



GOVERNMENT OF TAMILNADU

PUBLIC WORKS DEPARTMENT

WATER RESOURCES ORGANISATION

IAMWARM PROJECT

*Detailed Project
of
Kottakaraiyar Sub Basin*

Estimate Cost:- 6053.00 Lakhs

IAMWARM PROJECT

KOTTAKKARAIYAR SUB-BASIN

PROJECT REPORT.

1. INTRODUCTION:

Kottakkaraiyar is one of the Sub-Basin in Pambar-Kottakkariyar basin which is located in between Agniyar Basin in North and Vaigai Basin in South. This Sub -Basin lies in between $78^{\circ} 23' 42''$ E to $78^{\circ} 55' 10''$ E in longitudes and $9^{\circ} 30' 15''$ N to $9^{\circ} 52' 33''$ in latitudes which extends over a total area of 1427.20 Sq.Km It covers the taluks of Sivagangai, Manamadurai, Ilayangudi of Sivagangai District and the taluks of Paramakudi, Ramanathapuram and Thiruvadanai of Ramanathapuram District. This Sub -Basin is highly drought prone area and most backward in development both in industrial and agricultural aspects.

In the world Bank aid project implemented from 1995 – 2004 this Sub-Basin was not considered and hence it is taken up now under IAMWARM Project.

2. Statistical Profile of Sub-Basin:-

2-1 Hydrology:-

The general climate condition over this Sub -basin area is arid and dry.

2-1.1 Catchment:-

This sub basin is a vast plain area and there are no hills. Forest occupy only about 3% of this basin area. Gullies and soil erosion have not been noticed, Since hills are not located in this sub-basin, necessity for check dams has not arisen in the Catchment area mostly.

2.1.2 Rainfall Pattern:-

The contributing monsoon ie North East Monsoon in this sub -basin is highly erratic, uneven and unpredictable on the study of the previous rainfall records. The Probability of timely arrival of monsoon in most part of the area varies from 35% to 60%. During the normal rainfall period the rainy days are between 30 to 40 days, which shows 60% of rainfall received in a short period leads to maximum run off and flooded condition. This basin Area also gets floods due to low depression in Bay of Bengal during the month of November, December, which create inundation of crops, hamlets, due to poor drainage in the system.

There are six Rainfall stations in the basin for recording rainfall which are listed below along with seasonal average rainfall derived from long period of data.

Sl.No.	Name and Rainfall Station	Average Rainfall in mm			
		S.W	NE	Transit Period	Total
1.	Sivagangai	348	411	153	912
2.	Manamadurai	403	430	220	1053
3.	Thiruvadana	170	547	199	916
4.	Ramanathapuram	122	575	202	899
5.	Ilayangudi	197	415	138	750
6.	Paramakudi	189	416	163	768

2.1.3 Meteorological Details:-

There are two meteorological stations one at Thondi on the East-Coast in Manimuthar Sub-Basin and the other at Karaikudi in Thenar Sub-Basin both are being maintained by IMD. Karaikudi station has only less number of years of data. Since Thondi IMD has long period data, the average monthly data of Thondi weather station has been furnished in table No.1

Fortunately the entire basin area does not fall under the seismic zone.

2.1.4 Rivers ,Tributaries and Drains: -

There are no perunnial rivers and major reservoirs in this basin. Only the flash flood is occurring in the drainages , surplus courses during the monsoon.

Kottakkariyar river is formed by the junction of two rivulets Nattar and Saruganiar near Maruthavayal Village, (3 Km in upstream of R.S.Mangalam Big Tank.) and runs through a stretch of about 35Km in east direction before the confluence with Palk Strait.

Nattarkal and Sooriyankottaiyar are the tributories to Kottakkariyar, Subbankal and Nattar Channel are the significant flood carriers covered in this sub -Basin

The area drained by Saruganiar is called as saruganiar sub -basin and the balance portion is Kottakkariyar sub-basin.

Nattar River:-

This is a flood carrier formed by the surpluses of Alangulam , Kandani Periya Kanmoi ,Kattani kanmoi and Velanji kanmoi. It is located near Kandani village ,of Sivagangai taluk. It runs for about 24 Km in easternly direction and empties into Karaikulam Tank of Ilayangudi Taluk. and finally finds its way to R.S.Mangalam Big Tank through Akkavayal and Vishwanur Tanks.

Nattarkal:

Nattarkal has its origin near Natarasankottai village of Sivagangai Taluk from the surpluses of somangulam, Kollangudi and Put hanendal Tanks. After running for length of 16Km it empties into K.Pudur Tank and joins with Nattar River.

Subbankal:-

Subbankal starts from Vadakkuchandanur tank surplus weir located in Manamadurai taluk and runs for a length of about 15Km and ends into Ilayangudi and Thiruvallur Tanks.

Vadakkuchandanur Tank also gets its supply from Seikalathur anicut constructed across Uppar river through a link channel to feed Subbankal.

Nettur Tank is one of the major tanks fed by Vaigai River through LMC of Parthibanur Regulator. The surplus from Nettur Tank goes to Kovanur tank and Kakkudi tank and falls into Subbankal.

Nattar Channel:-

Narttar channel is also a flood carrier running in between Nattar River and Subbankal. It has its origin from the surplus of Melpidavur tank in Manamadurai Taluk. After running for a length of 25 Km it ends into Salaignramam tank in Ilayangudi taluk.

2.1.5 Water Resources Highlight:-**a) Surface water potential:-**

Rainfall contributes to the surface and ground water. As the rain fall is erratic, there is an imperative to store the rainwater in tanks/Uranies by its own Catchment as well as from flood carriers for surface water potential. It is generally assumes that 15% rainfall recorded is available in the form of surface flow in any season.

Using the rainfall data of all the rainfall stations, isohyets were drawn for the three seasons and the average rainfall for all the three seasons are computed below.

<u>Seasons</u>	<u>Basin's Average rainfall using isohyets for the respective season.</u>
S.W Monsoon	291.81 mm
N E Monsoon	463.16 mm
Transit period	173.68 mm
Annual	878.11mm (Using average annual isohyets)

From the above values and assuming 15% of this average rainfall to be realized as surface flow, the surface potential is computed as 159.36 M.cum. by IWS Taramani, Chennai.

(b) Ground Water Potential.

The state ground and surface water resources Data Centre, Taramani, Chennai in their publication of July –2002 have documented the details of ground water potential available in each taluk covering the entire Tamil Nadu. These data were taken into account to arrive at the basin potential as 113.37 M.cum.

The ground water fluctuations levels have been taken during July and January at a frequency of every five years starting from 1975 which are furnished in Table No.2

The ground water level is to raise during seasonal rain fall during non seasons. But this general trend of ground water level is on the decline year after year in the respective seasons.

The ground water potential has been arrived at by estimating the annual recharge and taking 90% of that quantity as net utilizable potential. Hence the ground water potential furnished is to be taken as the average dependable ground water recharge for this basin.

C) Water Demand:-

From SGSWRD Centre publication for July -2002, this total water demand for various sector is arrived below.

1. For Agriculture	=	478.59 M.Cum
2. For Domestic needs	=	8.73 M.Cum
3. Live stock demand	=	7.00 M.Cum.
4. Industrial Demand	=	9.30 M.Cum
Total Demand	=	503.62 M.Cum

d) Water Balance

It is seen that the water balance for agriculture purpose is found to be deficit from the detailed computation done in the articles 2.5.6 and 2.5.7

Sl.No	Description	For entire Sub-Basin M Cum	For project area M. Cum	
			Pre project	Post project
1	Total Agricultural Demand	478.59	261.84	224.55
2	Water potential available for agricultural purpose			
	a) Surface water potential	159.36	126.66	126.66
	b) Ground water potential	113.37	64.62	64.62
	c) Diversion from other basin	30.35	30.35	30.35
	d) D) Return flow	Nil	Nil	Nil
	Total potential available	303.07	221.63	221.63

Deficit for Agriculture = 175.52 40.21 2.92
(37%) (15%) (1.3%)

e) Quality of surface Water :-

The surface water is being tested by Environmental cell Division Madurai from December 2001 onwards taking water samples at the following two locations whenever there is flow in the river.

Location:1 D/s of Kottakkariyar Anicut in Kottakaraiyar River

Location:2 D/s of Causeway crossing River in R.S.Mangalam -Tiruvadana Road.

(f) Ground water Quality:-

In most of the upper half of this basin, the ground water quality is good and in lower reaches it is of moderate quality.

The test results of quality of surface water and ground water are narrated in the project proposal submitted by Environmental Division, Madurai in detail.

2.2 Land use pattern and Land holdings:-

Land area is used in several ways. Agricultural Department has classified the land into nine categories depending upon the way in which the land is used (or) put to use and these details are tabulated in Table No.4.

2.3. Soil Classification:-

Three types of major soil classifications are,

- i) Geological classification
- ii) Classification by soil scientists based on soil composition
- iii) Classification by agricultural department based on the soil profile

2.4 Irrigation Sector :-

2.4.1:-Anicuts, Supply Channels and Tanks :-

The flash flood occurred in the rivers (or) flood carriers during monsoon is diverted to irrigation tanks by anicuts (or) diversion head works through supply channels. The details of anicuts constructed across the rivers are furnished below.

Sl.No.	Name of the River (or) flood carrier	Length KM.	No.of Anicuts	Maximum flood Discharge c/s	No. Of Tanks Benefited	Ayacut Ha
1	Nattar River	36	4	12600	17	688.04
2	Nattarkal	16	3		11	649.18
3	Subbankal	15	1	6460	7	730.93
4	Nattar flood carrier	25	-	3240	27	1156.63
5	Kottakaraiyar	38	2	32950 (Realized on 27.11.05 during flood)	5	2319.78

In the past 14 years, the surplus flow into sea of River at this point of anicut at R.S.Mangalam big tank was recorded and furnished below .

Surplus flow details in Kottakaraiyar

Date	Discharge in Cumec	Flow days	Quantum of water surplussed M.Cum
12.11.92 & 13.12.92	28.32	2	4.90
15.12.97 & 16.12.92	3.68	2	0.64
09.12.98 & 10.12.98	2.27	2	0.40
25.11.05 to 12.01.06	133.33	49	564.46

From the above records, it is known that this sub basin has been highly affected by flood in this year 2005.

Regarding supply channels, they are available to feed system tanks from Vaigai river and to feed non-system tanks from the anicuts of non-Perunnial rivers (or) flood carriers .In addition, supply channels are also existing in rain fed tanks to receive the supply from their upper tanks.

In order to precise the rainwater in a short period by maximum run off, tanks were constructed by our ancestors in this sub basin . since major reservoir was not available. A special feature of the most of the tanks is their construction series. That is the surplus water escaping from one tank feed the lower down tank and so on the details of all categories of tanks are listed below.

Sl.No	Tanks Category	No. of Tanks	Registered Ayacut (Ha)
1	Under feeding from LMC of Parthibanur Regulator from Vaigai River	139	12114.30
2	Non system Tanks supplied by anicuts diversion head works etc., from Non-perunnial rivers etc., a)Above 40 Ha. b)Below 40 Ha. sub total	49 80 129	3778.23 2274.64 6052.87
3	Rain fed PWD Tanks	186	12401.95
4	Panchayat Union Tanks 0 - 20 Ha 20 - 40 Ha Sub total	725 270 995	7894.34 6873.00 14767.34
	Grand Total	1449	45336.46

NOTE :- The category of Tank is defined as

- i) Rain fed :-The tank which receives its supply only from its own catchment,
- ii)Non-system tank :- The tank in addition to its own catchment receives another source of supply from non-perunnial rivers through anicuts and supply channels.
- iii) System Tanks :-The tank in addition to its own catchment receives another source of supply from storage reservoir through Regulator and supply channels.

2.4.2 Command Area details :-

The cultivation data for Kottakaraiyar sub basin is given below based on the cultivation records obtained from the Village Administrative Officers.(Except Panchayat Union Tanks)

Sl.No.	Ayacut details	Extent in project area Ha	Extent in non project area (Already taken up in other schemes) Ha.	Total extent Ha
1	Registered Ayacut	17424	13145.12	30569.12
2	Fully irrigated	4988	10483.53	15471.53
3	Partially irrigated	9434	2201.01	11635.01
4	Cultivated ayacut	14422	12684.54	27106.54
5	Gap	3002	460.58	3462.58

2.4.3 Water User Association (WUA)

Since water flows for a very brief period in the channels and rivers, the scope of the Government to act. will be expected to be less. Therefore building on the basin management is absolutely necessary on the following activities

- i) Conversation and Development
- ii) Water management and contingency planing
- iii) Promoting local tank management organizations

Learning from the various cases in individual tank, tank chains, the following organization model has been prepared.

- i) Village level tank farmers organization
- ii) Cascade / chain of tanks level organization
- iii) System level tank farmers organization

The organization will remain as nested institution among themselves, System level tanks WUAs have already been formed under WRCP – I and are functioning now. The WUAs in Non – WRCP area have been identified and being processed for formation legally.(see Table No:-6)

2.5 Agriculture:-

2.5.1 Type of land:-

Under this, the details of wet and dry lands are to be dealt with. Wet lands are under the command of the systems and non system tanks .No direct Ayacut is practiced in this sub basin. The deficiency of water demand in system and non system tanks is supplemented through wells in certain command area . In lands where tank irrigation is not possible ,dry crops are raised.

2.5.2 Agriculture practice:-

Most of the agricultural operations are carried out manually except land preparation and puddle which are done by using bullocks (or) Machineries .For peak period (transplanting ,weeding , harvesting)farmers make use of hired labour mostly engaged from neighbour family within the village .The agricultural inputs commonly used are fertilizers , pesticides and fungicides.

2.5.3 Cropping pattern and crop calendar: -

These details have been collected from agriculture from Agriculture department for this sub basin and are produced in Table No: -7 .

2.5.4 Crop yield:-

The average crop yield obtained from various part of this sub basin have been documented below.

