सत्यमेव जयते

Mission Mariculture - 2020 & 2022

(2017 to 2022)

Action Plan

Towards Blue Revolution

DEPARTMENT OF ANIMAL HUSBANDRY, DAIRYING & FISHERIES
MINISTRY OF AGRICULTURE & FARMERS WELFARE
GOVERNMENT OF INDIA
July 2017

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MINISTRY OF AGRICULTURE & FARMERS WELFARE
GOVERNMENT OF INDIA
July 2017

राधा मोहन सिंह
RADHA MOHAN SINGH

D.O. No. 1659 /AM

सत्यमेव जयते

कृषि एवं किसान कल्याण मंत्री
भारत सरकार
MINISTER OF AGRICULTURE
& FARMERS WELFARE
GOVERNMENT OF INDIA

14th July, 2017

MESSAGE

Indian marine system utilization in a production perspective have played a vital role, not only in the food security of the country but also helped the marginalized sections of society to earn their livelihood. Sustainable mariculture promises economic and environmental benefits and the gradual elimination of unsustainable fisheries.

Mariculture development may be sustained by basic and applied research and development in major fields such as nutrition, genetics, system management, product handling and socioeconomics.

Mariculture Action Plan 2022 is designed to enhance fish production from marine sector sustainably through Mariculture and to achieve the targets/goals of national Action Plan for implementation of Blue Revolution Scheme, fulfilling the gaps of plan in Mariculture.

The Mission Mariculture 2020 & 2022 will ensure that marine system resources are tapped judiciously even while enabling adoption of appropriate technologies for increase in production, employment generation and economic empowerment for doubling fish farmers income by 2022 as per vision given by Hon'ble Prime Minister of India. The success of these efforts depends on the steps that states will have to take to encourage and implement the activities.

I compliment the officials involved in the formulation of the Mission Mariculture Plan and hope that under the able guidance of Shri Devendra Chaudhary, Secretary, Animal Husbandry, Dairying and Fisheries the concerned implementing agencies will work hard to achieve the specified goals in a timely manner.

Radha Mohan Singh

(Radha Mohan Singh)

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कृष्णा राज
KRISHNA RAJ

सत्यमेव जयते

कृषि एवं किसान कल्याण राज्य मंत्री
भारत सरकार
MINISTER OF STATE FOR
AGRICULTURE & FARMERS WELFARE
GOVERNMENT OF INDIA

संदेश

समुद्री मछली पालन एक ऐसा सेक्टर है, जिसमें खाद्य सुरक्षा मछुआरों के सामाजिक-आर्थिक उत्थान तथा विदेशी मुद्रा अर्जन की अपार संभावनाएं हैं। वैश्विक रूप से यह तेजी से बढ़ता पशु आहार उत्पादक सेक्टर तथा मानव उपभोग के लिए प्रोटीन का बढ़ता स्रोत और स्वास्थ्यवर्धक आहार के रूप में मान्यता प्राप्त है। इसमें संवर्धन की अपार संभावनाएं हैं, जो सभी पणधारियों, विशेषकर मछुआरों तथा मछली पालकों के कल्याण की ओर जाएंगी।

विस्तृत तटरेखा तथा तटवर्ती जल संसाधनों के साथ भारत में समुद्री मछली पालन की अत्यधिक संभावनाएं हैं। भारत विश्व का समुद्री मात्स्यिकी वास्तविक तथा जैविकीय का सबसे संसाधन धारक है- यहां जलीय जन्तुओं के अनुरूप विभिन्न भू-पर्यावरणीय परिस्थितियां हैं। इस क्षमता को देश की पौषणिक सुरक्षा तथा आर्थिक कल्याण के लिए दोहन किए जाने की आवश्यकता है।

नीली क्रांति 2022 के छत्र के तले समुद्री मछली पालन संबंधी कार्य योजना को विद्यमान समुद्री जलीय संसाधनों का प्रयोग करते हुए मात्स्यिकी में वांछित विकास दर प्राप्त करने के लिए तैयार किया गया है। मेरा यह विश्वास है कि अपेक्षित अवसंरचना में अंतर को कम करने के लिए परिकल्पित इस योजना के कार्यान्वयन तथा प्रौद्योगिकी उन्नयन के साथ रोजगार सृजन, उपभोक्ताओं को बेहतर बाजार पहुंच तथा निर्यात में महत्वपूर्ण सुधार होगा।

मेरा मानना है कि इस योजना के कार्यान्वयन में लगे सभी लोग पूरी शक्ति से कार्य करेंगे, जिससे देश में मात्स्यिकी सेक्टर के विकास में वृद्धि हो।

17/11/17

(कृष्णा राज)

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देवेन्द्र चौधरी
Devendra Chaudhry, IAS
सचिव
SECRETARY

सत्यमेव जयते

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

July 19, 2017

Message

Mariculture contributes to food security and provides direct employment to fisher people besides others indirectly dependent on the sector. There is a growing demand for marine finfish, and offshore fish farming can offer new vistas for India in aquaculture for national economic development and also to ensure livelihoods to many more fisherfolk.

Technical efforts to improve the sustainability of mariculture are positive responses to challenges and will yield constructive results in the medium and long term. The major problems faced by this sector such as availability of quality seed and cost-effective feed can be overcome by scientific innovations and technologies.

In Today's era of developments in Mariculture has proved to be a boon for Indian aquaculturist because it increases the productivity. There is great scope for the other fisheries based industries to enter into this sector.

The Mission Mariculture -2020 & 2022 will support the sector in a coordinated way throughout India to facilitate technology adoption for productivity enhancement, efficient management, environmental improvement and creation fo sustainable livelihood opportunities supported by well organized production systems, strengthened infrastructure and competent institutions for optimum utilization and protection of water resources.

During the preparation of Mariculture Action Plan, it was realized that there is a dearth of quality data related to various mariculture activities, which is a major impediment for policy planners. I compliment the whole team led by Mr. A. K. Joshi, Joint Secretary, Fisheries, Ministry of Agriculture & Farmers Welfare, Government of India and Dr.P.Paul Pandian, Fisheries Development Commissioner for providing comprehensive coverage to the sector in spite of impediments.

I hope Mission Mariculture -2020 & 2022 will be implemented with full zest to achieve 'Blue Revolution' in the sector.

(Devendra Chaudhry)

सत्यमेव जयते

Dr. B. Kishore
Joint Secretary (Fisheries)

संयुक्त सचिव
भारत सरकार
कृषि एवं किसान कल्याण मंत्रालय
पशुपालन, डेयरी और मत्स्य पालन विभाग
कृषि भवन, नई दिल्ली-110001

Joint Secretary
Government of India
Ministry of Agriculture & Farmers Welfare
Department of Animal Husbandry, Diarying & Fisheries
Krishi Bhawan, New Delhi-110001

7th November, 2017

FOREWARD

Mariculture, with its associated innovative technologies developed in recent years, is a viable option for supplementing marine capture fisheries and also providing gainful employment and income generation for the fisherfolk in the coastal areas. The Department of Animal Husbandry, Dairying & Fisheries has plans for enhancement of marine fish production and productivity in a sustainable manner. The Department has been making sincere efforts to bring together all stakeholders of the sector to promote the Mariculture sector, laying special emphasis on mariculture with the prime objective of ushering in "Blue Revolution" in India.

