

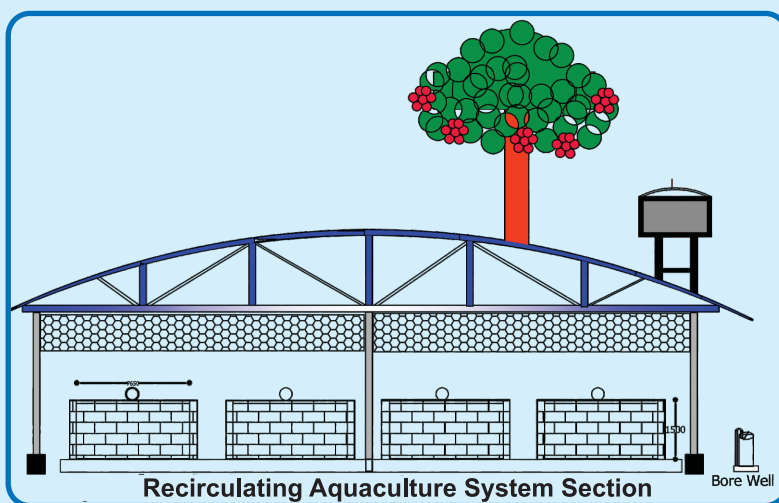


सत्यमेव जयते

# Recirculatory Aquaculture System (RAS)

(Pangasius Fish Production)

## Action Plan



## Towards Blue Revolution

DEPARTMENT OF ANIMAL HUSBANDRY, DAIRYING & FISHERIES  
MINISTRY OF AGRICULTURE & FARMERS WELFARE  
GOVERNMENT OF INDIA  
2017





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## **(Pangasius Fish Production)**

### **Action Plan**

### **Towards Blue Revolution**

**DEPARTMENT OF ANIMAL HUSBANDRY, DAIRYING & FISHERIES  
MINISTRY OF AGRICULTURE & FARMERS WELFARE  
GOVERNMENT OF INDIA  
2017**





राधा मोहन सिंह  
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D.O. No. 1741/AM.



कृषि एवं किसान कल्याण मंत्री  
भारत सरकार  
MINISTER OF AGRICULTURE  
& FARMERS WELFARE  
GOVERNMENT OF INDIA  
26 JUL 2017

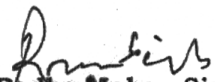
**MESSAGE**

Government of India has launched Mission Blue Revolution to increase fish production through various provisions. Transfer and adoption of technology is one of the important aspects of the Mission. Although there is progress in pond aquaculture but other culture practices are equally desirable for the intensification of production systems because natural resources are depleting fast and further technological advancements are need of hour to utilize precious resource in conservative manner.

To achieve the Blue Revolution objectives in the country, the promotion of new techniques is highly needed. The Re-circulatory Aquaculture System (RAS) is an efficient production system which consumes very limited natural resources vis-a-vis output of fish.

The propagation of Re-circulatory Aquaculture System (RAS) will ensure intensification of culture practices livelihood and addition to the food basket of the country. This Department has been making sincere efforts to increase fish production to fulfil the protein requirements by promoting Re-circulatory Aquaculture System (RAS) technique. Introduction of RAS will assist in transforming traditional aquaculture to modern aquaculture and will bring diversification and integration of aquaculture thereby creates opportunities for entrepreneurs.

I wish, the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture & Farmers Welfare will put sincere efforts to achieve the specified goal and objectives set under the Integrated National Fisheries Action Plan to enhance the fish production in the country.

  
(Radha Mohan Singh)



कृष्णा राज  
KRISHNA RAJ



कृषि एवं किसान कल्याण राज्य मंत्री  
भारत सरकार

MINISTER OF STATE FOR  
AGRICULTURE & FARMERS WELFARE  
GOVERNMENT OF INDIA

दिनांक 17 नवम्बर, 2017

संदेश

मेरे लिए यह अत्यंत हर्ष की बात है कि पशुपालन, डेयरी और मत्स्यपालन विभाग, कृषि और किसान कल्याण मंत्रालय देश में मछली उत्पादन बढ़ाने के लिए परिसंचारी जलकृषि प्रणाली (आरएएस) को बढ़ावा देने हेतु नवाचारी तकनीकों पर कार्य योजना का प्रकाशन कर रहा है। वैज्ञानिक और आधुनिक बेहतर प्रबंधन पद्धतियों के साथ मात्स्यिकी पालन के विस्तार के माध्यम से उत्पादन और परिणाम में पर्याप्त वृद्धि करने के लिए व्यापक अवसर उपलब्ध हैं। इसके साथ इन योजनाओं का कार्यान्वयन न केवल मत्स्यन उत्पादन और उत्पादकता को बढ़ायेगा बल्कि मछली की मांग और आपूर्ति के बीच व्यापक अंतराल को भी कम करेगा और उसके द्वारा उपभोक्ताओं के लिए गुणवत्ता मत्स्य प्रोटीन उपलब्धता सुनिश्चित करेगा। ये ग्रामीण आजीविका, खाद्य सुरक्षा और एकीकृत आर्थिक विकास में योगदान देंगे और इनका व्यापक सामाजिक प्रभाव होगा।

इस विभाग ने महत्वपूर्ण क्षेत्रों और इसकी धारणीयता की पहचान करते हुए परिसंचारी जलकृषि प्रणाली (आरएएस) को बढ़ावा देने के लिए एक कार्य योजना प्रारंभ की है।

मैं पशुपालन डेयरी और मत्स्यपालन विभाग, कृषि और किसान कल्याण मंत्रालय को परिसंचारी जलकृषि प्रणाली (आरएएस) के कार्यान्वयन हेतु कार्य योजना का निर्माण करने लक्ष्य को प्राप्त करने के लिए अपनी शुभकामनाएं देती हूँ।

(कृष्णा राज)





सत्यमेव जयते

संयुक्त सचिव  
भारत सरकार  
कृषि एवं किसान कल्याण मंत्रालय  
पशुपालन, डेयरी और मत्स्य पालन विभाग  
कृषि भवन, नई दिल्ली-110001

Joint Secretary  
Government of India  
Ministry of Agriculture & Farmers Welfare  
Department of Animal Husbandry, Dairying & Fisheries  
Krishi Bhawan, New Delhi-110001

### **MESSAGE**

During the year 2016-17, the Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India has launched the scheme "BLUE REVOLUTION: Integrated Development & Management of Fisheries" with a vision for "Creating an enabling environment for integrated development of the full potential of fisheries of the country, alongwith substantial improvement in the income status of fishers and fish farmers keeping in view the sustainability, bio-security and environment concern."