Sl.No	Name of the crop	Yield in Kg/Ha
1	Paddy	4300
2	Millets	1680
3	Ground Nut	1320
4	Cotton	2720
5	Sugarcane	12400
6	Chilly	920

2.5.5. Use of fertilizer and pesticides :-

The usage of fertilizer and pesticides has increased by leaps and bounds over the years due to overwhelming increase in the crop yield and thus on the return in this initial period .But its extension use has resulted in progressive deterioration of soil and water quality coupled with progressive reduction of soil fertility and productivity ,Hence the extent of their usage is taken into consideration to protect the quality of basin water , soils and the environment. The use of fertilizer and pesticides is shown in Table No: -8.

2.5.6 Crop Water Requirement and water demand for Agriculture :-

The net crop water requirement (CWR) for various crops are computed by latest technology, The field over all efficiency 44% is adopted for tank irrigation and 75% for well irrigation depending on the crops.

The crops water requirement (CWR) for all crops cultivated in this sub basin is calculated from project area and non project area separately in table No :9

CWR for project area (17424 Ha)	:- 261.84 M.Cum
CWR for Panchayat union Tanks	:- 20.48 M.Cum
CWR for Non -project area (13145 Ha)	:- 196.27 M.Cum
(Already taken up in other schemes)	
Total CWR	:- 478.59 M.Cum

2.5.7 Return Flow :-

Additional Water potential through diversion from other basin: -

For Old Vaigai system tanks fed through

LMC of Parthibanur regulator :-

Assuming 1/3 supply from Vaigai basin to	
Basin for 9898.41Ha	=1/3 x 9898.41 x 0.827/100
	=27.28 M.cum
From Uppar sub basin & Vaigai basin	=1/3 x 1114 x 0.827/100
	=3.07 M.cum

a)For basin area :-

Water demand for agriculture	= 478.59 M.Cum
------------------------------	----------------

Water potential available:-

(i) From diversion from vaigai	= 30.35 M.Cum
(ii) Surface potential	= 159.36 M.Cum
(iii)Ground water potential	= 113.36 M.Cum
Total potential available	= 303.07 M.Cum

$$\text{Deficit} = 478.59 - 303.07 = 175.52 \text{ M.Cum (37\%)}$$

b)For project area :-

Water demand for agriculture =282.32 M.Cum. (261.84 for PWD tanks and 20.48 for Panchyat union tanks)

Water potential available :-

- (i) From diversion from vaigai = 30.35 M.Cum
(ii) Surface potential (159.36 x 17424) / 30569 = 126.66 M. Cum
(iii)Ground water potential (113.37 x 17424) / 30569 = 64.62 M.Cum

Total potential available = 221.63 M.Cum

Deficit for Pre project = 261.84-221.63 =40.21 M.Cum (15%)

Deficit for Post project = 224.55-221.63 =2.92 M.Cum (1.30%)

The return flow is 'NIL'

2.5.8 Ground Water recharges :-

Kottkkaraiyar minor basin drains part of Kalayarkoil block,Sivagangai block,Major portion of Ilayangudi block,R.S.magalam block and small portion of Manamadurai ,Paramakudi and Ramnad blocks.

In these ,R.S.mangalam and Ramnad block lie in the coastal region where the ground water is saline whether in shallow aquifer or in deep aquifer ,Therefore no artificial recharge scheme have been proposed in coastal region .

In the other region ,construction of check dams (or) artificial recharge shaft is the remedy for artificial recharge of ground water .Since the formation of check dams across the water shed , small streams which confluences into the river is highly objected by the public and WUAS stating about the possibility of affecting the lower down ayacuts ,the construction of artificial recharge shaft is preferred by the Ground water wing of WRO.

However the check dam points where no objection arises from public side are being identified for taking into account.

2.6 Domestic Sector:-

The relevant data in respect of domestic sector is documented as below.

Sl.No	Districts	Tanks	Blocks	Villages	Municipality	Towns
1	Sivaganga	Sivagangai	Sivagangai	1	1	-
2	Sivaganga	Sivagangai	Kalayarkovil	62	-	1
3	Sivaganga	Manamadurai	Manamadurai	13	-	-
4	Sivaganga	Ilayangudi	Ilayangudi	52	-	-
5	Ramnad	Paramakudi	Nainarkovil	27	-	-
6	Ramnad	Thiruvadana	R.S.Mangalam	59	-	1
7	Ramnad	Ramnad	Ramnad	6	-	-
			Total	220	1	3

Total population as per 2001 census:- Male = 1,55,956 (49.9%)
Female = 1,56,497 (50.10%)
Total = 3,12,453

2.7 Industries:-

There are 15 Nos of industries in this sub-basin in the following category. No major industries are available.

1. Brick kilns	:-	8
2. Rice, flour Mills	:-	2
3. Weaving and Textiles	:-	1
4. Plastic Industry	:-	1
5. Chemical Industry and LPG Bottling plants	:-	2
6. Food Products	:-	1

Total:-		15

3.0 Present Scenario:-

3.1. Constraints in the irrigation system:-

Kottakaraiyar sub basin is a rapid, wide and old system. The major constraints in irrigation are highlighted below.

- (i) The non availability of new anicuts, grade walls bed dams, diversion structures etc essential at the existing open off takes of the in rivers leads to poor rain water harvesting during monsoon.

The damaged (or) dilapidated condition of the existing anicuts, diversion head works etc. and supply channels causes to poor standard of the entire conveyer system. No desilting work and improvement works have been carried out for the past many years. Due to long run of time, heavy accumulation of silt has been occurred in the channel bed by the earth sliding from the banks and due to flow from the river. The heavy growth of jungle in the bed is obstructing the flow in the channel severely, As such the supply channels have lost totally their original carrying capacity and designed cross section.

- ii) For many decade, most of the tanks were not taken up for desilting and full standardization due to lack of funds. They are now silted up heavily as to capable of not storing the quantity of water that were designed to hold. In addition, due to the poor standard of tank bund, water could not be stored upto FTL which results to further reduction in the original capacity. The loss in capacity affects the cultivation.
- iii) The allied structures of tank such as sluices and weirs are in bad damaged conditions which leads to heavy leakages resulting difficulties in control of water delivery to the command area. The sluices in complete dilapidated condition sometimes affects the tank bund also due to heavy leakages in barrel of the sluice. The water loss due to uncontrolled delivery from the damaged sluices and weirs play the major roll in cultivation statistics.
- iv) There are only earthen filed channels in existance for distribution of water to the cammand area from the tank sluice. The flow in earthen channel leads to considerable loss of water, non-possibility of equal distribution to tail end lands and thus conflict arises among the farmers.
- v) At Present, the farmers follow the traditional old practice in cultivation. There is lack of awareness among the farmers for effective utilization of water to the

requirement of crop. Proper selection of cropping pattern is not adopted for devising the optimal benefit per unit of water.

4. Objectives of the Project.

The Principal objectives of the IAMWARM Project are

- (i) To ensure preservation and stabilization of the existing water resources by rehabilitation and standardisation of the existing irrigation infra structures and construction of new structures wherever required with the aid of Plan formulation wing of WRO.
- (ii) Restoration of surface water and ground water potentials and improving them wherever possible through effective rainwater harvesting processes.
- (iii) Planning to, save water in the command area through involvement of farmers in water management mechanism and training facilities in connection with this.
- (iv) Collection of data on land use and present practice of irrigation, so that modern methods of irrigation practices are to be explored for increasing the productivity of crops per unit of water for irrigation.
- (v) Adopting a proper selection of cropping pattern which may give optimum benefit for the success of the project.

5) Remedies and Action Plan by WRO :-

In order to overcome the bottlenecks encountered in the efficiency of the present irrigation system, action has been taken by WRO as follows based on the concept of the IAMWARM Project.

- a) Effective rainwater harvesting from the catchment for restoration of surface water and ground water resources.
- b) Improving the overall irrigation efficiency by rehabilitation of infrastructures of conveyor system (Channels) and storage system (Tanks) Selective lining in the field channels may be preferred to the required extent as being implemented in the modern irrigation Projects.
- c) Economic and effective utilization of water in the command area is to be achieved by implementing water management practices among the farmers, through formation of WUAs. . The WUAs already in existence and WUAs identified in Non-WRCP area will be approached for participation in the planning of the project proposals.

- d) Conjunctive use of surface and ground water in all sources by giving awareness among farmers.
- e) To stabilize the existing registered ayacut in cultivation by bridging the gap by reducing the water demand in the way of effective water management and adoption of modern agriculture techniques (Micro irrigation) with the involvement of both the WRO and the line departments.
- f) To adopt the suitable cropping pattern which requires less water demand and more benefit to the farmers in consultation with the agriculture Department and the research team of TamilNadu Agricultural University

The actual constraints and action taken for the remedial remarks is tabulated separately in table No 10.

5.1. Roll of Line Departments-

The Line departments official along with WRO officials have to held a joint stakeholders meeting after under taking a detailed walk through survey of all the irrigation systems to assess their demand. Farmer's acceptance for adopting the modern methods of irrigation like SRI, Drip, Sprinkler, Organic farming and diversification of crops may be assessed.

6.0. Project Proposals: -

The following data relevant to the project proposals have been collected and produced in this proposals

- a) Salient features of the existing irrigation systems viz. Head works, anicuts, supply channels and Tanks co-related to memories and its present conditions.
- b) Flow diagrams of the rivers , canals and system & Non system tanks.
- c) Water resources data from IWS, Taramani
- d) The land holding of the farmers with details of crop cultivated, method of cultivation for the past 10 years and number of wells, present land use etc.
- e) Relevant maps regarding the sub basin.
- f) No.of WUAs to be formed in the Non-WRCP area.
- g) New schemes in the sub basin already prepared by the Plan formulation wing of WRO.

6.1 Walk through survey:-

A Walk through survey has been conducted by WRO officials along with WUA Members & Line department officials to assess the actual need of the farmers and also to take participate themselves actively in the process of planning and formulating the project proposal for this sub-basin The Minutes of the walkthrough survey with the stakeholders are enclosed herewith.

6.2 Estimate preparation Methodology:-

The detailed estimate has been prepared based on the technical guidelines circulated by as Chief Engineer ,PWD, WRO , Madurai Region ,Madurai in Letter no: - 0T3 /AE5 /General/ 99/Dt.7.6.2006 and the Chief Engineer PWD/WRO plan Formulation, Chennai Letter No :- 0T3/ IAMWARM /2006 / Kottakkaraiyar Sub basin / Dt.13.11.06 and 18.11.06

6-3 Estimation of Project Cost:-

6.3.1:WRO

Based on the technical quid line for every infrastructures, the project cost proposed by the WRO is estimated to a tune of Rs 4468.99 Lakhs, for rehabilitation of irrigation system covered to the extent of 17,424 Ha, out of the total ayacut extent of 30,569.12 Ha.. The remaining irrigation components having the ayacut of 13,145.12 Ha. have already been standardized by WRO in full undergone for the past three more years as well as to be taken up in other schemes. The details of tanks covered in this project and executed by WRO in other schemes with ayacut detail are given below.

Sl.No	Details of Tanks	Project area		Non Project area		Total	
		Nos	Ayacut Ha.	Nos.	Ayacut Ha.	Nos.	Ayacut Ha
1.	Vaigai System Tanks	85	6188.38	54	5925.92	139	12114.30
2.	Non System Tanks						
a)	Above 40 Ha	46	2818.49	3	959.74	49	3778.23
b)	Below 40 Ha.	80	2274.64	-	-	80	2274.64
3	Rainfed Tanks	104	6142.53	82	6259.42	186	12401.95
	Total	315	17424.04	139	13145.08	454	30569.12

The component of works and their estimate cost proposed from WRO is compiled in general abstract enclosed .

6-3-2 Proposals from Line Department:-

The Line departments have furnished their project proposals and they are compiled in a separate volume. The estimate cost for their provisions is highlighted as below:

a) Agriculture Department	: Rs175.46	lakhs
B) Agriculture Engineering Department	: Rs.792.80	Lakhs
c) Horticulture Department	: Rs.243.96	Lakhs
d) Fisheries Department	: Rs.47.07	Lakhs
e) Environmental wing of WRO	: Rs. 25.00	Lakhs.
f)Animal Husbandry	: Rs.55.73	akhs.
g)TamilNadu Agriculture university	: Rs.211.99	Lakhs..
h)Agriculture Marketing	: Rs. 32.00	Lakhs.
Total : Rs.1584.01 Lakhs.		

7-0 Implementation Schedule:-

The spanning period of the project implementation will be scheduled within the project period of five years based on the project management techniques based on the project management techniques after the finalization of the DPR.

It is scheduled to implement the project for a period of three years with the commence date as 31.10.06. It is proposed to prepare nine packages according to the component of the sub basin so as to implement the project comfortably. The procurement plans for the nine packages are enclosed herewith. The implementation schedule for the whole project is also furnished in a chart.

8.0 Socio – Economic Study.

Population of Villages in this sub – basin is about inhabitants most of them being agriculturalists and laborer. There are sufficient laborers available throughout the year.

The average figure of number of families per village benefiting from this project is nearly 250 to 500, the relevant farm size and their holding farmers are as below.

Less than 1 Ha	Small	74%
Between 1 to 2 Ha.	Marginal	16%
Above 2 Ha.	Big	10%

From the above, it is confirmed that almost all beneficiaries are marginal and small farmers.

Because of the present condition of the irrigation structures, erratic & unpredictable monsoon and high risk involved in crop cultivation, the gap between the water demand and available total water potential is alarmingly large as revealed in the hydrology calculations. This has resulted in around frustration and sufferings due to poverty among the farmer community.

As a result of the project, the overall efficiency of tank irrigation system will be improved by utilizing the water economically for increasing then productivity and also developing the living standards of farming community throughout the year.

9) Benefits from the Project:-

After the implementation of the project.

