



Optimism, reforms, investment: India on cusp of transforming seaweed sector

India has a long rich bio-diverse coastline that provides livelihood to millions. While traditional aqua farming has helped shape the coastal economy over the years, the country has been rather obtuse in adopting seaweed cultivation, an allied agricultural sector that holds immense prospects for the nation's economy.

Things, however, are beginning to gather steam. The Narendra Modi government has, sought to give the sector a heady start through strategic policy intervention, alive of the significant and emerging



opportunities for seaweed-based products and produces in the national and international markets. The Pradhan Mantri

The following table shows the major seaweed producing countries in the world.

Country/area.	Seaweed aquaculture production	
	Tones (wet weight)	Share of world total (%)
World	32 386 189	100.00
Asia	32 231 955	99.52
China	18 575 280	57.36
Indonesia	9 320 298	28.78
South Korea	1 710 500	5.28
Philippines	1 478 301	4.56
North Korea	553 000	1.71
Japan	389 800	1.20
Malaysia	174 083	0.54
Africa	112 815	0.35
Tanzania	104 550	0.32
Madagascar	5337	0.02
Americas	31 984	0.07
Chile	21 178	0.07
Oceania	14 040	0.04
Solomon Islands	5 520	0.02
Papua New Guinea	4 300	0.01
Kiribati	3 650	0.01
Europe	5 396	0.02
Russian Federation	4 527	0.01

Fig.1. Seaweed aquaculture production in the world in 2018 (source FAO-SOFIA 2020)

Matsya Sampada Yojana has earmarked over Rs 600 crore for bringing vibrancy to the sector and to raise the level of production from 25,000 tonnes in 2020 to 1,12,000 tonnes by 2025. The scope is endless for the sector and a palpable sense of optimism was visible at a two day Seaweed India meet where top government officials and policymakers engaged in constructive and thought-evoking discussion with veterans of the industry, academicians, agriculture experts and business leaders from India and abroad.

The conclave, organised by SMART AGRI POST & AQUA

POST on August 26-27, came against the backdrop of a renewed thrust on the sector fuelled by strategic policy intervention, even as India is warming up to the idea of seaweed farming as a key enabler in shaping India's aquaculture landscape in coming decades.

The deliberations among 28 speakers spanned over eight and a half hour that provided a rich repository of ideas for the growth and development of seaweed sector, about the umpteen potential, challenges and opportunities.

Initiating the discussion, Shri Jatindra Nath Swain, Secretary-Fisheries Government of India drew attention to the PM's Independence Day speech when he encouraged stakeholders 'to take full advantage of the new possibilities that are emerging in the cultivation of seaweed'.

The fisheries secretary alluded to the role of the processing sector in creating a vibrant aquaculture industry and stressed replicating a similar model in the area of seaweed cultivation to unlock India's potential in this sector. He said the states should look into framing unambiguous rules for seaweed farming to avoid legal issues and focus on the creation of seed banks for sustained cultivation.

Aquaculture and seaweed farming, he said, is also critical in India's context in the coming decades when the overgrowing population will lead to the saturation of land available for traditional agriculture farming. "We have to (then) move from land-based production system to sea-based production system".

Seaweed farming can also transform coastal areas into commercial hubs, generating incomes and improving the livelihoods of the farming community living on the margins.

Dr J Balaji, Joint Secretary, Department of Fisheries, Govt of India said there is a huge possibility of developing seaweed sector. He said India should lay focus on '3 S' such as seed, scale and sale of seaweed products" to give the much-needed growth trajectory to the sector.

Picking up the thread, **Dr JK Jena, DDG-Fisheries, ICAR, Govt of India** said "We need to have seed banks in several locations and

focus on generic improvement programmes. We need to see that the whole value chain is created so that seed to selling is not an issue”.

The observations of other speakers are as follows:

Director, Cluster Innovation Centre & Centre for Himalayan Studies of Delhi University Prof Dinabandhu Sahoo appealed to the research bodies to go for targeted innovations and identification of suitable seaweed cultivation areas in consultation with the concerned states, the Centre and with the industries. He underlined the need for a buyback arrangement from seaweed farmers at a predetermined rate, apparently indicating towards bringing the seaweed products under the MSP regime.