Although the sector is growing well, we need to tap the existing potential in a well planned and coordinated manner. Hence, the Mariculture Action Plan-2022 has been formulated under the aegis of the 'Blue Revolution' to focus and to ensure optimum utilization of all marine living resources. Our endeavour is to provide comprehensive coverage to all areas of mariculture.It is expected that implementation of this Plan will bring tangible environmental improvements in marine ecosystems through comprehenvise interventions.

At the same time it is necessary to support the sustainable management of all living aquatic resources, balancing their use and conservation in an economically, socially and environmentally viable manner. Sustainable management and conservation of marine resources including fish stock through focussed attention and a professional approach, with provision of modern infrastructure for mariculture will improve their utilization.

I am sure that the coordinated efforts by governmental and non-governmental organizations involved in this promising sector, will certainly help us in realizing the concept of 'Blue Revolution'. I thank the entire team who worked hard to complete this Plan in a limited time.

(Dr. B. Kishore)

Acknowledgement

We would like to convey our sincere gratitude to the Fisheries Division, Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India for this opportunity to prepare Mission Mariculture 2020-2022 under Central Sector Scheme on Blue Revolution: Integrated Development and Management of Fisheries (2017 to 2022). The Action Plan provides an unparalleled opportunity for pragmatic advancement of knowledge on the key aspects in the field of mariculture. We would also like to thank ShriDevendraChaudry, Secretary, Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare for doing a sterling job from initial stages, when all seemed impossible, till the completion of the Action Plan preparation. ShriAditya Kumar Joshi, Joint Secretary (Fisheries) and all staff members at the Fisheries Division including all our co-Fellows, made their important contribution towards this endeavour in many ways.

We acknowledge the invaluable contribution of Dr. A. Gopalakrishnan, Director, Central Marine Fisheries Research Institute (CMFRI), Kochi and his guidance. We also wish to thank Director, Central Brackishwater Aquaculture (CIBA), Chennai and Staff; Dr. Kirubagaran, Principal Scientist, National Institute of Ocean Technology (NIOT), Chennai and Dr. C. R. K. Reddy, Chief Scientist & Divisional Head, Division of Marine Biotechnology and Ecology, Central Sal and Marine Chemicals Research Institute (CSMCRI), Bhavnagar and the staffs and Governments of Maritime States/Union Territories (UTs) for their consistent support, either directly or indirectly towards this effort.

Authors:

1. Dr. P. Paul Pandian, Fisheries Development Commissioner
2. Dr. Ansy Mathew N. P., Fisheries Research and Investigation Officer
3. Dr. S. Ananth, Consultant (Fisheries)

Contents

Mission Mariculture - 2020 & 2022 - Blue Revolution (2017 to 2022)

1.0. Introduction

Fisheriesis one of the important allied sectors of Agriculture which supports livelihood of almost 1.5 million people in our country. The contribution of Indian fish to the food basket of the world has been substantial. India is the second largest fish producing and second largest aquaculture nation in the world. The total fish production during 2015-16 was registered at 107.62 lakh tonnes with a contribution of 71.82 lakh T (67 %) from the inland sector and 35.8 lakh T (33 %) from the marine sector. Fisheries export earnings from the sector was registered at Rs. 37,870.90 crore from 11,34,948 T in 2016-17. The sector contributed about 0.9% to the National Gross Domestic (GDP) and 5.17% to the agricultural GDP (2014-15).

2.0. Resources

India has about 8118 Km. of coastal line and nearly 2 million Sq Km of EEZ and half a million Sq Km. of Continental Shelf. From these marine resources, India has an estimated fisheries potential of 4.41 million tonnes. Similarly, we have 3.15 million hectares of reservoirs, 2.5 million hectares of ponds and tanks, 1.25 million hectares of brackish water area, cold water resources of hilly states and all other inland fishery resources offer a production potential of about 15 million tonnes. Against this potential, the production of fish from inland sector wasmere 7.18 million tonnes during 2015-16. In this context, optimum utilization of resources becomes pivotal to achieve the targeted production. It is against this backdrop that we want to harness all possibilities for intensive and integrated development of fishery sector.

3.0. Responsibility of the DADF for fisheries development

The Department of Animal Husbandry, Dairying & Fisheries (DADF), Ministry of Agriculture and Farmers Welfare which is responsible for fisheries development and management in the country, formulates developmental strategies for the sector and issues policy guidelines for Fisheries and Aquaculture development and management. It also provides technical and financial assistance for implementation of fishery development schemes to various States/UTs and other implementing agencies.

4.0. Blue Revolution:

Foreseeing the high potential for fisheries sector, the Hon'ble Prime Minister has called for a revolution in the fisheries sector and has named it as **"Blue Revolution".** The Blue Revolution, with its multi-dimensional activities, focuses mainly on increasing fisheries production and productivity from aquaculture and fisheries resources, both inland and marine besides strengthening of post-harvest fishery infrastructure facilities. The vast fishery resources offer immense opportunities to enhance fish production through aquaculture-system diversification, species diversification, introduction of new and advanced technologies in both marine and inland sector, adoption of scientific practices and application of suitable fish health management strategies etc.

4.1. Objectives:

Recognizing the potential and possibilities, the Department of Animal Husbandry, Dairying & Fisheries (DADF), has envisaged various activities to unlock the potential of country's fisheries sector through an integrated approach. Major objectives are:

(a) increase the overall fish production in a responsible and sustainable manner for economic prosperity,

(b) modernize the fisheries with special focus on new technologies

(c) ensure food and nutritional security

(d) generate employment and export earnings and

(e) ensure inclusive development and empower fishers and aquaculture farmers, the following major Reforms have been undertaken:

5.0. Integrated National Fisheries Action Plan-2016 (INFAP):

Understanding the availability and utilization of various fisheries the DADF has prepared a detailed Integrated National Fisheries Action Plan (INFAP) for achieving 150.00 lakh tonnes fish production by 2019-20. The INFAP aims at enhancing fish production and productivity towards achieving the Blue Revolution. The approach was initiated considering the various fisheries resources available in the country like ponds & tanks, wetlands, brackish-water, cold water, lakes & reservoirs, rivers and canals and the marine sector. All the States and UTs have been consulted from time-to-time on the matter of implementation of the scheme and they have also been advised to prepare their State Action Plans for 5 years in line with INFAP for achieving the Blue Revolution. The Blue Revolution aims at production and distribution of quality seed and feed for aquaculture and also culture-based-capture fisheries

6.0 Marine capture fisheries:

Capture fisheries is undergoing tremendous changes due to increasing fishing effort, the catch of almost all commercially important marine fin fishes and shell fishes is on the decline trend and result in severe resource depletion and unemployment. Decline in marine capture fishery also affects the availability of cheap protein for the masses and also affects the GDP growth of the country. It was in this context that mariculture including open sea cage farming of fin fishes and shell fishes assume importance.