- 1) The loss of precious rainwater will be minimized to a greater extent by rehabilitation of conveyer and storage systems, the delinked chain of tanks will be relinked.
- 2) The additional flow into the tanks can be utilized for filling the water ponds in the village which will solve the drinking water p problems to live stocks.
- 3) Due to storage of water in tank to its full capacity, the ground water potential of the entire sub-basin will be increased considerably and the sea water intrusion problem will be minimized in the coastal region.
- 4) Reconstruction (or) Repairs to infrastructures of the tank will help greatly in reducing the wastage due to leakage of preciously collected rain water.
- 5) The wastages of water will be reduced in the field channel by selective lining and creating awareness of importance of water management among the farmers.
- 6) Formation of Water User Association at all levels will help in the better basin water management and turning over the system under the maintenance of the user groups after post implementation of the project and in solving the conflicts arising during water scarcity period.
- 7) The scheme is expected to bridge the gap in the registered ayacut by adopting the modern technology in agriculture and change in cropping pattern in order to increases the productivity and profit in agriculture.
- 8) After completion of the project the impact on agriculture through intensification and diversification in farming activity in the scheme will generate additional employment opportunities. Implementation of the project involving civil works will fu rther add employment opportunities to the local labourers during project execution.
- 9) Above all the social economic status of the basin people will be improved greatly.

Conclusion:-

The relevant Bid documents for nine packages have been furnished for getting from this World Bank.

Table No 1
Meteorological Data

Sl. No	Meteorological Parameter	S.W Monsoon	N.E Monsoon	Winter	Summer
1.	Mean monthly Temperature Max/Min in °C	30/28.60	27.5/25.3	26.6/25.4	29.90/27.90
2	Average monthly Temperature Max/Min in °C	29.3	26.5	26.0	28.70
3	Average relative humidity in %	70.80	79.7	76.8	73.9
4	Average Wind velocity in Kmph	11.3	10.2	12.79	13.3
5	Average potential Evapo transpiration (Calculated)	155mm / Month.			

Table No.2
Ground Water Fluctuation.

S. N	Well No	Name of the station	1975	1980	1985	1990	1995	2000	1976	1981	1986	1991	1996	2001
1	83163	Sivaganga	9.61	1.60	6.65	9.60	9.65	10.20	2.73	1.77	4.80	8.2	8.0	10.2
2.	83243	Narttasankottai	7.87	5.40	7.08	8.75	9.90	7.80	7.30	5.90	6.75	5.40	7.90	4.0
3	83242	Satharasankotttai	9.00	4.05	5.65	6.65	4.65	5.80	4.42	1.75	5.65	4.32	4.50	3.55
4	83141 A	R.S.Man-galam	4.20	3.0	3.29	3.86	3.90	3.30	3.90	3.30	3.36	2.42	3.20	3.60

TABLE NO :-3

Soil classification based on composition.

SL. NO	Name of the District	Name of the Taluk	Soil classification	
			Great order	Sub group
1	Sivagangai	Ilayankudi	Alfisol	Ultihaplustalfs Vertichaplustalfs
			Vertisol	Typicchromusterts
		Manamadurai	Inceptisol	Typic ustropepts
			Entisol	Typic ustrothents
			Alfisol	Ultihaplustalfs
		Sivagangai	Alfisol	Udic Roadustalfs Ultihaplustalfs
			Inceptisol	Typic ustropepts
			Vertisol	Typicchromusterts
			Entisol	Typic ustrothents
			Inceptisol	Typic ustropepts
2	Ramnad	Thiruvadana	Vertisol	Typicchromusterts
			Alfisol	Vertichaplustalfs
		Thiruvadana	Entisol	Typic Ustipsamments
			Vertisol	Entic chromusterts
			Alfisol	Udic Haplustalfs
			Inceptisol	Fluventic Ustropepts
			Alfisol	Udic Rodustals
			Alfisol	Udic Rodustals
		Paramakudi	Vertisol	Typicchromusterts
			Alfisol	Udic Haplustalfs
		Ramnad	Vertisol	Typicchromusterts
			Alfisol	Vertichaplustalfs
			Inceptisol	Fluventic Ustropepts

TABLE NO:-4

Land use Pattern

Sl.No	Description	Area in Hec.	Percentage
1	Total area of sub basin	142720	100
2	Forest	4677	3.3
3	Barren & uncultivable land	1883	1.3
4	Land put to Non – Agri. Use	33548	23.5
5	Cultivable waste	3830	2.70
6	Permanent pasture and Grazing land	241	0.17
7	Misc. trees in net sown area	3711	2.6
8	current fallows	16265	11.4
9	Other fallow lands	27593	19.33
10	Net sown area	50972	35.70

TABLE NO :-5

Soil classification by Agriculture Department

Sl. No.	Name of Taluk	Soil classification (Agrl.)
1	Sivagangai	Nerpugapatti, Singampunari, Sembanur, Kallal, Milaganur, Thirukostiyur, Thiruppuvanam,
2	Ilayankudi	Hanumanthangudi, Milaganur, Sembanur, Thiruppuvanam.
3	Paramakudi	Nainarkoil, Paramakudi, Sayalkudi,
4	Thiruvadanai	Paramakudi, Kadaladi, Parthibanur, Anandur, Mamallakkarai, Pudukottai, Mandapam, sarugani, Thellivayal.
5	Ramnad	Paramakudi, Kadaladi, Thiruppuvanam,

TABLE NO :-6

DETAILS OF WATER USERS ASSOCIATION IN THE P ROJECT AREA

Sl.No	District	Taluk	NO.OF WUA	Ayacut(Ha)
	WUA already formed and functioning			
1	Sivagangai	Ilaiyangudi	10 Nos	4534.31
	WUA'S to be formed			
1	Sivagangai	Sivagangai	15Nos	5599.65
2	Sivagangai	Ilaiyangudi	14Nos	4389.83
3	Sivagangai	Manamadurai	4Nos	1053.54
4	Ramnad	Thiruvadanai	9Nos	1801.83
5	Ramnad	Devipattinam	4 Nos	44.84
		Sub Total	43 Nos	12889.69
		Grand Total	53 Nos	17424.00

TABLE NO :-7

KOTTAKARAIYAR SUB BASIN										
CROPPING PATTERN - Area in Hectare										
Sl No	Crops	Season	WOP				WP			
			FI	PI	Gap	TOTAL	FI	PI	Gap	TOTAL
1	Coconut	Perennial								
	With Drip			80			150			150
	With out Drip			20		100				
2	Mango	Perennial								
	With Drip			60			100			100
	With out Drip			10		70				
3	Amla	Perennial		20		20				
	With Drip						50			50
	With out Drip									
4	Sapota	Perennial								
	With Drip						30			30
	With out Drip									
5	Guava	Perennial		32		32	32			32
6	Sugarcane	Annual								
	With Drip			250			650			
	With out Drip			710		960	350			1000
7	Banana	Annual	40	20		60	100			100
8	Fodder	Annual		30		30	100			100
		Sub Total	40	1232	0	1272	1562	0	0	1562
	I Season (Sep-Jan)									
1	Paddy		4948	5412	1500	11860	10662			10662
2	Maize			100		100	1000			1000
3	Bhendhi			240		240	500			500
4	Tomoto			25		25	100			100
5	Brinjal			100		100	250			250
6	Water melon			25		25	50			50
7	Chillies			2000		2000	2800			2800

8	Ground nut				200	200				
	With Drip		40				100			
	With out Drip		260		300	400				500
		Sub Total	4948	8202	1700	14850	15862	0	0	15862
9	Fallow		--	--	1302	1302	--	--	--	--
		Total Ayacut	4988	9434	3002	17424	17424	0	0	17424
	II Crop (Feb-May)									
	Cotton		600		600		700			700
	Gingelly		50		50		60			60
	Ground nut		30		30		50			50
	Pulses		400		400		580			580
	Bhendhi						40			40
			1080		1080		40	1390		1430
		Total Cropped Area	4988	10514	1700	17202	17464	1390	0	18854
	Crop intensity					98.73				108.21
	Total Regd. Ayacut					17424				17424
	Fully Irrigated					4988				17464
	Partially Irrigated					10514				0
	Gap					3002				0

Table No:-8

Use of Fertilizers and pesticides .

Name of the Taluk	Fertilizers				Pesticides	
	N	P	K	Total	Dust Mt	Liquid Lit
Sivaganga	688.0	215.0	455.0	1358.0	2.8	399.0
Ilayangudi	610.0	297.0	446.0	1353.0	2.5	744.0
Manamadurai	662.0	253.0	400.0	1315.0	2.8	440.0
Thiruvadana	94.0	66.0	42.0	-	1.30	880.0
Paramakudi	660.0	160.0	84.0	-	0.50	1150.0
Ramnad	6.30	3.4	2.4	-	0.06	14.0

IAMWARM PROJECT

Table No:- 10

The actual constraints, Action taken by WRO for their remedial measures.

comp onent	Category	Constraints	Counter measures	Estimate Amount Rs. In lakhs
	Survey & Preliminary investigation & Project preparation.	Surveying & preliminary investigation for the entire system is needed	Surveying & Leveling the infrastructures by the department and walk through surveys with WUAs carried out.	4.00
	Catchment area	Nil	Nil	-
Irrigation System Conveyor System	River Courses , flood carriers etc.	*The river courses and flood carriers have lost their size and shape with accumulation of heavy silt and thick jungle growth. *Effective rain water harvesting could not be entertained in the condition of erratic and unpredictable monsoon.	*The river courses are to be reshaped by desilting and removal of jungle wherever necessary. *River training wall (Protection Wall) is to be constructed at weaker points to avoid flood damages.	19.63

<p>Anicuts, Diversion head works and cross masonry structures across the rivers.</p>	<p>*The existing anicuts , diversion head works across the river to feed the supply channels of tanks is in repaired or dilapidated condition. *At open off takes , no diversion structures are available to divert flow in the river into tanks effectively.</p>	<p>*The existing dilapidated anicuts (or) Diversion Head works are to be rehabilitated /repaired. *New anicuts, Diversion structures , Grade walls are to be suggested at open off take points .</p>	<p>455.13</p>
<p>Supply Channels and cross Masonry works.</p>	<p>*The existing supply channels which are the conveyor system have lost their original carrying capacity due to heavy silt up and jungle. *Maintenance works not carried out for many decades due to lack of funds. *Control structures not available at off-take points to regulate the supply to tanks.</p>	<p>The supply channels are to be desilted d to its standard. *New culverts are to be constructed where village road crosses. Repairs to the existing head sluices and construction of new control structures are to be provided. *Protection walls are to be provided at critical reaches.</p>	<p>568.42</p>

	Storage System	Tanks	<p>*The tanks have lost their designed capacity because of heavy silt up in bed and poor standard of bund.</p> <p>*The water spread area is covered by Juliflora jungle ,Ipomia etc. which affects environment.</p> <p>*Due to the dilapidated (or) repaired condition of the sluices and weirs there is uncontrolled delivery from the tanks resulting to water loss.</p>	<p>*Tanks are to be fully standardized with necessary protective arrangements at weaker portions.</p> <p>* The jungle such as Ipomia and Juliflora jungle are to be removed completely to avoid water pollution.</p> <p>The delapidated sluices and weirs are to be reconstructed (or) repaired which control water delivery from tank into field.</p>	2977.83
Farm system	Distribution	Field channel	<p>* Due to earthen channel in the field , water losses entertain heavily in distribution in field.</p>	<p>*Selective lining works in the field channels with cistern arrangements are to be provided to minimise the water loss (taken up by AED)</p>	--

		Irrigation Management	<p>*Over drawal of water in the head reaches irrelevant to the actual needs leads to considerable loss of water.</p> <p>*Non possibility of equal distribution to rail end arises complicit among the farmers</p>	<p>*Water distribution is to be planned and scheduled based on actual crop water requirement, cropping pattern, effective rainfall and available storage in tanks.</p> <p>*Farmers training and awareness development to be carried out for economic and effective utilization of water in the command area in order to improve irrigation efficiency.</p> <p>*Formation and functioning & WUAs to be encouraged.</p>	-
		Agricultural Practice.	<p>*Traditional old practice being adopted by the farmers.</p> <p>*Non adoption of proper cropping pattern.</p> <p>*Water balance for agricultural purpose is under deficit.</p>	<p>*Suitable cropping pattern is to be adopted for divising the optimal benefit using less unit of water.</p> <p>*Extension of modern agricultural technology is to be explored for increasing the productivity in profitable crops</p> <p>*Conjunctive use of ground water in all sources is to be encouraged among the farmers.</p>	-

TOTAL FOR WORKS FROM WRO: - 4021.02 lakhs

KOTTAKARAYAR SUB BASIN

GENERAL ABSTRACT

Sl No	Nature of work	Estimate Quantity	Project cost (Rs in lakh)
I	RIVERS, ANICUT, DIVERSION HEAD WORKS, CROSS MASONRY WORKS ETC:		
1	Desilting and Reshaping the Rivers, Flood carriers	268169 M ³	19.630
2	Construction of new Anicuts, new Grade walls, Diversion Structures, offtake structures, inlets etc,	24 Nos	264.20
3	Construction of Protection walls in the river in weaker portion to avoid flood damages	235 RM	157.02
4	Repairs to existing anicuts, Diversion structures etc,	4 Nos	33.91
Sub total			474.76
II	SUPPLY CHANNELS BRANCHING FROM THE RIVERS, FLOOD CARRIERS ETC,		
5	Desilting of the supply channel	1291612 M ³	425.66
6	Construction of new culverts, foot bridges etc	12 Nos	16.31
7	Shutter renewal	14 Nos	8.00
8	Construction of Grade walls in supply channels to regulate the flow into offtake sluices	11 Nos	36.38
9	Reconstruction of off take sluices	20 Nos	13.78
10	Repairs to Sluices	64 Nos	68.29
Sub total			568.42
III	TANKS		
11	Standardisation of Tank bund	4739989 M ³	1591.49
12	Providing Roughstone revetment for weaker portion of bund	1712 RM	33.70
13	Reconstruction of Tank sluices	460 Nos	701.67
14	Repair to Tank sluices	220 Nos	176.58
15	Reconstruction of Weir, surplus escape etc	62 Nos	274.71
16	Repairs to weirs	79 Nos	140.48
17	Shutter renewal	269 Nos	46.46
18	Selective lining of channel	285 Rm	8.14
19	Recharge wells	79 Nos	4.60