Although the productivity from ponds is about 3 MT/ha/Yr but it is comparatively lesser than other countries practicing aquaculture. Fish production from natural resources is under pressure due to various geo-climatic conditions. Therefore, propagation of new technologies is essential to get the required production, which also helps in conserving precious natural resources.

The Re-circulatory Aquaculture System (RAS) is an efficient production system especially for catfish, as it requires limited space and water. Further the quality of fish always remains better in the controlled climatic conditions. RAS can be the future of fish production system on a commercial scale as has been already established in many countries.

I hope with the active support of States, establishment of RAS units will lead to substantial increase in fish production in the future years.

(Aditya Kumar Joshi)  
Joint Secretary (Fisheries)



# Contents

Sl.No.	Topic	Page No.
1	Introduction	1
2	Advantages of RAS	1
3	Constraints of RAS	2
4	Indian Scenario	2
5	Identification of Potential States	2
6	Initiatives under Blue Revolution	2
7	Key Components	3
8	Time Frame	3
9	Strategy	3
10	Cost Summary	3
11	Farming in Recirculatory Aquaculture System	4





## 1. Introduction

A Recirculation/Flow-through system is an enclosed system for fish farming where the water replacement is only to the extent of loss to evaporation and cleaning. In Recirculation System water is reused or partial, exchange while a production system that uses water only once is referred exclusively as a Flow-through system.

It is an intensive approach (higher densities and more rigorous management) than other aquaculture production systems. Instead of the traditional method of growing fish outdoors in open ponds and raceways, this system rears fish in indoor tanks within a “controlled” environment. Recirculating systems filter and clean the water for recycling back through fish culture tanks. The technology is based on the use of mechanical and biological filters, and the method can in principle be used for any species grown in aquaculture. New water is added to the tanks only to make up for splash out, evaporation and for that used to flush out waste materials. The reconditioned water circulates through the system and no more than 10% of the total water volume of the system is replaced daily. In order to compete economically and efficient use of the substantial capital investment in the recirculation system, the fish farmer needs to grow as much fish as possible in the inbuilt capacity.

Given the fact that traditional methods of fish farming in India is able to produce up to 2 - 10 MT of fish per hectare of land and at the same time uses more than 20 litres of water per kg of fish. Contrary to this Re-circulatory Aquaculture System may need 1/8th of a hectare & 1/6th of water and still would be able to produce up to 60 MT of fish per year.

## 2. Advantages of RAS

Recirculation/Flow-through systems in aquaculture have stirred a great deal of interest in the field of fish farming and expanding very fast globally. There are several advantages in establishing Recirculation/Flow-through culture systems.

- The flexibility to choose the scale and module is the greatest advantage of this culture system, where the entrepreneur has the ability to measure and control most of the production and marketing related variables.
- Wide range of design and site as per geo-climatic conditions and investment capabilities. It can be used in extreme weather zone also with ease.
- Very low requirement of land and water as compared to pond aquaculture system.
- Independence from a land based large water source.
- Reduction in wastewater effluent volume and ability to closely monitor and control environmental conditions to maximize production efficiency.
- Increased bio-security and ease in treating disease outbreaks if any.
- High output fish from minimal area with fish density ranging up to 50 - 150kg/m<sup>3</sup> under perfect conditions.

### 3. Constraints of RAS

- High upfront investment in materials and infrastructure.
- Intensive technical monitoring of operations.
- Assured but limited supply of energy for operations.

### 4. Indian Scenario

Our country ranks good on fresh water fish production as traditional methods of fish farming in India are able to produce just between 2 - 10 MT of fish per hectare of land while Recirculating Aquaculture System may produce up to 500 MT of fish per year in same area. There is deficit of proper knowledge, expertise in technical management of Recirculatory systems and entrepreneurial attitude for commercial scale units. The high investment costs may have kept RAS away from our country until now. But there is an amazing potential for it in India and with growing interest the units are coming up in Uttar Pradesh, Andhra Pradesh and elsewhere. In the next 5 years, these are going to be seen in many places in India for sure and RAS would be the next big thing in Inland Fisheries sector to happen in coming years.

### 5. Identification of Potential States

Considering relevant factors and scope following States are identified for focussed attention to ensure visible impact of this activity.

1) Assam, 2) Bihar, 3) Chhattisgarh, 4) Haryana, 5) Madhya Pradesh, 6) Maharashtra, 7) Odisha, 8) Punjab, 9) Rajasthan, 10) Tamil Nadu, 11) Telangana, 12) Uttar Pradesh, 13) West Bengal.

### 6. Initiatives under Blue Revolution

**6.1. Low cost Recirculatory Aquaculture System (RAS):** As per actual cost with a ceiling of Rs. 15.00 lakh per unit (a) For General States: 50% of the unit cost with a ceiling of Rs. 7.50 lakh per unit/plant. (b) For North-Eastern/ Himalayan States: 80% of the unit cost with a ceiling of Rs. 12 lakh per unit/plant. (c) For UTs/ Central Govt. Institutes/ organisations including ICAR institutes: 100% of the unit cost with a ceiling of Rs. 15 lakh per unit/plant.

**6.2. Medium range Recirculatory Aquaculture System (RAS):** As per actual cost with a ceiling of Rs. 50.00 lakh per unit (a) For General States: 50% of the unit cost with a ceiling of Rs. 25 lakh per unit/plant. (b) For Northeastern/ Himalayan States: 80% of the unit cost with a ceiling of Rs. 40 lakh per unit/plant. (c) For UTs/ Central Govt. Institutes/ organisations including ICAR institutes: 100% of the unit cost with a ceiling of Rs. 50 lakh per unit/plant.

**6.3 Innovative Activities:** Actual (a) 50% of the unit cost with a ceiling of Rs. 50 lakh for each project for General States. (b) 100% of the unit cost with a ceiling of Rs. 100 lakh for the projects directly implemented by the Government of India through its institutes/ organisations including ICAR institutes and UTs. (i) Innovative activities shall broadly cover Recirculatory Aquaculture Systems (RAS) with a minimum production capacity of 500 MT/ year.