7.0. What is Mariculture?

Mariculture is a specialized branch of aquaculture involving the cultivation of marine organisms for food and other products in the open ocean, or in tanks, ponds or raceways which are filled with seawater. An example is the farming of marine fish, including finfish and shellfish like cobia, pompano, sea bass, lobster,or oysters and seaweed in saltwater ponds. Non-food products produced by mariculture include: fish meal, nutrient agar, jewellery (e.g. cultured pearls), and cosmetics.Fish raised through mariculture practices are perceived to be of higher quality than fish raised in ponds or tanks, and offer more diverse choice of species.

7.1. What is open sea cage culture?

Open sea cage farming is eco-friendly and done in open sea where wave action is less. The fishes that are being cultured in cages are high value fishes; hence there is huge export demand for cage cultured fishes. Cage is an enclosure, which can be of any shape or size wherein culture of biotic organisms, such as fin fish and shell fish is being practiced in captivity with a stipulated objective. The cages are totally enclosed on all sides, except leaving an opening at the top for providing feed. Size of a sea cage can vary from 6 -12 m dia for fish farming in open sea where the wave and tidal impact is suitable for farming. A series of cages are spaced in a battery for better operation.

8.0. Intervention of NFDB for promotion of open sea cage farming:

The National Fisheries Development Board (NFDB), Hyderabad functioning under the administrative control of Department of Animal Husbandry, Dairying & Fisheries (DADF), provided financial assistance to Central Marine Fisheries Research Institute (CMFRI) for implementation of a Technology Upgradation project on demonstration of open sea cage farming in 14 locations along the coasts of almost all the maritime States in India on pilot basis. Based on the successful implementationand outcome of the pilot project, it was recommended for establishment of open sea cage farming across the country.

Sea cage farming involving the local fishermen community can be promoted as SHG activity and each group having 5-10 members can be encouraged to undertake open sea cage culture. This will give the group a handsome profit in 6 months. This makes cage farming attractive and profitable. Considering the scope of the farming activity in open sea cages and the encouraging results of pilot projectimplemented by the CMFRI it was decided to promote cage farming in open sea.

9.0. Road Map for Development

9.1. Policy Issues

The cage culture as an industry or occupation does not exist in India at present and currently it is in the initial phase. Hence it needs dedicated support for its development. Cage culture may be promoted as a participatory activity involving research organizations, fisheries department, entrepreneurs and local fishermen. Policy issues have to be addressed once cage culture comes into existence.

9.2. Open sea cage culture Technology

The open sea cage technology developed at CMFRI reduced the cost of the cage to less than one fifth of an HDPE cage. CMFRI had developed two affordable cage models. The first one is a 6 meter fused GI cage and the second model is a dismantling type 10 meter GI cage. The production potential of one cage in a crop is about 4 tonnes quality fishes from a 6 meter diameter low cost cage.

9.3. Fish Seed

Quality fish seed for cage culture is still a major concern. CMFRI had attempted farming technology for six species of marine fin fishesviz; Cobia, Sea Bass, Pompano, Red snapper, White snapper and Sea bream.

Seed production technology for three species viz; Cobia, Sea Bass, Pompano is perfected and work is progressing in the case of another species. Open sea cage culture in India could not grow at fast rate because of certain constraints and the main constraint is the lack of adequate quantity of quality fish seeds of desired species at the right time and efficient land based nursery systems to grow hatchery produced seeds to sizes suitable for cage culture. To achieve this there is a need to develop the brood banks and hatchery infrastructure on the coast line, so that interested fishermen can form the SHGs and undertake nursery rearing as well as cage culture of Sea bass, Cobia, Grouper, Snapper, Silver Pompano and other cultivable species. However financial support is needed for promoting the mariculture technology.

9.4. National marine finfish brood bank

There is also a need to 'develop seed production' and 'culture technologies' for a large number of marine commercial species. In the case of species where seed production technologies have been developed such as cobia, sea bass, and pompano we have not yet started 'commercial level production' which has to be taken up now profusely. The maritime States have to come up with the proposals as per Integrated National Action Plan , so that the marine cage culture could contribute to the fish production in the country through an intensified system.

National finfish brood banksare necessary to support the seed production requirement of the country. These brood banks are to be established in ideal sites of maritime states preferably in Tamil Nadu, Kerala, Andhra Pradesh, Karnataka, Gujaratetc to address the regional requirement. CMFRI has already done considerable work in this regard and hence CMFRI may be entrusted with the responsibility of establishing the brood banks.

10.0. Background for Mission Mariculture -2020 &2022:

The current marine capture fisheries scenario in India is characterized by increased and excessive fishing effort, over-exploitation of certain resources from the inshore waters and increased conflicts among the different stakeholders in the sector. Due to the larger dependency on near shore fisheries over the years, the production from near shore waters has reached asymptotic level and hence ensuring sustainability is inevitable in our marine fisheries policy. It is evident that increasing marine fish production from the capture fisheries is not a practical option in future years. Therefore, 'Mariculture' is the option through which production from marine sector may be enhanced, which has been conceptualized under Blue Revolution. The status of initiatives taken and current developments in Mariculture activities in India are highlighted in **Annexure-I.**

While we have done comparatively well in freshwater and brackish-water aquaculture we are still in the primary stages of development of Mariculture. Though India is the second largest producer of fish through aquaculture in the world, till date aquaculture activities are confined only to coastal / brackish water aquaculture, chiefly shrimp farming.The other coastal aquaculture activities being undertaken are (i) green mussel(*Pernaviridis*) farming which is confined to Malabar Coast in Kerala and (ii) seaweed farming(*Kappaphycusalvarezii*) along Ramanathapuram and Tuticorin coasts of Tamil Nadu and Gujarat coasts.Many other mariculture technologies developed by R& D Institutions are still awaiting for commercialization.

Though the open sea cage farming is already initiated, limited research works has been done so far in India on the 'seed production' and 'farming of high value marine finfishes' and as a result globally we are far behind in this area of development. Major shortfalls include limited probability of success of technology, less outreach activities, less co-ordination among research, development and implementing agencies, lack of policy, roadmap of planning and implementation.

As per Integrated National Fisheries Action Plan, it has been estimated that we need to produce 15.2 million tonnes of fish by 2022, as compared to about 10 million tonnes of current total fish production both from inland and marine sectors. Hence, we need to achieve an additional production of about 5.2 million tonnes in the next 4-5 years. Through the activity of mariculture / open sea cage culture , a target of about 3213 numbers of additional cages have been proposed under Blue Revolution, aiming for total additional marine fish production of 9639 tonnes per annum (in 2022) from the existing production of 1002 tonnes. Sea bass, Pompano and Cobia are the main target speciesproposed to be cultured in sea cages. An estimated investment of about Rs.181.67crore is required to be invested to achievethe targeted production in 'open sea cage culture' under Blue Revolution by 2022.