	Sub total		2977.83
	Total Work Value		4021.02
V	OTHER PROVISIONS		
1	Provision for Surveying and levelling operation, cleaning the site etc		4.00
2	Audit & Account @ 1%		4.00
3	Documentation charges		4.00
4	Photographic and Videograph charges		1.00
5	Escalation in rates and variation in estimate quantity		321.15
6	Labour welfare fund		12.19
7	P. S.Charges and Contingencies		101.63
	GROSS TOTAL FOR WRO		4468.99
B	LINE DEPARTMENT COMPONENT		1584.01
	TOTAL PROJECT COST		6053.00

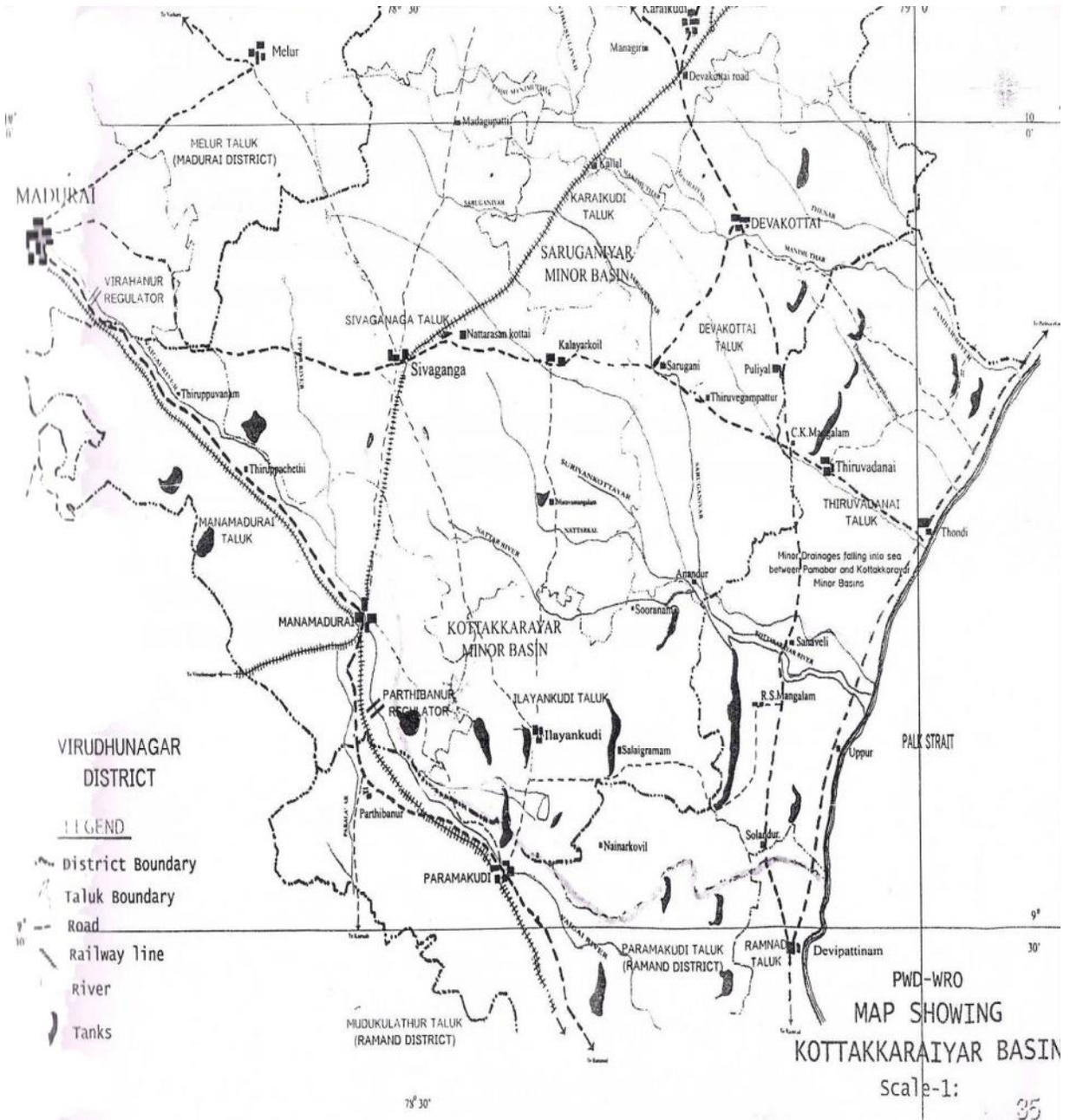
**DETAILED
PROJECT REPORT FOR
IRRIGATED AGRICULTURE
MODERNISATION & WATER
RESOURCES MANAGEMENT
(IAMWARM)
PROJECT
SIVAGANGA DISTRICT
KOTTAKARAIYAR BASIN**

**JOINT DIRECTOR OF AGRICULTURE
SIVAGANGAI**

INDEX

Sl.No.	Content	Page No.
1.	Basin Map	
2.	Introduction	
3.	Existing Agricultural scenario	
4.	Register Ayacut Details	
5.	Cropping pattern for the Basin	
6.	Production and Productivity	
7.	Impact of the project	
8.	Proposed components details	
9.	Component wise proposed expenditure	
10.	Split up details for components	
11.	Proposed increased area details	

MAP SHOWING KOTTAKARAIYAR BASIN



In Sivaganga District the IAMWARM Project is to be implemented in basin namely Kottaikaraiyaru , which consist of

3 Minor basin namely Nattarkal, Nattar river, Subbankal and Nattar supply channel

KOTTAIKARAIYARU BASIN :: 17424 Ha.

The Kottaikaraiyaru basin covers Kalaiyarkoil, Ilayangudi Manamadurai and Sivagangai block in Sivaganga District.

Total Number of tanks : 315
Total area : 17424 Ha.

It has been proposed to develop the area coming under the above basins by various line departments in a phased manner.

Based on the guidelines for the above project, Agriculture Department has proposed to implement the following components for increasing the production and income of the farmers.

I. Existing Agriculture crop Scenario

1. Agriculture Crop & Varieties :
Paddy – Bpt5204, ADT 39, ADT 43, TRY 1,MDU 5
2. Area : 9190 Ha
3. Production : 26081 MT (Rice)
4. Productivity : 4300 Kg/Ha (Paddy) 2838 kg/ha(Rice)

Existing Agriculture practices

Inputs

Seed

High yielding varieties are used which is supplied from Agriculture Department and Private. Seeds supplied from 17% from Department , 40% from Private dealer 43% from seed villages.

Soil Testing

Soil testing Lab, Mobile Soil testing lab and KVK are available for analyzing the samples.

INM and IPM

INM and IPM implemented in paddy and sugarcane crop 20 – 30% of the area covered in ICDP and Sugarcane Development schemes.

Extension

Extension services for the basin by the Department through Agricultural Development officers Agricultural officers Assistant Agricultural officers Extension officers is looking after 800 hectares.

II. Practices

Irrigation

Season	-	Oct-Jan
Source	-	Rain
Quality	-	Good
Irrigation	-	Flood

Pre and Post Harvest

Fifty Percentage area harvest by labours and Fifty percentage by Machineries. Only 10% Storage facilities are available in this Pambar basin.

Labour

At the time of weeding and harvesting major shortage of labour occurs

Agri processing and Factories

Modern rice mills and rice bran oil extraction factories are available.

III. Constraints

a. Problem soil

Patches of saline, alkaline and acid soil exist in scattered manner and accounts for 2-3% of the total ayacut area.

b. Adverse climatic condition

Drought : Mostly the available rain is erratic and the receipt of the north east monsoon decides the fate of the paddy crop.

c. Improper Irrigation

The Ayacut farmers flood the fields which have poor drainage resulting in poor growth and yield of the crops.

d. Inadequate Extension

As there are only limited extension staff of Government , NGO' and KVK are functioning presently. Farmers are not able to meet out the requirement for TOT, input supply and settlement of field problems.

e. Proper adoption of technologies

The awareness among the farmers towards adoption of latest technology is lesser especially IPM/INM and post harvest practices. Training of farmer in this aspect will improve the adoption

f. Limited availability of credit facilities

The availability of credit facility is low, and the farmer repaying capacity is poor due to the failure of monsoons.

IV. Diversification/ Future vision Proposed

In the post project scenario due to increased in the water use efficiency and extended availability paddy will be the predominant crop and diversion to crops like sugarcane, pulses and oil seeds will be very minimum.

V. Challenges thrown up by diversification / Area Expansion

Ensure water availability – after the project, the gap area and partial irrigated area covered into fully irrigated area.

VI. Solution and Recommendation

Soil reclamation

In the basin acid and saline soil are available, there is specific recommendation of lime and gypsum application at 70% cost.

TIP (Technical Input provider)

Agri clinic – provide one or two Agri clinic for the basin.

KOTTAKARAIYAR BASIN

Sl.No.	Name	No. of Tanks	Area Ha.
1.	Kottakaraiyar	315	17424
	Total Ayacut		17424
	Fully irrigated		4988
	Partially irrigated		9434
	Gap		3002

CROPPING PATTERN FOR KOTTAIKARAIYAR

FIRST CROP	
EXISTING	PROPOSED
Paddy (Sep. - Jan.)	Paddy (Sep. - Jan.)
	Maize (Nov. - Jan.)
	Vegetables (Sep. - Jan.)
SECOND CROP	
Pulses (Jan. - Feb.)	Pulses (Jan. - Mar.)
Groundnut (Nov. - Jan.)	Groundnut (Feb. - May.)
Gingelly (Dec. - Jan.)	Gingelly (Jan. - Mar.)

CROPPING PATTERN - KOTTAKARAIYAR BASIN (Area in Ha.)

Crop	Without Project				With Project				Increasing
	FI	PI	GAP	Total	FI	PI	GAP	Total	
Fruit Plan		122		122	212			212	90
Banana	40	20		60	100			100	40
Coconut		100		100	150			150	50
Sugarcane		960		960	1000			1000	40
Fodder		30		30	100			100	70
Total	40	1232		1272	1562			1562	290
Ist season									
Paddy	4948	5714		10662	10662			10662	
Maize		100		100	1000			1000	900
G.nut		300		300	500			500	200
Vegetables		2088		2088	3700			3700	1612
Total	4948	8202		13150	15862			15862	2712
Fallow			3002	3002					
Total	4988	9434	3002	17424	17424			17424	3002
2nd season									
Cotton		600		600		700		700	100
Gingelly		50		50		60		60	10
G.nut		30		30		50		50	20
Pulses		400		400		580		580	180
Vegetables									
Total		1080		1080		1390		1390	310
G.Total	4988	10514	3002	18504	17424	1390		18814	3312
Cropping intensity				89%				108%	

**PRODUCTIVITY AND PRODUCTION OF WITHOUT PROJECT
KOTTAIKARAIYAR BASIN**

Sl.No.	Crop	FI	PI	Total	Productivity per Ha	Total Production (in MT)
First Crop						
1	Paddy	4948	5714	10662	3.195	34065
2	Maize	0	100	100	1	100
3	G.nut	0	300	300	0.99	297
4	Sugrcane 425	0	960	960	87	83520
5	Coconut	0	100	100	0.1597	15.97 lakh nuts
Second Crop						
1	Gingelly	0	50	50	0.318	16
2	G.nut	0	30	30	0.99	30
3	Pulses	0	400	400	0.367	147
4	Cotton	0	600	600	0.2 lint	120 lint

**PRODUCTIVITY AND PRODUCTION OF WITH PROJECT
KOTTAIKARAIYAR BASIN**

Sl.No.	Crop	FI	PI	Total	Productivity per Ha (MT)	Total Production (MT)
First Crop						
1	Paddy	10662	0	10662	4.00	42648
2	Maize	1000	0	1000	1.70	1700
3	G.nut	500	0	500	1.40	700
4	Sugrcane 425	1000	0	1000	105.00	105000
5	Coconut	150	0	150	0.2 lakhs nuts	30 lakh nuts
Second Crop						
1	Gingelly	0	700	700	0.30	210
2	G.nut	0	60	60	0.45	27
3	Pulses	0	50	50	1.40	70
4	Cotton	0	580	580	0.60	348

EXPECTED IMPACT OF THE PROJECT - KOTTAKARAIYAR BASIN

S. No.	Crop	Area			Productivity(Kg / Ha)			Production in Mt			Income of Project in lakhs		
		WOP	WP	INCRS	WOP	WP	INCRS	WOP	WP	INCRS	WOP	WP	INCRS
1	Paddy	10662	10662	0	3195	4000	805	34065	42648	8583	1703.0	2123.0	420
2	Mize	100	1000	900	1000	1700	700	100	1700	1600	6	102	96
3	G.nut	330	550	220	990	1400	450	327	770	443	49	115.5	66.5
4	Gingelly	50	60	10	320	450	130	16	27	11	5.6	9.5	3.9
5	Pulses	400	580	180	367	600	233	147	348	201	44.1	104.4	60
6	Cotton	600	700	100	0.2 Lint	0.3 Lint	0.1 Lint	120 Lint	210 Lint	90 Lint	72.0	126.0	54
7	Sugarcane	960	1000	40	87	105	18.000	83520	105000	21480	888.6	1117.2	228.6
8	Coconut	100	150	50	0.159 L.Nuts	0.2 L.nuts	0.041 L.nuts	15.9 L.nut	30 L.nuts	14.1 L.nuts	55.7	105.0	49.4
9	Horti.crop	2270	4012	1742									
10	Fodder	30	100	70									
11	Fallow	3002	0	0									
	Total	18504	18814	3312							2824	3802.6	978.6

PROPOSED COMPONENTS

1. TECHNOLOGY DEMONSTRATION

After getting the area under fully irrigated the farmer to get higher profit, the technology demonstration laid in the basin adopting high yielding variety of Paddy, Pulses, Maize, Groundnut, seed treatment, biofertilizer, inorganic biofertilizers, Mn mixtures and other essential inputs. The new crop of maize is to be introduced as a focusing crop to the basins for development.