## 7. Key Components

- **Technology Adoption for Intensive Fish Farming:** Recirculatory Aquaculture is relatively new practice in Fish culture. Operation of these units is more demanding in terms of techniques related biology of culture fish and hydrological parameters. Establishment of these units will improve the knowledge base of farmers for impending future technologies in this area.
- **Conservation of Resources:** Being highly efficient, total use of natural resources is very less hence leads conservation of precious natural resources like water, land and environment.
- **Construction of Cemented Ponds and Drainage Systems:** It is main structural components, right design and layout is important for smooth operation and cost saving.
- **Feed Based Culture:** Feed constitutes highest (more than 70%) among various segments of OPEX. Production of quality fish feed is important to get higher FCR that improves the economic profitability of the venture.

## 8. Time Frame

The targeted activities shall be taken up in three (3) Years [2017 - 2018, 2018-2019 & 2019 - 2020] duration to timely achieve increase in fish production and benefits to farmers as well as to avoid cost escalations (Table-3).

## 9. Strategy

- Integrated approach to setup RAS units.
- Increase in fish feed production infrastructure
- Promotion of indoor culture based fisheries
- Cluster approach to be adopted
- Diversification of cultured Species
- Tie up of all stages from fish seed to marketing
- NFDB to Assist / supervise implementation of Action Plan with States

## 10. Cost Summary

S. No.	Year	RAS Units (No.)	Investment required (Rs. in lakh)		Year-wise Achievement (%)
			Total Cost	Gol Share	
1	2	3	5	6	8
1	2017-18	840	42000	21720	40
2	2018-19	840	42000	21720	40
3	2019-20	420	21000	10860	20
Total		2100	105000	54300	100

## 11. FARMING IN RECIRCULATORY AQUACULTURE SYSTEM

### About the Farmed Fishes



Pangasius and Tilapia both are ideally suited for culture in RAS. Presently emphasis is more over the Pangasius due different reasons. Pangasius belongs to a full family of catfish living in the Mekong and its estuaries in Vietnam. It is commonly called as river or silver striped catfish, Siamese shark, sutchi catfish, or swai catfish. This fish species live in freshwater. It exhibits fast growth when cultured given a good environment. Two members of this family can be farmed - the *Pangasius hypophthalmus* (Vietnamese: Tra) and the *Pangasius bocourti* (Vietnamese: Basa). It is cultured due to its strong market demand, fast growth; few countries dominate the culture production, and being the 3<sup>rd</sup> most important freshwater fish group within aquaculture sector. Pangasius is now cultured in several countries in the world like Thailand, Nepal, Pakistan, India, Bangladesh, Vietnam, Laos, Myanmar, Indonesia, and Cambodia. *Pangasius hypophthalmus* contributes more than 90% in global culture output. Pangasius is an air-breathing fish that can tolerate low Dissolve Oxygen (DO) of the water. It can be cultured in fish ponds, concrete tanks, fish cages or fish pens.

#### 11.1 Culture Protocol

1. Efficient source of water.
2. Free from pollution and acute environmental variations
3. Free from poachers or any social disturbance
4. Assured source of power/electricity
5. Fill the pond with water to about 1.5m to 2m deep, to provide a wide environment for the stocks.
6. Pangasius spp. can be stocked at a rate of 3-15 pcs/m<sup>2</sup> depending on the culture environment. Stocking should be done early morning or late afternoon. Survival rate of Pangasius spp. is estimated to be 80-90%.
7. Pangasius is omnivorous (eat both plants and animals) during their first year and become herbivorous for the following years. Pangasius can be fed with pelleted feeds (recommended

for faster growth and better fish quality) at a rate of 2.5% of their average body weight (ABW) and will be adjusted bi-weekly. Feed Conversion Ratio (FCR) averages to 1.5:1, which makes it a suitable for culture.

8. Water is important for all fish, so optimum conditions for certain parameters of water should be the primary factor to consider in engaging to fish culture. Water quality parameters like pH (6.5 - 7.5), Dissolve Oxygen (DO) (0.1 mg/l), Temperature (25 - 30° C), Salinity (< 2 ppt) and water depth (1.5 - 2m). These should be maintained to get a better yield for the culture of *Pangasius* spp.
9. Sampling is done to monitor the growth of stocks and to compute feeds to be given to the stocks for the following days. This is also done to see if the stock reaches its marketable/harvestable size. Since *Pangasius* spp. is fast grower fish, sampling is mandatory.
10. Harvesting can be done in partial (selective harvesting) or total harvesting. *Pangasius* spp. can be harvested for about 4-6 months of culture period. It can reach the weight of 1-1.5 kilogram in 6 months of culture given the proper management.

## **11.2 System Design**

Recirculation/Flow-through systems are beneficial where only limited water is used for removal of fish wastes out of the production system. Passing water through a treatment unit removes ammonia and other waste products, the same effect as a Flow-through configuration is achieved. A key to successful recirculation production systems is the use of cost effective water treatment unit to remove solid wastes, oxidize ammonia and nitrite-nitrogen. The following issues must be addressed fully for successful recirculation systems in aquaculture.

## **11.3 Fish Farming Recirculation/Flow through System**

The present recirculation system is designed to handle more than 100 table fish/m<sup>3</sup>. Each tank measuring 7.65 x 7.65 x 1.5 m dimensions having water capacity of 81.93 m<sup>3</sup> 8 tanks of any configuration or culture tanks. The waste treatment system Bio filter and other support components are taken into account as described in previous sections and shown schematically in figure.

## **11.4 Over All System Layout and Components of RAS Unit.**

The major work entailed in proposed system is construction of cemented culture tanks, and fabrication of pipe lines, power availability and water treatment facilities. The design and construction details for the project are mentioned in relevant sections.

### **11.4.1 Fish Culture Tanks**

A unit of total 8 tanks is proposed with the dimension of 7.65 x 7.65 x 1.5 m for each tank. The building material needed is bricks, cement, sand *etc* which are locally available. Flow of water out of tanks completes under the gravity.

### **11.4.2 Water Source**

A bore well with a capacity of 3" delivery is the main source of water supply. Power supply to run bore well may be electricity or pump set.

#### 11.4.3 Water Delivery and Hydraulic Gradients

Water will be channelled to each pond through delivery lines. Water flows from culture tanks to treatment plant or discard drain under gravity. The top of treatment basin or out-flow channel remain lower than bottom of culture tanks. All right angle turns are made with 'tee' fittings to ease cleaning. PVC pipes and superior quality accessories will be used in all water lines to ensure adequate strength of the system.

#### 11.4.4 Temperature Control System

The ambient temperatures of water vary with the species characteristics being cultured. It is achieved by construction of poly-house to create *greenhouse* effect or by supplement of underground water.

