

UNIT 2 AQUACULTURE

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1.0 INTRODUCTION

Aquaculture is a distinct commercial activity which has provided an excellent response to the global demand for fish and sea food through the nutritious and affordable source of animal protein. The technique not only facilitates the domestication of fish, but also guarantees optimum fish health and high-quality fish products through good feeding and care of cultivated fish, as well as sustainable harvest of fish of various types.

2.0 OBJECTIVES

By the end of this unit, you should be able to identify:

- the principles of aquaculture fisheries, and
- the types of aquaculture as a fisheries method.

3.0 MAIN CONTENT

3.1 Objectives of Aquaculture

- i. To increase fish production, and consequent protein intake;
- ii. To stock waters which are heavily depleted of their natural resource through pollution, over-fishing and high predation of offsprings;
- iii. For the production of fishing baits for commercial, industrial fisheries sector;

- iv. production of fishing species population for ornamental purposes; and
- v. For large-scale production of miscellaneous fish species for industrial purposes e.g. fish meal, fish flour, etc.

3.2 Aquaculture (Aquafarming) as a Fisheries Technique

Aquaculture is the cultivation (farming) of natural produce of water such as fish, shellfish, algae and other aquatic organisms in fresh or salt water. It is distinguished from fishing by the idea of active human effort in maintaining or increasing the number of organisms involved, as opposed to simply taking them from the wild. Economically, aquaculture is restricted to practices such as broodstock maturation, larval rearing, fingerling production, research animal production, specific pathogen-free (SPF) animal production and caviar and ornamental fish production. Aquaculture methods include Mariculture (aquaculture in the ocean), Algaculture (the production of kelp/seaweed and other algae), Fish Farming (the raising of catfish, tilapia and milkfish in fresh water and brackish ponds or salmon in marine ponds) and the growing of cultured pearls. In 2003, aquaculture contributed about 31% of the total world production of fisheries product. The growth rate of aquaculture is very rapid, higher than 10% per year for most species, compared to the flat contribution of wild fisheries to total production. Aquaculture minimizes environmental damage due to fishing through the use of a recirculating system (RAS), a series of culture tanks and filters where water is continuously recycled. Water is treated mechanically through the removal of particulate matter and biologically through the conversion of harmful accumulated chemicals into non-toxic ones to prevent the deterioration of water quality. Optimum water quality is maintained through UV sterilization, ozonation and oxygen injection, thereby increasing the efficiency of feed utilization and growth of fish. Aquaculture also minimizes escaped fish, water usage and introduction of harmful pollutants. A drawback of aquaculture is water exchange, which can however, be reduced through aquaponics such as incorporation of hydroponically-grown plants and denitrification.

3.3 Types of Aquaculture

3.3.1 Aquaculture

Aquaculture can be intensive, semi-intensive or extensive, depending on the inputs (liming, fertilizer application, stocking, management) applied. It may involve stocking of a single species of fish in a pond (monoculture) or culturing/stocking of different species of fish in ponds (polyculture). The criteria for selecting the fish species to stock are local

availability, ability to live and breed in confinement (captivity), ability to efficiently convert food to flesh, relative freedom and resistance to parasites and diseases, and recognition and acceptance as food fish and high market value. The types of fish in aquaculture are tilapia (*Tilapia zilli*, *Oreochromis niloticus*), cod, trout (e.g. Rainbow trout), Atlantic salmon, catfish (*Cyrusichthys nigrodigitans*), mud catfish (*Clarias gariepinus*, *Heterobranchus bidorsalis*), moonfish (*Citharius citharius*), African bony tongue (*Heterotis niloticus*), Niger/Nile perch (*Lates niloticus*), Snake head (*Chana obscura*), mormyrid (*Gymnarchus niloticus*), milkfish, common carp, mudfish, gourami, Asian carp, silver carp, bighead carp, black carp, grass carp, shellfish and catla.

3.3.1.1 Intensive (Closed-Circulation) Aquaculture

This involves the use of a network of circulation systems in culturing fish.

3.3.1.2 Extensive (Pond) Aquaculture

Available food supplies are by natural sources. Zooplankton feeding on pelagic algae or benthic animals such as crustaceans and mollusks are limited.

3.3.1.3 Specific Types within Intensive and Extensive Aquaculture Include

- i. integrated recycling systems- involving the use of large plastic fish tanks in a glasshouse with a hydroponic bed placed near, above or between the tanks;
- ii. irrigation ditch or pond systems- the use of irrigation ditches or farm ponds to raise fish;
- iii. cage system- the use of synthetic fibre cages to raise fish in rivers, lakes, filled quarries, etc.;
- iv. classic fry farming- the use of fry or fingerlings to raise trout and other sport fish.

4.0 CONCLUSION

In this unit, you have learned that aquaculture involves the cultivation of fish in either fresh or salt water, based not only on the need for maintenance, or increasing the population of fish species but also to minimize environmental damage, ensure optimum water quality, etc. using extensive, semi-intensive and intensive techniques.

5.0 SUMMARY

Aquaculture is a distinctly significant fishing method and contributes more to sustainable fish production and safe water environment for fish than any other fishing method, in spite of the requirement of water exchange.

6.0 TUTOR-MARKED ASSIGNMENT

- 1) What is “aquaculture” and the principle behind the technique?
- 2) Write short notes on aquaculture methods.

7.0 REFERENCES/FURTHER READING

http://www.dfo.mpo.gc.ca/Aquaculture/aquaculture_e.htm

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