RECIRCULATORY AQUACULTURE SYSTEM

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ABSTRACT

The State is playing an important role by generating self-employment through fisheries in rural areas which in turn provides nutritious food to rural folks. Fisheries business has generated an employment potential for about 2.09 Lakh persons, most of them belong to weaker section of the society. State has available water resources of which spreads from 67159 Rural Pond area covering 0.839 Lakh ha and 1770 Irrigation Reservoir covering 0.826 Lakh ha Water area totalling to 1.665 Lakh ha water area available for fisheries development up to the 2017-18. Out of the available Water Resources 0.772 lakh ha. rural pond area and 0.800 lakh ha. irrigation reservoir water area, thus totalling 1.572 lakh ha. water has already been brought under fish culture till 2017-18. The state is fastly emerging as fish hub +of central India and is now hope for opening scope in fishery sector or in turn we can say has given new technologies to be adapt by the aquaculture. In this era a different approach is being used combining both Innovation with Technology RAS which help us to save both water and land giving us a higher yield.

Keywords: *Recirculation, Filteration and Highyield*

1.Introduction (Ras)

Recirculation Aquaculture System are land-based fish farms, which allows all year round control and delivery of fish. Whether the facility will use fresh water, brackish or marine water, a R.A.S works on the same principles. The system can achieve optimal temperature and optimal and stable production all year round, independent of seasonal variation, location, climate and environment.Recirculation systems also occupy very little area and require little water consumption compared to other forms of aquaculture. A filtering (Bio filter) system is necessary to purify consumption compared to or detoxify harmful waste products and uneaten feed. Recirculation systems filter and clean the water for recycling back through fish culture tanks. RAS technology steadily developed over the past 30 years and is widely used for Brood Stock, Hatcheries and Rearing for Fish and increasingly for other species of Fish. Recirculation Systems occupy very little area and require little water consumption compared to other forms of Aquaculture. A Filtering system is necessary to purify the water and remove suspended solids or any other detoxifying waste products. Recirculation system include Biofiltration, Ozanation Oxygen Generation which in terms helps us to maintain good water quality and yield in higher production.As these Systems occupy a very small area which allow the grower to stock fish at high densities and produce high yields per unit area. Recirculation systems are becoming popular as they provide a predictable and constant environment for growing fish. Species of Fish that can be cultured with recirculation system include Barramundi, Murrel, Pangasius, and Tilapia etc.Recirculation of waste loaded pond water reduces potential pollutants which assures the availability of quality water for fish farming where the source of Fresh Water is limited. This system eliminates water quality problems. This system of farming highly improves survival and growth performances of fish due to high degree of control over the water quality. Oxygen can be replenished through aeration and the most of carbon dioxide is dispatched hence reduces the risk of disease and parasites infections considerably.

2.Benefits Of Ras

RAS offer fish producers a variety of important advantages over open pond culture. These include a method to maximize production on a limited supply of water and land, nearly complete environmental control to maximize fish growth year-round, the flexibility to locate production facilities near large markets, complete and convenient harvesting, and quick and effective disease control. RAS can be of various sizes ranging from large-scale production systems (over 1 million pounds per year) to intermediate-sized systems (500,000 pounds per year), to small systems (50,000 pounds per year). They can be used as grow-out systems to produce food fish or as hatcheries to produce eggs and fingerling sport fish for stocking and ornamental fish for home aquariums.

Intensive Production:

RAS applies to the broiler house or swine barn concept, so prevalent and effectively used in modern poultry and pork production systems, to rear large numbers of fish in a relatively small space. Indoor fish farming in tanks may revolutionize fish production in the same way that confinement systems altered the pork and poultry farming industries. This is an excellent alternative to open pond culture where low densities (extensive culture) of fish are reared free in large ponds and are subject to losses from diseases, parasites, predation, pollutants, stress, and seasonally suboptimal growing conditions.

Water and Land Conserved:

RAS conserve both water and land. They maximize production in a relatively small area of land and use a relatively small volume of water. For example, using a RAS it is possible to product over 100,000 pounds of fish in a 5,000 square-foot building, whereas 20 acres of outdoor ponds would be necessary to produce an equal amount of fish with traditional open pond culture. Similarly, since water is reused, the water volume requirements in RAS are only about 20% of what conventional open pond culture demands. They offer a promising solution to water use conflicts, water quality, and waste disposal. These concerns will continue to intensify in the future as water demand for a variety of uses escalates.

