehensive overview of the sector's growth trajectory and future prospects.

I am delighted to extend my heartfelt congratulations to Secretary, Department of Fisheries and his team for their untiring efforts in bringing out this useful publication. I sincerely hope that the readers will gain valuable insights and inspiration from the stories and perspectives shared by the stakeholders in this field.

(Rajiv Ranjan Singh)

प्रो. एस.पी. सिंह बघेल

राज्य मंत्री

मत्स्य पालन, पशुपालन एवं डेयरी तथा
पंचायती राज मंत्रालय
भारत सरकार



सत्यमेव जयते



पंचायती राज

Prof. S.P. SINGH BAGHEL

MINISTER OF STATE FOR
FISHERIES, ANIMAL HUSBANDRY &
DAIRYING AND PANCHAYATI RAJ
GOVERNMENT OF INDIA



MESSAGE

The Department of Fisheries remains steadfast in its commitment to advancing the fisheries sector through enhanced resource management, capacity building, technology transfer, and improved access to credit, inputs, and markets. Our initiatives are designed to support the development of the value chain, thereby augmenting livelihood opportunities, ensuring food security, and bolstering nutritional security across nation. India's seafood exports have experienced a remarkable surge, surpassing expectations despite the formidable challenges posed by the global pandemic. Under the visionary leadership of Hon'ble Prime Minister Shri Narendra Modi Ji the exports have soared to Rs. 60,523.89 crore in FY 2023-24 from Rs. 30,213 crore in FY 2013-14, marking a doubling of figures within a decade. Notably, the Blue Revolution scheme, Pradhan Mantri Matsya Sampada Yojana (PMMSY), Fisheries Aquaculture Infrastructure Development Fund (FIDF), Kisan Credit Card (KCC) have significantly contributed to the remarkable growth in fish production and export, setting unprecedented benchmarks in the industry.

This publication is poised to be a valuable resource in light of the current initiatives and the critical importance placed on the development of the fisheries sector. I extend my heartfelt gratitude to the Department of Fisheries, whose unwavering cooperation and diligence have been instrumental in the successful completion of this newsletter.

I would like to compliment Department of Fisheries for preparing this publication, which will serve as an important resource book for the fisheries sector. I am confident that "Matsya Sampada" will be a valuable resource for all those involved in the fisheries sector, aiding in their efforts to enhance productivity, sustainability, and economic growth.

I extend my best wishes for the continued success and prosperity of the Indian fisheries sector.

(Prof. S. P. Singh Baghel)

एडवोकेट जॉर्ज कुरियन
Adv. GEORGE KURIAN



राज्य मंत्री
मत्स्यपालन, पशुपालन एवं डेयरी और
अल्पसंख्यक कार्य मंत्रालय,
भारत सरकार
MINISTER OF STATE FOR
FISHERIES, ANIMAL HUSBANDRY & DAIRYING AND
MINORITY AFFAIRS
GOVERNMENT OF INDIA

MESSAGE

I am glad to know that Department of Fisheries is publishing fifth edition of newsletter 'Matsya Sampada'.

We all know that India's fisheries sector has demonstrated robust growth marked by significant increase in production, modernization of infrastructure, expansion of aquaculture practices and substantial contribution. This growth has provided livelihood to millions of people, particularly in coastal areas. Emphasis on sustainability and technological advancement continues to drive further progress in this vital sector of India's economy.

'Matsya Sampada' has provided a platform for disseminating valuable insights, best practices and policy updates in fisheries and aquaculture sector. This initiative has fostered greater awareness among stakeholders, facilitated knowledge sharing and promoted sustainable practices. The newsletter continues to play a pivotal role in driving innovation and supporting the sector's overall development trajectory.

I would like to extend my sincere appreciation and commendation to Secretary, Department of Fisheries and his team for the successful release of the newsletter. His dedication and leadership have played a pivotal role in bringing this informative publication to fruition.

I take this opportunity to extend my best wishes to all stakeholders and readers.

(George Kurian)

Dr. Abhilaksh Likhi, IAS
Secretary

डॉ अभिलक्ष लिखी, भा.प्र.से.
सचिव



सत्यमेव जयते



ONE EARTH - ONE FAMILY - ONE FUTURE

आज़ादी का
अमृत महोत्सव

भारत सरकार
मत्स्यपालन, पशुपालन एवं डेयरी मंत्रालय
मत्स्यपालन विभाग
कृषि भवन, नई दिल्ली-110001
Government of India
Ministry of Fisheries,
Animal Husbandry & Dairying
Department of Fisheries
Krishi Bhawan, New Delhi-110001

Message

Fisheries sector commenced purely as a traditional activity at the time of India's Independence. Over the past seventy-five years, the sector has gradually transformed into a commercial enterprise while maintaining its traditional and small scale character. During the last ten years, the annual fish production of India has increased from 95.79 lakh tons to an all-time record of 175.45 lakh tons in 2022-23. These production figures are a magnificent achievement in the endeavour of enhancing aquaculture farmers' incomes. This also indicates growing interest of youth in fisheries and aquaculture sector as a source of employment, income and entrepreneurship.

Government of India has taken transformational initiatives for holistic development of fisheries and aquaculture sector under the flagship of Pradhan Mantri Matsya Sampada Yojana (PMMSY). Since its inception, the Department of Fisheries (DoF) has been spearheading growth through consistent and coordinated efforts, effectively leveraging the sector's immense potential. The PMMSY scheme primarily focuses on adopting 'Cluster or Area based approaches' and creation of Fisheries clusters through backward and forward linkages. Special focus has been given for employment generation activities such as seaweed and ornamental fish cultivation. The scheme has emphasized on interventions for quality brood, seed and feed, with special focus on species diversification, critical infrastructure, marketing networks etc. Another scheme of GoI, Fisheries and Aquaculture Infrastructure Development Fund (FIDF) has been proved to be instrumental in upgradation of infrastructure of fisheries sector. As a result of which, the Union Cabinet chaired by Hon'ble Prime Minister Shri Narendra Modi approved extension of Fisheries Infrastructure Development Fund (FIDF) for another 3 years up to 2025-26 within the already approved fund size of Rs 7522.48 crore. Besides, the new sub-scheme Pradhan Mantri Matsya Samridhi Sah Yojana (PM-MKSSY) with an outlay of Rs 6000 crore launched in February 2024 aims to support formalization of the unorganized fisheries sector by creating a national fisheries digital platform for providing work-based identifies for 20 lakh fishers, fish farmers, fish vendors including the fisheries sector microenterprises and small enterprises by 2025.

It gives me immense pleasure to know that Department of Fisheries with the objective of disseminating information about governmental policies, recent events, and new technologies to all stakeholders and in alignment with PMMSY's objective has come out with the 5th edition of the newsletter "Matsya Sampada". This newsletter stands as a testament to our commitment to advancing knowledge, promoting best practices, and fostering innovation. Its launch marks a significant milestone in our efforts to disseminate valuable insights and updates to our stakeholders and the public at large.

I would like to place on record my appreciation for the consistent efforts put in by the editorial team towards making of this newsletter.

(Dr. Abhilaksh Likhi)

From the *Editorial Desk*

Welcome to the fifth edition of the newsletter 'Matsya Sampada' published by the Department of Fisheries, Ministry of Fisheries, Animal Husbandry, and Dairying, Government of India. It has been our constant endeavor to keep all stakeholders informed about government policies, programmes, and the latest opportunities in the fisheries sector.

During the last ten years, the Government of India has taken transformational initiatives for the holistic development of the fisheries and aquaculture sectors. During the last ten years, the annual fish production of India has increased by more than 83% from 95.79 lakh tonnes (at the end of FY 2013-14) to a record production of 175.45 lakh tonnes (at the end of FY -23), i.e. an increase of 79.66 lakh tonnes.

This initiative began with a vision to educate fishermen, fish farmers, and other stakeholders about the latest policies, programmes, and new initiatives of the department and their consequential impact. We believe that this newsletter will be a credible source of information about government policies, initiatives, and regulatory reforms in the fisheries sector. We give our readers crucial information in an easy-to-understand way to help them start a full-time business. Furthermore, the encouraging stories of fish farmers will certainly have a positive effect.

We extend our thanks to Dr. Abhilaksh Likhi, IAS, Secretary, Department of Fisheries; Shri Sagar Mehra, Joint Secretary (Inland Fisheries); and Smt. Neetu Prasad, IAS, Joint Secretary (Marine Fisheries) for their valuable guidance and suggestions, and we look forward to their continued guidance in making this newsletter.

We hope all our readers continue to benefit from the published material, and we extend our sincerest thanks to our readers and reviewers.

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SAGAR PARIKRAMA – A VOYAGE UNPRECEDENTED

Inspired by the vision of Hon'ble Prime Minister Shri Narendra Modi and spearheaded by the resolute Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Sagar Parikrama embarked on a monumental mission. It was a campaign unlike any other- a magnanimous endeavor to traverse the entire coastline, reaching the remotest coastal villages and towns, and forging a direct connection with the fisher folks. The objectives of the Yatra are to meet the fishers at their doorsteps and understand their issues and grievances, promote sustainable fishing, and publicize the schemes and programs of the government. Over 12 captivating phases, the

program meticulously navigated the diverse coastal tapestry of India. From the vibrant shores of Gujarat to the serene islands of Andaman & Nicobar, Sagar Parikrama meticulously charted a course that touched 79 coastal districts and 3071 villages through 162 formal and innumerable instances of informal interactions. This unprecedented outreach program ensured that interactions with fishermen and stakeholders weren't confined to meeting halls, rather unfolded in the very environments where their lives and livelihoods thrived.