#### 11.4.5 Aeration System

Aeration may be provided through stone diffusers located at bottom in each tank. Air is supplied from pump mounted above water level. The air delivery line is 1 inch diameter PVC pipe and fitted with ¼ inch diameter flexible clear tube connecting the PVC pipe air delivery system with air-stone diffusers.

#### 11.4.6 Filtration System

Managing a bio-filter is related to all of the water quality tests, any of which tells what filter needs and how well it is doing. The goal is to make bio-filter function as efficiently and as stable as possible, while the practice of growing fish, increasing feed, harvesting fish and adding material to the water reduces efficiency and makes the filter less stable. A healthy bio-filter has a very thin growth of orange-brown coloured bacteria on the surface of the bio-filter material. Thick clumps of a brown slimy material is likely to be heterotrophic bacteria and not nitrifying bacteria these may lead to clogging of the filter and also pipes and should be discouraged by keeping the particles of uneaten feed and wastes out of system as much as possible. Water quality tests must be looked at in two ways. What does it mean to my cultured species and what does it mean to bio-filter?

#### 11.4.7 Design Parameters

1. Production capacity: 42.70 MT
2. Capacity of each culture tank: 81.93cum
3. Total number of Tanks: 8
4. Total capacity of all tanks: 655.44 cum

#### 11.4.8 Project Cost:

1. Total Capital Cost: ₹ 30,84,648/-
2. Total Operational Cost: ₹ 19,18,000/-

**Total: ₹ 50, 02,648** [say Rs.50,00,000/- (Fifty lakh only)]

**A. Capital Cost**

S.No	Description	Rate	Cost
1	Construction of tanks of size - 7.65 m x 7.65 m x 1.5 m with capacity of 81.93 cum each - Total 8 Nos - Including driage, shallow bore-well and motor	13,30,898.00	₹ 13,30,898
2	Construction of shed-33.55m X 17.79 m-for the above 8 tanks=596.85 sqm	7,20,000.00	₹ 7,20,000
3	Construction of Store & Office room -28 sqm	3,30,000.00	₹ 3,30,000
4	Bio Filters -Civil work	1,50,000.00	₹ 1,50,000
5	Cost of Pumps & Filter materials	1,10,000.00	₹ 1,10,000
6	DG set -Power Generator	2,50,000.00	₹ 2,50,000
7	Electrification	1,31,250.00	₹ 1,31,250
8	Water supply	52,500.00	₹ 52,500
9	Water quality testing equipment	10,000.00	₹ 10,000
	<b>Total</b>		₹ 30,84,648

## Operational Estimates

### Pangassius Farming

#### Seed Stocking, Feeding Schedule, Sale Value, Production & Ammonia Production

Tank size 7.65x7.65x1.5 m, Area of one Tank 87.55 cum, Volume capacity of water 87550 L										
No. of Fish	After sale/ mortality balance number	Average weight in gm	Total weight in kg	Sale out number	sale out average weight in kg	Sale rate Rs./kg Average	total sale Amount in Rs.	Feed used @1.3 F.C.R.	Total feed consumed /month in kg	Nitrogen production in mg/ day (25 times x per day feed)
1	2	3	4	5	6	7	8	9	10	11
8000	7700	30	240	0	0	0	0	3.600	108	90000
7700	7500	50	385	0	0	0	0	5.775	173	144375
7500	7200	100	750	0	0	0	0	11.250	338	281250
7200	7000	250	1800	0	0	0	0	27.000	810	675000
7000	5400	400	2800	1600	640	90	57600	42.000	1260	1050000
5400	2600	500	2700	2600	1300	90	117000	40.500	1215	1012500
2800	0	750	2100	2800	2100	100	210000	31.500	945	787500
<b>Total</b>				<b>7000</b>	<b>4040</b>		<b>384600</b>		<b>4849</b>	

### Economics

Average Fish production in tanks:

4000 kg x 8 tank = 32000 kg or 320 qt or 32 ton

Fish production cost in one tank for 4000 kg:

Fish seed value of 8000 nos. seed for one tank @ Rs. 4.00/nos. = Rs. 32000

Fish feed value of 4850 kg @Rs 35.00 /kg = Rs. 169750

Other expenses (electricity, labour, equipment etc) = Rs. 38000

Total for one tank = Rs. 239750

**Total Fish production cost: Rs 239750 x 8 = Rs. 1918000**

Fish sale proceed for one Tank: Rs. 380000

**Total sale proceed from 8 tanks (384600 x8) = Rs. 3040000**

**Total Profit Rs. 1122000**

**A. Capital cost= Rs. 3067233/-**

**B. Operational Cost= Rs. 1918000/-**

**C. Total Project cost = Rs.50 02 648/-**

Profit/Kg. Rs. 36.00

Fish production cost Rs. 60/kg

Average sale value Rs. 95/kg

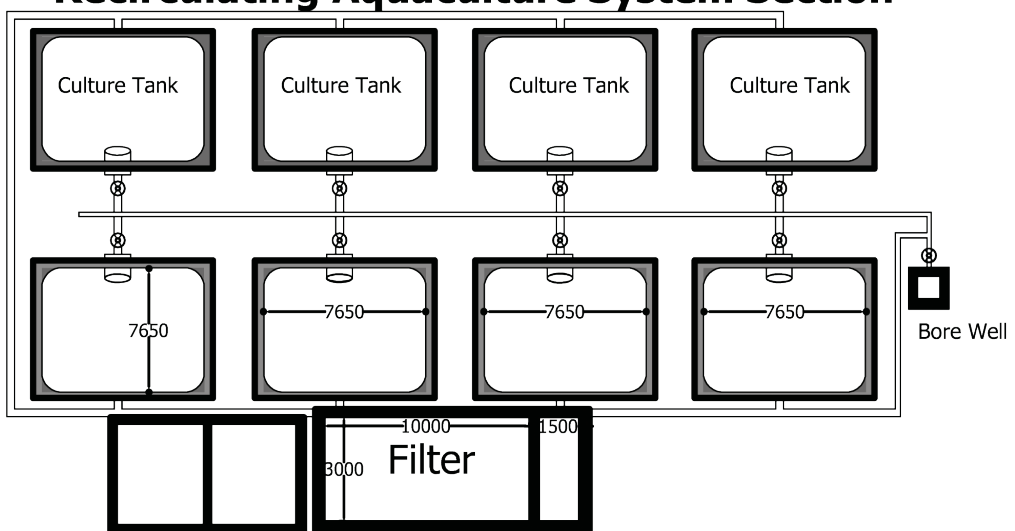
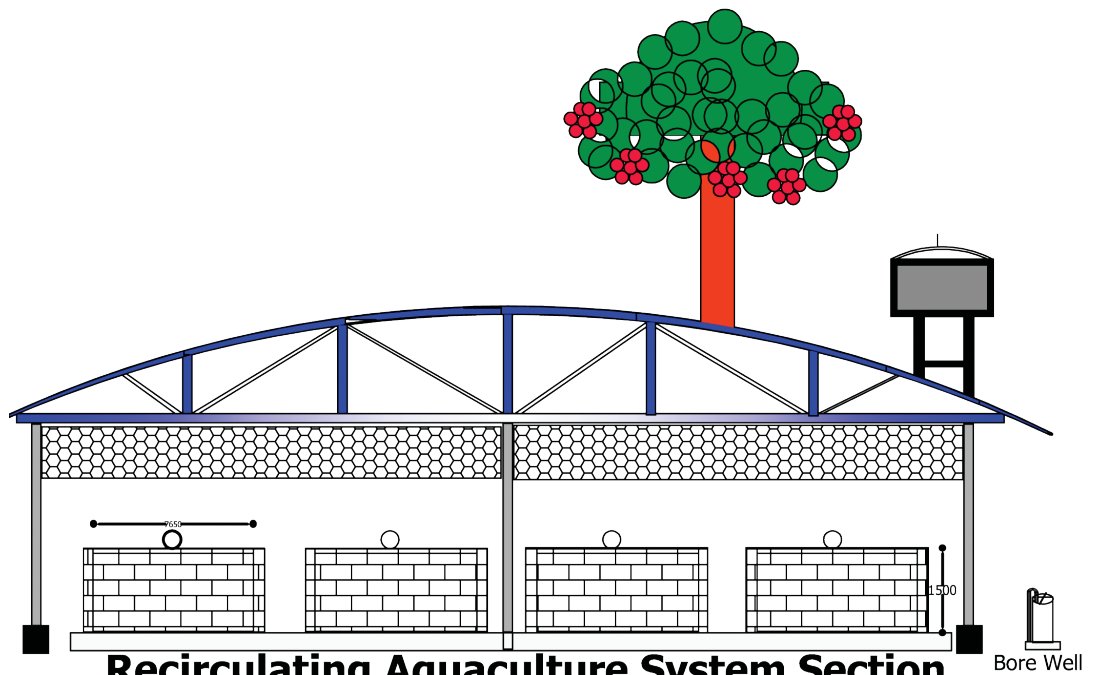
Average feed cost per kg Rs. 42/kg

Average F.C.R. = 1.2:1



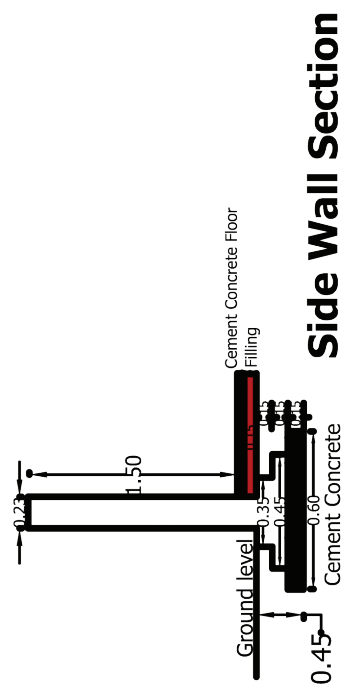
## Financial Analysis

Item	Years			
	First	2nd to 4	Fifth	6 to 9
A - Costs				
1- Capital cost	3067000	-	150,000*	-
2- Operational Cost	1918000	1918000	1918000	1918000
Total	4985000	1918000	2,068,000	1918000
B- Sale of fish	3040000	3040000	3040000	3040000
Net Present of worth	-1945000	1122000	972000	1122000
D.F.@ 20%	0.833	1.755	0.402	1.041
Net Present of worth	-1620185	1969110	390744	1168002
Present worth of cost	4152505	3366090	831336	1996638
Present worth of Benefit	2532320	5335200	1222080	3164640
B.C. Ratio at 20% DF	$\frac{12254240}{10346569}$	=1.18 or 1:1.18		
D.F.@ 40%	0.714	1.134	0.185	0.341
Net Present of worth	-1388730	1272348	179820	382602
Present worth of cost	3559290	2175012	382580	654038
Present worth of Benefit	2170560	3447360	562400	1036640
B.C. Ratio at 40% DF	$\frac{7216960}{6770920}$	=1.06 or 1:1.06		
D.F.@ 50%	0.666	0.837	0.131	0.2
Net Present of worth	-1295370	939114	127332	224400
Present worth of cost	3320010	1605366	270908	383600
Present worth of Benefit	2024640	2544480	398240	608000
B.C. Ratio at 50% DF	$\frac{5575360}{5579884}$	=0.99 or 1:0.99		
Internal Rate of Return	$40 + 10 \frac{(446040)}{446040 - (-4524)}$ $40 + 10 \frac{(446040)}{446040 + 4524}$ $40 + 10 \frac{(446040)}{450564}$ $40 + 10(0.99)$ $40 + 9.9$ 49.90 or 49.90%			

