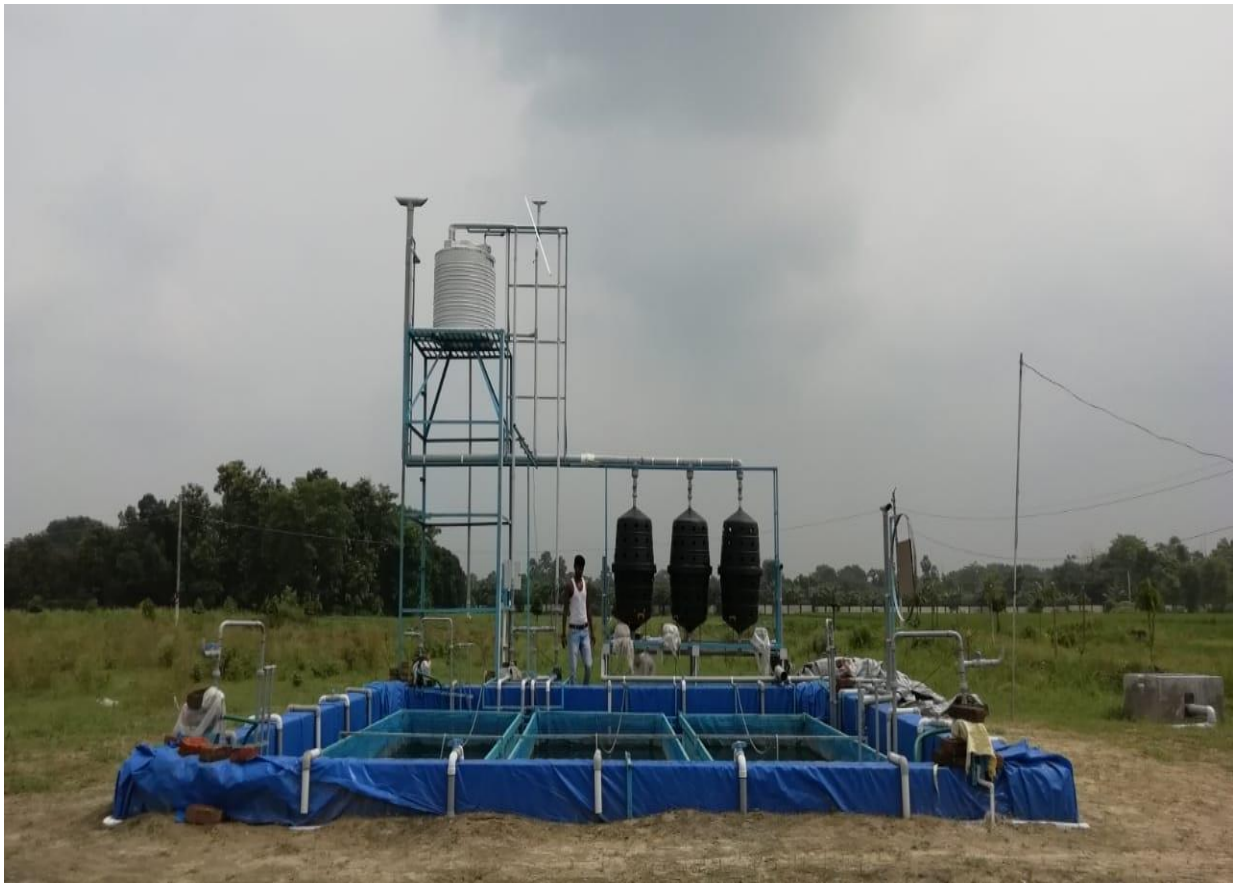
RECENT TRENDS IN AQUACULTURE

Recirculatory Aquaculture System (RAS)