Sagar Parikrama improves people's quality of life and economic well-being by acknowledging their





challenges and provides a good opportunity for fishermen to interact with government officials right on their doorstep. Sagar Parikrama became a catalyst for transformative change. Sagar Parikrama not only addressed the challenges faced by the communities but also empowered them through the dissemination of knowledge about sustainable fishing practices, government schemes such as Pradhan Mantri Matsya Sampada Yojana (PMMSY), Kisan Credit Card (KCC), and other programmes conducted by the Government of India. It embarked on a groundbreaking maritime journey tracing the coastal belt, weaving through

The journey of Sagar Parikrama began on the vibrant western coast of India and the first step of Sagar Parikrama journey started from Mandvi, Gujarat with the theme of “KRANTI se SHANTI” as Phase-I on 5th March 2022. The Yatra in twelve phases has covered Coastal states/UTs viz., Gujarat, Daman & Diu, Maharashtra, Goa, Karnataka, Kerala, Puducherry, Andaman & Nicobar, Tamil Nadu, Andhra Pradesh, Odisha and West Bengal. It reached out to more than 216.15 lakh in-person participants, covered nearly 114 locations with a coastal length 7440 km, covering 12 coastal states/UTs.



The twelve phases of the Sagar Parikrama Yatra represent a significant journey over numerous coastal regions, confronting varied hardships and encountering distinct cultures. It emerged as a platform for “Delivering at Doorstep,” offering tangible solutions and support to thousands of fishermen along the way. Spanning the entire coastline of India, the expedition provided invaluable firsthand feedback, illuminating the diverse aspirations and challenges faced by coastal population. By embracing a culture of learning and adaptation, Sagar Parikrama demonstrated a commitment to long-term sustainability, ensuring that the strides made during the journey would endure and flourish in the years to come.



coastal states/UTs, to express solidarity with all fishermen, fish farmers and concerned stakeholders in the spirit of Atmanirbhar Bharat and to promote the protection of marine ecosystem, addressing environmental challenges and to preserve the biodiversity and overall health of our oceans.



Extension of Fisheries and Aquaculture Infrastructure Development Fund (FIDF)

To realize the potential of fisheries sector in the country, the Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India during 2018-19 has created dedicated fund namely Fisheries and Aquaculture Infrastructure Development Fund (FIDF) with a total funds size of Rs 7522.48 crore. Fisheries and Aquaculture Infrastructure Development Fund (FIDF) has been proved to be instrumental in upgradation of infrastructure of fisheries sector.



Consequently, the Union Cabinet chaired by Hon'ble Prime Minister Shri Narendra Modi approved extension of Fisheries Infrastructure Development Fund (FIDF) for another 3 years up to 2025-26 within the already approved fund size of Rs 7522.48 crore.

In the earlier phase of implementation of FIDF during the period from 2018-19 to 2022-23, a total 121 fisheries infrastructure projects with an investment cost of Rs. 5588.63 crore have been approved for creation of various fisheries infrastructures. Extension of FIDF will further intensifies development of various fisheries infrastructures like fishing harbours, fish landing centers, ice plants, cold storage, fish transport facilities, integrated cold chain, modern fish markets, Brood Banks, Hatcheries, aquaculture development, Fish Seed Farms, state of art of fisheries training centres, fish processing units, fish feed mills/plants, cage culture in reservoir, Introduction Deep Sea Fishing Vessels, disease Diagnostic Laboratories, Mariculture and Aquatic Quarantine Facilities.

FIDF will continue provides concessional finance to the Eligible Entities (EEs), including State Governments/ Union Territories for development of identified fisheries infrastructure facilities through Nodal Loaning Entities (NLEs) namely National Bank for Agriculture and Rural Development (NABARD), National Cooperatives Development Corporation (NCDC) and All scheduled

Banks. The Government of India provides interest subvention up to 3% per annum for the repayment period of 12 years inclusive of moratorium of 2 years for providing the concessional finance by the NLEs at the interest rate not lower than 5% per annum.

The Government of India also provides credit guarantee facility to the projects of entrepreneurs, individual farmers and cooperatives from the existing credit guarantee fund of Infrastructure Development Fund of Department of Animal Husbandry and Dairying.

The completed 35 projects in its earlier phase of FIDF, created safe landing and berthing facilities for more than 8100 fishing vessels, enhancement of fish landing of 1.09 lakh tones, 203.28 lakhs fish seed/fingerling production/year from the projects supported for fish seed farms. Further, the completed projects are benefiting around 3.3 lakh fishers and other stakeholders and creation of 2.5 lakh direct and indirect employment opportunities.

Further, the extension of FIDF will further leverages the financial resources, encourages more investments in development of infrastructure for fisheries and aquaculture both from the public and private sector, thereby promoting economic development and expansion of fisheries and aquaculture sector. FIDF not



only give impetus for creation of modern infrastructure for fisheries and aquaculture, it will also complement and consolidate the achievements of Pradhan Mantri Matsya Sampada Yojana (PMMSY) and Kisan Credit Card (KCC) and making it an important scheme for bringing in more stakeholder, investments, employment opportunities, augmentation of fish production and transformation in the Fisheries and Aquaculture Sector.

Global Fisheries Conference (GFC) 2023-

To boost the entrepreneurial ecosystem in fisheries sector



To celebrate the contribution and achievements of fishers and fish farmers and other stakeholders and reinforce commitment towards sustainable and equitable development of the Fisheries sector, Department of Fisheries, GoI organized the Global Fisheries Conference India 2023, on occasion of World Fisheries Day. The two-day event held on 21st and 22nd of November 2023 at the Gujarat Science City in Ahmadabad with the theme 'Celebrate the Fisheries and Aquaculture Wealth'. Chief Minister of Gujarat, Shri Bhupendra Rajnikant Patel, Ministers of various states, Ambassador of various countries, other dignitaries and heads of various organizations and fisheries research institutes were present in the event.

Fisheries and aquaculture play pivotal roles as significant sources of food, nutrition, employment, income, and foreign exchange. In India, this burgeoning sector not only sustains the livelihoods, employment, and entrepreneurship of three crore fishers and fish farmers at the primary level but also supports several lakhs of individuals along the value chain. As the world's second largest fish-producing country, India holds an approximately 8% share in global fish production. Over the past ten years, the Government of India has undertaken transformative initiatives to foster the comprehensive development of the fisheries and aquaculture sector in the country.

The conference provided a platform for the convergence of ideas and foster partnerships amongst all fisheries sector stakeholders; deliberated upon research and development, best practices, major achievements and untapped



potentials in the fisheries sector; promoted international trade in the aquaculture and seafood industry and facilitated business pitches for leading entrepreneurs as well as start-ups. It also showcased success stories from Central and State Government fisheries organizations and shared the best practices undertaken.

Delegates from ten foreign missions representing diverse countries, in conjunction with various international organizations, took part in the conference. Additionally, participants encompassed fisheries ministers from States/Union Territories, experts in national and international fisheries and aquaculture (including academicians and researchers), institutes affiliated with the Indian Council of Agricultural Research (ICAR), subordinate organizations of the Department of Fisheries-Government of India, State/Union Territory Fishery Departments, fish farmers, fishers, fisheries associations, start-ups, prominent businesses in the fisheries sector, financial institutions, students, and more. The two-day conference garnered an impressive attendance of over 14,000 participants, both in person and virtually.

The inauguration session, presided over by Hon'ble Ministers, featured dignitaries such as Chief Minister of Gujarat, Shri Bhupendra Rajnikant Patel; Ambassadors from various countries; Mr. Takayuki Hagiwara, Head of the Food and Agriculture Organization of the UN (FAO) in India; Fisheries Ministers from different States; Secretary-Department of Fisheries, Govt. of India; Joint Secretary- Department of Fisheries, Govt. of India; as well as representatives and leaders from various international and national organizations, including the Asian Development Bank (ADB), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Bay of Bengal Program (BoBP), and Marine Stewardship Council India (MSC). These distinguished guests were joined by other attendees to mark the occasion.

Following the inaugural session, there was an International Roundtable meeting led by the Hon'ble



Union Minister, MoFAHD, Government of India. At a broader level, the Roundtable meeting was designed to gather perspectives and insights from national and international stakeholders, aiming to identify focus areas, gaps, opportunities, solutions, and potential partnerships for the advancement of the Indian fisheries sector.

The conference featured a total of 5 Technical Sessions, with two sessions held on day-1 and three sessions on day-2. Correspondingly, there were 5 Industry Connect Sessions, with two sessions on

day-1 and three sessions on day-2. Each session focused on a specific theme for discussions and included a special addressee, keynote speaker, moderator, five/six panelists, and a stakeholder audience. Comprehensive minutes were taken for each session to document the outcomes.