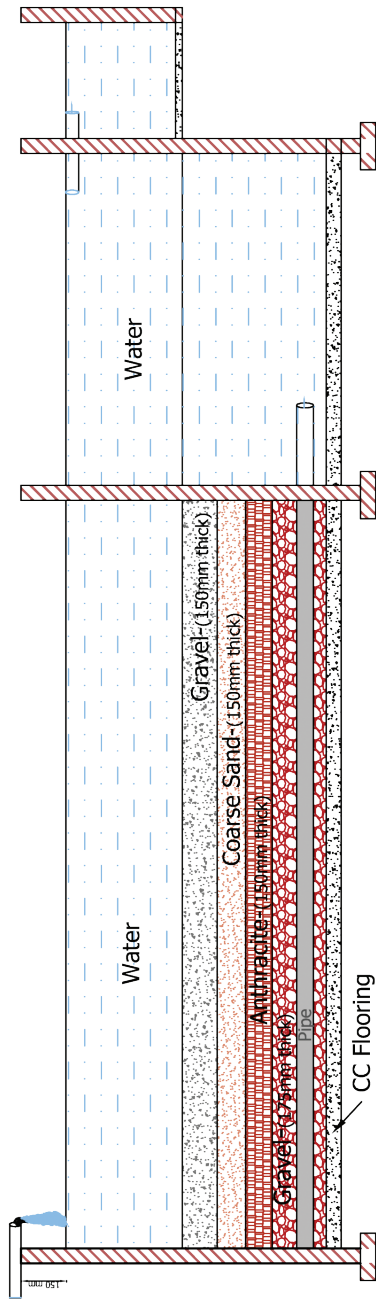


Settling Tanks

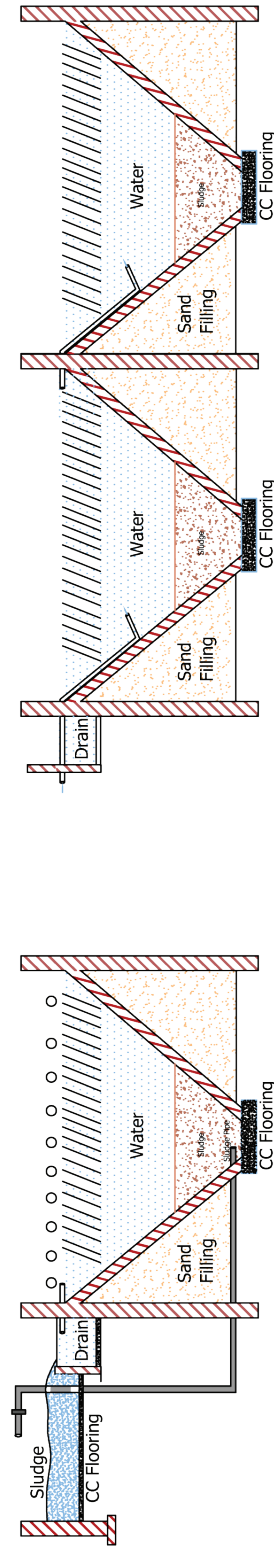
## Recirculating Aquaculture System Plan



# Bio Filters



Sand Filter- Cross Section



Setting Tank - Cross Section

Setting Tank - Cross Section

**DETAILED ESTIMATES**

Input		
Wall thickness	=	0.23 m
Length	=	07.65 m
Breadth	=	07.65 m
Height	=	01.50 m
Number of tanks in length wise	=	4.00 Nos
Number tanks in Breadth wise	=	2.00 Nos

25.09 ft
25.09 ft
04.92 ft

Free Board	=	0.100 m
Capacity of each tank	=	81.93 cum
Total capacity of 8 tanks = 8 X 81.93	=	655.44 Cum

2891.06 cuft
23128.51 cuft

Shed over tanks		
Length	=	33.55 m
Breadth	=	17.79 m
Store & Office room	=	53.37 sqm

**Detailed Estimate - Culture Tanks**

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
1	Earth work in excavation by means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth. 1.5m in width as well as 10 sqm on plan) including disposal of excavated earth, Lead upto 50 m and lift upto 1.5 m; disposed earth to be levelled and neatly dressed.							
	Length wise	2.00	31.52	0.60	0.45	17.02		
	Breadth wise	4.00	15.76	0.60	0.45	17.02		
	Centre-length	1.00	30.92	0.60	0.45	8.35		
	Centre-Breadth	1.00	14.56	0.60	0.45	3.93		
	<b>Total</b>					<b>46.32</b>	<b>95.00 /Cum</b>	<b>4400.00</b>

### Action Plan Towards Blue Revolution

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
2	Filling available excavated earth(excluding rock) in trenches,plinth,sides of foundation etc. in layers not exceeding 20cm in depth,-consolidating each deposited layer by ramming and watering,lead upto 50m and lift upto 1.5m	8	7.65	7.65	0.15	70.23	68.00 /Cum	4776.00
3	Providing and laying in position cement concrete of specified grade cost of centering and shuttering - All work upto plinth level.							
	(a) 1:4:8 (1 Cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size)							
		2.00	31.52	0.60	0.15	5.67		
		4.00	15.76	0.60	0.15	5.67		
		1.00	30.92	0.60	0.15	2.78		
		1.00	14.56	0.60	0.15	1.31		
		8	7.65	7.65	0.15	70.23		
	<b>Total</b>					<b>85.66</b>	<b>3790.00 / Cum</b>	<b>324651.00</b>
4	Brick work with common burnt clay F.P.S. (non modular ) bricks of class designation 7.5 in foundation and plinth in cement mortar 1:4							
	Up to Ground level	2.00	31.52	0.46	0.15	4.35		
		2.00	31.52	0.35	0.15	3.31		
		2.00	31.52	0.23	0.30	4.35		
		4.00	15.76	0.46	0.15	4.35		
		4.00	15.76	0.35	0.15	3.31		
		2.00	15.76	0.23	0.30	2.17		

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
	Central walls	1.00	31.06	0.46	0.15	2.14		
		1.00	31.17	0.35	0.15	1.64		
		1.00	31.29	0.23	0.30	2.16		
		1.00	14.84	0.46	0.15	1.02		
		1.00	15.06	0.35	0.15	0.79		
		1.00	15.30	0.23	0.30	1.06		
	<b>Total</b>					<b>30.65</b>	<b>5425.00 / Cum</b>	<b>166276.00</b>
5	Brick work with bricks in superstructure above plinth level upto V floor level in cement mortar 1:6 (1 Cement: 4 coarse sand).							
		2.00	31.52	0.23	1.50	21.75		
		4.00	15.76	0.23	1.50	21.75		
		1.00	31.29	0.23	1.50	10.80		
		1.00	15.30	0.23	1.50	5.28		
						59.58	5855.00 / Cum	348841.00
6	12 mm cement plaster finished with a floating coat of neat cement of mix (1 cement: 2 fine sand)							
		8X2	7.65		1.50	183.6		
		8X4		7.65	1.50	367.2		
		1X2	31.52	0.23		14.5		
		1X4	15.76	0.23		14.5		
		1	31.29	0.23		7.2		
		1.00	15.30	0.23		3.52		
	<b>Total</b>					<b>590.52</b>	<b>195.00 /sqm</b>	<b>115151.00</b>
7	12 mm cement plaster finished with a floating coat of neat cement of mix (1 cement: 3 fine sand)							
		1X2	31.75	1.8		114.30		
		1X4	15.76	1.8		113.47		
						227.77	155.00 /sqm	35304.00