2. DISTRIBUTION OF BIOFERTILIZERS

To reduce the use of inorganic fertilizers, use biofertilizers like Azospirillum and Phosphobacteria to compensate N and P.

3. BUND CROPPING WITH PULSES

To increase the beneficial insects population and get additional income to the farmers.

4. ORGANIC FARMING DEMONSTRATION

To reduce the environmental pollution and increase the beneficial micro organisms to get the sustainable yield. Only Organic fertilizers are used and foliar application of micronutrients.

5. SUPPLY OF MN MIXTURES

To overcome micro nutrient deficiency and to avoid low yield. To reclaimed alkaline saline and acid soils to get more yield.

6. SUSTAINABILITY OF SOIL HEALTH

To sustain the soil health in the project area it is proposed to analyse the status of major and micro nutrient available in the soils of the area with reference to the crops to be cultivated and specific recommendations to

improve the productivity are to be made by issue of soil health cards as a permanent record.

7. EXPOSURE VISITS TO THE FARMERS

With a view to expose the farmers to the latest proven technologies, Exposure visits are proposed to the Agricultural Research Institution and relevant demonstration areas within and outside the state.

8. DOCUMENTATION, PUBLICITY AND PROPOGANDA

To popularize the technologies and the scheme components among the farmers, Hoardings, Banners, Booklets, Phamplets and extension materials are proposed to be utilised in the project area. Scheme orientation campaigns and field days are also proposed to be conducted. All the activities are to be documented with photographs, Videos / CD's and Performance Reports. Hence provision has been requested for documentation and publicity

9. CAPACITY BUILDING FOR TOT

It is proposed to depute the Nodal Officer and Implementing Officer for TOT training in Tamilnadu Agricultural University, Coimbatore and other relevant institutions for capacity building of the officers.

10. CREATION OF TRAINING HALL CUM INPUT STORAGE FACILITIES

Since this scheme involves hundreds of farmers and inputs distribution to thousands of Hectares in phased manner, creation of a place for training and inputs storage for the farmers is considered essential. Hence provision has been requested for a building for every 5000 Ha.

11. PROVISION OF NETWORKING SYSTEMS AND STAFF ON CONSOLIDATED PAY

Since this scheme involves multi various works like Preliminary Survey, Orientation, Selection of beneficiaries, Distribution of inputs, lay out of demonstrations, Collection and Compilation of Data for analysis, interpretation and presentation. Separate staffs on consolidated pay is considered essential for both technical and networking operations. Hence one technical person and one clerical person with computer knowledge are proposed for every basin.

12. PROVISION OF CONVEYANCE FOR EFFECTIVE IMPLEMENTATION AND SUPERVISION

Since this scheme involves heavy outlay and vast area it is considered that for effective implementation and supervision Nodal Officers may be given provision for hiring vehicles on need basis.

COMPONENTS PROPOSED TO KOTTAIKARAIYAR BASIN FOR FIVE YEARS INPUTS DISTRIBUTION AND DEMONSTRATION

Sl. No.	Component and Assistant to farmers	Assistance	Proposed plan for five year			
			Phy (Ha)	Farmer	Govt	Total
1	Paddy tech.dem @Rs5000/Ha-	50%	1000	25	25	50
2	Maize tech.dem @Rs5400/Ha	100%	1000	0	54	54
3	Pulses tech.dem. @Rs 3700/Ha	50%	580	10.73	10.73	21.46
4	Groundnut tech dem @ Rs 6000/Ha	50%	500	15	15	30
5	Biofertiliser Dem @ Rs 150 / ha	50%	1000	0.75	0.75	1.5
6	Organic farming dem.@ Rs10000/No	100%	50	0	5	5
7	Soil health card @ Rs 10 / No	100%	15000	0	1.5	1.5
8	Mn mixer dem.@ Rs 160 / Ha	50%	5000	4	4	8
9	Pulses bund cropping dem @ Rs.200/Ha	50%	2000	2	2	4
	Total			57.48	117.98	175.46

**OTHER COMPONENTS PROPOSED TO KOTTAIKARAIYAR BASIN
FOR FIVE YEARS**

S.NO	Component Details	Assistance in L.Rs
1.	Exposer visit @ Rs 800 per farmer	2
2.	Documentation and publicity	2.5
3.	Capacitybuldind	5
4.	Creation of training hall and storage godown	50
5.	Provision of net working system and staff on consol idated pay	6.5
6.	Provisionof conveyance	2.5
	Total	68.5

ABSTRACT

PROPOSED EXPENDITURE DETAILS

KOTTAKARAIYAR BASIN

Sl. No.	Component Details	I Year	II Year	III Year	IV Year	V Year	Total
1.	Agricultural Inputs distribution & demonstration assistance	35.092	35.092	35.092	35.092	35.092	175.460
2.	Other components expenditure assistance	54.100	3.600	3.600	3.600	3.600	68.500
	Total	89.192	38.692	38.692	38.692	38.692	243.960

ANNEXURE
SPLIT UP DERTAILS FOR COMPONENTS

I	Paddy Technology Demonstration (Ha)	(Norms as per ICDP Rice)
1.	Seeds 50 kgs/ Ha @ Rs. 12.50/ Kg	Rs. 625
2.	Seed Treatment T. Viridi 0.5 kg @ Rs.80/Kg	Rs. 40
3.	Nursery DAP 20 Kgs Rs.10/Kg	Rs. 200
4.	Biofertilizers 25 Nos/Ha @ Rs.6/No.	Rs. 150
5.	BGA 10Kgs/Ha @ Rs. 3/Ha	Rs. 30
6.	Gypsum 500 Kgs/Ha @ Rs. 1/Kg	Rs. 500
7.	MN Mixture 12.5Kgs/Ha @ Rs. 20/Kg	Rs. 250
8.	NPK fertilizers Urca 275 Kgs @ Rs. 5/Kg Super 310 Kgs @ Rs. 3.60 /Kg MOP 85 Kgs @ Rs. 4.70/Kg	Rs. 1375 Rs. 1125 Rs. 400
9.	Azadiractine 2.5 lit/Ha @ Rs. 100/lit	Rs. 250
10.	Pulses seed 3Kg/Ha @ Rs. 50/Kg	Rs. 150
	Total	Rs. 5095
	Limited to	Rs. 5000
II.	Maize Technology Demonstration (Ha)	(Norms as perISOPOM)
1.	Seeds-20Kgs/Ha @ Rs.65.00 /Kg	Rs.1300
2.	Field Application Biocides 2.5 Kg @Rs.80/Kg	Rs. 200
3.	Biofertilizers 25 Nos @ Rs.6/Pocket	Rs.150
4.	MN Mixture 12.5Kg @ Rs.20/Kg	Rs.250
5.	Application of Urea 300 Kgs @ Rs. 5/Kg	Rs.1500
6.	Super 400 Kgs @ Rs. 3.60/Kg	Rs.1450
7.	M.O.P 85 Kgs @ Rs. 4.70 / Kg	Rs. 400
8.	Bund cropping 3 Kg @ Rs 50 /Kg	Rs.150
	Total	Rs.5400

III . Pulses Technology Demonstration (Ha) (Norms as per ISOPOM)

1.	Seeds-20Kgs/Ha @ Rs.30/Kg	Rs. 600
2.	Field Application Biocides 2.5Kg @Rs.80/Kg.	Rs. 200
3.	Biofertilizers 25 Nos @ Rs.6/Pocket	Rs. 150
4.	weedicides @ 1.5 Lit @ Rs. 500/Kg	Rs. 750
5.	MN Mixture 12.5Kg @ Rs.20/Kg	Rs. 250
4.	Application of Urea 55 Kgs @ Rs. 5/Kg	Rs. 275
5.	Super 320Kgs @ Rs. 3.50/Kg	Rs.1125
6.	D.A.P Spraying @Rs. 35/kg	Rs. 350
	Total	Rs.3700

IV. Ground nut Technology Demonstration (Ha) (Norms as per ISOPOM)

1.	Seeds-200Kgs/Ha @ Rs.25/Kg	Rs. 5000
2.	Field Application	
	Biocides 2.5Kg @Rs.80/Kg.	Rs. 200
3.	Biofertilizers 25 Nos @ Rs.6/Pocket	Rs.150
4.	MN Mixture 12.5Kg @ Rs.20/Kg	Rs.250
5.	Application of Gypsum 200 Kgs @ Rs. 1.50/kg	Rs.300
6.	Field days	Rs.100
	Total	Rs.6000

V. Organic Farming Demonstration (Ha) (New technology)

1.	Green Manure Seeds 60Kgs @ Rs.20/Kg	Rs.1200
2.	Azospirillum 25 No @Rs.6/no.	Rs.150
3.	Phosphobacteria 25 No @R6/No	Rs.150
4.	Vermicompost 2 MT @ Rs.4.25/kg	Rs.8500
	Total	Rs.10000

VI. Distribution of Bio Fertilizers (Norms as per ISOPOM)

1.	Bio Fertilizers 25Nos./Ha @ Rs.6	Rs.150
----	----------------------------------	--------

VII. Bund Cropping with Pulses

1. Seeds 5Kg/Ha @ Rs.40/Kg	Rs.200
Total	Rs.200

VIII. Supply Of MN Mixture

(Norms as per ICDP(Rice)
& ISOPOM)

MN Mixture 12.5Kg/Ha @ Rs.12.80	Rs.160/-
---------------------------------	----------

IX. Soil Health Cards

Analysis of Macro and Micro Nutrients Status of Rs.10/Sample

X. Exposure Visit

(Norms as per RSVY Scheme)

Visit to Research Station for 2 days (50 farmers/batch) Rs.40 000

50 farmers @ Rs.800/Farmer

(Including Transport Charges, Accommodation, Food, Honorarium and Documentation)

XI. Documentation and Publicity

1. Hording including eraction charges	Rs.5000
2. Documendation	
a. Preparation of Project report	Rs.3000
b. Photo/Video	Rs.5000
c. Leaflets/Phamplets/Booklets/Field Label	Rs.12000
d. Orientation Campaings 100 Farmers/Batch Rs.2500/batch (5 batches x 2500= 12500)	Rs.12500
e. Conduct of field days for 100 farmers/batch Rs.2500/batch (5 batches x 2500 = 12500)	Rs.12500
Total	Rs. 50000

XIV. Capacity building for officers.

Imparting technical and managerial training to implementing officers in institute like MANAGE, NPPTI, etc
@Rs.10000/officer Rs.10000

XV. Creation of Training Hall and Input Storage facilities.

1 No. for every 5000 Ha. Rs.10 lakhs.

XVI. Provision of Networking systems and staff on consolidated pay.

i. Purchase of computer with accessories

@ 1 No. per basin Rs.50000.

ii. Appointment of technical staff @Rs.6000/month

& clerical staff @ Rs.4000/pm Rs.12000/year/block

XVII. Provision of conveyance for implementation and supervision

- 50 km average per visit Rs.50000/year

AGRICULTURAL ENGINEERING DEPARTMENT

DETAILED PROJECT REPORT ON IRRIGATED AGRICULTURE MODERNIZATION
AND WATER RESOURCES MANAGEMENT IN KOTTAKARAIYARU SUB-BASIN IN
SIVAGANGA DISTRICT

Location of the area

The Kottakaraiyaru sub-basin is located in between 78 23' 43" E to 79 1' 12.5" E longitude and 9 29' 20" N to 10 2' 56" N latitude, and it is spread over a total area of 2232.06 Sq.km and Contained in the districts of Madurai Sivaganga and Ramanathapuram. The basin is drained by Koluvar, Pambar and Kottakaraiyaru. Kottakaraiyaru formed by the junction of two rivers Nattar and Saruganiaru. Its drains into Rajasingamangalam tank and falls into palk bay at south of Thondi at Pudukadu.

Kottakaraiyaru sub basin is a wide and old system and comprises of flood carries such as Vaigai and R.S.Mangalm system tanks, Nattarkal, Subbankal, Nattarr iver, Nattar supply channel.

Ayacut Details

- (i) System Tanks - 85 : 6183.38.0 Ha
- (ii) Non system Tanks (PWD) - 230 : 11240.62.0 Ha

The total ayacut under the Sub Basin - 315 : 17424.00. 0 Ha.

Existing Ayacut Scenario:

Total Registered Ayacut in Ha	17424.00.0
Total Irrigated Area in Ha	14422.00.0
Fully Irrigated	4988.00.0
Partially Irrigated	9434.00.0
Average cultivation	14422.00.0
Gap	3002.00.0

Land Use Pattern

The classification of land use pattern in the Kottakaraiyaru sub basin is detailed below

SI No	Description	Area (Ha)	Percentage
1.	Total of basin	223208	100.00
2.	Forest	6625	2.97
3.	Barren uncultivable land	3126	1.40
4.	Land put to non-agri. Use	53315	23.90
5.	Cultivable waste	6035	2.70
6.	Permanent pasture	364	0.16
7.	Misc. trees in hot sown area	4853	2.17
8.	Current fallow	20640	9.25
9.	Other fallow lands	46190	20.69
10.	Net sown area	82038	36.76

Water Users Association – Details

Total Command Area	: 17424.00.0 Ha
Number of WUAs Existing	: 10 Nos.
Number of WUAs Proposed	: 53 Nos.

I Existing Agricultural Crop Scenario

Agriculture crop and varieties

In Kottakaraiyaru sub basin area, paddy is the major crop raised by the farm ers. Short duration crop variety is raised due to shortage of water. Followed by the paddy other crops such as Chillies, cotton, sugarcane, pulses, maize and vegetables are raised by the farmers.

Area of Major crop grown

Sl. No	Crop	Area (Hec) (I Crop)	Area (Hec) (II Crop)	Total Area (Hec)
1.	Paddy	11860		11860
2.	Maize	100		100
3.	Groundnut	500	30	530
4.	Coconut	100		100
5.	Sugarcane	960		960
6.	Fruit plants	207		207
7.	Vegetables	2365		2365
8.	Fodder	30		30
9.	Pulses	---	400	400
10.	Cotton	---	600	600
11.	Gingelly	---	50	50
		16122	1080	17202

3. Production

Traditional practice of raising the paddy is by direct sowing method. Hence the production is considerably less.