The Technical Sessions were planned with the objectives of fostering deeper understanding of trending topics in fisheries sector pertaining to challenges and opportunities in inland aquaculture, coastal aquaculture and mariculture, deep sea fishing, sustainable aqua feed, fish health management, innovations & best practices, new and emerging technologies etc. The Industry Connect Sessions were planned with focus on bringing together businesses and organizations in the fisheries sector to share market insights, trends, opportunities and challenges while networking and fostering collaborations/partnerships. The event also included G2G and B2G connect session. G2G sessions were open format forum for stakeholders to freely explore opportunities for bilateral

deliberations for promoting trade and long-term sustainability of the sector. B2G sessions were facilitated to entail dialogues between policy makers, experts and industry for knowledge sharing, networking etc.

The exhibition pavilion during the occasion provided a platform for around 200 start-ups and leading companies in fisheries and aquaculture sector to demonstrate their businesses, networking and brand building. A special exhibition Pavilion was also inaugurated and the pavilion theme was "Technology Infusion" in Fisheries Sector" and showcased initiatives namely multi-species hatchery, Re-circulatory Aquaculture System (RAS), Biofloc, Cage culture, Seaweed cultivation, Ornamental fisheries, Pearl cultivation, Communication and Tracking systems on fishing vessels, Artificial reefs, LPG converter kits, etc. There was also a fish food mela and a cultural event showcasing richness and diversity of fisheries sector.



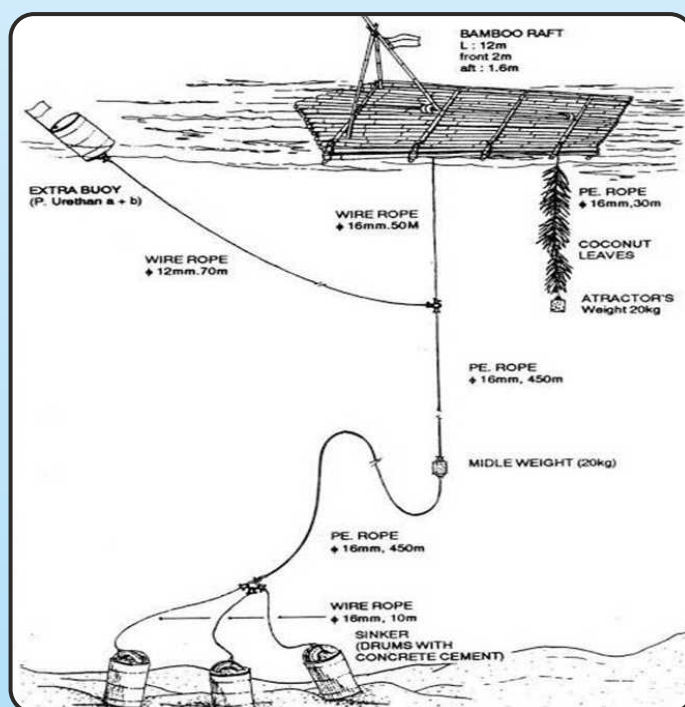
Fish Aggregating Device (FAD)- a tool for congregation

Fish aggregating devices, more commonly called FADs, are anchored or drifting objects that are placed in the ocean to attract fish. They may be a permanent, semi-permanent or temporary structure or device made from any material and used to lure fish. They have been used for thousands of years in various forms. The earliest surface/midwater FADs were elements from nature such as driftwood and trees. Fishermen from Indonesia and Philippines began building floating rafts of bamboo and other materials to attract fish as early as 1900. Now surface and midwater artificial FADs are systematically used in a large number of countries. Present practices vary considerably, sometimes involving advanced technology.

Traditional FADs, based on long-term fishing experience, are made on-the-spot with local materials and used in shallow coastal waters (depth 50-200 m) by small-scale fishers to catch small pelagic fish and bait, e.g. payaos (Philippines), unjang (Malaysia), rumpon (Indonesia). Modern FADs, the result of imported technology and materials, can be anchored to over 3000 m.

Drifting FADs are not tethered to the bottom and can be natural objects such as logs or man-made. Certain models have large surface dimensions. Moored FADs occupy a fixed location and attach to the sea bottom using a weight such as a concrete block. A rope made of floating synthetics such as polypropylene attaches to the mooring and in turn attaches to a buoy. The buoy can float at the surface (lasting 3-4 years) or lie subsurface (mid water FAD) to avoid detection and surface hazards such as weather and ship traffic. The midwater FADs – where the only surface component is a small marker buoy is less subject to stress from wind and waves and the risk of damage by ships. Subsurface FADs last longer (5-6 years) due to less wear and tear, but can be harder to locate. In some cases the upper section of

rope is made from heavier-than-water metal chain so that if the buoy detaches from the rope, the rope sinks and there by avoids damage to passing ships that no longer use the buoy to avoid getting tangled in the rope. Smart FADs include sonar and GPS capabilities so that the operator can remotely contact it through satellite to determine the population under the FAD. FADs can be used in either a single or multiple arrangements. Common practice is to use more than one, with enough distance between each. The most suitable distance between each FAD depends on the abundance and type of species targeted; ranging between several hundred and one thousand meters for small pelagic fish in coastal or shallow waters; or 5 to 10 nautical



miles for deep-water tuna FADs aggregate different fish at different depths. Fish also aggregate under drifting logs and even whales, and rules on fishing around FADs often apply to all objects drifting on or near the sea surface, which attract fish. Various types of FADs in different areas, after a short period,

attract and aggregate fish around the structure, irrespective of its design. Fish are fascinated with floating objects. They aggregate in considerable numbers around objects such as drifting flotsam, rafts, jellyfish and floating seaweed. The objects appear to provide a "visual stimulus in an optical void", and offer some protection for juvenile fish from predators. The gathering of juvenile fish, in turn, attracts larger predator fish.

Some FADs are permanent structures while others are moveable. The former are set mainly in deep waters and relocation is virtually impossible. Present experience shows that the expected life of a permanent FAD would be 2 to 3 years. The mobile, lighter structures can be moved to attract fish to a particular point. Still others can be removed from the water during certain seasons when the fish are not in the area or when the weather is rough, e.g. monsoon.

Two major categories of FAD's may be classified into two - Artisanal and Industrial types. Simple or advanced FADs are left drifting in deep waters to help offshore, artisanal and industrial fleets catch big pelagic fish, mainly tuna. Hundreds of simple, traditional types of drifting FADs are used by each large, modern tuna purse seiner operating in certain areas. Before FADs, the commercial purse seiners used to target surface-visible aggregations of birds and dolphins, which were a reliable signal of the presence of tuna schools below. The demand for dolphin-safe tuna was a driving force for FADs. The artisanal FADs are smaller and used by subsistence, artisanal and recreational fishers. These are mostly anchored offshore or near-shore and in lagoon and maybe surface or subsurface. The Industrial FADs are huge structures and may be drifting or anchored. The fishers use purse seine, long line or pole & line type of fishing and cater to fishing companies in support of industrial scale vessels. Industrial FADs improve the catch rate of purse seine and pole & line vessels that target large schools of tuna.

These are commonly drifting rafts, with an electronic beacon so the fishing boat can find the FAD and sometimes sonar equipment that shows the amount of fish under it. Anchored buoys are also used. FADs play an important economic role for industrial fishing fleets and their use has increased greatly in recent years. Most fishing is by purse seine

is non-selective and catches all the fish around the FAD. Fish tend to move around FADs in varying orbits, rather than remaining stationary below the buoys. They mostly target tuna schools. Shoals of juvenile big eye tuna and yellow fin tuna aggregated closest to the devices, 10 to 50m. Further out, 50 to 150m, was a less dense group of larger yellow fin and albacore tuna. Yet further out, to 500m, was a dispersed group of various large adult tuna. The distribution and density of these groups was variable and overlapped. The FADs are also used by other fish, and generally the aggregations disperse when it was dark.

The deployment and proliferation of FADs in an extensive way has influenced harvesting practices and become the concern of fisheries managers. The use of FADs by purse seine vessels has come under increased criticism for its impact on tuna stocks and its potential threats to biodiversity, specifically the by-catch of sharks and other marine life. Tropical tuna show a natural behavioral tendency to aggregate around floating objects and the fishermen exploit this behavior using FAD. Technological advances in FAD design have increased fishing efficiency and FADs have contributed to increasing tuna catches especially skipjack and yellow fin tuna. Studies on FAD fishing showed that the vulnerability to FAD fishing varies with species size and age and FAD contribute sustainability to overfishing risks and as suggested earlier the FAD fishing takes significant levels of by-catch. On the positive side, FADs may trap tunas in unproductive regions.

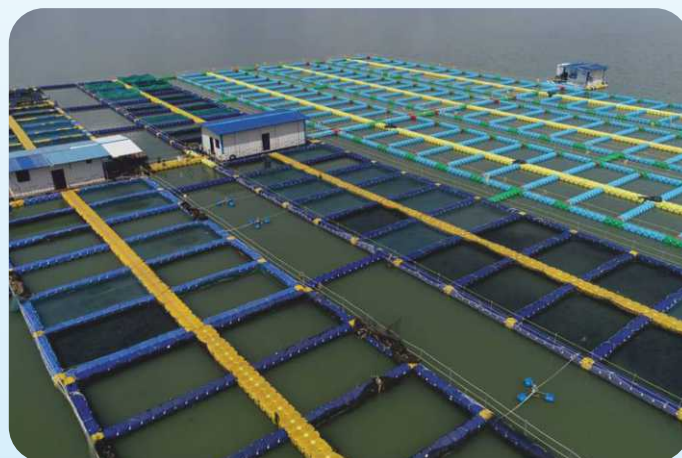
Management of FAD associated fishing is becoming a concern for policy makers. Time-area closures are the predominant method used to limit impacts of fishing on FAD has been suggested but the effectiveness of time - area closures is uncertain. Management of FAD-based fisheries will need to be assessed on a regional basis. Further, the degree of local impact is uncertain due to uncertainties over stock structure. In general, FADs are not inherently bad; however, these floating objects require additional attention from the scientific and fishing communities. If used correctly, FADs can reduce fuel costs and carbon footprints without jeopardizing the ecosystem or the survival of the target species. And, like all fishing methods, FADs need to be monitored and managed.