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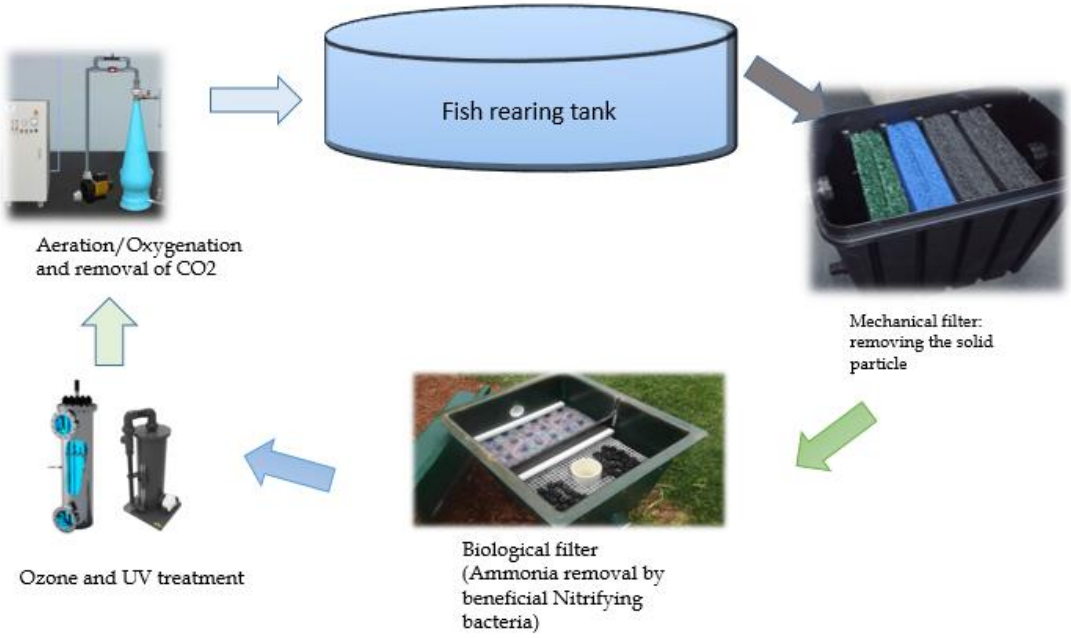
Introduction:

Recirculatory Aquaculture System (RAS) is a technology where water is recycled and reused after mechanical and biological filtration and removal of suspended matter and metabolites. This method is used for high- density culture of various species of fish, utilizing minimum land area and water.

It is an intensive high density fish culture unlike other aquaculture production systems. Instead of the traditional method of growing fish outdoors in open ponds and raceways, in this system fish are typically reared in indoor/outdoor tanks in a controlled environment. Recirculating systems filter and clean the water by recycling it back to fish culture tanks. The technology is based on the use of mechanical and biological filters and the method can be used for any species grown in aquaculture. New water is added to the tanks only to make up for splash out, evaporation and that used to flush out waste materials. The reconditioned water circulates through the system and not more than 10% of the total water volume of the system is replaced daily. In order to compete economically and to efficiently use the substantial capital investment in the recirculation system, the fish farmer needs to grow as much fish as possible in the inbuilt capacity. The management of recirculating systems relies heavily on the quantity and quality of feed and the type of filtration. Numerous filter designs are used in recirculating systems, but the overall goal of all filtration is to remove metabolic wastes, excess nutrients, and solids from the water and provide good water quality for the aquatic organisms. It is important to consider all factors when designing and investing in aquaculture systems.

However, in order to encourage small-scale fish farmers and entrepreneurs and also to facilitate fish production in urban and semi-urban areas where land and water are scarce, it is proposed to promote Backyard Recirculation Aquaculture Systems.

How RAS works?



Advantage of RAS

- Extended durability of tanks and equipment
- Reduced dependency on antibiotics and therapeutants hence, advantage of getting high quality fish.
- Reduction of direct operational costs associated with feed, predator control and parasites.
- Potentially eliminate release of parasites to recipient waters.
- Risk reduction due to climatic factors, disease and parasite impacts
- RAS production can promote flexibility in terms of location for farming, proximity to market.
- Enable production of a broad range of species irrespective of temperature requirements.
- Feed management is considerably enhanced in RAS when feeding can be closely monitored for 24 hrs.
- Exposure of stock to stress on RAS can be reduced for some factors such as adverse weather, unfavourable temperature conditions, external pollution and predation.
- Enable secure production of non-endemic species.
- Judicial use of water and land areas

Disadvantage of RAS

- Constant uninterrupted power supply is required if electric power fails than backup of electricity is required

- Capital cost of starting a recirculating aquaculture system is high as compared to ponds and raceways.

Species suitable for RAS

- Baramundi/ Asian Seabass/Bhetki (*Lates calcarifer*)
- Cobia (*Rachycentron canadum*)
- Silver/Indian Pompano (*Trichinotus Blochii/ Trichinotus mookalee*)
- Tilapia (*Oreochromis niloticus*)
- Pearl spot/Karimeen (*Etroplus suratensis*)
- Pangasius (*Pangasianodon hypophthalmus*)
- Rainbow Trout (*Oncorhynchus mykiss*), especially in Hilly/cold water Region

Components of RAS:

- Insulated shed/ Building
- Store cum office for feed and accessories,
- Pump house,
- Grow out tanks: Circular cement tanks/ FRP tanks, including inlet, outlet central drainage
- Settling tanks for sludge
- Water Storage (sump) tanks,
- Overhead tanks.
- Mechanical (Hydraulic) filters, Drum filter, Glass wool/ muslin cloth filter
- Pumps and motors
- Power generator
- Sludge collector, settable/ dissolved solid collectors
- Biofilters, UV units
- Electrification,
- Automatic feeder (wherever required)
- Aeration system (air/ oxygen), Carbon dioxide trapper system (degasser),
- Water testing kit
- Water supply system, bore well etc. (wherever required)
- Inputs such as Seed, Feed, additives and supplements, electricity/ Diesel, man power etc.