4. Productivity

The Productivity of sub basin area is an average of 3 ton / Hectare.

II Existing Farm Practices

1. Soil

a. Type of soil

Based on the survey conducted by the soil survey and land use organization of Tamil Nadu agriculture department indicates five different type of soil lies in the basin are red soil, black soil, laterite soil, river alluvium, coastal alluvium.

Sl. No	Taluk	Red Soil	Black Soil	Laterite Soil	River Alluvium	Coastal Alluvium
1.	Sivaganga	72 %	-	28%	-	-
2.	Manamadurai	82%	-	18%	-	-
3.	Ilayankudi	-	90%	-	10%	-
4.	Thiruvadana	3%	3%	3%	52%	45%
5.	Paramakudi	-	-	-	88%	7%
6.	Ramanathapuram	-	-	-	-	100%

b. Problem Soil

Some areas in the river basin are affected by the salinity and alkalinity. In major area, the PH value of the soil is neutral so that the reclamation is not required for cultivation of crops. In the affected area, treatment of soil is carried out with the aid of central government scheme.

2 Water

A. Irrigation Practices

Flood Irrigation

- i. Furrow Irrigation: Furrow Irrigation area is only 1418 Hec which is very less compared to the total area of the basin. Only sugarcane areas are irrigated by furrow irrigation.
- ii. Saucer irrigation: In garden lands the cultivation of coconut is practiced by Soucer irrigation in the river basin.
- iii Bed irrigation : As the crops like paddy ,coconut are cultivated in the most of the area is under bed irrigation by the farmers.

b. Micro irrigation

Sprinkler and drip irrigation has not been widely used by the farmers because of the cost constraint and in-adequate knowledge of the farmers about the micro irrigation

3. Land holding pattern

Land holding pattern of this sub basin is furnished below

Farmers Category	Size of holdings	Numbers	Percentage
Marginal	Below 1.00 Ha	5672	62.8 %
Small	1.00 – 2.00 Ha	2475	27.4 %
Medium	2.00 – 5.00 Ha	596	6.6 %
Big	5.0 ha & above	289	3.2 %
Total		9032	100 %

4. Level of Mechanization:

The preparatory cultivation is being done by the tractors for wet ploughing. The Level of mechanization in respect of transplanting, sowing, inter cultivation is very poor. Besides, there is shortage of farm labor due to their mobilization to industries like textiles and so farm mechanization is must for this sub-basin area. There is no awareness among the farmers regarding usage of agricultural machinery such as paddy transplanter, seed drills, weeder etc. In respect of plant protection, the farmers use knapsack and power sprayers. For harvesting, the farmers are using combine harvester due to acute labour problems. The farmers are unaware of reapers, multi crop thrashers etc. The farmers do not have sufficient thrashing floors and drying yards for post harvesting operations .

5. Labour

In this sub basin area, Agriculture is the main activity of the people. More than 90% of the landowners are small (or) marginal farmers. Among the landless labourers women are major roll but their income is very low. Most of them are living below the poverty line. During the non-agriculture seasons the labours generate their income by getting employment in brick chambers and other non -agricultural activities.

6. Ground realities

Fertilizers and other implements available only in near by towns like Ilayankudi, Paramkudi, Kalayarkovil . The harvested products are also taken to the ne ar by towns which are located at least 15 km away from the harvested area.

III Constraints

(a) In Kottakaraiyaru sub basin ayacut only, field -to-field irrigation is practiced

(b) There is no controlled flow due to uneven gradient of channels ; travel time for water to reach the tail end is more resulting heavy percolation losses and scarcity in the tail end of the ayacut especially during the critical period of crop growth.

(c) Besides the lack of equity in distribution of water between h ead reaches farmers and tail end farmers leads to conflicts.

(d) This results in the reduction in production

(e) Apart from that, the excess rainwater runoff received during the monsoon periods goes as waste. Is water could not be stored and used as supplementary irrigation during the critical period of crop grown

(f) The rein fed tanks and non-system tanks under the control of the WRO and Panchayat union, are facing huge water scarcity even in the monsoon season. Always crop gets less water in the flowering stages.

(g) Conservation of water is also main challenge

(h) Fragmented land holding

(i) Low level of mechanization

IV Diversions / Future Vision Proposed

1. In the post project scenario water saving technologies and crop patterns will be synchronized.

2. Maximize the profitability per unit of water consumed ie, agriculture, animal husbandry and fisheries all will be cared of in an integrated approach.

V Challenges thrown up by diversification / area expansion

1. Devising local specific water savings technologies and TOT
2. Consolidation of fragmented land holdings through water users association
3. Assuring supply of water at 3R (Right quantity, Right time and Right places)
1. Introduction of micro irrigation system for the areas under Agri /Horticulture crops proposed by the respective departments.

VI Solutions and recommendations

1. Water users associations should be strengthened with the coordinate of line departments .
2. The water users associations should be trained and educated in adopting efficient water usage concept.
3. Suitable cropping pattern should be evolved based on the available water as proposed by Agriculture department.

4. With the objective of collecting the excess water received during the monsoon period and for preventing water logging in the low-lying area at the tail end of the command, farm ponds are proposed. The stored water may be pumped and utilized as supplementary source of irrigation at the time of critical periods of crop growth.

5. Farmers should be trained and educated on the benefits of consolidation of land holdings.

6. The farmers in non-system and rain fed tanks under WRO and are suffering for want of irrigation water during the time of land preparation and during the maturity stage of grain formation. Community bore wells are proposed in those areas where plenty of ground water is available, to enable conjunctive use of ground water and surface water.

7. Micro irrigation system has been implemented wherever necessary to avoid conveyance loss and improves the productivity. Under this component no budget provision is made, since this can be implemented through centrally sponsored scheme and National Horticulture Mission, which are in force now.

DETAILS OF DEVELOPMENT COMPONENTS PROPOSED:

I MICRO IRRIGATION

A. DRIP IRRIGATION SYSTEM

Agricultural Department has proposed planting Coconuts for an additional area of 50 ha. in addition with existing area of 100 Ha. An extent of 80 Ha is already covered under centrally sponsored micro irrigation scheme. Hence it is proposed to lay Drip irrigation system for 70 ha within a span of 5 years.

Horticulture Department has proposed to cover an area of 115 Ha under fruit tree plantation such as Mango, Sapota, Amla, and Guava in addition with existing fruit tree area of 147 ha. It is proposed to lay drip irrigation system for 132 Ha. and it is also proposed an extent of 500 Ha to lay drip irrigation system for sugar cane and 100 Ha for Banana.

B.SPRINKLER IRRIGATION SYSTEM

Sprinkler irrigation is proposed to 200 Ha in Groundnut crop area in additional to 40 Ha area already covered under centrally sponsored micro irrigation scheme.

Horticulture Department has proposed 587 Ha under Vegetable cultivation in addition with existing vegetable cultivation area of 2365 Ha. It is proposed to provide the Sprinkler Irrigation system to an extent of 1110 Ha.

II. PVC BURIED PIPE LINES WITH BORE WELL AND SUMP:

To facilitate the conjunctive use of ground water and augment surface water resource, PVC buried pipe lines are proposed to connect Bore wells and Sumps in order to convey the water for the irrigation of Gap area. Bore wells sumps and pipe lining works are proposed under this item of work as demo in Periyakiluvachi tank and Sengulam tank to an extent of 117.71 Ha

III. PRECISION FARMING:

Precision Farming is a farm practice, in which all inputs such as water, seed, nutrients, plant production chemicals, and other production technologies are supplied in optimum quantity at right time in right manner to get the highest possible yield. Fertigation is a system wherein application of plant nutrients to a crop is done through Drip irrigation, resulting 25% savings of fertilizers usage ensuring complete uptake of applied fertilizer by the plant as reported by TNAU.

In Kottakaraiyaru basin 100 Ha area in ten tanks are selected for precision farming on demo basis in Ilayankudi, Manamadurai and Sivagangai taluks.

IV. FARM MECHANISATION:

To promote and demonstrate the farm mechanization among the farmers, the labour and time saving agricultural machinery and implements shall be distributed to the Water Users' Associations (WUA) (100% funding) to attain more farm productivity. These implements shall be hired out to the beneficiaries by the WUA and hire charges will be prescribed by the WUA. The collected hire charges will be utilized for maintenance mechanism.

Tractor drawn Rotovators are proposed for pulverizing the soil clods and crop remains especially sugarcane stubbles. Post Hole Diggers would be utilized for Sugarcane under pit method. Power Weeders would be useful for paddy & irrigated dry crops and hence proposed. Seed Drills, for cotton, maize, pulses, are proposed.

It is proposed to give 95 nos. of farm machineries to WUA and with these, the farm operations shall be effectively carried out by the farmers without excess dependence on labor force.

V. FARM PONDS

The Farm Ponds are ideal water harvesting structures, proposed in tail end areas of the ayacut area. The drained water and surplus irrigation water shall be stored in the Farm Ponds during monsoon seasons. Unexpected heavy run off received during summer seasons shall also be harvested in these Farm Ponds. During the critical stage of crops (before harvesting stage) when irrigation water could not be extended, the water stored in Farm Ponds shall be utilized as life saving irrigation. This will give assured yield of crops for the farmers.

The Farm Ponds are constructed in the dimension of 30M X 30M X 1.50M and the capacity of farm pond would be 1350 Cubic meters. With the help of 13.50 lakhs liters of water, an extent of 2.7 hectares under dry irrigated crops like maize, millets, pulses shall be given life saving irrigation. The Farm Ponds will have 4 to 6 fillings of rainwater during one year period due to all monsoonal rains.

Besides, the Farm Ponds shall act as Fish ponds for Fish culture giving additional income to the farmers of the tail end. About 140 nos. of Farm Ponds are proposed. The Farmers who opted for Farm Ponds would be motivated for adopting Drip / Sprinkler irrigation for raising their crops.

No	Constraints and Challenges	Counter measures
1.	Un regulated irrigation practice followed time, frequency and season.	Farmers association should be formed, strengthened and registered.
2.	The excess rain water received during the monsoon periods goes as waste as runoff which could be rather harvested and used as supplementary irrigation during the critical period of crop growth.	With the objective of collecting the excess water received during the monsoon period and storing it at the low lying area at the tail end of the command, farm ponds are proposed. This stored water would be pumped and utilized as supplementary irrigation at times of critical periods of crop growth. These farm ponds can also be used for rearing fish culture as value addition and income generation for farmers. Farmers are willing to offer their land for constructing farm pond.
3.	Conservation of water is also the main challenge.	In micro irrigation system is to bring water directly to the root zone of the crop thus reducing the wastage of water due to flood irrigation. Hence the water thus saved could be used for irrigating more extent, which results in increased production and productivity. Under this micro irrigation, drip and sprinkler irrigation systems would be installed for orchard crops, vegetables, flowers etc., More over precision farming and pvc buried pipe lining is proposed as demo basis
4.	This basin area mainly depends on monsoon rain only. If the rain failure or rainfall is lower than average rain fall, the farmers facing major problems for cultivation particularly in rain fed area and non system tanks has been suffered due to non availability of assured water. Hence the farmers loss the confident in cultivation and migrate to the other region as a labour. Less production and poverty is increased due to the non-availability of assured water.	Over come this problem, where ever frequent failure of crop area due to the non availability of sufficient water, the community bore well is proposed with the consultation of farmers association and the water diviner, the bore well location is furnished. From this community bore well early nursing; uniform cultivation, alternative crops and micro irrigation scheme would be implemented. Assured water, confident of raising the crops has been attained from this community bore well by the farmers.

GENERAL ABSTRACT

Project Area :17424 Ha.

Sl No	CROP	Unit	Unit Cost in Rs	Proposed by AED	
				Area	Amount in Lakhs
1	MICRO IRRIGATION				
a)	Drip Irrigation				
	Coconut (8 m x 8 m Spacing)	Ha.	22900	70.000	16.03
	Mango (10 m x 10 m spacing)	Ha.	21000	50.000	10.50
	Sapota (8 m x 8 m spacing)	Ha.	22900	30.000	6.87
	Amla (6m x 6m spacing)	Ha.	33200	40.000	13.28
	Guava (6m x 6m spacing)	Ha.	33200	12.000	3.98
	Banana (2 m X 2 m Spacing)	Ha.	52800	85.000	44.88
	Sugar cane(1.5m X1.5m Spacing)	Ha.	58000	500.000	290.00
b)	Sprinkler Irrigation				
	Groundnut	Ha.	15000	200.000	30.00
	Bhendi	Ha.	15000	200.000	30.00
	Brinjal	Ha.	15000	160.000	24.00
	Chillies	Ha.	15000	600.000	90.00
	Tomoto	Ha.	15000	50.000	7.50
				1210.000	181.50
	Total for Micro Irrigation			1997.000	567.04
II	PRECISION FARMING				
	Vegetables(Chillies)	Ha	75000	100.000	75.00
				100.000	75.00
III	PVC Burried pipe laying for water conveyance and micro irrigation with bore well				
	Preriyakiluvachi tank	Ha		53.620	8.96
	Sengulam tank	Ha		64.090	9.80
				117.710	18.76
IV	Farm mechanisation with advanced user friendly implements				
	Rotavator	Nos	90000	25	22.50
	Post hole digger	Nos	90000	10	9.00
	Tractor drawn groundnut harvester	Nos	40000	10	4.00
	Seedrill for Groundnut and Maize	Nos	35000	15	5.25
	Maize husker cum sheller	Nos	90000	10	9.00
	Power weeder attachment for tractor	Nos	75000	15	11.25
	Solar poly house tunnel type chillie drier	Nos	150000	10	15.00
				95	76.00
V	Water Harvesting Structures				
	Farm Pond	No	40000	140	56.00
	Grand Total				792.80

BENEFITS ANTICIPATED:

The following benefits will be derived from ayacut area development works under IAMWARM project:

1. Improved irrigation efficiency resulting in enhanced farm productivity per unit of irrigation water.
2. The Gap area is bridged.
3. Sustained farm income to the farming community.
4. The farm productivity per unit area is increased.
5. Increase in cropping intensity.
6. Improvement in socio-economic status of the farmers.