### Action Plan Towards Blue Revolution

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
8	50 mm thick cement concrete flooring with concrete hardener topping, under layer 20 mm thick cement concrete 1:1.5:3 and top layer 3 mm thick etc. complete.							
		8	7.65	7.65		468.18	490.00 /sqm	229408.00
						Tanks cost		<b>1228807.00</b>
	<b>Construction of Drain</b>							
9	Earth work in excavation by means (Hydraulic excavator)/manual means over areas (exceeding 30cm in depth. 1.5m in width as well as 10 sqm on plan) including disposal of excavated earth, Lead upto 50 m and lift upto 1.5 m; disposed earth to be levelled and neatly dressed.							
		1	2.00	0.60	0.60	0.72	95.00 /Cum	68.00
10	Providing and laying in position cement concrete of specified grade cost of centering and shuttering - All work upto plinth level.							
	(a) 1:4:8 (1Cement: 4 coarse sand: 8 graded stone aggregate 40 mm nominal size)							
		1	2.00	0.60	0.10	0.12	3790.00 /Cum	455.00
11	Brick work with common burnt clay F.P.S. (non modular ) bricks of class designation 7.5 in foundation and plinth in cement mortar 1:4							
		1	2.00	0.46	0.08	0.07		
		1X4	2.00	0.12	0.30	0.14		
	<b>Total</b>					<b>0.21</b>	<b>5425.00 /Cum</b>	<b>1139.00</b>



Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
12	12 mm cement plaster finished with a floating coat of neat cement of mix (1 cement: 2 fine sand)							
		1	2.00	0.23		0.5		
		1X4	2.00	0.30		1.20		
		1X4	2.00	0.12		0.50		
						2.2	195.00 /sqm	429.00
	<b>Drain Cost</b>							<b>2091.00</b>
13	Sahllow Bore well with Motor of 2HP& all required materials							100000.00
	<b>Total cost</b>							<b>1330898.00</b>

### Detailed Estimate - Filters Media

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
1	Anthracite for the filters	1	10.00	3.00	0.15	4.50		
	density-673Kg/1cum					3.0 T	8000 /ton	24228
2	Gravel	1	10.00	3.00	0.325	9.8 Cum	1750 /Cum	17063
3	Coarse sand	1	10.00	3.00	0.15	4.5 Cum	1500 /Cum	6750
4	Pipes					LS		10000
5	Pump sets					LS		20000
6	Aerators					LS		30000
7	Other items							1959
	<b>Total</b>							<b>110000</b>

## Detailed Estimate - Filters

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
1	Earth work in excavation by means (Hydraulic excavator)/ manual means over areas (exceeding 30cm in depth. 1.5m in width as well as 10 sqm on plan) including disposal of excavated earth, Lead upto 50 m and lift upto 1.5 m; disposed earth to be levelled and neatly dressed.							
	Filters	1	13.10	3.60	2.4	113.18		
	Settling tank					50.0		
					<b>Total</b>	<b>163.2</b>	<b>95.00 / Cum</b>	<b>15502.00</b>
2	Providing and laying in position cement concrete of specified grade cost of centering and shuttering - All work upto plinth level.							
	(a) 1:4:8 (1 Cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size)	1	13.10	3.60	0.15	7.074	3790.00 /Cum	26810
3	Brick work with common burnt clay F.P.S. (non modular ) bricks of class designation 7.5 in foundation and plinth in cement mortar 1:6							
	Foundation	2	13.00	2.000	0.23	11.96		
		3	3.00	2.000	0.23	4.14		
					Total	16.1	3885.00 /Cum	62549
4	Brick work with common burnt clay F.P.S. (non modular ) bricks of class designation 7.5 in foundation and plinth in cement mortar 1:6							
		2	13.00	0.500	0.23	2.99		
		3	3.00	0.500	0.23	1.035		
					<b>Total</b>	<b>4.025</b>	<b>3885.00 /Cum</b>	<b>15637</b>

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
5	12 mm cement plaster finished with a floating coat of neat cement of mix (1 cement: 2 fine sand)							
		2	13.00	2.500		65.00		
		4	3.00	2.500		30.00		
	Tanks					20.00		
					<b>Total</b>	<b>115.00</b>	<b>155.00 / sqm</b>	<b>17825.00</b>
6	CC Flooring with 1:3:6 concrete work							
		1	13.00	2.000		26.00		
	tanks					25.00		
					<b>Total</b>	<b>51.00</b>	<b>155.00 / sqm</b>	<b>7905.00</b>
7	Other items							3772.00
	<b>Total</b>							<b>150000</b>

### Detailed Estimate - Shed

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
1	E/W in foundation & plinth in ordinary soil including lift & lead up to completion of work as per direction	18	0.90	0.90	0.75	10.94	95.00 / Cum	1039
2	Providing & laying in cement concrete (1:4:8) and curing complete in form work in foundation and floor	18	0.90	0.90	0.15	2.19	3790.00 /Cum	8289
3	CC (1:2:4) cement, concrete stone aggregate complete as per pwsr	18	0.90	0.90	0.60	8.75	4800.00 /Cum	41990
4	I-Section for columns-ISMB	18				1076.40	75 /Kg	80730
5	S/F of Corrugated Profiled	1 Nos	33.55 m	17.79 m		596.85	450.00 / sqm	268585
6	S/F angel iron frame for roofing with all materials, T&P etc. as per					7938 Kg	40 /Kg	317527
7	Contengencies							1840
	<b>Total Cost of the Estimate</b>							<b>720000</b>

**Detailed Estimate - Store - Office Room**

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
1	E/W in foundation & plinth in ordinary soil including lift & lead up to completion of work as per direction							
	Length	2	7.68	0.45	0.45	3.11		
	Breadth	2	3.78	0.45	0.45	1.53		
					<b>Total</b>	<b>4.64</b>	<b>95.00 / Cum</b>	<b>441</b>
2	Providing & laying in cement concrete (1:4:8) and curing complete in form work in foundation and floor							
	Length	2	7.68	0.45	0.15	1.04		
	Breadth	2	3.78	0.45	0.15	0.51		
	Floor	1	7.00	4.00	0.10	2.80		
					<b>Total</b>	<b>4.35</b>	<b>3790.00 /Cum</b>	<b>16476</b>
3	B/W in foundation (1:6) cement & fine sand including supply of all materials, labour and tools and plants etc required for completion of work as per direction/pwdsr 303							
	1st step	2	7.68	0.45	0.20	1.38		
		2	3.78	0.45	0.20	0.68		
	2nd step	2	7.68	0.35	0.23	1.24		
		2	3.78	0.35	0.23	0.61		
					<b>Total</b>	<b>3.91</b>	<b>5425.00 /Cum</b>	<b>21200</b>
4	B/W in 1:4 S/S cement & c. sand including supply of all materials ,labour and tools and plants etc required for completion of work as per pwd sr305							
		2	7.23	0.23	3	9.98		
		2	4.00	0.23	3	5.52		
					<b>Total</b>	<b>15.50</b>	<b>5855.00 /Cum</b>	<b>90737</b>

