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MARICULTURE- A Futuristic Opportunity for Minimizing Land Use

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Introduction

In this contemporary era, reducing food production pressures on the environment while feeding an ever-growing human population is one of the grand challenges facing humanity. The magnitude of environmental impacts from food production, largely around land use, has motivated evaluation of the environmental and health benefits of shifting diets, typically away from meat toward other sources, including seafood.

Mariculture is a specialized branch of aquaculture (which includes freshwater aquaculture) involving the cultivation of marine organisms for food and other products in the open ocean of offshore aquaculture, an enclosed section of the ocean, or in tanks, ponds or raceways which are filled with seawater. It is commonly known as marine farming also. An example of the latter is the farming of marine fish, including finfish and shellfish like prawns, 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. Mollusks (clams, oysters, abalone, scallops, and mussels) represent the most important species cultured in marine waters.

Seaweeds (brown, red, and green) are a close second. While most people do not think that they eat much (or any) seaweed, extracts from seaweeds can be found in everything from toothpaste and ice cream to automobile tires. Seaweeds themselves are dried and used directly as human food in many parts of the world. Crustaceans include shrimp, crabs, lobsters, and crayfish. While shrimp culture has become a major industry in Asia and Latin American since the early 1980s, global production is far less than that of mollusks and seaweeds.

Marine fish production is even smaller. Top finfish groups include Atlantic salmon, milkfish, sea bream, sea bass, red drum, yellowtail, striped bass, and hybrid striped bass.

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Types of Operations:

Marine culture can refer to many different methods for raising species. For example, oyster culturists may place old shells on the bottom to provide places for a new generation of oysters to attach. The oysters feed on wild phytoplankton and are harvested when they reach the proper size. The next level would be to spawn oysters in a hatchery and allow the larval oysters (called spat) to settle on oyster shell, after which the shell is placed on the oyster bed in bays or suspended on ropes from a raft. Mussels and scallops also can be grown on ropes below rafts. The culture of blue mussels on long ropes is common in the bays and inlets of Nova Scotia, Canada. This mollusk is economically important to local growers, even though it represents only a small fraction of the province's mollusk production.

- **Floating Cages**: In the open sea or large sheltered bays floating cages are used for culture purposes. Other structures are not practicable because of constant wave action. But for culture in cages because of high cost of cages it is necessary to maintain a large number of individuals inside the cage to make the venture profitable. This in turn necessitates supplementary feeding since the quantity of natural food available in the volume of water inside the cage cannot sustain the large number normally cultured in these cages. For this type of culture practice to get popular it will therefore be necessary to first develop inexpensive cages and also fish feed at reasonable prices and understandably as a result, this method has been slow to develop in developing countries.
- **Net Enclosures:** Net enclosures barricading off large areas in sheltered bays are being tried on a commercial scale in some countries. But this requires considerable capital outlay and frequent replacement as a result of corrosion. In addition, supplementary

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feeding is essential which requires higher running costs - but it does pay its way that is why some private farms exist in developed countries.

- **Earth Ponds:** For inland brackish water areas where the tidal range is adequate, experience in developing countries in the east has shown that for mariculture, earth ponds constructed to impound spring tide water is the most suitable structure. This can be done without much difficulty in areas where the land is more or less flat or has slight slope and the nature of the soil is satisfactory. The construction of earth ponds and use of tidal water encourages the use of manual labour for construction and harneses gravitational force in the form of tides for the water supply. It would not only be independent of any foreign imported energy source but also reduce the imported material component to negligible quantities.
- **Constant Water Circulation Systems:** Constant water circulation units are popular in some developed countries. These are large cement structures. In addition this requires continuous pumping of water in large quantities and also supplementary feed. Thus this system requires not only a heavy capital outlay but also high recurrent costs. This proves economical where a high price can be obtained for the end products and adequate raw material for feed is available.
- **Sustainability:** Mariculture development must be sustained by basic and applied research and development in major fields such as nutrition, genetics, system management, product handling, and socioeconomics. One approach uses closed systems that have no direct interaction with the local environment. However, investment and operational cost are currently significantly higher than with open cages, limiting closed systems to their current role as hatcheries.

Benefits

Sustainable mariculture promises economic and environmental benefits. Economies of scale imply that ranching can produce fish at lower cost than industrial fishing, leading to better human diets and the gradual elimination of unsustainable fisheries. Fish grown by mariculture are also perceived to be of higher quality than fish raised in ponds or tanks, and offer more diverse choice of species. Consistent supply and quality control has enabled integration in food market channels.

Conclusion

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Mariculture is and will increasingly become an important producer of aquatic food in coastal areas, as well as a source of employment and income for many coastal communities. Wellplanned and managed mariculture can also contribute positively to coastal environmental integrity. However, mariculture's future development will occur, in many areas, with increasing pressure on coastal resources caused by rising populations, and increasing competition for resources. Thus, considerable attention will be necessary to improve the environmental management of aquaculture through environmentally sound technology and better management, supported by effective policy and planning strategies and legislation.