

1. Lesson-1

Shore based aquaculture

1.1 Sea farming and shore based aquaculture

"Aquaculture" is the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, health management, genetic improvement etc. Farming also implies individual or corporate ownership of the stock being cultivated (FAO definition of aquaculture).

"Coastal aquaculture" is the farming of aquatic organisms in land-based facilities such as , ponds, tanks, pens etc. in the coasts using brackish or salt water. It is also known as 'shore based aquaculture'.

"Mariculture" or " sea-farming" is the term used for farming of aquatic organisms in the open sea, away from the shore, mainly in cages (fish and crustaceans) or using rafts or long-lines (for molluscs and seaweeds).

1.2 Marine finfish Seed

stock production

Hatcheries are producing greater numbers and a wider range of marine finfish species, but the industry is still heavily reliant on capture of fingerlings for grow- out, particularly for species that are difficult or costly to raise in hatcheries, such as grouper or Napoleon wrasse or for which there is no established hatchery technology, such as tunas .

In general, the availability of seed from wild sources is in decline through over- fishing and habitat destruction . Consequently, there is a need to develop sustainable technologies for seed production, particularly hatchery production.

Hatcheries range in size and technology. In Asia there has been considerable development of small-scale or backyard hatcheries that have only a couple of larval rearing tanks. These hatcheries use basic but effective techniques to produce large numbers of seed stock of a range of marine finfish species.

Traditionally, much of their production has been of milkfish, but production is diversifying to include more difficult to rear species such as groupers .

At the other end of the spectrum are the large technology-dependent hatchery systems that have been developed in Australia and Japan. Much of the hatchery technology in use in Australia has been adopted from Europe and modified to meet local conditions . A major focus in developing

hatchery technology in Australia in particular is the need to reduce labour inputs because of high labour costs.

Taiwan PC has established itself as a major seed stock production centre for the Asia-Pacific region, with around 1 000 farms involved in producing fry and juvenile marine finfish . Marine finfish production in Taiwan PC is typified by highly specialized production sectors: e.g. one farm may produce eggs from captive brood stock, a second will rear the eggs, a third may rear the juveniles through a nursery phase (to 3–6 cm TL) and a fourth will grow the fish to market size .

Nursery

There is substantial mortality of juvenile seed stock captured from the wild . Cannibalism among hatchery-reared juveniles is a major cause of losses in many species. Transportation of fingerlings also results in losses.

Grow-out technology

Grow-out technology employed in the Asia-Pacific region ranges from small floating or fixed cages used by small family-run operations, to extremely large cages (15x15x15 m) used for amberjack grow-out in Japan or 30–50 m diameter circular cages used for southern bluefin tuna grow-out in Australia.

Much of the marine finfish aquaculture production in the Asia-Pacific region is from small to medium-scale farms. Many farms use relatively simple technologies, with wooden or bamboo cages and plastic barrels or polystyrene blocks to provide buoyancy. However, Japan and Australia in particular use larger and more sophisticated cage systems. In the case of Australia, these are based on European technologies. The traditional Asian cage system is suited to sheltered inshore waters.

As coastal sites have become increasingly crowded, several countries have begun to adopt cage designs that can withstand more open water. These offshore cages have been based on Japanese and European designs. The ability to site farms in more open water has opened up more coastal area for farming.

A major issue regarding the continued proliferation of marine finfish aquaculture in the Asia-Pacific region is the environmental impact of such operations. Although there is now a good understanding of the environmental impacts of cage aquaculture in temperate environments, there has been relatively little work done in tropical systems.