Cage Culture in reservoirs of India

India has 3.54 million ha of reservoirs and more than 5.0 lakh ha of floodplain wetlands across the numerous river basins in the country. The present fish yield from reservoirs is low, to the tune of about 82 kg/ha, in spite of their high production potential (500 kg/ha, 250 kg/ha and 100 kg/ha in small, medium and large reservoirs, respectively). Similar is the case with floodplain wetlands, where the present yield has been estimated at 400–800 kg/ha, against the production potential of 1500–2500 kg/ha. Harvesting is a major problem in most of the reservoirs and lakes in the country as most of them are either weed-choked or having obstructions in the form of boulders or tree stumps limiting operation of many a fishing gear. Presence of predators often results in high natural mortality of stocked fishes causing low productivity. This, coupled with poor utilization of all food niches available in these ecosystems in the absence of efficient fish grazers, is mainly responsible for low fish yield from these ecosystems. It is prudent, therefore, to explore alternate production tools to augment fish yield. Thus, enclosure culture systems have a definite role to play in augmenting fish production from inland open waters in India especially the reservoirs and floodplain lakes. These can overcome many production constraints in lakes and reservoirs by maintaining a captive stock, growing it on artificial feeds, protecting it from predators and enabling harvesting at will.

Cage Culture- Definition

Cage is an enclosed space to rear organisms in water that maintains free exchange of water with the surrounding water body. "Pens" are essentially portions of water body cordoned off by erecting a fence like structure. Usually pens are enclosed portions of the lake margin, with fencing three sides; the free fourth side being contiguous with the land. But, pen can also be away from the shore with



fencing on all the four sides. The main difference between a pen and cage is: pen bottom is never covered so the soil water interface of the water body is not compromised. Enclosure aquaculture in the context of inland fisheries in India refers to both 'cage culture' and 'pen culture'.

Shape of Cages and Cage Materials to be used

The cages are generally enclosed on all sides, except for leaving an opening at the top for feeding and handling the stock. They can be positioned at the bottom, middle or surface of the water column, but floating cages are very popular and easy to manage. Cages are of many shapes (round, square or rectangular). While round cages with a cylindrical net, supported by circle-shaped support frames, are



extensively used for sea cage culture in India, cube-shaped, rectangular/square cages are used in reservoirs.

The size of a cage for fish culture in reservoirs can vary, but often multiple units are installed as a battery of cages with catwalks for easy access to the fish stock and floating huts. However, from operational and planning purposes, a cage with the dimensions: 6m (length) x 4m (width) x 4m (height) is considered as a standard unit and a battery comprises 6, 12 or 24 such cages, as per requirement. The cages in a battery are arranged in

caterpillar design for better exchange of water thereby facilitating relatively high dissolved oxygen.

Durable and stable cage materials are essential for achieving better results. A cage comprises hard frames as support and nylon nettings as cage body. It is desirable to have environment friendly, rust-free materials for cage fabrication. Commonly used materials for cage frames are bamboos, mild steel (MS), galvanized iron (GI), poly-vinyl chloride (PVC) and virgin-grade HDPE (High Density Polyethylene) (for runner-based & pontoon-based frames).

Table 1. Recommended Cage Net Specifications for culture of *Pangasianodon hypothalamus*

| Types of Nets | Specifications (Ply) | *Mesh Size (mm) |
|------------------------------------|----------------------|-----------------|
| Fingerling Growing Nets (Knotless) | 10-12 | 10-15 |
| Grow-out Nets (knotless) | 20-30 | 30-40 |
| Predator of Outer Nets | 25-30 | 35-40 |
| Bird Protection Nets | 18-20 | 60-80 |

Site Selection

Selection of suitable site for cage farming is a very important criterion considering the economic viability of cage farming. It decides the success of cage farming as well as capital investment, operational expenses, yield and mortality rates. Areas prohibited for aquaculture activities by the regulatory authorities should be avoided for installation of cages. The major factors considered for selection of cage sites consists of depth of water body, carrying capacity, water quality requirements, winds, waves, currents, tides and bottom substrate. Geographical information systems can be effectively applied for the analysis of environmental issues in coastal zones for assessing suitability for aquaculture activities. The reservoir identified for cage culture should contain water throughout the year with an approximate depth of 8 meters at the cage installation area.

Depth and Water Quality

Depth is an important criterion for selecting the reservoir and also the cage site. The reservoir should have at least 10 meters of mean depth and the cage



site needs a water depth of at least 10 meters round the year. A clearance of 6 meters will be always needed from the cage bottom to the floor of the water body. As the cage culture operations will tend to increase nutrient load, BOD and COD in the water bodies, care must be taken to pre-assess the water quality of the location. Excessive nutrient load from cage culture inputs, especially feeds can create eutrophic conditions with disastrous consequences to the ecosystem. Therefore, it is necessary to conduct an Environment Impact Assessment (EIA) before cages are installed in reservoirs. The ICAR research Institutes have the capacity to make rapid EIAs.

Species suitable for Cage Culture

Considering the consistent demand for species of high economic and nutritive value, coupled with the regional preference (for some species), the following indigenous species need to be inducted into the cage culture domain: *Labeo bata*, *L. rohita* (Jayantirohu), *Osteobrama belangeri* (pengba), *Ompok bimaculatus* (pabda), *Anabas testudineus* (koi), *Pangasius pangasius*, *Puntius sarana*, *Lates calcarifer* (bhetki), *Chanos chanos* (milk fish), *Etroplus suratensis*, *Chitala chitala* (featherback), Murrels (*Channa striata*, *C. marulius*), Wallago attu and shellfish *Macrobrachium rosenbergii*.

Stock Management

For raising fingerlings in cages in Indian reservoirs, healthy carp fry measuring 12–15 mm long, or even up to 25 mm, are best suited. A stocking density of 250 carp fry measuring 12–18 mm per cubic metre is best for cages installed in Indian reservoirs. The oxygen packets transported with the fry (1,000 fry in 4 litres of water in a polythene packet 2/3 filled with oxygen) are kept inside cages for at least an hour before the fry are released. Prior to release, fry is subjected to some prophylactic measures to protect them from diseases and ecto-parasites. They are dipped in a 5–6% salt solution as well as potassium permanganate (5–8%) for 1 to 2 minutes and then released into the cage water. Raising carp fingerlings in cages generally requires 60 to 120 days, depending on the water body's natural productivity and the quality of supplementary feed. The cage fish farming being purely based on supplementary feeding, selection of good/best fish feed and its application in right quantity is important to achieve desirable results. It is advised that only quality floating feed is selected. Sinking feed is totally unsuitable for cage fish farming as it accumulates at the base and fouls the cage/ reservoirs environment. Excessive feeding should also be avoided in cages, as it may pollute the environment and hamper the growth rate of stocked fish.

Fish Health Monitoring

Health of the fishes stocked in cages must be monitored at monthly interval and proper treatment

measures must be adopted in case of disease outbreak, (if any). In case of disease outbreak, the State Fisheries Department or National Institutes (one of the eight fisheries research Institutes under ICAR (other Central Government labs like NABL accredited aquaculture lab of RGCA) or any laboratory belonging to the State governments can be approached. Recognizing the importance for improving the reporting of aquatic animal disease in the country, Department of Fisheries has launched the ReportFishDisease (RFD) App to support fish farmers in improving farmer-based reporting, getting scientific advice and reducing losses due to diseases.

Market, Harvesting and Post-Harvest Management

The feeding should be stopped 2 days prior to harvesting. If antibiotics were used during the culture period, sufficient withdrawal period may be given before harvest. Records of harvest should be maintained at the site. It is essential to have a post-harvest and marketing strategy before launching cage culture ventures on a large-scale. The large-scale cage production centres should either have their own facilities or have linkages for proper harvesting gadgets, Fish holding and storage, Live fish transport, Post-harvest processing centres like fillet plants and Market chain including E-markets.

Environmental Precautions and Assessment

Major environmental threats from cage aquaculture include the release of excessive nutrient that accumulate in water and sediments. It will be mandatory for the cage culture operators to record the water quality parameters like Dissolved Oxygen, pH, CO₂ and Total Alkalinity, inside and outside the cages from the day-one of the operations, keeping in view the need for long-term environmental impact. Any increase in nutrients level away from the cage area should be taken as a warning. It will be mandatory for the cage culture operators to collect data on the trophic status in and around the cages as well as the areas away from the cages, periodically and report to the authorities to assess the impacts in terms of nutrient loading.

