

Fish on Your Attic: Scope of Urban Aquaculture

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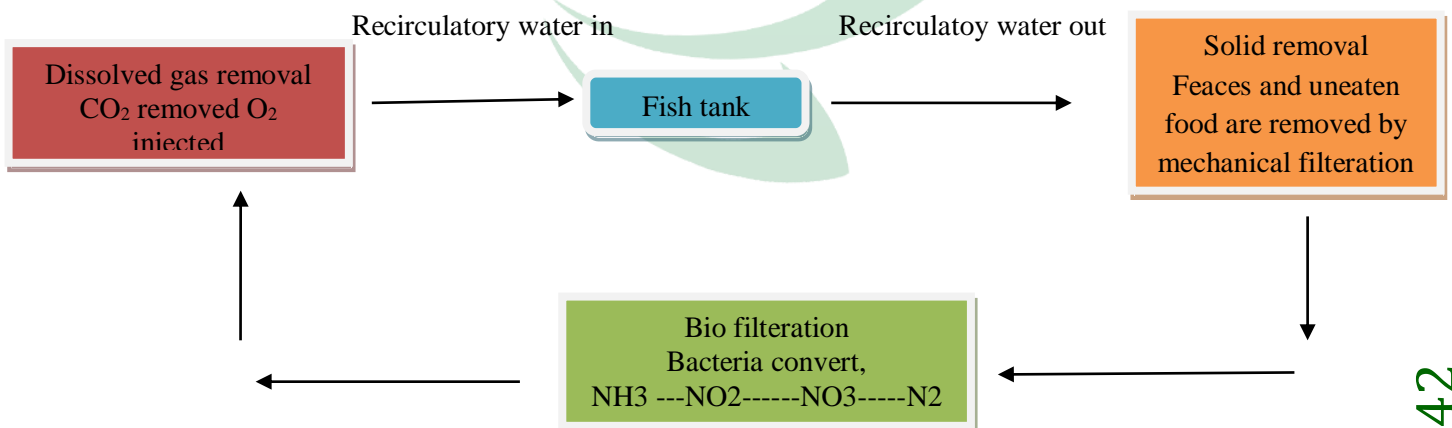
Urban aquaculture is the farming of aquatic organism such as fishes, aquatic plants etc, in an urbanized environment. Urban aquaculture aims with the production of using very limited resources. The systems utilizes very little space and water hereby resulting in large production. Aquaculture is a developing sector resulting in the production of fish and even job opportunities. The most promising candidate for aquaculture is tilapia, since it can withstand sudden change in water quality parameters. Other species cultured include cuttle fish, mussels, shrimp and even aquatic plants. The explosion in population and urbanization are the key factors leading to the demand of urban aquaculture. Population growth demands large quantity of food and urbanization results in lack of cultural lands, which creates demand for urban aquaculture.

Types of urban aquaculture

RAS (Recirculatory Aquaculture System)

Recirculatory Aquaculture System provides a system of series of mechanical and biological filters to reuse and recirculate the majority of water in the culture system. About 90% of water are being reused in this culture system.

Flowchart representing recirculatory aquaculture system



The mechanical filter removes the solid debris, followed by biofilters which space the nitrifying bacteria such as nitrosomonas and nitrococcus that convert ammonia (NH_3) to nitrate (NO_2^-) and nitrobacter that convert nitrate to nitrite (NO_3^-) and finally to nitrogen. Then the water is degassed to remove carbon dioxide and oxygen is injected into. The RAS shows its potential in current scenario as it demands less area and reuse of water resource since water is a very demandable resource in future. Species cultured mainly involves tilapia, trout, perch, bass, Arctic char etc.

