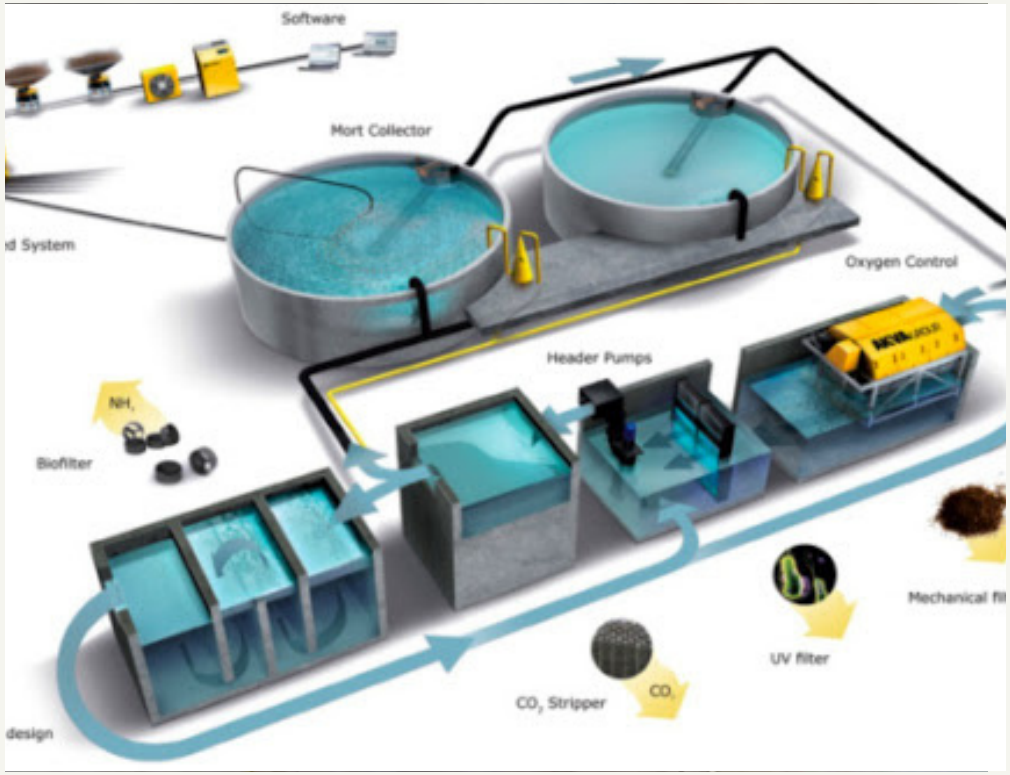
# Dos and Don'ts in Recirculatory Aquaculture system





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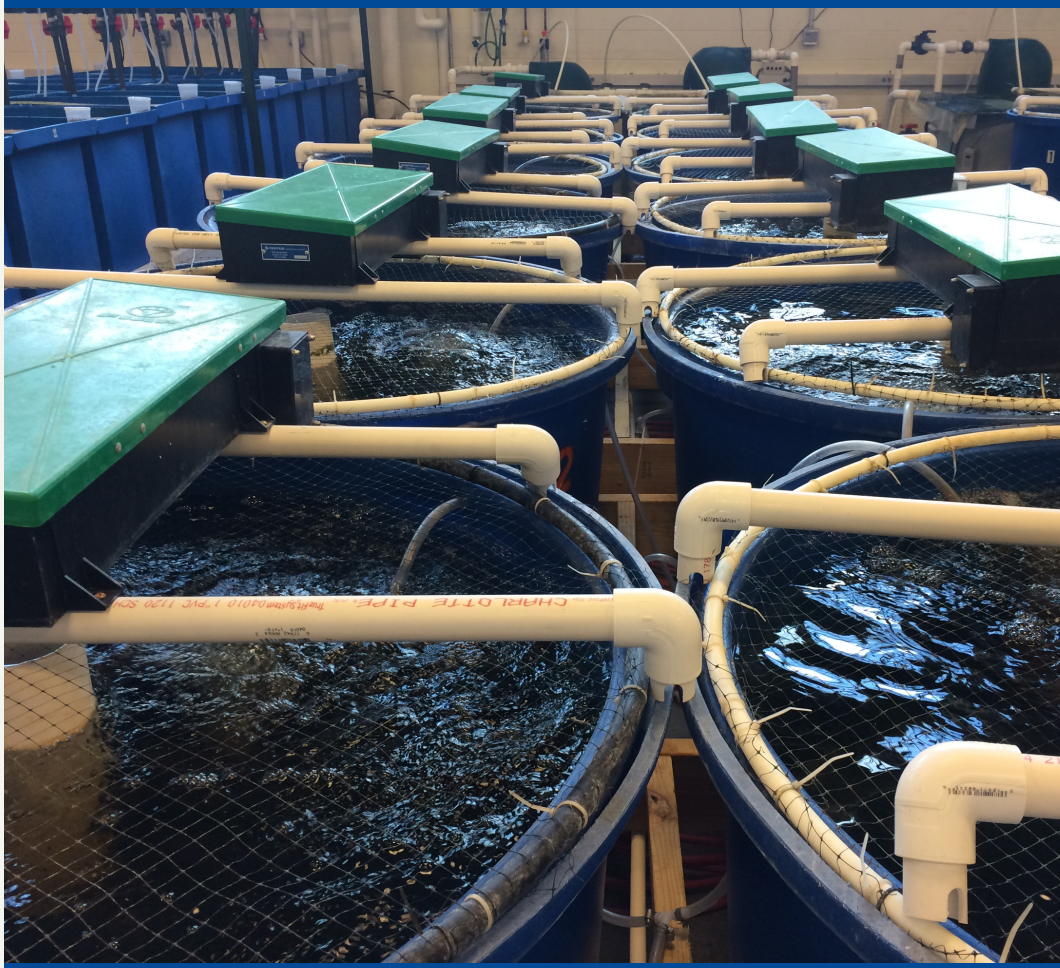