Feed:

- A high protein feed, containing all the essential minerals and vitamins
- Species specific feed
- Feeding can be done @ 3-5 % of the body weight of the fish depending on the quality and protein content of feed.
- More frequent feedings (several times per day) shall result in better growth rates and thus improved feed conversion ratio.

Model Technical Specification for GIFT Tilapia culture in RAS

S.No.	Title	Description
1	Name of Species	Nile Tilapia (GIFT)
2	Tank size	6.7mX 6.7mX 2m
3	Total volume	90 m^3
4	Stocking size	Fingerling
5	Stocking density/tank	6000
7	Survival rate	90%
8	FCR	1:1.3
9	Culture period/crop duration	6 months
10	Cost of Seed	Rs.4/pc
11	Cost of feed	Rs.30/kg
12	Total feed required	3.51 MT
13	Size at the time of Harvest	500g
14	Expected total Biomass	2.7 MT
15	Sale price	Rs.140/kg

Cost estimates for GIFT Tilapia culture in RAS

Sl. No.	Components	Amount (Rs. in lakh)
A	**Capital Cost**	
1	Fish Tank Construction	1.50
2	Procurement & installation of pumps, filters, aerators, pipes, valves, etc.	4.50
	Sub-Total (A)	**6.00**
B	**Input Cost**	
1	Seed (4500 fingerlings @ Rs.4/each)	0.18
2	Feed (28-30% protein; floating pellets)	0.77
4	Probiotics	0.05
5	Electricity	0.40
6	Miscellaneous	0.10
	Sub-Total (B)	**1.50**
	Total Cost (A+B)	**7.50**

Economic feasibility for 1-year production

S.No.	Particulars	Amount (in lakhs)
1	Capital cost	6.00
2	Operational cost	1.50
3	Total project cost	7.50
4	Gross income from 1st crop	3.78
5	Gross income at the end of 1st crop after deducting recurring cost for the 2nd crop	2.28
6	Gross income from 2nd crop	3.78
7	Gross income at the end of 2nd crop	6.06
8	Depreciation cost @15% of capital cost	0.90
9	Interest @ 12% of TPC	0.90
10	Repayment @1/7th of TPC	1.07
11	Recurring cost for next year	1.50
12	**Net profit = (6.06)- (0.9+0.9+1.07+1.5)** **6.06-4.37**	**1.69**

Cost Breakup for various models

1. Large RAS (with 8 tanks of minimum 90 m^3/tank capacity

S.No.	Particulars	Total amount (in Rs. lakhs)
A. Capital Cost		
1	Construction of tank including the pump, aerator, biofilter, Net, water quality testing kits and accessories @Rs.4.5 lakh/unit	36.00
B. Input Cost		
1	Seed cost @ Rs.4/pc for 48000	1.90
2	Feed cost	8.00
3	Electricity charges	3.00
4	Manpower	0.96
5	Miscellaneous	0.14
	Sub total	14.00
Total		**50.00**

2. Medium RAS (with 4 tanks of minimum 90 m^3 /tank capacity)

S.No.	Particulars	Total amount (in lakhs)
A. Capital Cost		
1	Construction of tank including the pump, aerator, biofilter, Net, Water quality testing kits and accessories @Rs.4.5 lakh/unit	18.00
B. Input Cost		
1	Seed cost @ Rs.4/pc for 24000	0.95
2	Feed cost	4.00
3	Electricity charges	1.50
4	Manpower	0.48
5	Miscellaneous	0.07
	Sub total	7.00
Total		**25.00**

3. Small RAS (with 1 tanks of 100 m^3 /tank capacity)

Sl. No.	Components	Amount (Rs. in lakh)
A	**Capital Cost**	
1	Fish Tank Construction	1.50
2	Procurement & installation of pumps, filters, aerators, pipes, valves, etc.	4.50
	Sub-Total (A)	**6.00**
B	**Input Cost**	
1	Seed (4500 fingerlings @ Rs.4/each)	0.18
2	Feed (28-30% protein; floating pellets)	0.77
4	Probiotics	0.05
5	Electricity	0.40
6	Miscellaneous	0.10
	Sub-Total (B)	**1.50**
	Total Cost (A+B)	**7.50**