Carrying Capacity and Limit of Cage Number

| Reservoir Area | Maximum Number of Cages Allowed |
|----------------|---------------------------------|
| <1000 | Not allowed |
| 1001 to 2000 | 500 |
| 2001 to 3000 | 1000 |
| 3001 to 4000 | 1500 |
| 4001 to 5000 | 1900 |
| 5001 to 10000 | 3000 |
| >10000 | 5000 |

Economics of Cage Culture

- ❖ Cage size= $6*4*4 = 96m^3@1m^3 = 500-700$ no. of pangasius fry to fingerlings
- ❖ Total cage cost (one cage comprises of 32 blocks @4000/block) = Rs.1.2 lakh
- ❖ Input cost for one cage = Rs.2.4 lakh
- ❖ Set up cost (Cage building + input cost) = Rs.3.6 lakh
- ❖ Culture Period = 6-7 months
- ❖ Weight of Fish at Harvest = 600g
- ❖ Expected Yield/Cage/6 months = approx. 4.608 tonnes
- ❖ Estimated Returns/cage/6 months (Sale prize of Pangasius @90/kg) = 4,14,720
- ❖ Estimated Total costs/cage/6 months = Rs.3,60,000
- ❖ Net Return= Rs.1,14,720

Current Status

Cage aquaculture offers wide opportunity for optimizing fish production from reservoirs and lakes through vertical expansion. To boost the additional production of fish through cage culture, Department of Fisheries, Government of India implementing various schemes to provide financial assistance for promoting cage culture in reservoir in India. Under Blue Revolution: Integrated Development and Management of Fisheries Scheme, Department of Fisheries during 2015-16 to 2019-20 approved a total of 14022 Nos of cages at a total project cost of Rs. 42036.96 lakh during 2015-16 to 2019-20.

Government of India launched Pradhan Mantri Matsya Sampada Yojana (PMMSY) scheme for F.Y. 2020-25. In this scheme, a total of 50,170 Nos of cages in reservoirs has been approved so far.

Expansion of Aquafeed Industry in India



The aquafeed industry in India is witnessing unprecedented growth, driven by a multitude of factors. This sector, essential for sustaining the country's burgeoning aquaculture, is propelled by diverse aqua species, organized retail shifts, increased fish catch volumes, and a solid aquaculture infrastructure. The industry's expansion underscores its crucial role in supporting both domestic consumption and export markets.

Indian aqua feed mills are pivotal, boasting a production capacity of 2.9 million metric tons, with Andhra Pradesh leading as the largest consumer of fish feed in the country. India's extensive 7,517 km coastline and extensive river and canal systems further support aquaculture, facilitating significant

cultivation of aqua products. For example, Karnataka saw fish production rise from 588 thousand metric tons to over 861 thousand metric tons in fiscal year 2020, highlighting robust growth potential within the industry.

Key Drivers of Growth

India's aquafeed industry is expanding due to several critical factors:

- ❖ **Diverse Aqua Species:** India's rich variety of aquatic species, including fish, crustaceans, and mollusks, significantly contributes to the export market. This biodiversity not only caters to domestic needs but also strengthens India's position in global aquaculture exports.

- ❖ **Shift to Organized Retail:** The transition from traditional, unorganized retail channels to organized outlets such as supermarkets is driven by rising disposable incomes, heightened health awareness, and improved cold chain logistics. This shift ensures better distribution and availability of high-quality aquafeed products.
- ❖ **Increased Fish Catch Volume:** The substantial increase in fish catch volume, reaching 12.18 million metric tons in 2020, highlights the growing demand for aquafeed. This surge in fish production is a clear indicator of the expanding aquaculture sector in India.
- ❖ **Aquafeed Production Capacity:** Indian aquafeed mills boast a production capacity of 2.9 million metric tons, with Andhra Pradesh emerging as the largest consumer of fish feed. This capacity is pivotal in meeting the rising demand for aquafeed across the country.
- ❖ **Extensive Coastline and Water Systems:** India's extensive 7,517 km coastline and abundant river and canal systems provide a fertile ground for aquaculture. These natural resources support the significant cultivation of various aquatic products, enhancing the scope and scale of aquaculture activities.

Regional Contributions and Growth Potential

The regional dynamics within India play a crucial role in the growth of the aquafeed industry:

- ❖ **Andhra Pradesh:** As the leading consumer of fish feed, Andhra Pradesh is a key player in the industry. The state's robust aquaculture infrastructure and favorable geographic conditions make it a significant contributor to the aquafeed market.
- ❖ **Karnataka:** Karnataka has demonstrated impressive growth in fish production, rising from 588 thousand metric tons to over 861 thousand metric tons in 2020. This growth underscores the region's potential and its vital role in the industry's expansion.

Market Valuation and Demand Drivers

The India aquafeed market has reached a substantial valuation, emphasizing its importance in the global sector:

- ❖ **Market Valuation:** Valued at approximately USD 1.76 billion in 2023, the India aquafeed market is crucial for meeting the nutritional needs of diverse aquatic species. This valuation reflects the market's significant impact on both domestic and international aquaculture.
- ❖ **Rising Seafood Consumption:** Increasing consumer demand for seafood is driving the expansion of aquaculture, subsequently boosting the demand for high-quality aquafeed. This trend is fueled by a growing preference for healthy and sustainable protein sources.

Sustainable Farming Practices: The shift towards sustainable farming practices is integral to the industry's growth. Sustainable aquaculture ensures long-term viability and environmental responsibility, further promoting the demand for aquafeed.

- ❖ **Government Support:** Supportive government policies and initiatives aimed at promoting sustainable aquaculture practices provide a conducive environment for market growth. These policies encourage investments and innovations in the sector.

Challenges and Opportunities

The aquafeed market faces several challenges but also presents numerous opportunities for growth:

- ❖ **Challenges:** Fluctuating raw material prices and environmental concerns related to aquaculture practices pose significant challenges. These issues can affect the cost and sustainability of aquafeed production.
- ❖ **Opportunities:** Despite the challenges, there are substantial opportunities for growth. Increased R&D investments, innovative and sustainable feed solutions, and expanding

export markets are expected to drive the market forward. Embracing these opportunities can help overcome the challenges and ensure sustained growth.

Technological Advancements and Innovations

Technological advancements and innovations are pivotal in propelling the aquafeed industry:

- ❖ **Advanced Feed Formulations:** The adoption of advanced feed formulations is enhancing the efficiency and sustainability of aquaculture. These formulations are designed to meet the specific nutritional needs of various aquatic species, improving growth rates and overall health.
- ❖ **Digital Technologies for Precision Farming:** Implementing digital technologies for precision farming is revolutionizing aquaculture practices. These technologies enable more precise feeding, monitoring, and management, leading to better resource utilization and productivity.
- ❖ **Collaborative Efforts:** Collaboration between industry stakeholders and research institutions is fostering innovation. These partnerships are essential for developing new technologies and practices that enhance the aquafeed industry's efficiency and sustainability.

Projected Market Growth

The Indian aquafeed market is poised for robust growth in the coming years:

- ❖ **Projected Growth Rate:** The market is projected to grow at a robust CAGR of 8% from 2024 to 2032. This growth is driven by increased

investments in aquaculture, expanding seafood consumption, technological advancements in feed production, and supportive governmental policies.

- ❖ **Investment and Consumption Trends:** More investments are flowing into the aquaculture sector, boosting the demand for aquafeed. Concurrently, growing consumer preference for seafood is driving the need for high-quality aquafeed products.
- ❖ **Technological and Policy Support:** Innovations in feed production and supportive government policies are facilitating market growth. These factors ensure that the industry can meet the rising demand while maintaining sustainability.

Conclusion

India's aquafeed industry is on a trajectory of substantial growth, driven by a confluence of factors including organised retail shifts, increased fish catch volumes, significant aquafeed mill capacity, and favourable coastal and riverine ecosystems. The dynamics shaping the market include escalating seafood demand, advancements in feed technology, and supportive government initiatives.

While challenges such as fluctuating raw material prices and environmental concerns exist, the opportunities for growth through R&D investments, innovative feed solutions, and expanding export markets are substantial. The Indian aquafeed industry is set to play a pivotal role in the global aquaculture sector, supporting sustainable practices and meeting the nutritional needs of diverse aquatic species. With continued innovation and strategic investments, the industry is expected to experience robust growth in the coming years.



Netting the Future

AI in Fisheries & Aquaculture

Artificial Intelligence (AI) represents a transformative force in the fisheries sector, offering innovative solutions to sustainability challenges and paving the way towards a more resilient and equitable future for global fisheries and aquaculture industries.