10.1. Objectives of Mission Mariculture -2020 & 2022:

a) To enhance fish production from marine sector sustainably through Mariculture.

b) To achieve the targets/goals of National Action Plan for implementation of Blue Revolution Scheme, fulfillingthe gapsof plan in Mariculture.

It is proposed to promote the Mariculture especially open sea cage culture activity in all the maritime States and UTs on priority basis with the active participation of maritime States/UTs and fishers.

10.2. Strategy:

a) To develop a MaricultureAction Plan for the entire country.

b) To formulate Scheme level interventions/innovationsto fill the demand – supply gap.

c) To ensure improvements in the existing Mariculture technologiesin orderto further improve the quality and quantity of production.

d) To establish Finfish brood banks, hatcheries and nurseries on the coast line to meet the requirement of finfish seed.

e) To make arrangements to meet the immediate requirement of finfish seed for promoting open sea cage culture.

f) To designate identified facilities as quarantine centres to receive imported high quality finfish seeds to meet the immediate requirement.

g) To develop new Mariculture techniques through appropriate R&D programmes.

h) To develop outreach and participatory Projects with the aim of filling the gap between the technologies and their adoption.

i) Promotion of fisheries producer organizations (FPOs) in Mariculture through "fisheries entrepreneurship development programmes" in all coastal states/ UTs.

j) Establishment of cold-chain, provide market linkages for domestic trade and exports.

10.3. National Consultation Meet on Mariculture:

A National Consultation Meet on Mariculture and Open sea cage culture development was held on 8-9th June, 2017 at CMFRI, Mandapam and subsequently a meeting was alsoheld on 13th June 2017at KrisiBhavanto discuss further plan and finalization of the Action Plan on Mariculture and open sea cage culture development in India for commercialization of developed Mariculture techniques.Action Points proposed and recommended during the said meetings in respect of the participated Institutes/Organisations likeCentral Marine Fisheries Research Institute (CMFRI), Central Salt and Marine Chemicals Research Institute (CSMCRI), National Institute of Ocean Technology (NIOT), Central Institute for Brackish Water Aquaculture (CIBA), National Fisheries Development Board (NFDB), Department of Fisheries (DoF) (Govt. of Tamil Nadu) and Aquaculture Foundation of India (AFI)) arefurnished at **Annexure- II**.

10.4. Action Plan:

The targeted activities shall be taken up as per Integrated National Fisheries Action Plan for timely achievements of goals for the benefits to fish farmers as well as to avoid cost escalations.

Duration : Five (5) Years [2017-18, 2018-19, 2019-20, 2020-21 & 2021-22]

Year wise targets:

S. No.	Year	Marine Cages [50% Unit Cost @ Rs. 2.5 lakhs/cage]		Hatcheries [50% Unit Cost @ Rs. 12.5 lakhs/ hatchery]		Nurseries** [50% Unit Cost @ Rs.35.43 lakhs/nursery]		Brooders*		Recirculatory Aquaculture System (RAS) @Rs.50 lakhs		Total Financial Yr. (2017-22) For all component (Rs. in lakh)
		No.	Funds (Rs. in lakh)	No.	Funds (Rs. in lakh)	No.	Funds (Rs. in lakh)	No.	Funds (Rs. in lakh)	No.	Funds (Rs. in lakh)	
1	2	3	4	5	6	7	8	9	10	11	12	13
1	2017-18	639	1597.50	8	100.00	11	389.73	891	44.55	21	1050.00	3181.78
2	2018-19	639	1597.50	5	62.50	18	637.74	904	45.20	24	1200.00	3542.94
3	2019-20	639	1597.50	4	50.00	20	708.60	919	45.95	24	1200.00	3602.05
4	2020-21	643	1607.50	4	50.00	23	814.89	973	48.65	26	1300.00	3821.04
5	2021-22	653	1632.50	3	37.50	24	850.32	990	49.50	29	1450.00	4019.82
Total		**3213**	**8032.50**	**24**	**300.00**	**96**	**3401.28**	**4677**	**233.85**	**124**	**6200.00**	**18167.63**

*(Sea bass & Cobia)

**Capacity 1 lakh fingerling per cycle

Time frame for implementation (Tentative): The schedule of activities for the first year (2017-18) of the Action Plan is stated below.

S. No.	Activity	Period
1	Formulation of Action Plan&mailing to States	
2	Discussion with States through **VC**	12th April, 2017
3	Finalization of Action Plan with States	20thApril, 2017
4	Submission of DPRs by States	30th April, 2017
5	Starting of cage fabrication work	Last week of May, 2017
6	Completion of cage fabrication work	30thJune, 2017
7	Installation of cages	10th July, 2017
8	Stocking of Fingerlings in cages	September, 2017

Remaining activities of 2017-18 may be merged and taken up in 2018-19; and works for forthcoming years shall be planned/started well in advance to ensure timely implementation and achieving the desired targets.

10.5. Mechanism of Implementation:

The Action Plan has to be formulated and commenced in all maritime States/UTs immediately. A Task Force will be constituted to ensure time bound implementation and monitoring of the project, having Members from Ministry of Agriculture & FW, NFDB, ICAR-CMFRI and MPEDA.A three tier Task Force structure will be constituted as follows:

- **Advisory Committee at National Level:**

  (a) Secretary, DADF,

  (b) Chief Executive, NFDB (**Convenor**)

  (c) Joint Secretary (Fisheries), DADF

  (d) Dy. Director General (Fy)- ICAR

  (e) Fishery Development Commissioner, DADF

  (f) Director, CMFRI

  (g) Representative from MPEDA

- **Technical Committee at National Level**

  a) Joint Secretary (Fisheries), DADF

  b) Asst. Director General (M.Fy)- ICAR

  c) Fishery Development Commissioner, DADF

d) Executive Director, NFDB (**Convenor**)

e) Director, CMFRI

f) Representative from MPEDA

- **Technical /Implementation Committee at State Level:**

a) Agriculture Production Commissioner/Equivalent.

b) Principal Secretary/Secretary (Fisheries)

c) Commissioner/ Director Fisheries (**Convenor**)

d) Managing Director, Fish. Deve. Corporation& Federations

Cluster approach shall be adopted for the implementation of Mariculture projectsin identified areas of Maritime States/UTs/Districts/Blocks/ Villages/Project area, which shall be worked out by the National level Technical Committee in consultation with the maritime States/UTs.

10.6. Funding Pattern:

- Central government shall provide part funding assistance as admissible in the Blue Revolution guidelines.
- State Governments shall try to dovetail additional funds (other than state share) required for Blue Revolution funded projects from State budget/RKVY etc and other sources.
- Financial allocations will be considered as per Action Plan details.
- There will not be any funding for the Operational Costs.
- Maximum allocation on each activity/project will be as per unit cost fixed in Blue Revolution Scheme.
- Estimated/projected expenditure for each State / activity is detailed in annexed Tables-7.1, 7.2, 7.3 , 7.4 & 7.5 at **Annexure- III**.