4. Backyard mini RAS units (with Aquaponics or with Gravel filter)

Sl. No.	Components	Amount (Rs. in lakh)
A	**Capital Cost**	
1.	Fish Tank Construction, Procurement & installation of pumps, filters, aerators, pipes, valves, etc.	0.47
B	**Input Cost**	
1.	Seed and feed	0.03
Total Cost (A+B)		**0.50**

RAS Scheme under PMMSY

Beneficiary oriented sub-components and activities				
S.no.	**Sub-component and activities**	**Unit**	**Unit cost (Rs. Lakhs)**	**Page No.**
A	**Enhancement of production and productivity**			
5	**Technology infusion and adaptation**			
5.1	Establishment of large RAS (with 8 tanks of minimum 90 m3/tank capacity 40 ton/crop) culture system.	(No)	50.00	120
5.2	Establishment of Medium RAS (with 6 tank of minimum 30m3/tank capacity 10ton/crop)	(No)	25.00	120
5.3	Establishment of small RAS (with 1 tank of 100m3 capacity) culture system	(No)	7.50	121
5.4	Establishment of Backyard mini RAS units	(No)	0.50	121-122

How to avail subsidy?

- Beneficiary needs to submit the project report (PR) along with required documents including documentary evidence of availability of requisite land (either own/registered lease document to the **concerned District Fisheries Office** for further process. In case of leased land, proper registered lease document for a period of 7(seven) years from the date of submission of Self-Contained Proposal will have to be submitted.

- Self-Contained Proposal (SCP) with full justification & technical-economical details including the species to be cultured, capital cost and the recurring cost involved. Project report should also contain details of anticipated direct & indirect employment generation to local population, enhancement of fish production, specific time lines for implementation of project etc. has to be furnished to DFO.

- Governmental assistance will be restricted to one large / one Medium unit / one small RAS unit for individual beneficiary. Governmental assistance will be restricted to 2 large units / 3 Medium units / 4 Small RAS units per group or society in case of group of fishers and fish farmers

- However, a cluster/area may have multiple groups/societies. As far as FFPOs/Cs are concerned, the modalities of implementation and upper ceiling on the total area eligible for support would be decided by the CAC.

Training/Technical Guidance:

For Training the below may be contacted:

Dr. I.S. Bright Singh
Emeritus Professor (UGC-BSR-Faculty)
National Centre for Aquatic Animal Health
Cochin University of Science and Technology
University Road, South Kalamassery, Kochi, Kerala- 682022
Mob: 9447631101,
Office: 91- 484-2381120
E-mail: isbsingh@gmail.com , info@ncaah.ac.in
Web: www.ncaah.org

List of Tank Manufacturers/Polythene suppliers			
Name of the Manufacturer	**Address**	**Contact number**	**E-mail**
M/s R.S Polymers	BN 85, Block BN, West Shalimar Bagh, Near Darbari Lal D. A. V. Model School, New Delhi-110088	Mr. Siddharth Mehta Mob: 9999997454	rspolymers2000@yahoo.com
M/s Ambrotechs	Indian Office: H.No.8-2-248/A/B, Ground Floor, Road No.3, Land Mark: Chutney's, Banjara Hills, Hyderabad - 500034.	Mr. Jagan Katuri, Mob: 7330666330/ 9542357290 Indian Office: Mob: 98662 69142	jagan.katuri@iprotechs.com
M/s Garware Technical Fibres Ltd	Plot No. 11, Block-D-1, MIDC, Chinchawad, Pune , Maharashtra-411019		zbutt@garwarefibres.com
M/s Texel Industries Limited	Block No. 2106, Santej – Khatraj Road, Near Shah Alloys Ltd., Santej, Kalol (N.G), Gandhinagar, Gujarat- 382721	Mob: 89800 26110 / 89800 26220 / 89800 24320	sales@geotexelin.com / info@geotexelin.com
M/s Das & Kumars	D 63/10, Mahmoorganj Varanasi 221010, Uttar Pradesh	Ph: 91-542-2220521 / 2220414	sales@daskumars.com / daskumars@yahoo.com
M/s Plastikraft, Aurangabad	Traffic Signal ATM, 6, Basement, Konark Arcade, Beside Sant Sawta, Gajanan Maharaj Mandir Rd, nr. Aurangpura, Maharashtra 431001	Mob: 93704 52289	plastikraftone@gmail.com

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