Reticulating Aquaculture system (RAS) is closed loop water circulation system designed for high density fish farming. In RAS, fish tank water is circulated through mechanical and biological filters for removing bio waste from fish tank and maintain desire water quality parameters (mainly dissolved oxygen and ammonia) for achieving maximum fish density/unit of water volume. The RAS is simple and water and energy consuming option for HD fish farming under controlled conditions. These systems are good for fresh water fishes like tilapia, catfish, blue-gill, Pangasius. Long term plan is to adopt/modify this system as aquaponics farming technique, for farm tank farmers.

**Why Tilapia fishes are preferred?**

**Advantages:**

i. Tilapias grown well at high densities in the confinement of tanks when good water quality is maintained.

ii. Tolerant to poor/variable water quality.

iii. They can be readily available year-round.

iv. They can be located in areas that do not have sufficient water resources for pond aquaculture.

v. Tilapias produce a solid waste that is well-suited for removal from culture tanks, relatively large, filterable size.

**System components:**

i. Fish Tank  
ii. Bio Bed  
iii. Water circulation  
iv. Water Quality parameters  
v. Fish & Fish Feed
i) **Fish Tank:**
- Fish tank is about 54,643 lit capacities (Average) with 1 M water dept. Tank is lined by plastic paper (HDPE 200 micron). Volume of water is calculated by formula:

\[
\text{Tank volume} = \{(L_T\times W_T)+(L_B\times W_B)+(L_T+L_B)\times(W_T+W_B)\}\times D
\]

Where,
- \(L_T\) = Length of top of the tank
- \(W_T\) = Width of top of the tank
- \(L_B\) = Width bottom of the tank
- \(W_B\) = Length of the bottom of tank
- \(D\) = Depth of the water tank

- Water level in tank is measured by vertical water level indicator scale fixed at middle of tank.
- Fish tank is covered with green shed net film (50 % shed) to avoid external dirt material/leaves etc.
- This shed net allows phytoplankton’s growth in tank (water is of green color).

ii) **Bio bed preparation:**
- Bio-bed of size 12.45 * 4.50 M is, made up of sand, gravel and bricks (1:1:2) with 0.30 m thickness.
- It’s lined with HDPE paper and slope maintained in such way that water flows back to fish tank through bio-bed allowing nitrification.
- Fish tank water circulated on bio-bed through drippers and micro sprinklers.
- Bio-bed is planted with Spinach which will help reduction of nitrate/nitrite content.

iii) **Water circulation System:**
- Water from the fish pond pumped by 1.5 HP motor with discharge rate about 7000-10,000 lit/hr.
- Water which is pumped out by motor and distributed to growing bed (Bio-bed) and flows back to Fish tank.
- Water circulation system is adjusted in such way that it will maintain desire DO and \(NH_3/NO_2/NO_3\) level.
- Separate arrangement is made to stir water (bottom of the tank) so as to remove bottom slump and avoid anaerobic growth/ammonia accumulation.
iv) Water Quality parameters
- DO (Dissolved oxygen) levels measured by compact aquarium testing kits periodically. Presently day times DO remain around 6 ppm, with periodical water circulation and reduced to about 4 ppm in night time (12 water non-water circulation times).
- We have not measured water DO level in water with respect to water level (Bottom layer DO may vary from upper layer DO).
- Presently NH3 levels are below 1 PPM.

v) Fish feed:
- Fish tank loaded with 8.5 kg tilapia fish (around 500 fingerlings with average 12.4 Gm wt).
- Fish feeds are prepared by using ground nut cake and rice bran (1:2) which having protein value about 40.6 % and 9.9 % respectively.
- Presently we are feeding fish with 2 % by wt and wish to maintain it as per reference paper – (Page – table)
- We are expecting FCR of 1.0 to 1.5, planned to monitor fish growth on monthly basis by random sampling.
Present challenges –

- Achieving desire fish growth
- Reducing daily water uses
- Testing COD / BOD and maintaining it.
- Deciding proper fish feeding rate.
- Maintaining DO / Ammonia in safe level while increasing fish feed.