Aquaponics

It is the aqua cum agri integrated culture system where water from the aquaculture is used in the hydroponic production beds, which are equipped with nitrifying bacteria such as nitrosomonas, nitrococcus and nitrobacter. The waste water from aquatic system is contaminated with fish manure, uneaten feed etc, this water act as liquid fertilizer to the gravel beds, which in turn act as bio-filter that converts ammonia to nitrite finally to nitrate. Plants absorb these nitrates for their growth. The excess aerated clean water from the bed is recirculated back to fish tank. This is a system which is widely used nowadays because of its limited area requirement and thereby causing no pollution to the environment. This culture system truly obeys the rule of nature as nothing is left unutilized. Frequent monitoring of the bio-filters are necessary to ensure the growth of bacteria, and also daily checking of the water pumping system is mandatory. The culture ensures the production of sized species on harvesting and pesticide free vegetables from the gravel bed.

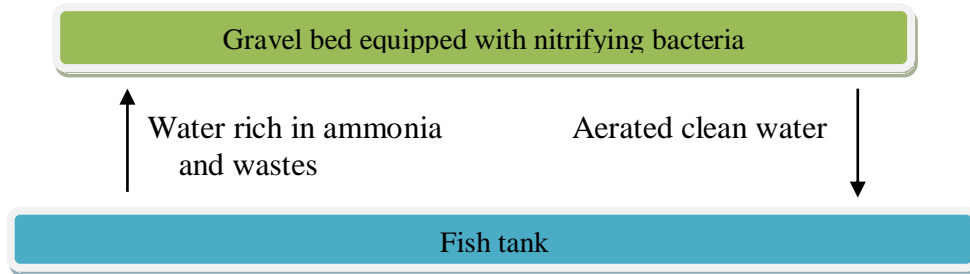


**Recirculatory Aquaculture System
in Fisheries College, Pusa Bihar**



**Aquaponic system in Thodupuzha,
Kerala**

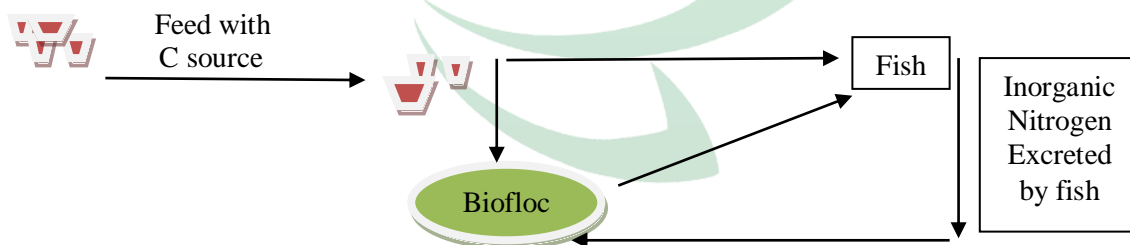
Flowchart showing aquaponic system



Biofloc technology

Bio floc technology is based on the principle of waste nutrient recycling, into microbial biomass floc. The biomass constitute bacteria, phytoplankton, unused feed, detritus etc., this floc balances the C:N ratio in the aquatic system. Maintaining C:N ratio through external addition of carbohydrates (molasses) to stimulate the growth of heterotrophic bacteria to allow decomposition of the organic material and nitrogen uptake (feaces) leading to production of microbial proteins. The biofloc acts as a bioreactor for controlling water quality and also as a protein food source for aquatic organisms. This technology is useful in maintaining optimum water quality, under zero water exchange system, thus prevents eutrophication and effluent discharge to the surrounding and hence most used in urban aquaculture. This method require continuous aeration as to keep the bio-floc in suspension rather allowing its settling and frequent monitoring of the water quality parameters .

Flowchart Showing Biofloc System





Bio floc system in Ernakulam, Kerala

Scope in Future

These culture systems are in demand because they don't cause environmental pollution, the waste from one system itself act as source for another system. The tremendous explosion in population and urbanization are the key factors leading to demand for these culture systems and thereby resulting in much better production. The system also provide ambient job sectors in the society, thereby providing better sources of income, making the people self sustained, providing them with safe fish for good health and providing food security for the society. For a developing country like India, urban aquaculture provide an important source of food, employment and income and most importantly leads to the overall aquaculture production of the country.