Location Flexibility:

RAS are particularly useful in areas where land and water are expensive and not readily available. They require relatively small amounts of land and water. They are most suitable in northern areas where a cold or cool climate can slow fish growth in outdoor systems and prevent year-round production. RAS provide growers who are geographically disadvantaged because of a relatively short growing season (less than 200 days) or extremely dry (desert) conditions, a competitive, profitable, year-round fish production system. They can be located close to large markets (urban areas) and thereby reduce hauling distances and transportation costs. RAS can use municipal water supplies (dechlorination is necessary) and discharge waste into sanitary sewer systems. Nearly all species of food fish and sport fish that are commonly reared in ponds including catfish, tout, and striped bass can readily be grown in high densities when confined in tank systems.

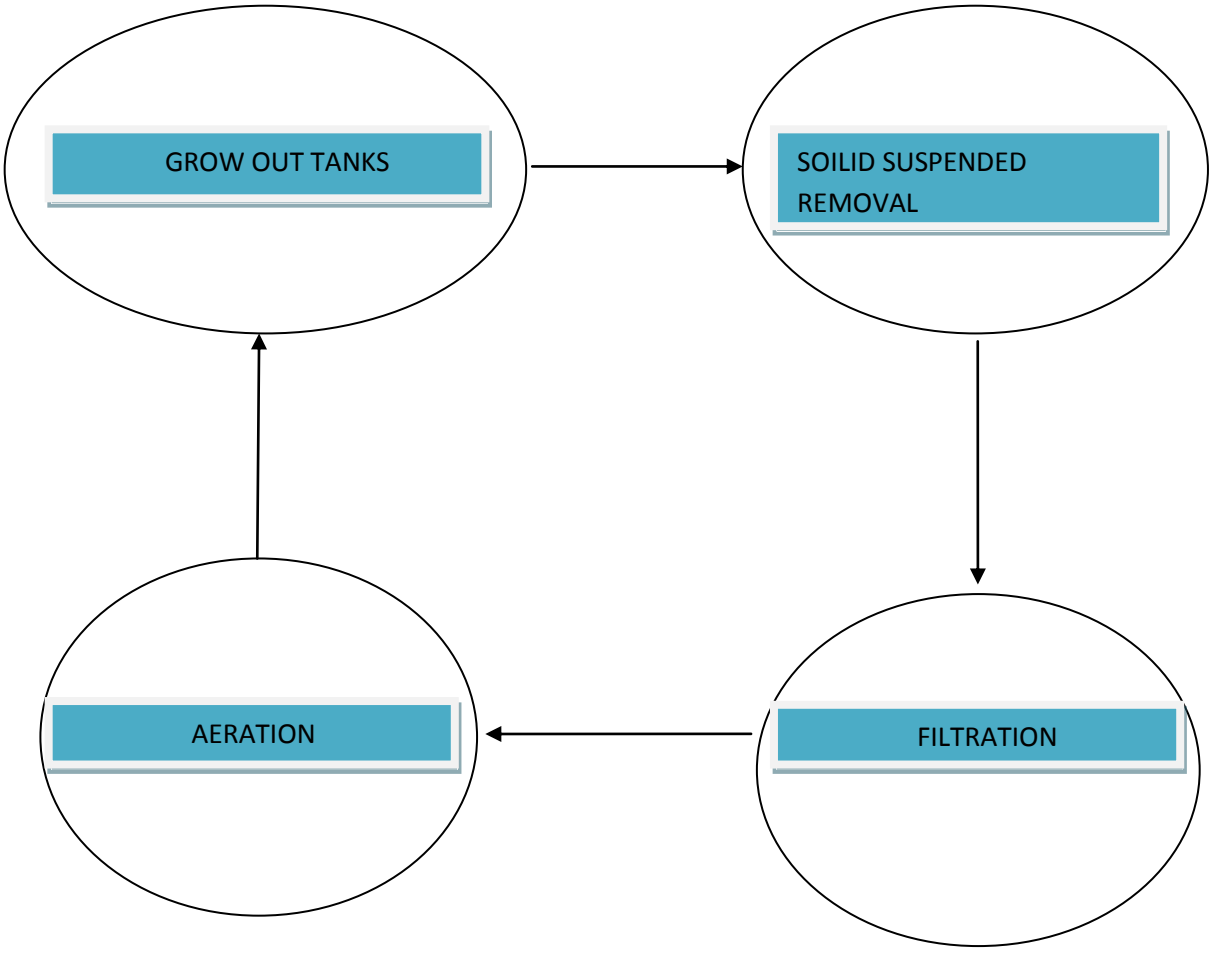
Species and Harvest Flexibility:

RAS are currently being used to grow catfish, striped bass, tilapia, crawfish, blue crabs, oysters, mussels, and aquarium pets. Indoor fish culture systems offer considerable flexibility to (1) grow a wide diversity of fish species, (2) rear a number of different species simultaneously in the same tank (polyculture) or different tanks (monoculture), (3) raise a variety of different sizes of one or several species to another depending on market demand and price. RAS afford growers the opportunity to manipulate production to meet demand throughout the year and to harvest at the most

profitable times during the year. This flexibility in the selection of species and harvest time allows the grower to rapidly respond to a changing marketplace in order to maximize production and profitability. RAS permit the grower to competitively respond to market price and demand fluctuations by altering harvest rates and times and the species cultured. Tank culture systems are now being used to hold and purge (depurate) contaminated of off-flavor, pond reared catfish until they are acceptable for marketing. RAS do have some disadvantages when compared to open pond culture. They are relatively expensive systems to develop (building, tanks, plumbing, biofilters) and to operate (pumping, aerating, heating, lighting). Moreover, they are complex systems and require skilled technical assistance to manage successfully. Constant supervision and skilled technical support are required to manage and maintain the relatively complex circulation, aeration, and biofilter systems, and to conduct water quality analysis. The danger of mechanical or electrical power failure and resulting fish loss is always a major concern when rearing fish in high densities in small water volumes. Operating at or near maximum carrying capacity requires fail-safes in the form of emergency alarms and backup power and pump systems. The business and biological risk factors are correspondingly high. Continuous vigilance and quick reaction times (15 minutes or less) are needed to avert total mortality. However, the higher risk factor, capital investment, and operating costs can be offset by continuous production, reduced stress, improved growth, and production of a superior product in the RAS.

System Design

The following process helps us to understand the terminology of Low Recirculation Aquaculture System which starts from grow out tanks from where the waters flows to solid suspended removal tanks were solid suspended are being removed through filtration process and their after it being moved to the biological filtration tanks where NH3 and NH4 are being removed through plastic media and after that waters flows to the additional filtration tanks where oxygenation and ozone nation can be added and now water is ready for reuse.



3.Aquaculture in Chhattisgarh

Chhattisgarh has always known for its paddy Culture in India but now speedily turning out tables in the sectors of Aquaculture too. Main rivers Mahanadi, Indravati and their tributaries flow 3573 Kms. in the state and offer themselves in fishery development activities. Table source wise fish production - 2016-17 Chhattisgarh

Source	Fish production (mt)	% of share in production
Rural Tanks	3,56,100	94.7
Irrigation Tanks	18,375	4.7
River	2,326	0.6
Total	3,76,801	100

Average productivity in rural tanks is 3105 kg/ha/year and 211 Kgs./ha/year in irrigation tanks.

Fish production and productivity is gradually increased due to following action :-

1. Use of balanced nutritious floating feed, fertilizers and high density of seed stocking (based on modern scientific technology) in ponds and tank.
2. Stocking of large size fingerlings (75 mm and above) in selected reservoirs and ponds.
3. Skill training imparted to the fishermen member engaged in reservoirs and ponds for fisheries development.
4. Assistance given to the fishermen for equipping them with net and boats for increasing fishing efforts.
5. Fish seed rearing in seasonal ponds.
6. Establishment of demonstration units.Some progresssive farmers in the state who are successfully harvesting 8000 to 12000 kg /ha major carp fish production &upto 70tons Pungasius fish production.

4.Conclusion

A proper filtration process and expects to reuse the 90% of the used water through filtration process. As it will help to culture Pangasius and Tilapia as well other varieties of Cat fish too. A recirculation fish farming system comprises of a number of major components(24*7 electricity, water facility Bulk feed storage, Emergency Generator, and Three Phase Electricity, Pump house, Building and Recirculation components)that are necessary for the management of the whole RAS system which need to have both site and system components.

The use of some ecological engineering principles permits production of high value fish crops while meeting stringent nutrient/toxicant discharge regulations. Recirculatory systems are indispensible for sustainable fish culture and as principle that forces to develop ecological engineering design. This system creates greater efficiency and productivity of ponds. The application of ecological engineering principles to water pollution control in fish culture ecosystems can reduce treatment costs. Fish culture systems are generated to have large volumes and system backing to have less polluted water. Since nutrient mass loading is the critical factor which always need to be taken as the most important to look after , treatment of tank water should be in regular practice which will allow us to achieve better results in tank culture.

5.References

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