10.7. Expected production:

Total marine fish production from 3213 marine cages is estimated to be 9639 tonnes @ 3tonnes/cage/year. Estimated/projected production of marine fish through open sea cage farming for each State is furnished in annexed Table 7.4 at **Annexure- III**.

Annexure-I

Initiatives and status of Mariculture Practices in India

A. Marine Finfish Culture

(i) Cobia (*Rachycentron canadum*):

Cobia isone of the suitable species for open sea cage farming. It can grow to about 3-4 kg body weight in one year and 8-10 kg in two years. Broodstock development of cobia was initiated by CMFRI at Mandapamduring 2007-08. The technology of cobia seed production and farming was standardised by CMFRI during 2010-15 and is being taken up by fish farmers successfully. The successful sea cage farming of cobia by the 'Cobia Farming Association' in Palk Bay region,Rameswaram and subsequent adoption by many fishermen groups at Tamil Nadu, Kerala, Karnataka and Goa indicated that the technology is commercially viable. At Mandapam-Rameswaram area currently more than 50 cages are deployed for cobia farming by fishermen groups. There is a great demand for seed to deploy further cages for cobia farming.

(ii) Seabass *(Lates calcarifer):*

Seabass is one of the most important candidate species for open sea cage culture and pond culture and has high commercial value. Seed production technology has been developed and standardised by the ICAR Institutes. Protocol for nursery and rearing of seabass are developed by CMFRI and CIBA.Several cage and pond farming demonstrations were done successfully. CMFRI has perfected cage culture of Seabass at Karwar in Karnataka and has successively proved production to the tune of about 3 tonne fishes from a 6 meter diameter cage. Seabass seeds are produced in the hatcheries of Rajiv Gandhi Centre for Aquaculture (RGCA) and CIBA. However the hatchery production meets less than 40% of the demand. Sea bass is successfully farmed along Maharashtra, Goa, Karnataka, Tamil Nadu, Andhra Pradesh and Kerala coasts.

(iii) Silver pompano (*Trachinotus blotchii*):

Silver pompano is also a suitable species for marine aquaculture due to itsvide acceptability and medium size suitable for a small family. It has the ability to accustom to take pellet feeds, wide tolerance to water quality and high market demand. The CMFRIhas achieved successful broodstock development, induction of spawning and larval production of silver pompano. The technology of silver pompano seed production and farming developed and standardised by CMFRI during 2011-15 was taken up by fish farmers successfully.The techno economic viability of coastal pond farming of silver pompano was also demonstrated by the CMFRI during 2012 in Andhra Pradesh. Silver pompano is found to grow faster in low salinities (10-25 ppt), less cannibalistic and more resistant to wide range of diseases and commands good price in the domestic and international markets. Pompano seeds were supplied to many farmers in Tamil Nadu, Andhra Pradesh, Kerala, Karnataka, Goa, Gujarat and West Bengal for commercial culture.

(iv) CMFRI has also attempted some research on seed production technologies for the following species

a) Epinephelescoioides – Cage farming is being tested at 4 centres across east and west coast

b) Lethrinuslentjan – Cage farming is being done at 3 different locations along west and East coast of India

c) Gnathanodonspeciosus – Seed production is successfully being carried out

d) Trachinotusmookalee - Seed production is successfully being carried out

e) Lutjanusargentimaculatus – Breeding is achieved seed production is being attempted.

(v) Way forward for commercialization of Mariculture of Sea bass, Cobia and Pompano are :

a) Establishment of broodbanks

b) Establishment of hatcheries

c) Establishment of land based nurseries

d) Feed production

e) Establishment of Cage farms

f) Establishment of land based support facilities including cold chain and processing

g) Marketing strategies

(a) Components for establishment of brood banks are:

- Establishment of broodbanks
- Bio-secure Broodstock production
- Production of required newly hatched larvae
- Supply to Pilot hatcheries

(b) Components for establishment of Finfish hatcheries are:

- Establishment of hatcheries through state departments
- These hatcheries supply fry to nurseries
- Establishment of required nurseries
- Supply of ready-to-stock fingerlings to fishermen/farmers

These activities can be established through State agencies and private entrepreneurs.

(c) Commercialization of Sea cage/pond Farming:

- Selection of prospective farmers, farm sites and imparting training at research institutions, empowerment and continued support through NFDB till they become self sustainable
- Identification and empowerment of feed manufacturer/ supplier for supplying good quality marine finfish feed at subsidized price to farmers.

(d) Constraints for developing cage farming business:

- Non-availability of quality seeds of high value finfish
- Want of Suitable sitesfor cage culture.
- Lack of high quality formulated feeds
- Lack of sea cage farming policies

B. Oyster and Mussel farming

The Asian green mussel, *Pernaviridis*is a significant resource of Indian coast. Recent years have witnessed an increased demand for mussels especially in Northern Kerala and Goa. CMFRI has developed technologies for oyster and mussel farming on commercial scale. Advantages of these farming are:

- Short grow out period of 4 to 5 months as compared to 18 to 24 months in Europe and America
- Lower trophic level advantage, Simple technology – easily adoptable
- Raw materials (wooden poles, nylon rope and seed) on locally available.
- Good domestic market in Kerala, Karnataka, Maharashtra, Goa
- Suitable for women empowerment in Maharashtra, Goa, Karnataka, Tamil Nadu, Andhra Pradesh.
- Potential for development and export of value added products

Oyster farming:

- Seasonal group farming activity in Kerala
- Small-scale aquaculture units of 20 to 24 sq.m
- Benefits more than 500 families
- Part time labour opportunities for making oyster rens and shucking of oyster meat.

Constraints in Mussel and Oyster farming:

- Methods suitable for seed collection from open sea are yet to be developed

- Social conflict between common resource users like fishers and farmers (eg. *Conflict between mussel farmers and mussel fishers in Kasargod district regarding collection of seed by farmers from natural beds*)
- Presence of bio toxins due to sudden harmful algal blooms
- Lack of common depuration facilities in villages. Lack of storage facilities for holding harvested mussels in villages.
- Lack of leasing rights
- Poaching of farm stock in open sea farming
- Since the practice is mainly confined to brackishwater bodies the carrying capacities have not been convinced to the farmers resulting in environmental problems

C. Crab fattening of Mud crab (*Scylla serrata*)

- Commercial level seed production technique and economically viable farming methodology need to be improved.
- Fattening practice to selected farmers in Kerala, Karnataka and Tamil Nadu.
- 'Water crabs' (freshly moulted crabs) of 550 g and above are stocked and maintained for a period of 3 to 4 weeks for hardening the shell thereby increasing their commercial value.
- *Scylla serrata* and *S. tranquebarica* are high valued crabs for which fattening procedures has been developed.
- Crabs are fed with trash fish @ 5 to 10% of the biomass / day thrice daily at regular intervals.
- Harvested after 3 to 4 weeks
- Wild collection of seed not resource friendly

D. Lobster fattening

- Lobsters weighing an average 80 g weight can be fattened to above 100 g within a month (Threefold increase in price). Lobsters weighing below 100 g take 5-6 months to attain 300 g in a grow out operation.
- **Constraint**: collection of juveniles from wild is not resources friendly. Hatchery techniques for seed production not yet ready.
- *Panulirushomarus, P. ornatus*and *P. polyphagus* are the main species having high value in the export market.
- Fast growing and highly adaptable to culture conditions.