CONTRIBUTION BY THE BENEFICIARIES:

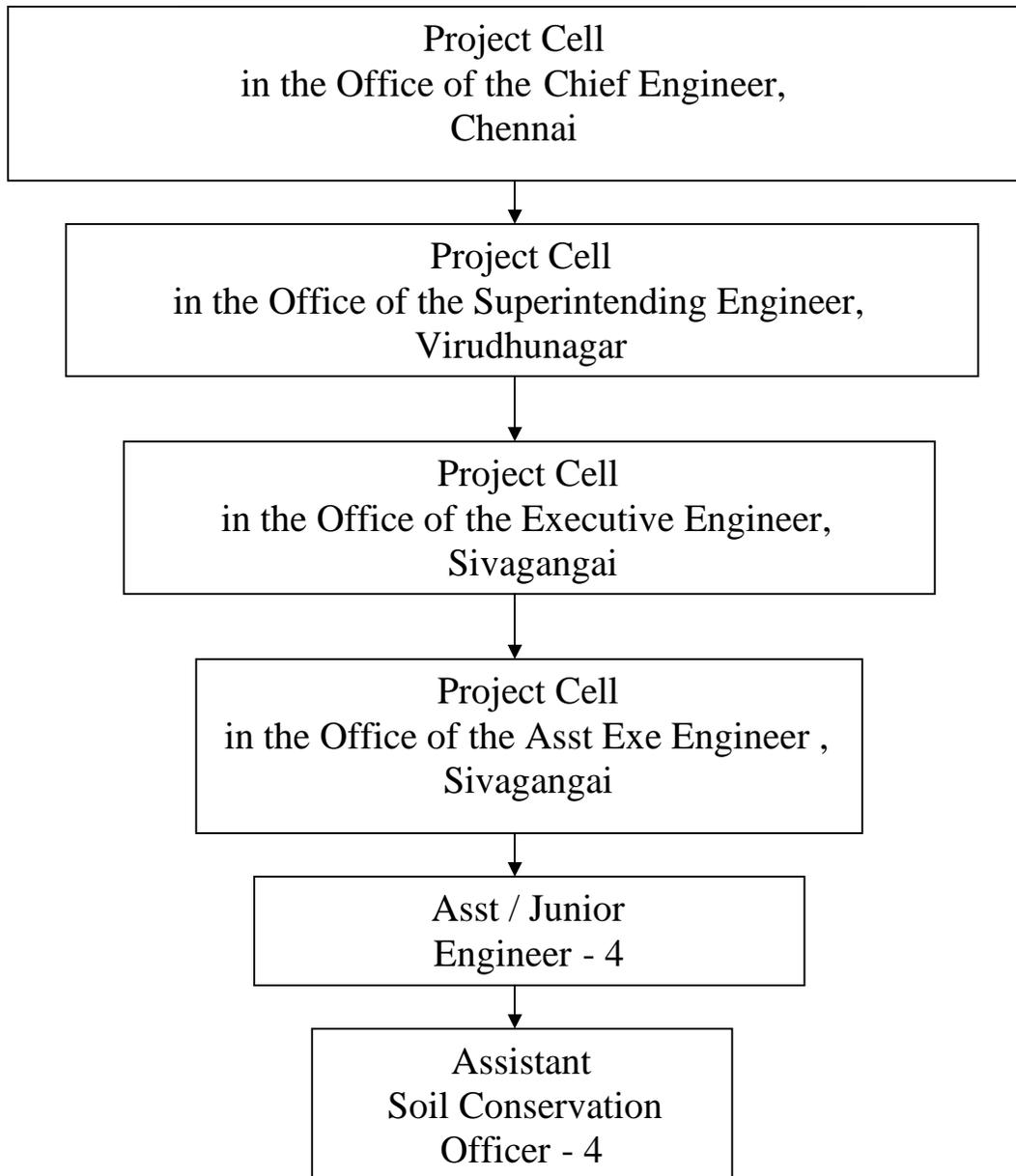
The beneficiaries are motivated to contribute for the works component proposed for their effective participation in the project. The work components like Micro Irrigation System implementation are individual oriented benefit schemes and so it was insisted to contribute 50% contribution during WUA / Farmers' meeting. But, the farmers expressed that they could only contribute 10% of the total cost in view of their socio economic status and 5% in the case of SC/ST farmers. Hence, the beneficiary contribution may be fixed as 10%. In respect of common benefited/community oriented works such as Bore wells with energisation, 10% contributions shall be collected as beneficiaries' contribution which is appraised with the ayacut farmers during WUA meeting.

IMPLEMENTATION STRATEGY:

The Project Cell for IAMWARM project has been created in the office of Chief Engineer (AE), Chennai-35 comprising Superintending Engineer (AE), Executive Engineer (AE), Asst. Executive Engineers (AE) and Assistant Engineers (AE) to formulate project proposals, to carry out procurement plans, to co-ordinate with the line departments and to monitor the performance of the district level officers.

The District level Project Cell for IAMWARM project has been formed comprising the Executive Engineer (AE), Asst. Executive Engineers (AE) and Asst. Engineers (AE) to finalize the DPR, to co-ordinate with the district level line departments and to monitor the performance of the field personnel.

The Flow Chart showing the HR Pattern and the sanctioned strength of the available field personnel for implementation of IAMWARM project is furnished below:



MODE OF IMPLEMENTATION

The Work components viz. Community Bore Wells along with the buried PVC Pipe Lines and Farm Ponds shall be executed through the concerned Beneficiaries / WUA .

In respect of Farm Mechanization, the farm implements will be procured by the Agricultural Engineering Department from the approved suppliers and distributed to the concerned WUA.

The Work Components viz. Micro Irrigation System Installation and Precision Farming will be executed by National Shopping, adopting procurement procedures.

The table showing the year wise split up action plan for all work components is enclosed in annexure.

MODE OF REVIEW AND SYSTEM OF REPORTING PROGRESS OF WORK

Executive Engineer (AE) Sivagangai will review Asst Executive Engineers' once in a fortnight and submit the fortnight progress report to Chief Engineer.

Chief Engineers reviews Executive Engineers in every month to review the progress and submit the review report to the Project Director, MDPU every month.

OUTCOME INDICATORS:

1. The Crop Diversification and crop intensity in post project period due to installation of Drip & Sprinkler Irrigation systems in the extent of 1997 Ha.
2. Increased area under Hi-Tech Irrigation like Drip and Sprinkler Irrigation.
3. Precision Farming practices in an extent of 100 Ha. for increased income.
4. Increased Farm Productivity per unit area and unit of irrigation water
5. Irrigated Agriculture in gap area.
6. Increase in irrigation efficiency by way of laying with PVC Buried pipe lines
7. Supplement income generation by diversified farm activities through fisheries (from farm ponds), Increase in per capita income.

IRRIGATED AGRICULTURE MODERNIZATION AND WATER
RESOURCES MANAGEMENT PROJECT

Kottaikariyar - Sub-Basin

I AMWARM

PROPOSAL

SIVAGANGA DISTRICT

Assistant Director of Horticulture,

Devakottai

HORTICULTURE
WORLD BANK MULTI DISCIPLINARY IRRIGATED AGRICULTURE
MODERNIZATION AND WATER RESOURCES MANAGEMENT PROJECT

I AM – WARM

Sub basin : Kottaikariyur
District : Devakottai
WRO Region : Karaikudi
Blocks Covered : Sivagangai, Ilayangudi, R.S.mangalam, Kalayarkovil.

I. Existing Horticulture Crop Scenario

The following horticulture crops are grown in the sub basin.

S.No.	Crop	Varieties	Area(in Ha)	Production (in M.T.)/ha	Productivity (in M.T.)/ha
A.	Fruits				
1.	Banana	Local (Poovan)	78	2450	31.5
B.	Vegetables				
1.	Tomato , Bhendi, Brinjal, Gourds	PKM1, Tomato Arka Anamika, Bhendi, MDU1 Brinjal, Gourds,	52	1090	21
2.	Chillies	K1,K2, PKM1,	20	30.40	1.5
	Total		150	3570.4	

II. Existing Horticulture Practices:

Existing cropping pattern and Season :

1. Banana - June-July to May- June
2. Vegetables - June to September - (Adipattam)
3. Fruits - July- Dec

Proposed Generic Cropping Pattern:

1. Banana - January – December.
2. Vegetables - September – January.
3. Vegetables - February – May.

Existing Irrigation Potential:

Out of the registered Ayacut area of 11185 Ha. the present irrigation potential is

Fully Irrigated	6031 Ha
Partially Irrigated	596 Ha
Gap	5559 HA

	11185 Ha

Proposed Irrigation Facilities:

Out of 850 Ha. under Horticulture Crops, an area of 719 Ha. is proposed to cover micro irrigation with Fertigation by the Agricultural Engineering Department (vide page number -)

INM & IPM :

None of the farmers adopting INM but few farmers are adopting IPM in pre project.

It is proposed to adopt INM in 130Ha. under fruits and 1350 Ha. vegetables.

1. Inputs:**a. Seeds:**

Certified seeds and seeds of traditional varieties of vegetables are used by farmers at present. Many farmers use their own seeds and also exchange seeds among themselves. Few innovative farmers get the required seeds from the near by TNAU research stations, KVKs and private sources also.

It is proposed to procure Planting materials from the Government farms, Horticulture Research station. The Hybrid Seeds are available from the private sources and it will be procured and supplied to the farmers and under Tender acts.

b. Soil :

In Kottakaraiyar sub-basin mostly the soil is alluvial clay, sandy loam and black soils with PH- ranging from 7 to 8.9. Soil is tested by soil testing laboratory at Kudumianmalai. Few farmers are practicing the STL recommendation and mobile soil laboratory at Kudumianmalai. The climate is mainly tropical in nature with the temperature ranges from 28 to 39 °c and relative humidity ranging from 72 to 90%.

In view of the large number of soils samples proposed to be covered in the proposed intensive cropping pattern, private sources like Agri Clinic, Spic, MFL services etc also will be utilized for testing.

c. Prevalence of Organic farming :

Organic farming is practiced by few farmers, less than 50 Ha.

It is proposed to cover 800 Ha. under Organic farming in chillies.

d. Actual extension service available for TOT - Government / Private.

Available extension officers - Horticulture Officer, Sivagangai -1No
- Horticulture Officer,Paramakkudi -1No

Assistant Agriculture Officer

1) Sivagangai block - 2nos
2) Paramkkudi block - 2nos
3) Ilaiyangudi block - 2nos
4) Kalaiyarkoil block - 2 nos
5) R.S. Mangalam - 2 nos

Available extension officers and extension service to the farmers are inadequate. Apart from this NGOs providing extension service to the farmers.

Name of the NGO's :

Place

1) ASSEFA Sivagangai
2) REEDA Sivagangai
3) REDS Kalaiyarkoil

For transfer of latest farming techniques, many extension methods are being adopted. Besides distribution of inputs, required technical advice essential for the increased productivity are also given to the farmers. As per the Training and Visit program norms, there must be one Village Extension Worker (VEW) for every 800 to 1000 farm families. But such norms are not followed in reality due to vacancies at all levels of extension staff.

In view of the above, it is proposed to out source Technical Input Provider for 840 man months for 5 years according to the existing policy..

2. Practices - Ground realities :

a. Irrigation :

Irrigation is by open well and borewell. Mostly farmers are using ridges and furrow irrigation system. Only 20% of the farmers are using drip irrigation. Mainly farmers are raising fruit crops under rainfed condition.

b. Micro irrigation :

There is lot of scope for developing Orchards in this sub -basin area by introducing Micro irrigation system.

Drip and sprinkler irrigation are proposed during the current year.

Out of 2390 Ha. under Horticulture Crops, an area of 1130 Ha. is proposed to cover micro irrigation with Fertigation by the Agricultural Engineering Department (vide page number -)

S.No	Crop	Area Proposed to Cover Under Drip Irrigation
A.	Fruits plants	
1.	Mango	50
2.	Sapota	30
3.	Amla	40
B.	Vegetables crops	
1	Bhendi	200
2	Brinjal	160
3	Tomato	50
C.	Spices	
1.	Chillies	600
Total		1130

c. Fertigation :

Farmers apply fertilizers directly. Awareness on Fertigation among the farmers is inadequate.

It is proposed to adopt INM in 130 Ha. under fruits

d. Contract farming :

Contract farming is not practiced in command area. Farmers are reluctant to adopt contract farming practice due to fluctuation in produce prices and for want of legal guarantee. However steps are being taken to convince to the farmers to take up contract farming atleast for commercial crops, to start with.

e. Pre & Post harvest practices adopted :

Chillies – Stalk less chillies are sun dried and exported. Oleoresin from chillies also extracted and exported some quantity is stored in cold storage at Virudhunagar.

f. Labour issues :

Availability of labour is very scarce.

3. Agri - Processing - Factories, Capacity, etc.

No processing facilities in this District. Establishing processing industries in cashew and juice making factories will facilitate in the growers to get more income from the produce.

III. Constraints :

1. Constraints in Existing Scenario :

a. Soil :

- 1) Soil PH is slightly alkaline in about 1% of the area.
- 2) Less humus content

To overcome the problem soil, addition of organic matter has to be done based on soil test reports. Green manuring composting and application of Farm Yard Manure have to be increased.

b. Adverse climatic condition :

These blocks are drought prone. Rainfall is not distributed uniformly through out the year. Maximum rainfall is received during South West monsoon. Drought resistant crops like Mango and Guava are suggested in this sub -basin.

c. Inferior quality of seed and planting material :

Farmers are using local and poor quality seeds. Truthful seeds are used by very few farmers.

Quality planting materials are supplied through Department of Horticulture. There are two State Horticulture farms at Devakkottai and Nemam to supply the planting materials.