Dr Ira Levine, Professor, Natural & Applied Sciences, Fulbright Scholar Maine, USA:

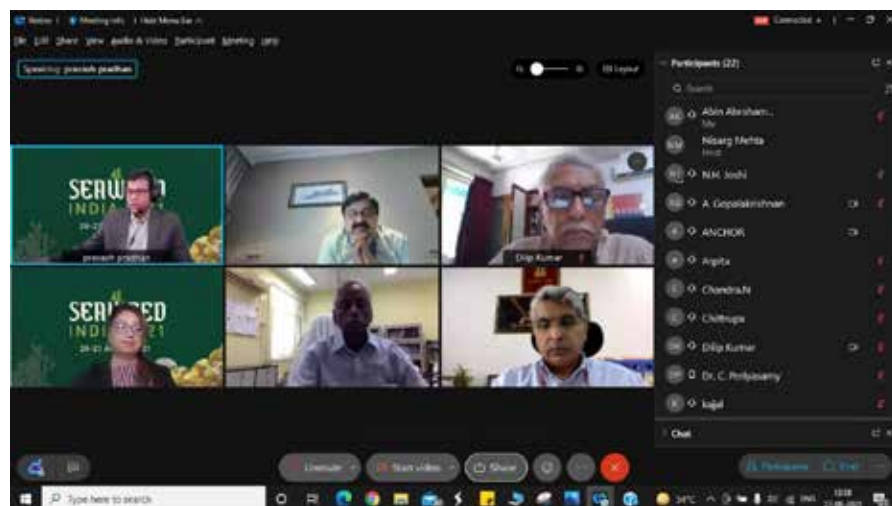
“India has the infrastructure and human power to succeed in seaweed farming. What we need is confidence and support to sell products at a proper price, a guaranteed purchasing”.

Shrikumar Suryanarayan, Co-Founder, Chairman & CEO, Sea6 Energy:

“If we can improve labour productivity, it is possible to reduce the cost of sea plant. Even bio fuel can become viable. Besides, we must focus on applications of seaweed because of versatility”.

Dr. Anicia Q. Hurtado, Scientist-Consultant in Seaweed, Tissue Culture & Aquaculture, Philippines:

“There is a need to have an established land-sea based nurseries for year round availability of seedlings, sustained farming, stable income and a robust, strong



and sustainable industry”.

Dr. Lim Phaik Eem, Deputy Director, Head of Marine Biotechnology Research Unit, Institute of Ocean & Earth Sciences, University Malaya:

“The way forward for seaweed industry is continuous supply of robust, versatile seeds, biosecurity application, increased cultivation area, diversifying value chain and cultivated species.”

Dr Stefan Kraan, CSO, The Seaweed Company Purple Turtle, Tamil Nadu:

“There is a need for mechanization. To compete with China, Philippines, Malaysia is not easy...., (mechanization) this aspect can be explored. We need licensing issues to be addressed”.

Prof. CRK Reddy, CEO, Indian Centre for Climate and Societal Impact Research:

“India need to have a strong S&T programme, infrastructure facilities, nodal agencies to promote the industry. Further, we need to focus on HR development because no university in India at present offer courses on seaweeds and seaweeds cluster development”.

Dr. Alan Critchley, The Verschuren Centre for Sustainability in Energy and Environment, University of Cape:

“There are few differences in the principles of agronomy and phyconomy. Do not repeat the mistakes in the marine sector. Do not distribute limited genetic crops around the world. Investigate indigenous diversity for best applications and invest in indigenous efforts”.

Dr. Vaibhava Mantri, Principal Scientist & Divisional Chair Applied Phycology and Biotechnology Division, CSIR-CSMCRI underlined the potential of tech intervention for good yield in India. He gave an insight into the research that has been carried out in the last couple of years in understanding the process of cultivation and adopting new technologies for improving the production in the country.

Dr. Johnson. B, Scientist, ICAR-CMFRI Mandapam Centre said, ‘Along with seaweed farming, Integrated Multi-Trophic Aquaculture is increasingly gaining global traction as a means of environmental sustainability and economic stability. He offered an incisive account of the economic benefit of seaweed farming and innovative measures for better yield for fish farmers in India’.

Dr. Muruganatham, Manager, Sathyam Group of Companies, Madurai:

“Seaweed extracts under bio stimulants, the market of which has grown rapidly. The products are natural, biodegradable and non-hazardous in nature”.

Dr. Kajal Chakraborty, Principal Scientist, ICAR-Central Marine Fisheries Research Institute. (ICAR-CMFRI):

“Seaweeds are exceptional store house of bioactive natural products with pharmaceutical and functional food applications. Marine flora has, however, remained largely unexplored and approximately 71 per cent of the molecular entities listed in the dictionary of marine natural products have novel molecular structures compared to 40 per cent of those in the dictionary of natural products”.

Dr. P. K. Anil Kumar, Scientist, TIFAC:

“Support can be extended for seaweed value addition with technology upgradation of traditional seaweed processing units. Seaweed based start-ups should be provided seed fund, market access etc. Besides, commercial production of

seaweed-based pharmaceuticals should be taken up.