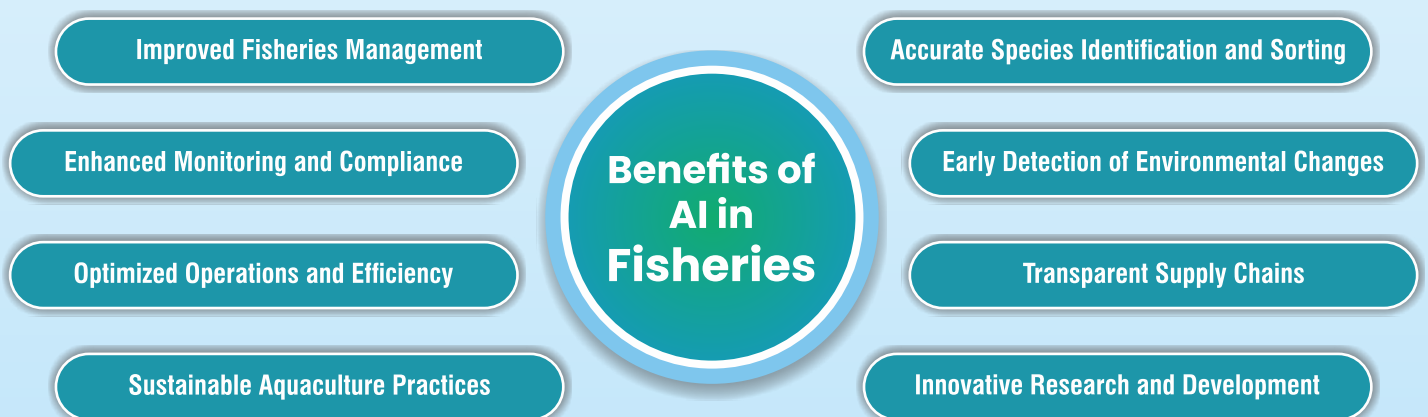
Artificial Intelligence has the potential to revolutionize the fisheries and aquaculture sector by enhancing sustainability, improving resource management practices, increasing operational efficiency, and promoting economic growth. However, to fully realize these benefits, collaboration among researchers, industry stakeholders, and policymakers is essential to develop and deploy AI technologies effectively and responsibly in the fisheries domain.



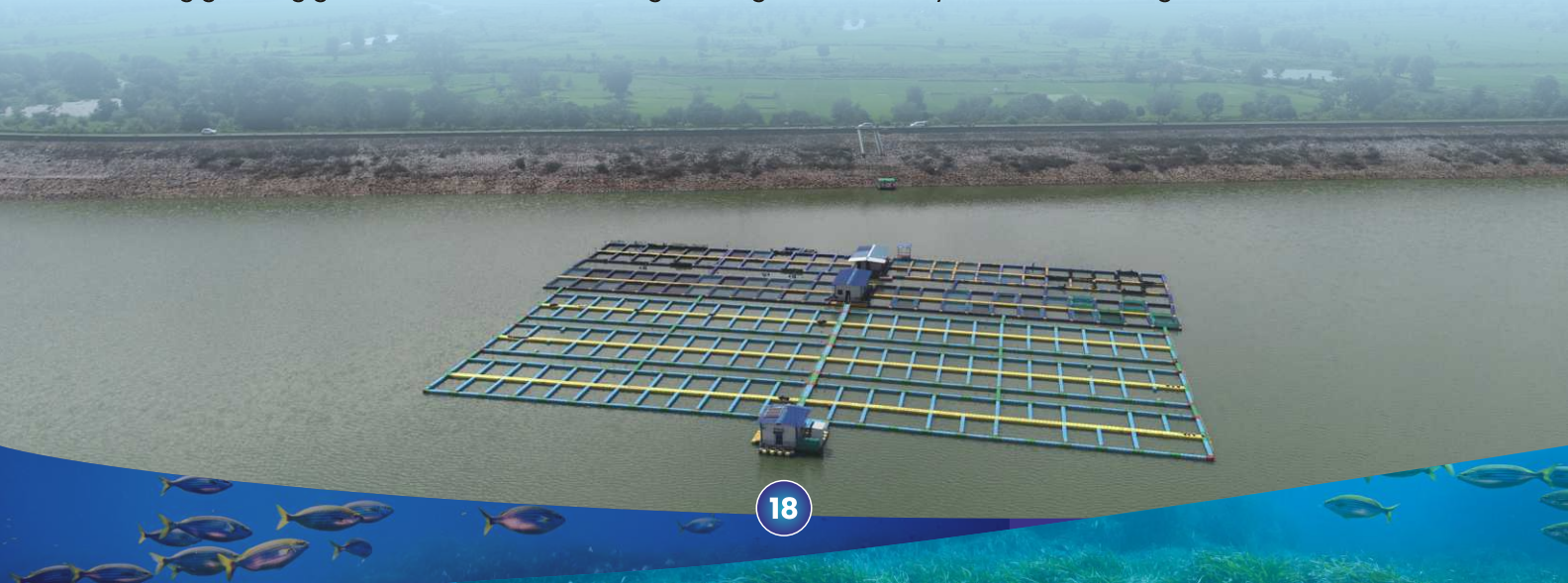
Few of the areas where inclusion of Artificial Intelligence may be explored in Fisheries Sector:-

| Component | Features |
|--|--|
| Underwater Fish Behavior Detection | <ul style="list-style-type: none"> • Critical for fish growth and health management. • Utilizes computer vision and AI for continuous monitoring. • Essential for effective surveillance and object recognition. |
| Water Quality Monitoring and Management | <ul style="list-style-type: none"> • AI sensors and algorithms monitor temperature, dissolved oxygen, pH, and ammonia levels. • Detects minor deviations to prevent fish stress or mortality. • Analyzes data trends to predict and optimize future water conditions. • Ensures a healthier environment and improves production. |
| Feeding Optimization and Growth Monitoring | <ul style="list-style-type: none"> • AI analyses fish feeding behavior, growth rates, and environmental conditions. • Optimizes feeding schedules and minimizes feed wastage. • Uses underwater cameras to estimate biomass and monitor growth. • Smart feeders enhance feed efficiency and reduce manpower. |
| Smart Aquaculture Systems and Automation | <ul style="list-style-type: none"> • Integrates AI with sensors and control systems. • Automates feeding, fertilizing, water quality analysis, and fish behavior monitoring. • Reduces labor costs and improves operational efficiency. • Provides real-time data for proactive management and sustainability. |

| | |
|--|---|
| Fish Health Monitoring and Disease Detection | <ul style="list-style-type: none"> • AI image analysis detects signs of disease or stress in fish. • Identifies anomalies in color, spots, or swimming behaviors. • Enables early disease detection and rapid treatment. • Prevents outbreaks and ensures healthier fish populations. |
| Fisheries Catch Monitoring | <ul style="list-style-type: none"> • Uses electronic monitoring (EM) for catch and bycatch in capture fisheries. • Employs computer vision, machine learning, and AI-based systems on fishing vessels. |
| Precision Fishing | <ul style="list-style-type: none"> • IoT devices and AI optimize fishing locations and times. • Sensors detect fish size and onboard cameras assist with sorting. • Reduces costs and fuel consumption. • Uses AI for predictive maintenance of fishing fleets. |
| Intelligent Packaging | <ul style="list-style-type: none"> • Integrates AI with packaging to assess food freshness. • Enhances detection efficiency and precision. • Facilitates prompt assessment of food freshness through mathematical models. |



Realizing AI's full potential in the fisheries sector requires addressing challenges such as data quality, accessibility, regulatory frameworks, and ethical considerations. Collaborative efforts between governments, researchers, industry stakeholders, and technology developers are essential to overcome these challenges and harness AI's transformative power responsibly. Ultimately, integrating AI into fisheries management holds the promise of creating a more sustainable and resilient seafood industry, capable of meeting growing global demand while safeguarding marine ecosystems for future generations.

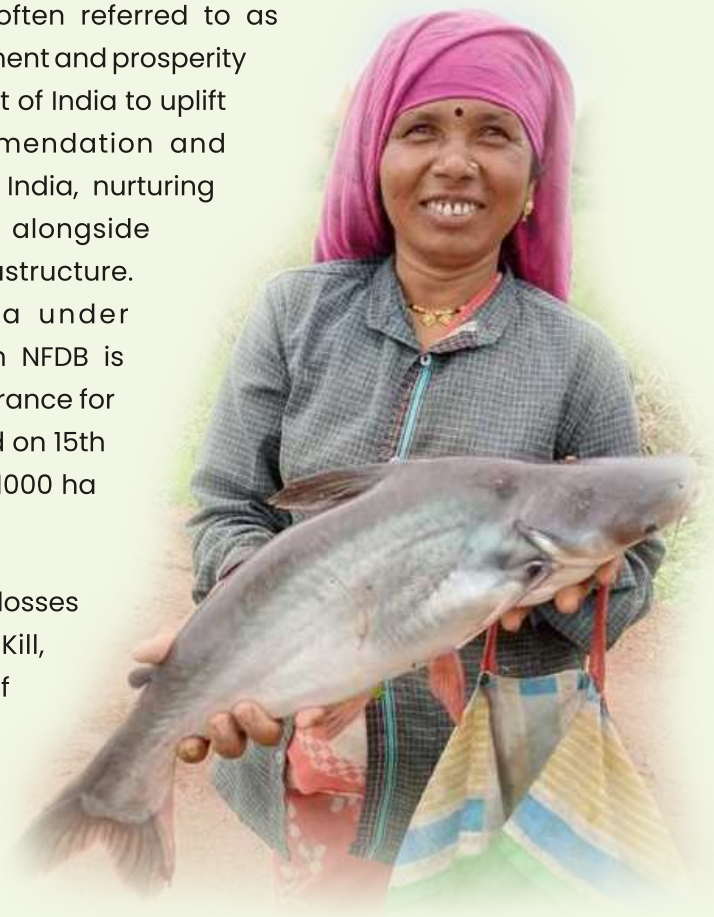


Ensuring Prosperity Aquaculture Crop Insurance

The strength and vitality of a nation's farmers, often referred to as 'Annadatas', is closely linked to the overall empowerment and prosperity of the country. The sincere efforts of the Government of India to uplift this crucial segment of society warrant commendation and recognition. In a rapidly advancing economy like India, nurturing the agricultural sector holds equal importance alongside the transformation of industries and digital infrastructure. Recognizing the need, Government of India under Pradhan Mantri Matsya Sampada Yojana through NFDB is implementing Pilot Project on Aquaculture Crop Insurance for both fish crop and Shrimp Crop which was launched on 15th December, 2022 to cover 1200 ha Shrimp Crop and 1000 ha fish crop.

