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Abstract

Fisheries sector is now facing demand-supply gap due to declining marine fish stocks. Countries have realized that intensifying sea farming- 'mariculture' will be one of the productive initiatives to fulfill this gap. Latest statistics shows that the contribution of mariculture to global fish production is increasing constantly. Apart from providing comparatively low cost proteinaceous food, Mariculture also ensures sustainability of the stocks. Keeping all this in view, this article has been attempted to provide an overall glance of the current global status of mariculture production as per the recent state of world fisheries and aquaculture published by Food and Agriculture Organization.

Global Status of Mariculture

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Introduction

Fish is an unavoidable component in ensuring nutritional security to growing human population. At the global level, fish consumption as food by humans has doubled since 1973. Increasing demand for fish with growing population encouraged aquaculture (Inland aquaculture and mariculture) substantially in addition to capture fisheries. As freshwater aquaculture more or less constantly faces stiff competition with agriculture for water or land use, mariculture has slowly emerged as one of the promising aquaculture subsector. As the name suggests mariculture is conducted in marine environment, where species are cultured with naturally occurring seeds in sea and production is entirely in sea and for some species, the seeds are brought from hatcheries and nurseries where grow-out phase is only carried out in sea. The major species cultured are seaweeds, molluscs, crustaceans and finfish.



Figure 1: Farming of aquatic animals in cage in marine water (source: ekarthimerini.com)

Global Mariculture Production

Mariculture is practised in marine water environment, while coastal aquaculture is practised completely or partially in human-made structures in areas

adjacent to the sea, such as coastal ponds and gated lagoons. In coastal aquaculture, the salinity is less stable than in mariculture because of rainfall or evaporation, depending on the season and location. On the world level, it is hard to distinguish between Mariculture and coastal aquaculture production, because while reporting data to Food and Agriculture Organization (FAO), usually countries give combined production data from both coastal aquaculture and mariculture.

The total aquaculture production in the year 2018 was 82.1 million tonnes in which 30.8 million tonnes came from mariculture production that is 37.5% of total aquaculture production in 2018 and rest from inland aquaculture production. The production has slightly increased in 2018 when compared to production of species through mariculture in the year 2016 which total to 28.7 million tonnes. The contribution of mariculture in the total aquaculture production from the year 2011 to 2018 is shown in table 1.

Table 1: World Mariculture production trend from 2011-18 in million tonnes:

Production year	2011	2012	2013	2014	2015	2016	2017	2018
Mariculture	23.2	24.4	25.4	26.8	27.5	28.7	30.0	30.8
Total Aquaculture	61.8	66.4	70.2	73.7	76.1	80.0	79.5	82.1

(Source: FAO, 2020)

Major Global Mariculture Producers

East and Southeast Asian countries were the major producers of mariculture species in the World which constitutes of 3.9 million tonnes of finfish species, 4.8

million tonnes of crustaceans, 15.8 million tonnes of molluscs and 0.3 million tonnes of other aquatic animals in the year 2018. Table 2 shows the continent wise mariculture production (Thousand tonnes, live weight) of main species group in the year 2018.

Table 2: Mariculture production of main species group by continent in 2018 (Thousand tonnes, live weight)

Species	Africa	America	Asia	Europe	Oceania	World
1. Finfish	291	1059	3995	1892	92	7328
2. Crustacea	6	888	4834	0	6	5734
3. Molluscs	6	640	15876	680	102	17304
4. Other aquatic animals	0	...	387	0	0	390
Total	302	2587	25093	2575	200	30756

(Source: FAO, 2020)

Countries such as Japan, United Kingdom of Great Britain, Chile, Norway, Canada, Northern Ireland and Greece mainly concerned in mariculture of finfish species especially coldwater salmonids. Developing countries in Asia and Latin America are the major producers of crustaceans' especially marine shrimps which are the important source of foreign-exchange earnings. China produce high quality of marine molluscs. Countries such as Japan, Spain, Italy, France and the Republic of Korea produce bivalves in significant quantities.

Major Species Produced through Mariculture

Farming of marine plants and animals for food, medicine, or any industrial applications are also involved in mariculture. Farmed aquatic plants mostly include seaweeds and lesser production volume of microalgae. The non-food products include ornamental shells and pearls.

In 2018, mariculture production was 30.8 million tonnes (USD

106.5 billion) and the production was dominated by molluscan species with 17.3 million tonnes which accounted for about 56% of total mariculture production. Finfish production is dominated next to molluscs with 7.3 million tonnes which contribute 22.5 % of total production. Crustacean accounted 5.7 million tonnes with 17.6 % contribution to total production in Marine aquaculture (Figure 1).

Finfish species which are being used for mariculture are European sea bass, salmon, Bigeye tuna, Cobia, Grouper, Snapper, pompano, pearls spot, Mullet, pomfret, Barramundi, cobia and others. Shellfish species cultured are Abalone, oysters, prawn, Mussels. Culture of extractive species like Marine bivalves (filter-feeding organism) and seaweeds which extract organic matter from marine environment for their growth and benefit the environment. This eco-friendly culture with fed species was encouraged in European Union and North America as this culture contributed 57.4% to in total aquaculture production in 2018.