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
5	D.P.C. coarse 2.5 cm thick with (1:2:4) cement , concrete stone aggregate 10 m.m. normal size & cutting complete as per pwsr 5.7.1							
		2	7.23	0.23		3.33		
		2	4.00	0.23		1.84		
					<b>Total</b>	<b>5.17</b>	<b>265.00 / sqm</b>	<b>1369</b>
6	S/F of angel iron door frame	2	1.80	1.10		3.96		
	S/F of angel iron window frame	2	1.20	0.90		2.16		
					<b>Total</b>	<b>6.12</b>	<b>500.00 / sqm</b>	<b>3060</b>
7	S/F of flushdoor commercial quality including fixing of wooden cleat and stoppers and including fixing and adjustment of hinges bolts ,locks ,handles spring fitting with necessary screw etc							
		2	1.80	1.10		3.96		
		2	1.20	0.90		2.16		
					<b>Total</b>	<b>6.12</b>	<b>1400.00 /sqm</b>	<b>8568</b>
8	RCC Lintels	2	1.10	0.23	0.15	0.51		
		2	0.90	0.23	0.15	0.41		
	Lab platform	1	7.00	0.60	0.10	4.20		
					<b>Total</b>	<b>5.12</b>	<b>7200.00 /Cum</b>	<b>36864</b>
9	20 m.m. plastering work on rough side wall in ratio 1:3 (cement coarse sand) as per direction pwsr 17.63							
		2	6.46	-	3.00	38.76		
		2	4.00	-	3.00	24.00		
	Deductions	1	1.80	1.10		-1.98		

# Action Plan Towards Blue Revolution

Sl. No	Description	No	L	B	H/D	Qty	Rate	Amount
		1	1.20	0.90		-1.08		
					<b>Total</b>	<b>59.70</b>	<b>158.00 / sqm</b>	<b>9433</b>
10	15 m.m. plastering work in ratio 1:3 fair side walls as per direction pwd s.r. 17.59							
		2	7.23	-	3.00	43.38		
		2	4.00	-	3.00	24.00		
		2	7.23	-	0.10	1.45		
		2	4.00	-	0.10	0.80		
		1	7.00	4.00	-	28.00		
	Deductions	1	1.80	1.10		-1.98		
		1	1.20	0.90		-1.08		
					<b>Total</b>	<b>94.57</b>	<b>145.00 / sqm</b>	<b>13712</b>
11	S/F of Asbestos Cement Sheet- (1.05x3.6)-(16m.m.)	9 Nos					1000 / No	9333
12	S/F angel iron frame for roofing with all materials,T&P etc. as per requirement					1540 Kg	60 /Kg	92400
13	Steel for RCC work					230 Kg	55 /Kg	12672
14.	Colour washing including cost and conveyance of all the materials ect complete.					94.57	65.00 / sqm	6147
15	Synthetic Enamel painting over primary coat and Enamel painting in two caots including csot and conveyance of all the materials ect complete							
	Doors & Windows	2	1.80	1.10		3.96		
		2	1.20	0.90		2.16		
					<b>Total</b>	<b>6.12</b>	<b>150.00 / sqm</b>	<b>918</b>
16	Contengencies							6670
	<b>Total Cost of the Estimate</b>							<b>330000</b>

## Establishment of RAS Units - Targets for Identified States

Table - 1

S. No.	State	Total			Fish yeild (MT)
		Units No.	Cost (Rs. in lakh)	Gol Share (Rs. in lakh)	
1	2	3	4	5	6
1	Assam	120	6000	4800	3840
2	Bihar	210	10500	5250	6720
3	Chhattisgarh	180	9000	4500	5760
4	Haryana	180	9000	4500	5760
5	Madhya Pradesh	150	7500	3750	4800
6	Maharashtra	150	7500	3750	4800
7	Odisha	150	7500	3750	4800
8	Rajasthan	150	7500	3750	4800
9	Punjab	150	7500	3750	4800
10	Tamil Nadu	120	6000	3000	3840
11	Telangana	210	10500	5250	6720
12	Uttar Pradesh	210	10500	5250	6720
13	West Bengal	120	6000	3000	3840
<b>Total</b>		<b>2100</b>	<b>105000</b>	<b>54300</b>	<b>67200</b>

## Establishment of RAS Units-Year wise Targets

Table - 2

S. No.	State	Total			2017-18		2018-19		2019-20	
		Unit No.	Cost (Rs. in lakh)	Gol Share (Rs. in lakh)	Unit No.	Gol Share (Rs. in lakh)	Unit No.	Gol share (Rs. in lakh)	Unit No.	Gol share (Rs. in lakh)
1	2	3	4	5	6	7	8	9	10	11
1	Assam	120	6000	4800	48	1920	48	1920	24	960
2	Bihar	210	10500	5250	84	2100	84	2100	42	1050
3	Chhattisgarh	180	9000	4500	72	1800	72	1800	36	900
4	Haryana	180	9000	4500	72	1800	72	1800	36	900
5	Madhya Pradesh	150	7500	3750	60	1500	60	1500	30	750
6	Maharashtra	150	7500	3750	60	1500	60	1500	30	750
7	Odisha	150	7500	3750	60	1500	60	1500	30	750
8	Rajasthan	150	7500	3750	60	1500	60	1500	30	750
9	Punjab	150	7500	3750	60	1500	60	1500	30	750
10	Tamil Nadu	120	6000	3000	48	1200	48	1200	24	600
11	Telangana	210	10500	5250	84	2100	84	2100	42	1050
12	Uttar Pradesh	210	10500	5250	84	2100	84	2100	42	1050
13	West Bengal	120	6000	3000	48	1200	48	1200	24	600
Total		2100	105000	54300	840	21720	840	21720	420	10860



***Prepared by:*** Dr. Salim Sultan (Sr. Consultant), S.K. Rath (Asst. Commissioner),  
Digamber Swain (Sr. Technical Assistant), Deepti Sharma (Stenographer)

**Notes:**

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**Notes:**

**Notes:**



## **National Fisheries Development Board**

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