The Scheme provides basic insurance cover for yield losses due to non-preventable risks such as Summer Kill, Pollution, Poisoning, Riot and Strike, malicious acts of third parties, Earthquake, Explosion/Implosion, Storm, Cyclone, Flood, Inundation and other natural calamities.

Under this project, one-time premium subsidy (excluding GST) at the rate of 20% for general and 30% for SC/ST/Women categories is given.



INSURANCE PREMIUM

| Culture | Area | Insured unit cost/ha | % of Premium* | Premium amount in Rs/ha/crop |
|-------------|-----------------------------|----------------------|---------------|------------------------------|
| Fish crop | Non-Flood Prone Areas | Rs.4.00 lakh | 4.7 | 18800 |
| | Flood Prone Areas | | 5 | 20000 |
| Shrimp crop | Areas under Cyclone Zone | Rs.8.00 lakh | 3 | 24000 |
| | Areas under NonCyclone Zone | | 2 | 16000 |

*18% GST to be paid extra by farmer

For any risk, the claim will be assessed based on the approved total fortnightly input cost or actuals incurred whichever is less. Loss above 70% is considered for total loss and no partial loss coverage.



The minimum eligible area is 0.10 Ha for freshwater fish culture and a minimum of 0.5 Ha for Shrimp culture. The maximum eligible area for both freshwater fish culture and shrimp culture is 2.0 ha per farmer. A farmer is eligible to avail any one subsidy assistance i.e., either shrimp or fish crop insurance. Till date, financial assistance of Rs. 55.50 lakh has been provided to six States of **Odisha, Assam, Madhya Pradesh, Goa, Karnataka and UT of Puducherry** for insuring 615 ha fish crop and 414 ha shrimp crop.

A new insurance product exclusively for Shrimp Crop has been devised by Indian Council of Agricultural

Research (ICAR) - Central Institute of Brackish water Aquaculture (CIBA) with the support of Alliance Insurance brokers through M/s. Oriental insurance Company limited, New Delhi which is providing basic cover and disease cover. Memorandum of Association (MoA) has been signed by NFDB with ICAR-CIBA for promoting the insurance product among the shrimp farmers in Tamil Nadu, Andhra Pradesh and Gujarat with subsidy assistance of NFDB. An amount of Rs 48.00 lakhs has been provided to ICAR-CIBA for coverage of 800 ha shrimp farms benefitting around 400 shrimp farmers.

Further, the Union Cabinet approved in February, 2024 a new Sub-scheme, the "Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana" (PM-MKSSY): a Central Sector Sub-scheme under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) at a total outlay of Rs.6000 crore. The PM-MKSSY will be implemented as Central Sector Sub-scheme under the ongoing flagship scheme i.e. Pradhan Mantri Matsya Sampada Yojana. The Sub-scheme shall be implemented with one of the major component; Facilitating adoption of aquaculture insurance. The objective of this component is to facilitate the creation of appropriate and affordable aquaculture crop insurance products. This new sub scheme envisages One-time monetary incentive by Gol to aquaculture farmers' up to 4 ha water spread area for one crop cycle only.



Skill Development in the Indian Fisheries and Aquaculture Sector



Fisheries and aquaculture is a sunrise sector that is continuously expanding and growing. In spite of being a traditional means of occupation and livelihood for many, the technical intricacies involved across the fisheries' value chain make it a very a niche sector. The two extremities of being traditional yet requiring technical expertise make fisheries' occupations very unique requiring adeptness and precision.

The implementation arm of DoF (GoI), National Fisheries development Board (NFDB) has been spearheading the mandate of awareness creation, training and capacity building. It has partnered with organizations such as Indian Council of Agricultural Research (ICAR), Council of Scientific and Industrial Research (CSIR), National Bank of Agriculture and Rural Development (NABARD), National Cooperative Development Corporation (NCDC), etc. to fulfill its training mandate. So far, in collaboration with States/UTs fisheries departments, various Central & State academic, training & research Institutions, Universities & Colleges, Fisheries Research Stations, and Kisan Vigyan Kendras (KVKs), NFDB has sanctioned 2432 number of training and capacity-building programs under its flagship scheme Pradhan Mantri Matsya Sampada Yojana (PMMSY).

Under PMMSY, fishers, fish farmers, fish workers, fish vendors, Self Help Groups (SHGs), members of fishermen & fisherwomen Cooperatives, members of Fish Farmer Producing Organisations/Companies (FFPOs/Cs), Sagar Mitras and Matsya Seva Kendras (MSKs) in the field of the fisheries and aquaculture sector and other stakeholders have been trained through various capacity and skill building programs across the sector. In order to cater to various target beneficiaries and various types of training programs are planned such as webinars, half/full day awareness programs, 3 to 7 days of residential & non-residential trainings, skill



development/upgradation programs, workshops, conferences, Training-of-Trainer (ToT) program, exposure visits etc. Capacity and skill building trainings have been conducted on fisheries activities such as Freshwater Aquaculture, Brackish Water Aquaculture, Mariculture, Coldwater Fisheries, Ornamental Fisheries, Capture Fisheries, Fish Processing, and Marketing, Species-specific Hatchery/Breeding Technologies for species diversification, On Board Tuna handling, Beach Life Support Course etc.

In order to spread awareness amongst targeted beneficiaries, NFDB has sponsored 133 events with an investment of Rs 7.4 crores across 27 States and Union Territories, effectively reaching approximately 65,500 beneficiaries. These concerted efforts have significantly contributed to the growth and development of the fisheries industry by fostering widespread understanding and engagement among stakeholders and the public alike.

In addition, fisheries and its allied ministries and departments such as Ministry of Food Processing Industries (MoFPI), Ministry of Rural Development (MoRD), Department of Financial Services (DFS) etc. have been imparting various fisheries and aquaculture trainings and funding projects under their organizational mandate. Department of Fisheries (GoI) and State/UT fisheries departments too ensures that trainings are imparted to its serving officers hence officers have been sent to workshops, trainings, field trips, immersion programs domestically and abroad such as Japan, Norway, China etc.

As the Indian fisheries and aquaculture sector is in the limelight with increased attention from the apex level, hence for sustainable expansion of the sector it is key to build its human capital. The human capital should be increased in number by attracting newer people such as youth, women, start-ups, entrepreneurs etc. And the newer people engaged should either have or acquire technical knowledge to understand the nuances of the fisheries activities they are engaged in.

In spite of various and continual efforts, a more focused approach is required to bridge the skill and training gap. While the fisher and fish farmers engaged in traditional fisheries learn fishing techniques passed on within the family and through their own experiences; however aspects of hygiene, safety and best management practices still need to be imbibed. As the sector evolves and focus now moves to promoting fisheries activities such as

seaweed farming, ornamental fisheries, pearl cultivation, tuna, seed sufficiency programs, fisheries' value chain efficiency, robust disease management system, commercialization of technologies to farm indigenous species and value addition, the mandate for capacity and skill building becomes more specific, technical and elaborate. It



is noteworthy that fisheries' activities like pearl culture and tuna processing require precision and specific skills. To imbibe the learning from capacity and skill building and improve ways of working, it is essential to bring in discipline and compliance at the individual level and state & centre level in form of regulatory frameworks for traceability, standards, certification and accreditation for leveraging the full potential in harvest and post-harvest fisheries sector.

Thus, ensuring right skill and capacity building will not only develop a technically strong and knowledgeable workforce but also ensure that Best Management Practices (BMP) and Good Aquaculture Practices (GAP) are implemented. With a strong knowledge base, not only basic fish rearing should be easier, but innovation and research & development and sustainable growth shall take the sector to newer heights. Decreased losses, increased awareness and business skills will ensure optimal market prices and higher incomes; thereby make the sector more attractive for more businesses and people to engage.

ReportFishDisease

Monitoring Fisheries Diseases Nationwide



Aquaculture sector is witnessing an impressive growth over the years and at present, total exports earnings from the sector are approximately Rs.60,523.89 crores. However, the diseases are the major constraint to the growth of the aquaculture. Surveillance for aquatic animal diseases is essential for early detection of diseases, thereby minimizing their impacts. Early detection of diseases is important for eradication and containment. Many cases of diseases in aquaculture go unreported due to unavailability of the field-level disease reporting mechanism. Therefore, there is a necessity of a mechanism that can connect farmers, field-level officers, and fish health experts.

In this regard, for strengthening the farmer-based disease reporting system and for improving the

Report Fish Disease App:
Benefits for farmers

- Farmers can timely report incidence of disease.
- Farmers can interact with field level-officers and fish disease experts, as and when required.
- The data regarding the diseases will be stored on temporal and spatial scale.
- The stored data can be used for mapping the disease cases.