- CMFRI has successfully demonstrated spiny lobster fattening in floating sea cages at Vizhinjam,Veraval and Mandapam.

E. Seaweed farming

- Global production 10.1 million tonnes worth US $ 5.6 billion
- Technologies developed are yet to be commercialized except for *Kappaphycusalvarezii.*
- Raw material for seaweed based cottage industries for agar and alginates only from natural harvest.
- Village linked seaweed farming programs initiated in the villages around Mandapam by MSSRF with technical help from CMFRI.
- Commercial farming of *Kappaphycusalvarezii*carrageenan yielding seaweed is getting expanded in Ramanathapuram and Tuticorin areas of Tamil Nadu.

Strengths

- Easily adoptable farming techniques
- Market demand for seaweeds mainly from cottage industries
- Industry needs 2000 tonnes (dry wt.) of agarophytes; now available only 800 tonnes to 1100 tonnes
- 12,000 tonnes of (dry. Wt) of alginophytes required (3600 to 5400 tonnes currently available)

Drawbacks

- Grazing of farm crops by fishes
- Low returns from monoculture of seaweeds and inconsistent yields
- Non availability of seaweed seed stock with high yield of colloids
- Poor quantity (gel strength) of polysaccharides from Indian seaweeds.

F. Integrated Multi Trophic Aquaculture (IMTA)

is the practice which combines in appropriate proportions the cultivation fin fish / shrimp with shell / herbivorous fish, seaweed etc. to create balanced systems for environmental stability, economic stability.

G. Strategies for Business Opportunities

a) Need to establish Broodstockcenters for cobia, pompano and seabass

b) Hatcheries for production of seed of cobia, pompano and seabass

c) Nursery rearing centers for production of ready to stock fingerlings of cobia, pompano and sea bass

d) Development of cage/pond farms for cobia, pompano and seabass

e) Production of grow out feeds for cobia, pompano and seabass

f) Fabrication of site specific and cost effective cages and mooring systems

g) Establishment of hatcheries for green mussel, edible oyster and pearl oyster

h) Farming systems for green mussel, edible oyster and pearl oyster

i) Hatcheries for marine ornamental species

j) Conditioning centers for green certified wild collected ornamental species trade

k) Selection of suitable sites for farming

l) Production of seaweeds through farming

m) Commercial level production of designer pearls

n) Development of commercial level IMTA systems

o) Grow out Production through Recirculation aquaculture systems

H. Way forward for development of Mariculture sector in India

- An integrated effort is needed by linking up the entrepreneurs, fisheries development agencies, State/UT Fisheries Departments and Marine and Brackishwater Fisheries Research Institutions with regard to financial, technical and marketing aspects.
- Effective handholding is needed for the entrepreneurs to get themselves established in the sector.
- A coordinated and synchronised action by empowering the entrepreneurs in the available business opportunities together can create a farmed seafood production sector in the country in the near future.

Mariculture technologies ready for commercialization

1. **Cobia aquaculture**

   a. Production of Seed

   b. Production of nursery reared fingerling (ready to stock)

   c. Farming of cobia

2. **Silver pompano aquaculture**

   a. Production of seed

   b. Production of nursery reared fingerling (ready to stock)

   c. Farming of silver pompano

3. **Asian seabass aquaculture**
    a. Production of seed
    b. Production of nursery reared fingerling (ready to stock)
    c. Farming of Asian seabass
4. **Sea cage farming**
    a. Fabrication and supply of cages of different sizes
    b. Production of formulated grow out feeds for marine finfish
5. **Green mussel and edible Oyster farming**
    a. Sourcing or hatchery production of seeds
    b. Farmed production
6. **Marine Ornamental fisheries**
    a. Development of a hatchery produced trade
    b. Certified wild collected trade
7. **Seaweed farming**
8. **Designer pearl production**
    a. Production of pearl oysters
    b. Production of mebe pearls
9. **Recirculation aquaculture Systems**

Annexure - II

Action Points proposed / recommended in the National Consultation Meet on Mariculture and Open sea cage culture development held on 8-9th June, 2017 at CMFRI, Mandapam and in the Meeting on 13th June 2017 atKrishiBhawanto discuss on Mariculture and open sea cage culture development in India for development of Mariculture techniqueswith institutions like CMFRI, CSMCRI, NIOT, CIBA, NFDB, DoF (Govt. of Tamil Nadu) and AFI.

1. Central Marine Fisheries Research Institute (CMFRI), Kochi

Sl. No.	Actions Proposed / Recommended
1.	To prepare an Action Plan to achieve 4 lakh tonnes of fish through mariculture in 5 years (by 2022) with locations identified along with state-wise and year-wise Action Plan
2.	To draft Mariculture policy document and circulate to different coastal states and UTs for stakeholder's feedback before communicating to DAHD&F (Govt. of India) for finalization.
3	To submit DPR on Open Sea Cage Culturewith covering letter for mariculture activities in Palk Bay and Gulf of Mannar area by the CMFRI.
4.	To submit a project proposal to DAHD&F for the establishment of seaweed seed bank facility at Mandapam to propogate seaweed culture in India.
5.	To impart skill development training to coastal fisher folk on mariculture/cage culture activities at various centres of CMFRI. To initiate this activity, fishermen from Palk Bay of Tamil Nadu coast to be given priority.
6.	To draft guidelines on mariculture by constituting a committee.
7.	Submission of details on total area suitable for mariculture with Digitalized picture on depth zone upto 15 meter depth
8.	To strengthen the ongoing Integrated Multi Trophic Aquaculture (IMTA) activities by integrating seaweeds with cage culture by collaboration with other research institutions.
9.	Details of area to be identified for mariculture with seaweed in Gujarat coast
10.	500 fish farmers in Thiruvananthapuram, Kerala for training on Mariculture to be Identified
11.	To make a project of cultivation of sea weeds with 100 farmers, select sites for sea weed culture, beneficiary numbers may be increased phase wise

2. Central Salt & Marine Chemical Research Institute (CSMCRI), Bhavnagar

Sl. No.	Actions Proposed / Recommended
1.	**Action Plan for Seaweed Culture**: To undertake Seaweed Culture near open sea cages, Environment Impact Assessment of fish and seaweed culture
2.	To strengthen the Integrated Multi Trophic Aquaculture (IMTA) activities by integrating seaweeds with cage culture by collaboration with other research institutions.
3.	Details of area identified for mariculture with seaweed in Gujarat

3. National Institute of Ocean Technology (NIOT), Chennai

Sl. No.	Actions Proposed / Recommended
1	NIOT to calculate and submit the economic feasibility study of mariculture activities in open ocean

4. Department of Fisheries, Govt. of Tamil Nadu

Sl. No.	Actions Proposed / Recommended
1	To submit proposals for mariculture activities in Palk Bay and Gulf of Mannar area with technical assistance from CMFRI

5. National Fisheries Development Board (NFDB), Hyderabad

Sl. No.	Actions Proposed / Recommended
1.	To impart skill development training to coastal fisher folk on mariculture/cage culture activities at various centres of CMFRI. To initiate this activity, fishermen from Palk Bay of Tamil Nadu coast to be given priority.
2.	To draft guidelines on mariculture by constituting a committee.

