Aquaculture units

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Land based systems

Lagoons: are natural coastal features in which populations of fish and shellfish are traditionally found, water volume ranging from less than a hectare to several thousands of hectares, fish yield are generally low and can be increased with specific management.

Salines/salt-pans/salinas: traditional shallow coastal pond areas for concentrating and collecting salt, offers an interesting resource for aquatic production, yields are more typical of conventional ponds due to adoption of certain types of aquaculture.

Reservoirs: are widely used throughout the world, represent potential resources for fishery production through enhancement or conventional aquaculture, normally sited in inland areas-particularly on river systems, size can vary from a few thousand m^3 to millions of m^3 in volume.

Tanks and raceways: are mainly used in intensive operations. Tanks can be of any shape. Although round tanks may be more expensive, they are superior in terms of water flow, waste removal and water quality. Larger tanks are less expensive but tanks greater than 10 m in diameter are difficult to design, install and manage. In general, a diameter: depth ratio of 5 to 10:1 is desirable to ensure good cleaning. Raceways are large elongated tanks, normally have an inflow at one end and outflow at the opposite end. Length: width: depth ratio should be 30:3:1.

Rice fields: are important sources of aquatic animals over large areas of Asia, introduction of hatchery fish to rice field appears to still be relatively localized but management and capture of wild stocks widely practiced. Rice field is modified in rice/fish culture to encourage of fish. Usually a trench or ditch is dug around the field as a refuge or place of safety for fish.

Ponds: are normally supplied with gravity or tidal flow water supplies. Generally ponds are cheap and technologically simple, and are still most widely structure for commercial aquaculture. Major pond site requirements are: **site level**- high enough for drainage and low enough for economical water supply; **exposure**-well exposed to sunlight, sufficient for good local water mixing; **soil condition**- suitable for pond construction, good fertility, avoiding acidic conditions; water quality- suitable for rearing, good growth, reduced risk; **land cost**- low purchase or lease price; **access**- reasonable access to road and /or water for construction and operation; and **services**-reasonable access to power supply, phone, labor, freshwater or alternatives available. Pond uses are found to be varied with depths.

Pond depth (m)		**Pond uses**
0.2 to 0.5	:	"warming ponds" for spawning fish early or fry rearing ponds
0.3 to 0.7	:	"kitchen ponds" for high productivity algal production
0.8 to 1.2	:	typical production pond depths
1.0 to 1.8	:	deeper ponds for overwintering
1.5 to 3.0	:	typical reservoir ponds also used for aquaculture

***Major features of different types of ponds*:**

Type	Major features	Applications/limitations
Barrage	built across suitably shaped valleys; shape and size depends on topography	water storage, extensive stocking/aquaculture, cage culture in deep ponds, generally poorer stock/management and poorer yield
Diversion	built in suitable locations, with well controlled water supply, normally rectangular shape, size typically 100 to 5,000 m^2, depth 1 to 2 m.	most forms of freshwater aquaculture, can be operated and managed efficiently for good yields further increased with aeration, water flow etc.
Sunken	size typically 100 to 50,000 m^2, depth 1 to 5 m, may need pump for drainage	not widely used for managed systems but may have some cost advantages where sites are suitable
Tidal	built in lagoon and coastal plain areas with good tidal range, acceptable water quality, size typically 100 to 20,000 m^2, depth 1 to 1.5 m with separate supply and drain canals	mainly for shrimp and marine fish, increasingly using pump-assisted water to maintain water quality and productivity
Pumped	usually above ground, regular shape, size typically 100 to 5,000 m^2	normally for more intensive systems where value and importance of environmental control justify use of pumps
Mixed	designed for high degree of environmental control, size typically 1,000 to 2,000 m^2, depth 1 to 3 m, with central drain	for experimental/high value/high intensity production only

Water based systems

Cages: are the most versatile and cost effective units used for aquaculture operations. Both floating and fixed cages are used. In general, fishes are stocked at high density for farming in cages. Sufficient water flow is one of the important considerations for cage system to remove waste from the cage area. Some advantages of cages are: relatively low cost, simple and fast to assemble, not too dependent on land availability, easy to move and relocate if needed, do not require water supply installation and relatively easy to service.

Enclosures/pens: are aquaculture systems in which a section of coastal or open water is separated by a solid or open-screen wall or fence to create a partially controlled internal volume suitable for holding and rearing stock. Unlike cages, they do not have a separate floor which holds the stock above and separate from the sea, lake or reservoir bed. The basic criteria in selecting site for enclosures are that sufficient water exchange be available.