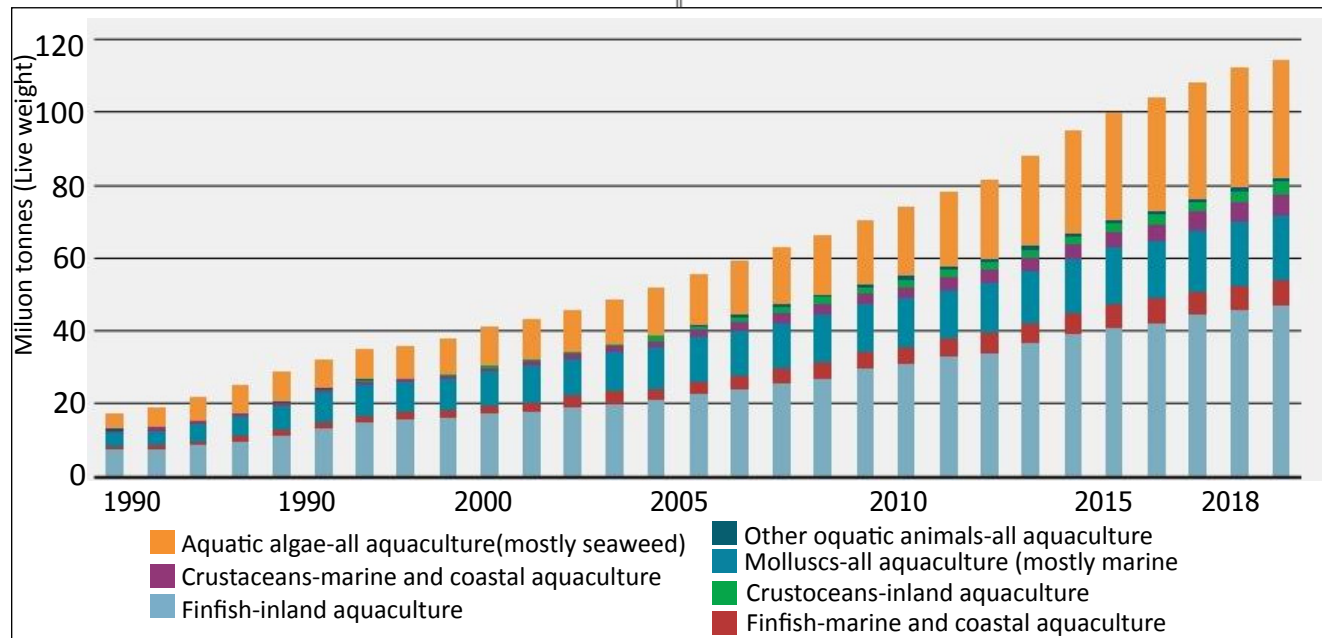


Figure 2: World aquaculture production of aquatic animals and algae (source: FAO, 2020)

Seaweed Production through Mariculture

The culture and harvest of Marine algae or seaweed was the major activity done in Mariculture with 32.4 million tonnes production in 2018, the production has tripled from 2000 to 2018. *Kappaphycus alvarezii* (1.5 million tonnes production in 2018) and *Eucheuma spp.* (9.2 million tonnes) are used as raw material for carrageenan extraction. In Indonesia, the production level of seaweed was increased from 4 million tonnes in 2016 to 11 million tonnes in 2018 because tropical seaweeds were cultured in large quantity.



Figure 3: Women engaged in seaweed culture (source: wikiwand.com)

Major Seaweed Species Produced

In 2018, Japanese kelp (*Laminaria japonica*) with 11.4 million tonnes production and *Eucheuma spp.* with 9.2 million tonnes production contributed 35.5% and 28.5%

respectively to the total global seaweed production. These were followed by *Gracilaria spp.* falls in third position with 10.6% contribution to the total production followed by *Undaria pinnatifida* (wakame) and *porphyra spp.* with 7.1% and 6.2% contribution to total production respectively. Brown seaweeds, *porphyra tenera*, *Sargassum fusiforme* and other algal species are the other important seaweeds produced. Microalgae, *Spirulina spp.*, *Chlorella spp.*, *Haematococcus pluvialis* and *Nannochloropsis spp.*, are commercially produced in large scale in many countries for nutrient supplement and other uses. Many countries are involved in seaweed culture because of increasing demand for seaweeds which are being used for various purposes in food industries, pharmaceutical products, bio-fuel and more importantly they have various beneficial impact on marine environment. China and Indonesia are the top seaweed producing countries in the world.

Conclusion

Fisheries and aquaculture together as a comparatively cheaper source of protein satisfies the global animal protein requirement for human nutritional security. Once the fisheries resources were considered infinite but due to growing population and its consequential anthropological stress coupled with climatic change has already made them near to a finite resource. It paved the way for intensifying aquaculture as an alternative source for capture fisheries. In between the years 2011 and 2018, in national agendas of many countries, the importance of aquaculture grew significantly and emerged as an important revenue generating sector. To minimize the use of sparsely (3% of the total water in world) available freshwater for aquaculture, many countries have opted for culture of needed aquatic species in coastal waters

(97% of the total water in world). As a result, the production status of mariculture is showing a positive trend in many countries. But still many countries in comparison to the available resources with them, have not started to or fully utilize it for mariculture production. Creating or modernising existing infrastructure facilities for mariculture and providing necessary incentives to farmers engaged in mariculture will help nations attain sustainable development goals through strengthened blue economy at faster rate. It is also noteworthy to mention that mariculture should be further intensified with underutilized coastal resources as it has huge capacity to

cater alternative livelihood and socio-economic upliftment to coastal communities in many developing as well as third world countries. Mariculture will also play a key role in near future to meet out the world's equitable demand for nutritive seafood.

Reference

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