Director of AquAgri, Tanmaye Seth also recommended formulation of a clear policy specifying the area where the cultivation is not permitted. Such areas should be demarcated with GPS coordinates to remove ambiguity. He also suggested the introduction of insurance from the government for seaweed growers as protection against natural calamities.

Dr C Periyasamy, Assistant Professor & Head, Department of Botany, Pasumpon Muthuramalinga Thevar College said that the expansion of this seaweed cultivation has not yet flourished after 2011 as expected due to various factors. The probable reasons would be lack of promoting agencies, lack of proper practices, lack of crop data, lack of viable seed material, lack of feasible cultivation methods in open waters and lack of public awareness, besides lack of Government support.

S Vasu of Thashava Marine Products, Seiyappa Goundan

Puthur drew attention to the issue of imposition of GST on seaweed products, contending that the 14 per cent tax rate is having a detrimental impact on the industries. As opposed to the earlier 5 per cent tax regime, GST has increased their burden and have blunt the prospects of competing with other countries, he contended.

Alluding to the challenges facing the sector, **Director, ICAR-CMFRI Dr A Gopalakrishnan** suggested a leasing policy for seaweed farming for the benefit of the sector. The policy can spell out the modalities for leasing of coastal water and so on, a view shared by several speakers while pointing to possible litigations and legal disputes.

Dr M V Gupta, World Food Laureate & Former Assistant Director-General of World Fish Centre said, “Seaweed farming is a livelihood activity for women in coastal areas. This is an alternative source of livelihood. The per capita income of women is low. They were not involved in processing. Most of the profit is being taken by the middlemen. We need to address this issue to catch up with other countries and be in the reckoning.”

Summing up the two days conclave, Dr DilipKumar, Chairman, Board of Directors, Institute of Livelihood Research and Training (ILRT); Adviser International Civil Service FAO of the UN - Retired, suggested to use the term ‘Sea plant’ instead of “seaweed” which undermines the importance of sea plants which bear enormous potential for contributing to food, nutrition, livelihood security, and carbon sequestration. He has tried to sum up the deliberations as mentioned below.

Converting potential into realities – few recommendations

- Considering the resources, needs and aspirations of millions, India needs to follow the strategy of mass production of seaweed but unlike the West where this is exclusively a large scale and highly mechanized farming. India also needs to ensure that its approach should be primarily on increasing the income of the farmers rather than increasing production. The research institutes should,

therefore, aim at developing need based technologies.

- Bringing the seaweed production from subsistence to commercial mode with technological inputs and integrating it with the industry to ensure a scalable and sustainable value chain.

Priority interventions points

- Need to conduct an extensive survey to identify the most suitable areas for the development of seaweed farming and making it

available in the public domain.

- Conduct a comprehensive market study on the demand, supply, price, export market, emerging areas for product diversification, etc.
- Isolation of bioactive compounds and possible areas for their application including technologies for their bulk production and utilization and quality assurance
- Creating a conducive regulatory environment for the sustainable growth of seaweed production and the processing industry.
- It was observed that, though seaweed cultivation is a labor-intensive system, it keeps the production costs high. At this stage it is important to introduce mechanization by developing small-scale, user-friendly and low-cost affordable harvesters, aggregators, etc., to bring down the production cost.
- Promotion of seaweed-based biofuel production
- Developing infrastructure facilities such as seed banks, facilities for aggregation and drying yards, transport and

storage facilities in addition to developing land and sea-based nurseries for year-round availability of seed propagules.

Research thrust areas

- Selective breeding technologies for scalable inshore and offshore farming practices including location and collection of broodstock and domestication program.
- Development of In-vitro/tissue culture technologies for quality seed production.
- Development of commercially viable seed production technologies to ensure adequate supply of seed for the primary producers.
- Promotion of IMTA systems combining sea cage and seaweed farming
- Developing and diversifying production technologies, conducting extensive field trials and fine-tuning before releasing such technologies for mass application.

Institutional strengthening and capacity building

Major production of seaweed for the industry still comes from the wild collection, while only

a fraction of production comes from cultivation. For making the best use of the huge allocation of resources for the fisheries sector, both at the union and maritime states level, it is high time for promotion of seaweed farming and value chain development by strengthening extension services system, research - extension linkage, making easy availability of inputs including quality seed, easy access to institutional finance, and creating a coherent relationship between primary producers and the industries. Creating a dedicated unit for the development of seaweed farming in the maritime states deserves priority.

A strong coordination mechanism is required to foster functional linkages between the maritime state departments of fisheries, NFDB, fisheries universities and colleges and ICAR research Institutes to ensure smooth and sustainable delivery of technical assistance, the flow of technologies, and conduct of quality training for extension personnel and farmers. Encouraging innovations among the farming communities and processing sector is equally important.