# Dos and Don'ts in Recirculatory Aquaculture system: A farmer's guide for sustainability

# RAS- Recirculatory Aquaculture System

In the current scenario of increased fish production to meet the ever-increasing per-capita consumption requirement of fish, there is a shift in the aquaculture production of aquatic animals with the limited space and resources. The pressure on production in limited space with limited resources causes stress in aquatic animals and results in diseases. Numerous technologies are introduced to the fisheries production chain recently and out of which Recirculating aquaculture system (RAS) has gained prominence recently.

## RAS- Recirculatory Aquaculture System

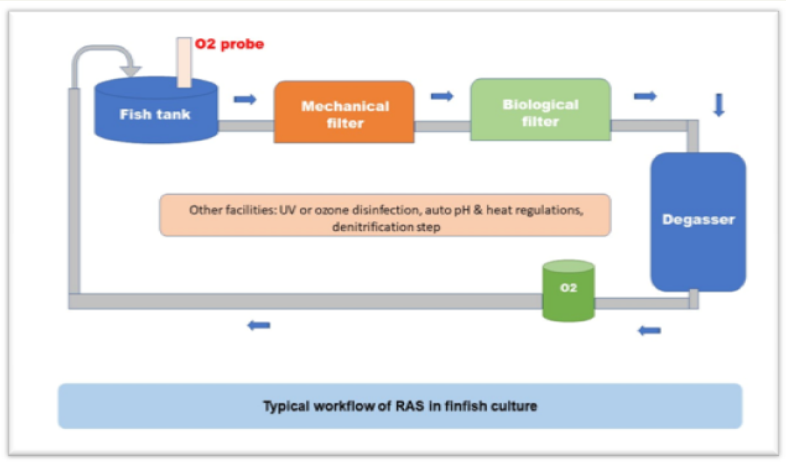
RAS is an aquaculture system that is a completely closed system in nature.

## How does it work?

The RAS works on the principle of removal or reduction of toxic waste from finfish aquaculture water. Along with that, frequent recharging of the purified water with oxygen to the saturation level, and the addition of water that got evaporated is then recirculated in a cyclic process. The toxic waste of finfish aquaculture which is removed is CO2, ammonia, and solid waste from the fish excreta and left-over feed. The system enables the farmers to reuse 90% of the water for the finfish culture.

## What are the basic features of RAS?

A typical RAS consists of culture fish tanks, filtration assembly (mechanical and biological), ducts for input and output of water from the culture tanks with pumping unit, and a building to control the environment. Along with that, accessories such as UV light and oxygen generators are used. Monitoring of water quality and automatic feeders and selection of filters are optional based on the budget. Insulated building for completely controlling the environment is optional and incurs huge investments. RAS can be used at various capacities based on water requirement for recirculation and reuse and hence, infrastructure requirement changes.



Typical workflow of RAS in finfish culture

## What does RAS provide?

In the RAS, the parameters which cause stress to the animals and in turn productivity are controlled viz., oxygen, carbon dioxide, temperature, light, salinity, pH, water flow, stocking density, feeding rate, and organic matters. Hence, the stress to the animals and the risk of disease is minimal.

## Prospects:

- Controlled environment viz., oxygen, ammonia
- Very efficient use of water by cyclic recharging
- Efficient use of feed, space, etc
- Easy disease control program and grading of fish for marketing purpose
- The system can be adapted to other aquatic animals' viz., shrimp, clams, etc
- Eco-friendly as the release of water to the environment is 17L/hour for 5000 tonnes /year finfish aquaculture system

## Constraints:

- Heat generation during summer seasons in tropical countries
- Requirement of continuous power supply, sometimes warrant for investments on generators
- Requirement of technically skilled personnel for monitoring and controlling of the environment
- High initial capital investment
- Energy consumption is high

## Where the system can be used?

- In places where land availability is very minimal
- In places where climatic conditions are extreme
- In places where water availability is very minimal
- Areas having enormous potential for implementation of production units
- To prevent endemic diseases which are rampant in the particular area causing huge economic loses
- To save the endangered population of aquatic animals in a population

## Common problems which can be avoided:

- Releasing of tested seeds in the RAS for economically important pathogens viz., bacteria, virus, protozoan, and parasites.
- Proper feeding pattern with minimal leftovers.
- Balancing the pH in the biological filter between 7-7.5: By lime or NaOH
- Management of water quality parameters.
- UV light disinfection at 2000 to 10000 Ws/cm2 (Bacteria and viruses); 50000 to 100000 Ws/cm2 (fungi and small parasites)
- Avoid incoming water directly from a source such as rivers, canals, etc
- EUS and TiLV infections in tilapia are reported, which can be controlled by the release of tested seeds.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