6. Aquaculture Foundation of India (AFI), Chennai

Sl. No.	Actions Proposed / Recommended
1	To strengthen the Integrated Multi Trophic Aquaculture (IMTA) activities by integrating seaweeds with cage culture by collaboration with other research institutions.

Table - 7.1 Brooders **Annexure - III**

Neel Kranti 2022

Blue Revolution: Interigated National Fisheries Action Plan 2022

7. Marine Fisheries-Cage culture

7.1. Brooders (Sea bass & Cobia) [50% Unit Cost will be subsidy]

Sl. No.	States	1st Yr.(2017-18)		2nd Yr. (2018-19)		3rd Yr. (2019-20)		4th Yr. (2020-21)		5th Yr. (2021-2022)		Total Yr. (2017-22)	
		No. of brooders	Fin (Rs in Lakh)	No. of brooders	Fin (Rs in Lakh)	No. of brooders	Fin (Rs in Lakh)	No. of brooders	Fin (Rs in Lakh)	No. of brooders	Fin (Rs in Lakh)	No. of brooders	Fin (Rs in Lakh)
1	Andhra Pradesh	207	10.35	207	10.35	207	10.35	208	10.40	208	10.4	1037	51.85
2	Goa	60	3.00	60	3.00	60	3.00	70	3.50	75	3.75	325	16.25
3	Gujarat	100	5.00	104	5.20	104	5.20	106	5.30	106	5.3	520	26.00
4	Karnataka	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0	0.00
5	Kerala	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0	0.00
6	Maharashtra	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0	0.00
7	Odisha	140	7.00	145	7.25	150	7.50	170	8.50	175	8.75	780	39.00
8	Pondicherry	39	1.95	39	1.95	39	1.95	39	1.95	39	1.95	195	9.75
9	Tamil Nadu	145	7.25	145	7.25	150	7.50	165	8.25	175	8.75	780	39.00
10	West Bengal	100	5.00	104	5.20	104	5.20	105	5.25	107	5.35	520	26.00
11	Andaman & Nicobar	50	2.50	50	2.50	50	2.50	55	2.75	55	2.75	260	13.00
12	Daman & Diu	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0	0.00
13	Lakshadweep	50	2.50	50	2.50	55	2.75	55	2.75	50	2.5	260	13.00
	Total	**891**	**44.55**	**904**	**45.20**	**919**	**45.95**	**973**	**48.65**	**990**	**49.5**	**4677**	**233.85**

Table - 7.2 Hatcheries

Annexure - III

Neel Kranti 2022

Blue Revolution: Interigated National Fisheries Action Plan 2022

7. Marine Fisheries-Cage culture

7.2. Hatcheries [50% Unit Cost @ Rs. 12.5 lakhs/hatchery]

Sl. No.	States	1st Yr. (2017-18)		2nd Yr. (2018-19)		3rd Yr. (2019-20)		4th Yr. (2020-21)		5th Yr. (2021-22)		Total Yr. (2017-22)	
		No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)
1	Andhra Pradesh	0	0.00	1	12.50	1	12.50	1	12.50	1	12.50	4	50.00
2	Goa	1	12.50	0	0.00	0	0.00	0	0.00	0	0.00	1	12.50
3	Gujarat	1	12.50	1	12.50	0	0.00	0	0.00	0	0.00	2	25.00
4	Karnataka	1	12.50	1	12.50	0	0.00	0	0.00	0	0.00	2	25.00
5	Kerala	1	12.50	0	0.00	0	0.00	0	0.00	0	0.00	1	12.50
6	Maharashtra	0	0.00	0	0.00	1	12.50	1	12.50	1	12.50	3	37.50
7	Odisha	0	0.00	0	0.00	1	12.50	1	12.50	1	12.50	3	37.50
8	Pondicherry	1	12.50	0	0.00	0	0.00	0	0.00	0	0.00	1	12.50
9	Tamil Nadu	0	0.00	1	12.50	1	12.50	1	12.50	0	0.00	3	37.50
10	West Bengal	1	12.50	1	12.50	0	0.00	0	0.00	0	0.00	2	25.00
11	Andaman & Nicobar	1	12.50	0	0.00	0	0.00	0	0.00	0	0.00	1	12.50
12	Daman & Diu	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
13	Lakshadweep	1	12.50	0	0.00	0	0.00	0	0.00	0	0.00	1	12.50
TOTAL		**8**	**100.00**	**5**	**62.50**	**4**	**50.00**	**4**	**50.00**	**3**	**37.50**	**24**	**300.00**

Table - 7.3 Nurseries

Annexure - III

Neel Kranti 2022

Blue Revolution: Interigated National Fisheries Action Plan 2022

7. Marine Fisheries-Cage culture

7.3. Nurseries [50% of Unit Cost @ Rs.35.43 lakhs/nursery (Capacity 1 lakh fingerling per cycle])

Sl. No.	States	1st Yr.(2017-18)		2nd Yr. (2018-19)		3rd Yr. (2019-20)		4th Yr. (2020-21)		5 th Yr. (2021-22)		Total Yr. (2017-22)	
		No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)	No of Units	Fin (Rs in Lakh)
1	Andhra Pradesh	3	106.29	3	106.29	3	106.29	3	106.29	4	141.72	16	566.88
2	Goa	0	0.00	1	35.43	1	35.43	1	35.43	1	35.43	4	141.72
3	Gujarat	1	35.43	1	35.43	2	70.86	2	70.86	2	70.86	8	283.44
4	Karnataka	1	35.43	1	35.43	2	70.86	2	70.86	2	70.86	8	283.44
5	Kerala	0	0.00	1	35.43	1	35.43	1	35.43	1	35.43	4	141.72
6	Maharashtra	2	70.86	2	70.86	2	70.86	3	106.29	3	106.29	12	425.16
7	Odisha	2	70.86	2	70.86	2	70.86	3	106.29	3	106.29	12	425.16
8	Pondicherry	0	0.00	1	35.43	1	35.43	1	35.43	1	35.43	4	141.72
9	Tamil Nadu	2	70.86	2	70.86	2	70.86	3	106.29	3	106.29	12	425.16
10	West Bengal	0	0.00	2	70.86	2	70.86	2	70.86	2	70.86	8	283.44
11	Andaman & Nicobar	0	0.00	1	35.43	1	35.43	1	35.43	1	35.43	4	141.72
12	Daman & Diu	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
13	Lakshadweep	0	0.00	1	35.43	1	35.43	1	35.43	1	35.43	4	141.72
TOTAL		**11**	**389.73**	**18**	**637.74**	**20**	**708.60**	**23**	**814.89**	**24**	**850.32**	**96**	**3401.28**

