MARICULTURE

A FUTURISTIC OPPOURTUNITY FOR MINIMIZING LAND USE

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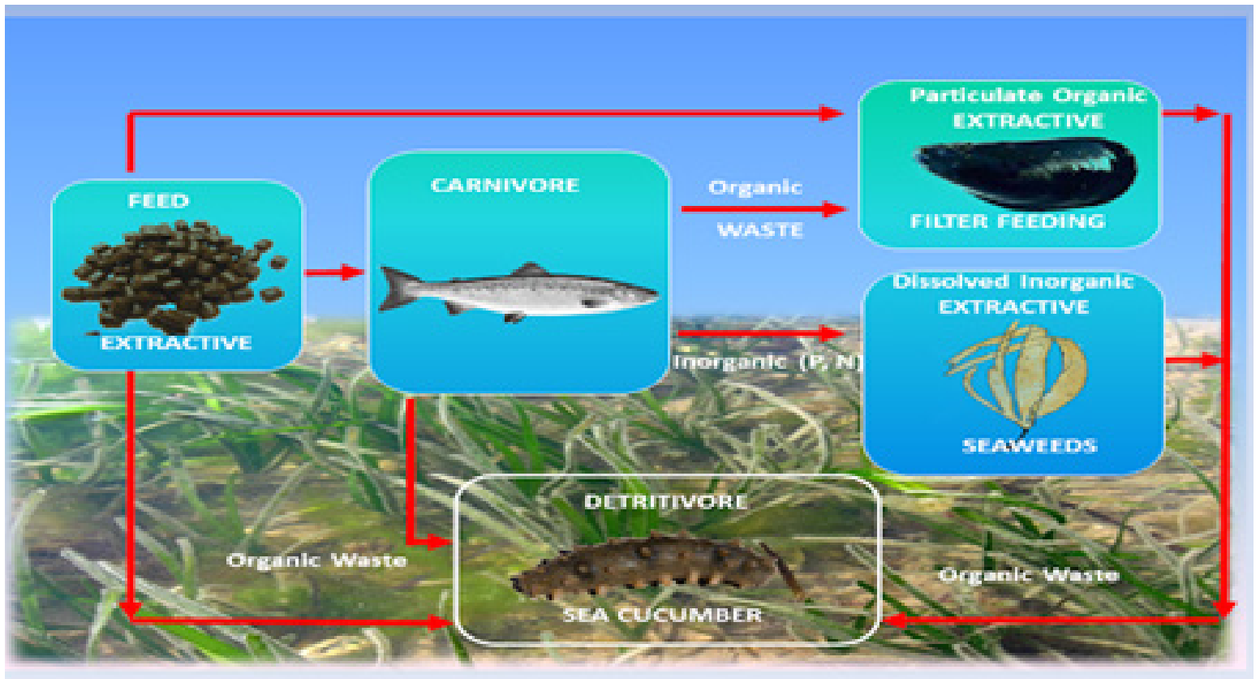
INTRODUCTION

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.



TYPES OF OPERATIONS

Various levels of technology are involved in mariculture, the lowest giving nature the major role in producing the crop. The culturist may help prepare the growing area but does little else. 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.

PONDS.

Shrimp and various species of marine fishes are often grown in ponds. The young shrimp and fish are usually produced in hatcheries, though collection of young animals from nature has been used in the past and is still used in some cases. The ponds may be filled with sea water by pumping water, or through tidal flow (the farmer opens the floodgate when the tide is rising and closes it when the pond is full). Depending on the particular species being produced and the size at stocking, the time required for the animals to reach market size can range from a few months to nearly 2 years.

PENS AND CAGES.

In addition to ponds, marine fish also are being reared in floating pens or cages in protected bays. * Most cultured salmon are produced in these types of facilities, primarily in Norway, Canada, the United States, Scotland, and Chile. Various other fish species also are being produced in pens and cages in Japan, Europe, and the Middle East. In recent years, there has been interest and a limited amount of activity associated with cage culture in offshore waters.

INDOOR FACILITIES.

The highest level of technology is associated with indoor facilities in which the animals are grown in raceways or tanks (circular raceways) that receive pumped seawater that may be taken directly from the ocean. The water may be flowed through the tanks and discarded, or it may be recirculated, that is, reused by passing it through an elaborate water treatment system. Marine species can be reared to market size in such facilities, but they are most commonly used as hatcheries and to hold broodstock (adults used for reproduction).

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

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. Well-planned 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.