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reporting of aquatic animal diseases in the country, Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, GoI launched the

ReportFishDisease(RFD) App on 28th June, 2023 at Krishi Bhawan in the presence of Dr Abhilaksh Likhi, IAS, Secretary, Department of Fisheries, MoFAH&D, Government of India; Dr. Himanshu Pathak, Secretary, DARE & DG, ICAR; Dr J. K. Jena, Deputy Director General (Fisheries Science), ICAR and Coordinator, NSPAAD. The app has been developed by ICAR-NBFGR under National Surveillance Programme for Aquatic Animal Diseases (NSPAAD), funded under Pradhan Mantri Matsya Sampada Yojana by the Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India.

The RFD app is helping the farmers in reporting incidence of diseases in finfish, shrimps, and mollusks on their farms with the field level-officers and fish health experts. This shall help farmers in getting the scientific advice for efficient management of disease. The data regarding the diseases will be stored on temporal & spatial scale and can be used for mapping the disease cases.

The App provide support to farmers in improving farmer-based reporting, getting scientific advice, and reducing losses due to diseases, thereby increasing farmers' income. Also, Fish Disease



Reporting App also has a massive impact on fish disease management, promoting early detection, rapid response, collaboration, and knowledge sharing. It is also contributing to the sustainability and resilience of aquaculture systems by minimizing the negative impacts of fish diseases on fish population, industry, and ecosystems.

The ReportFishDisease App has been proved to be impactful and as a result, the app has now been launched in 12 different regional languages by the Union Minister of State for Fisheries, Animal Husbandry and Dairying, Prof. S. P. Singh Baghel at National Bureau of Fish Genetic Resources (ICAR-NBFGR), Lucknow.





INSPIRATIONAL
STORIES
FROM
**INNOVATIVE
FARMERS**

FIN-TASTIC WOMAN: EMPOWERING THROUGH ORNAMENTAL FISHERIES



Ms. Marlin Flora's journey from a fisherwoman in Rameswaram to a renowned ornamental fisheries entrepreneur is an inspiring tale of passion and dedication. It all began with a simple desire to fulfill her son's wish for a pair of fighter fish. Living near the seashore, where her husband worked as a fisherman, Ms. Marlin had a natural affinity towards aquatic life. Initially, she started growing ornamental fish at home, driven by her curiosity and observation of fish behavior. She meticulously studied their breeding patterns and feeding habits, gradually honing her skills in fish care and breeding techniques. Her expertise grew, and soon she ventured into commercial ornamental fisheries. Rameswaram, known for its Pearl rock sediments in the Indian Ocean, offered a rich diversity of indigenous ornamental fish species. Ms. Marlin became deeply passionate about preserving the sea ecosystem amidst increasing human exploitation. She advocated for sustainability practices in fisheries, recognizing the delicate balance needed for the marine environment to thrive. Her efforts did not go unnoticed. The late President, Hon'ble Shri Abdul Kalam Azad, renowned for his commitment to science and sustainability, honored Ms. Marlin Flora for her exceptional contributions to ornamental fisheries. This recognition further motivated her to continue her journey, now not only as a skilled fisherwoman but as a respected entrepreneur. Ms. Marlin's story underscores the potential for individuals to make a significant impact through their passion and commitment. Starting from a small-scale endeavor driven by a mother's love for her son, she transformed into a pioneer in her field, advocating for environmental stewardship and showcasing the beauty of ornamental fish from the Indian Ocean's depths. Her journey is a testament to the power of perseverance and the importance of sustainable practices in preserving our natural resources for future generations.

SUPPLYING FRESH FISH WITH INSULATED VAN



Mrs Jyoti Vijendra Koli, a middle-class fisherwoman belonging to Mahul Village of Mumbai, Maharashtra is engaged in business of fishing since last 8 years and Earlier, the fish catch was transported by other suppliers who used their vehicle to transport fish to processing units. This incurred huge cost on daily supply and also was dependent on other vendors resulting in delay in supply of fish and the quality is not maintained. Her dream of having own insulated van to cater the needs of consumers by providing them with the possible fresh catch was fulfilled by the PMMSY scheme. She took benefit of "Insulated Van under PMMSY scheme". Now she owns a trawler and also has a fish supply business which is operated from New Ferry Wharf Mumbai. Owning a vehicle has provided her with the opportunities to other retail markets such that fish can be transported to other retail markets from Mumbai as well and the insulated vehicle provides control on transport of fish so that quality is maintained and greater returns are generated. The Insulated Vehicle is operated from Mumbai, Mahulgaon to processing units at Talaja, Veraval in Gujarat and Karnataka according to the demand of fish. It can carry up to 8 - 10 Tons of Fish depending on Ice applied as per days required to reach the respective destination. The vehicle is coated with insulating material (foam-based, puff panel - 2.5 to 3 inches approximately). A vehicle with proper insulation and proper packing in HDPE tubs with ice increases the shelf life of fish by 2 days. This provides additional time for supplier as well as processing factories to align their production unit to optimum as well as fish catchers can get greater returns and more time to catch fish. This vehicle provides direct employment opportunities in form of driver, cleaner, loading/unloading staff for fish.

BEAUTICIAN TO ORNAMENTAL FISH FARMER



Mrs Pallavi Dipak Panzade belongs to the Washim district of Maharashtra. After completing her schooling she started her career as a beautician and later motivated to start ornamental fish business. It's being sixteen years that she is in the same business. Initially, she started it as a hobby by setting up an aquarium at her home. Unfortunately, her first few trials failed due to lack of knowledge in maintenance of aquarium resulting in high rate of fish mortality. After many trials and errors, she was successful in setting up an aquarium. She also faced problems in selling large-sized aquariums as they got leaked or cracked and in turn, she had to refund the full amount to the clients. There was a time when Mrs Panzade and her husband used to go on a bicycle after closing their shop for aquarium servicing at night. She got solutions for all her problems after attending a seminar arranged by the NFDB and the local Fisheries Department. Under their supervision, she applied for the activity "Ornamental Fish Kiosks under Pradhan Mantri Matsya Sampada Yojana (PMMSY). Her hard work, failures, and circumstances made her strong enough to launch a small aquarium business at her home and installed a unit of 100 sq. ft. area with total capacity of 500 fish.

As the business was thriving, they could employ two people. Mrs Panzade received financial assistance of 6 lakhs for setting up this unit. The total net profit in the first year was 5 lakhs. Currently the Panzade Fish Aquarium is a brand in itself and is well known as best aquarium shop in the region. Mrs Panzade uses good quality fish seed, fish feed, and aquaculture drugs. The unit follows "Good Handling Practices" with proper hygiene and sanitation. This improved the firm's total export and brand value. Coupled by her hard work, support from her spouse, and family motivated her to march on to become a successful entrepreneur. Her aim is to expand the business by opening franchises thus creating employment opportunities to youth.



INCOME GENERATION FROM ICE FACTORY



Mrs. Rhona C. Henriques belongs to a middle class family from Gorai Village of Borivali neighbourhood in Mumbai district of Maharashtra. Gorai Village is a fishing village consisting of 70 marine fishing boats engaged in fishing activities. Since fish is a perishable product and needs to be preserved immediately, ice is much required in this process. Due to the demand for ice, procurement of the same became a necessity in the fishing village. Therefore, in order to meet the needs of the fisher folk, Mr. and Mrs. Henriques applied for "Construction of ice plant" under Pradhan Mantri Matsya Sampada Yojana (PMMSY) scheme. After getting it sanctioned, they constructed an ice plant unit of 20 ton capacity in Gorai Village. The total project cost was Rs. 82.95 lakhs. He received Rs. 48 lakhs as grant under PMMSY. The ice factory is producing around 29700 kg i.e. 29.7 tonnes of ice through 198 cans. Besides production of ice, the plant also functions as storage facility for the ice produced. The ice can be stored for a long time. The plant also consists of a completely insulated room lined with puff and stainless steel walls. The ice lasts in the storage facility for up to 4-5 days. By availing PMMSY scheme, they are now self-reliant and providing employment to the local fishermen.

BENEFITTING FROM BIOFLOC



Mrs. Rajni Bajaj belongs to village Nagpura of Durg district of Chhattisgarh. Initially their family was involved only in agricultural activities and devoted in some social services. Later in her own land at Village -Nagpura (Durg), she decided to construct a small pond and start doing fish culture and since few years they are doing fisheries work. When she came in contact with state fisheries departmental officials she came to know about the schemes of Pradhan Mantri Matsya Sampada Yojana and decided that will do Biofloc culture system. Department of Fisheries provided sufficient support from initial stage to final stage, and extended proper guidance to construct Bio-Floc System and start fish culture through biofloc. Department of Fisheries provided subsidy of Rs 3.00 Lakh. Beside fisheries, her family is also involved in agricultural work on their land in Nagpura, trees of Miliadubia, Nilgiri, bamboo trees and plants of horticulture have already been planted by them. With integrated fish farming, agriculture and horticulture they are able to generate more income and increase their livelihood standards.

After Construction of 7 tanks of a Bio-Flock System, now Fish culture work is in progress. On first quarter of this year, Production of 4 Quintal of Fish per tank is her target, on this calculation target of 28 Quintal of Fish is her overall target from Fish production. She intends to expand her production in future to Rs.3,36,000.



Department of Fisheries
Ministry of Fisheries, Animal Husbandry and Dairying
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