Table - 7.4 Marine Cages

Annexure - III

Neel Kranti 2022

Blue Revolution: Interigated National Fisheries Action Plan 2022

7. Marine Fisheries-Cage culture

7.4. Establishment Marine Cages [50% Unit Cost @ Rs. 2.5 lakhs/cage]

Sl. No.	States	1st Yr.(2017-18)			2nd Yr. (2018-19)			3rd Yr. (2019-20)			4th Yr. (2020-21)			5th Yr. (2021-22)			Total Yr. (2017-2022)		
		Phy (No)	Production @ 3 tonne/ cage/year (in tonne)	Fin (Rs in Lakh)	Phy (No)	Production @ 3 tonne/ cage/year (in tonne)	Fin (Rs in Lakh)	Phy (No)	Production @ 3 tonne/ cage/year (in tonne)	Fin (Rs in Lakh)	Phy (No)	Production @ 3 tonne/ cage/year (in tonne)	Fin (Rs in Lakh)	Phy (No)	Production @ 3 tonne/ cage/year (in tonne)	Fin (Rs in Lakh)	Phy (No)	Production @ 3 tonne/ cage/year (in tonne)	Fin (Rs in Lakh)
1	Andhra Pradesh	100	300.00	250.00	100	300.00	250.00	100	300.00	250.00	100	300.00	250.00	103	309.00	257.50	503	1509.00	1257.50
2	Goa	71	213.00	177.50	71	213.00	177.50	71	213.00	177.50	71	213.00	177.50	71	213.00	177.50	355	1065.00	887.50
3	Gujarat	69	207.00	172.50	69	207.00	172.50	69	207.00	172.50	69	207.00	172.50	69	207.00	172.50	345	1035.00	862.50
4	Karnataka	71	213.00	177.50	71	213.00	177.50	71	213.00	177.50	71	213.00	177.50	71	213.00	177.50	355	1065.00	887.50
5	Kerala	49	147.00	122.50	49	147.00	122.50	49	147.00	122.50	49	147.00	122.50	49	147.00	122.50	245	735.00	612.50
6	Maharashtra	62	186.00	155.00	62	186.00	155.00	62	186.00	155.00	63	189.00	157.50	64	192.00	160.00	313	939.00	782.50
7	Odisha	28	84.00	70.00	28	84.00	70.00	28	84.00	70.00	28	84.00	70.00	30	90.00	75.00	142	426.00	355.00
8	Pondicherry	10	30.00	25.00	10	30.00	25.00	10	30.00	25.00	10	30.00	25.00	12	36.00	30.00	52	156.00	130.00
9	Tamil Nadu	151	453.00	377.50	151	453.00	377.50	151	453.00	377.50	151	453.00	377.50	153	459.00	382.50	757	2271.00	1892.50
10	West Bengal	10	30.00	25.00	10	30.00	25.00	10	30.00	25.00	12	36.00	30.00	12	36.00	30.00	54	162.00	135.00
11	Andaman & Nicobar	7	21.00	17.50	7	21.00	17.50	7	21.00	17.50	7	21.00	17.50	7	21.00	17.50	35	105.00	87.50
12	Daman & Diu	4	12.00	10.00	4	12.00	10.00	4	12.00	10.00	4	12.00	10.00	4	12.00	10.00	20	60.00	50.00
13	Lakshadweep	7	21.00	17.50	7	21.00	17.50	7	21.00	17.50	8	24.00	20.00	8	24.00	20.00	37	111.00	92.50
TOTAL		**639**	**1917.00**	**1597.50**	**639**	**1917.00**	**1597.50**	**639**	**1917.00**	**1597.50**	**643**	**1929.00**	**1607.50**	**653**	**1959.00**	**1632.50**	**3213**	**9639.00**	**8032.50**

Table - 7.5 RAS **Annexure - III**

Neel Kranti 2022
Blue Revolution: Interigated National Fisheries Action Plan 2022

7. Marine Fisheries-Cage culture

7.5. 1 RAS=Rs.50 lakhs, 1 RAS=40 brooders (120-150 Kg) Cost of 1 brooder Rs.5000/-

Brooders (Sea bass & Cobia) [50% Unit Cost will be subsidy]

Sl. No.	States	1st Yr. (2017-18)		2nd Yr. (2018-19)		3rd Yr. (2019-20)		4th Yr. (2020-21)		5th Yr. (2021-22)		Total Yr. (2017-22)	
		No. of RAS	Fin (Rs in Lakh)	No. of RAS	Fin (Rs in Lakh)	No. of RAS	Fin (Rs in Lakh)	No. of RAS	Fin (Rs in Lakh)	No. of RAS	Fin (Rs in Lakh)	No. of RAS	Fin (Rs in Lakh)
1	Andhra Pradesh	5	250.00	5	250.00	5	250.00	6	300.00	7	350.00	28.00	1400.00
2	Goa	1	50.00	1	50.00	1	50.00	2	100.00	2	100.00	7.00	350.00
3	Gujarat	2	100.00	2	100.00	2	100.00	3	150.00	3	150.00	12.00	600.00
4	Karnataka	0	0	0	0	0	0	0	0.00	0	0.00	0	0
5	Kerala	0	0	0	0	0	0	0	0.00	0	0.00	0	0
6	Maharashtra	0	0	0	0	0	0	0	0.00	0	0.00	0	0
7	Odisha	4	200.00	4	200.00	4	200.00	4	200.00	4	200.00	20.00	1000.00
8	Pondicherry	1	50.00	2	100.00	2	100.00	2	100.00	2	100.00	9.00	450.00
9	Tamil Nadu	4	200.00	4	200.00	4	200.00	4	200.00	4	200.00	20.00	1000.00
10	West Bengal	2	100.00	2	100.00	2	100.00	3	150.00	3	150.00	12.00	600.00
11	Andaman & Nicobar	1	50.00	2	100.00	2	100.00	1	50.00	2	100.00	8.00	400.00
12	Daman & Diu	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00	0.00
13	Lakshadweep	1	50.00	2	100.00	2	100.00	1	50.00	2	100.00	8.00	400.00
	Total	**21**	**1050.00**	**24**	**1200.00**	**24**	**1200.00**	**26**	**1300.00**	**29**	**1450.00**	**124.00**	**6200.00**

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National Fisheries Development Board

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