SL.NO	CROP	PRODUCTION CAPACITY		TOTAL PRODUCTION	TOTAL REQUIRMENT FOR THE SUB BASIN
		SHF Devakkottai	SHF Nemam		
1	MANGO	20000	10000	30000	3000
2	Sapota	15000	5000	20000	4800
2	Amla	20000	10000	35000	8250

The Hybrid Seeds are available from the private sources and it will be procured and supply to the farmers and under Tender acts.

d. Limited planting material available from government sources :

Required quantity of seeds is not available with department of Horticulture. Seeds are supplied to the farmers by department after procuring the Hybrid Seeds through tender system.

e. Improper varieties :

Traditional varieties of vegetables are adopted by majority of the farmers. In some cases varieties of fruit plants were not true to type, hence purchased from vendors of unknown sources.

f. Improper irrigation practices(Ridges and Furrows, Basin irrigation)

Ridges and Furrows system is followed for Vegetables and Basin irrigation is followed for Fruits. Drip irrigation is going to be introduced by the Agriculture Engineering Department for 1130 Ha.

g. Inadequate extension service :

Available extension officers to provide extension service to the farmers are inadequate. Apart from this, NGOs provide extension service to the farmers. More extension personnel are required.

Only 2 Horticultural Officers for Sivaganiga and Paramakkudi, Taluks and 8 Assistant Agriculture Officers are available in four Blocks. They are not sufficient even for the ongoing schemes of the Horticulture Department.

Hence to cater the need of Technical Input Providers for Ilaiyangudi Kalaiarkoil, R.S.Mangalam Sivagangai, blocks. It is proposed to hire TIP for 840 man months for 5 years.

h. Low price for produce :

There is price fluctuation for fruits and vegetables due to unorganized marketing and inadequate storage facilities, Middleman are taking the major portion of the profit of the farmers. Farmers are cultivating same vegetables in a particular season year after year. So produce arrival to the market is heavy during particular season every year leading to low price.

The staggered planting methods recommended to the farmers will maintain price fall in Vegetables especially during peak period of harvest. It is recommended to plant early and late season varieties.

i. Poor adoption of Pre & Post harvest technologies :

Farmers are not following pre and post harvest technologies, this needs more attention.

1. Banana

- The farmers are not following pre harvest technologies to overcome the problem of seeds in Poovan variety.
- Bunch covering
- Removal of male flowers
- Fruit ripening
- Grading

2. Chillies

- To prevent fruit drop spraying of NAA
- Conventional sun drying
- Inadequate of storage facilities
- Lack of processing units

3. All fruits and vegetables

- Grading
- Processing
- Packing
- Refrigerated vans for transport

Awareness should be created among the farmers in pre and post harvest techniques by giving training to the farmers.

j. Limited availability of Credit facilities :

Credit facilities are available through primary Agriculture Cooperative Banks and Nationalized banks. However to avail these facilities many formalities has to be gone through. Hence simplification of procedure and single window system is essential.

k. Risk aversion

Few farmers have the knowledge of Risk aversion. However many farmers have poor knowledge on this, due to non visit to Horticulture depots and Departmental officers often. Due to lack training, lack of capacity building, etc awareness of the new technologies in cultivation of crops and price trend of the produces at various levels are low.

l. Limited processing units :

Processing units available is limited in the sub-basin. Required type of processing unit for the required crop is not available.

m. Availability of labour

Labour availability is in decreasing trend for agriculture works, due to availability of non agricultural works which pays more wages to the labours.

IV. Diversification / Future vision proposed :

S.No.	Components	Physical target in Hectares						Product ion MT	Productivity MT	
		I Year	II Year	III Year	IV Year	V Year	Total		EXIS TING	PROPO SED
I.	AREA EXPANSION									
A.	Fruits plants									
1.	mango	30			-	-	30	240	6	8
2.	Sapota	30			-	-	30	750	20	25
3.	Amla	30					30	750	20	25
4.	TC Banana		40				40	240	30	60
	Total	90	40				130			
B.	Vegetables crops									
1.	Hybrid tomato	25	25	25	-	-	75	3000	20	40
2.	Hybrid Bhendi	70	115	115			300	7500	15	25
3.	Chillies	200	300	300			800	1200	0.5	1.5
4.	Brinjal	50	50	50			150	3000	12.0	20.0
5.	Water melon	5	10	10			25	375	8	15.0
	Total	350	500	500			1350			
	GRAND TOTAL	440	540	500			1480			

Kotakaraiyar sub-basin , Sivagangai.
Places of Diversification of crops are furnished as follows

Sl. No.	Crops	Area increased in ha during W.P.	Places of diversification
I	Fruits.		
1.	Mango(Alphonsa)	30	S.Pudur, Sakkottai, Singampunari, R.s. Mangalam
2.	Sapota (PKM-1 &PKM2)	30	Thirupathur, Sivagangai, Devakkottai, Sakkottai,
3	Amla (Kanchan, Krishan)	30	Thirupathur, Sivagangai, Devakkottai, Sakkottai,
3.	T.C. Banana(G.9)	40	Kalaiyarkoil, Ilaiyankudi, Sakkottai,
II.	Vegetables		
1.	Tomato(Ruchi,& suruchi)	75	S.Pudur, Kalaiyarkoil, Ilaiyankudi, Devakkottai, Sivagangai
2.	Bhendi M10	300	S.Pudur, Kalaiyarkoil, Ilaiyankudi, Devakkottai, Sivagangai
3.	Chillies(k1,k2)	800	S.Pudur, Kalaiyarkoil, Ilaiyankudi, Devakkottai, Sivagangai
4.	Brinjal	150	S.Pudur, Kalaiyarkoil, Ilaiyankudi, Devakkottai, Sivagangai
5.	Water melon	25	S.Pudur, Kalaiyarkoil, Ilaiyankudi, Devakkottai, Sivagangai
	Total	1480	

V. Challenges thrown up by diversification /area expansion :

1. Judicious Utilization of water.

WRO should ensure quality and required quantum of irrigation water especially during the sowing season and the peak period of water requirement for each crop till harvest. Water can be judiciously utilized by adopting micro irrigation and mulching techniques.

2. Identification of suitable crops/ varieties.

The crops, cropping pattern proposed in this project are suggested based on the micro climatic suitability market trend, soil type and based on the choice of the farmers(WUA) / FA.

3. Production of quality / quantity planting materials.

Timely supply of good quality and required quantity of pedigree planting materials that will be made available from the State Horticulture Farms and quality Hybrid seeds should be made available through the horticulture depots.

4. Farmers acceptability for new crops.

On farm training at the successful / progressive farmers fields, training, meetings, motivation campaigns, should be conducted. Publicity and propaganda to be taken up.

5. Lack of transfer of technology

Transfer of latest farming techniques, distribution of inputs, technical advice should be given to the farmers through the extension personnel. Now the existing extension personal is inadequate. Hence out sourcing technical input provider is the only solution.

6.Strengthening of Horticulture information centers

Information Education and communication facilities should be strengthened. Required training should be given to the extension personal and field level workers. The infra structure facilities should be strengthened at sub basin level as well as project cell.

VI. Solutions and Recommendations

1. Soil reclamation :

- i) Soil reclamation will be made as per the recommendations STL.
- ii) Mulching, addition of organic manure.

2. TIP (Technical Input Provider) - Agri clinic :

- i) Extension service should be provided to the farmers at 100 ha/TIP.
- ii) The problem of inadequate TOT due to insufficient in extension personnel can be overcome by employing TIP. Outsourcing of tip for 840 man months for 5 years period is proposed in this project.

	I YEAR	II YEAR	III YEAR	IV YEAR	V YEAR	TOTAL
TARGET /YEAR(HA)	440	540	500	0	0	1480
Number of TIP	4	5	5	0	0	14
LOCATION	Kalaiyarkoil, Ilaiyankudi,	Sivagangai, Devakkottai	R.S. Mangalam, Vembanur			
MANMONTHS PER YEAR	48	96	240	240	216	840

3. Staggered Planting :

Farmers can be advised on phased planting and long and short duration varieties and off season planting.

4. Mulching, Micro - irrigation :

Efficient water usage by adoption of micro irrigation and mulching.

5. Identification of crops & Varieties suitable for drought.

The crops with low water requirement like mango, Sapota and Amla etc. are identified for this sub basin.

SL.NO	NAME OF THE CROP	VARIETIES	SOURCE
1	MANGO	ALPHONSO, BANGALORA	SHF, Devakkottai, SHF, Nemam
2	Sapota	PKM-1&2	
3	Amla	Krishan, Kanchan,	
4	TC Banana	G-9	Private sources

6. Consultative process undertaken in the sub basin :

The walk through survey was conducted on 29.07.2006, 22.08.2006 & 24.08.2006 at Ilaniyankudi, kalaiyarkoil villages. Discussion was held with farmers and their requirement was heard. Then after discussion among the officers the decision taken up, accordingly the cropping pattern revised and updated.

7. Stakeholders demands (List)

- i. Instead of local variety farmers demanded hybrid variety of vegetables and quality seeds.
- ii. Demand for micro irrigation.
- iii. Latest technology transfer - production technology and post harvest technology.
- iv. Inputs for organic farming.
- v. Credit facilities
- vi. Processing unit for preserving vegetables and fruits.
- vii. Need technical advise,
- viii. Need market information centre.

8. Marketing intervention proposed with reference to identified constraints :

S.No.	Constraint & Challenges	Counter Measures
1.	Problem soil Existing capacity of the STL at Kudumiyamalai is 18000	To overcome the problem soil, the farmers are advised to take up soil sampling and soil testing. Existing capacity of the STL at Kudumiyamalai is 18000. Measures to be taken up to augment the organic content of the soil. The crops like Mango and Guava which can come up in all kinds of soil are suggested in this sub-basin.
2.	Adverse climatic condition :	Drought resistant and high yielding crops of Mango, and Guava, are suggested in this sub-basin.
3.	Inferior quality of seed and planting material Farmers are using local and poor quality seeds. Truthfull seeds are used by the meager farmers	Quality planting materials supplied through Department of Horticulture. There are two State Horticulture farms available at Devakkottai and Nemam to supply the planting materials. The Hybrid Seeds are available from the private sources and it will be procured and supply to the farmers and under Tender acts.
4.	Limited planting material available from government sources	Seeds are supplied to the farmers by department after procuring the Hybrid Seeds through tender system.
5.	Improper irrigation practices(Ridges and Furrows, Basin irrigation).	Drip irrigation and fertigation is going to be introduced by the Agriculture Engineering Department for 1130 Ha.
6.	Inadequate extension service :	To cater the need technical input providers are proposed to be hired for 840 man months for 5 years. For every 100 Ha of area increase one TIP is proposed
7.	Low price for produce :	Staggered planting methods recommended to the farmers will maintained price fall in Vegetables especially during peak period of harvest. It is recommended to plant early and late season varieties.
8.	Poor adoption of Pre & Post harvest technologies :	Awareness should be created among the farmers in pre and post harvest

		techniques by giving training to the farmers.
10.	Risk aversion	Training should be given to the farmers on new techniques.
11.	Limited processing units :	Entrepreneurs should be motivated through training and seminars to start new processing units. Seeking new market for the produces eg for Banana, Kerala is a new market.
12.	Availability of labour	Farm mechanization is essential. Providing farm machineries for drudgery reduction, weeding, spraying, to the WUA is needed.

**PROJECT ON DEVELOPMENT OF HORTICULTURE CROPS IN Kottakkaraiyar
SUB-BASIN**

Physical In Ha

S. No	Components	Fin in Rs.			Physical target in Hectares					
		Unit cost	Assistance 75%	25% share by farmers	I Year	II Year	III Year	IV Year	V Year	Total
I.	AREA EXPANSION									
A.	Fruits plants									
1.	mango	30000	22500	7500	30			-	-	30
2.	Sapota	30000	22500	7500	30		-	-	-	30
3.	Amla	30000	22500	7500	30					30
3.	TC Banana	50000	37500	12500		40			-	40
	TOTAL				90	40				130
B.	Vegetables crops									
1.	Hybrid tomato	30000	22500	7500	25	25	25			75
2.	Water Melon	30000	22500	7500	5	10	10			25
3.	Hybrid Bhendi	30000	22500	7500	70	115	115			300
4.	Brinjal	30000	22500	7500	50	50	50			150
5.	Chillies	15000	11250	3750	200	300	300			800
	TOTAL				350	500	500			1350
	GRAND Total				440	540	500			1480

PROJECT ON DRIP IRRIGATION FOR HORTICULTURE CRO PS

S.No.	Crop	Area Proposed to Cover Under Drip Irrigation	Implemented by
A.	Fruits plants		AGRICULTURAL ENGINEERING DEPARTMENT (PAGE NO)
1.	mango	50	
2.	Sapota	30	
3	Amla	40	
4	Bhendi	200	
5.	Brinjal	160	
6	Chillies	600	
7	Tomato	50	
	Total	1130	

PROJECT ON INM / IPM

S.No	Components	Fin in Rs.		Physical target in Hectares					
		Unit cost	Assistance 100%	I Year	II Year	III Year	IV Year	V Year	Total
A.	Fruits plants								
1.	mango	1000	1000	30			-	-	30
2.	Sapota	1000	1000	30		-	-	-	30
3	Amla	1000	1000	30					30
5.	TC Banana	1000	1000	0	40				40
	TOTAL			90	40				130
B.	Vegetables crops								
1.	Hybrid tomato	1000	1000	25	25	25			75
2.	Hybrid Bhendi	1000	1000	70	115	115			300
3	Hybrid Brinjal	1000	1000	50	50	50			150
4	Hybrid Chillies	1000	1000	200	300	300			800
5	Hybrid Water melon	1000	1000	5	10	10			25
	Total			350	500	500			1350
	GRAND Total			440	540	500			1480

PROJECT ON ORGANIC FARMING

S.No	Components	Fin in Rs.		Physical target in Hectares					
		Financial proposal already given in area expansion programme		I Year	II Year	III Year	IV Year	V Year	Total
C.	Spices								
1.	Chillies			200	300	300			800
	Total			200	300	300			800

**PROJECT ON DEVELOPMENT OF HORTICULTURE CROPS IN ARJUNA NADHI
SUB-BASIN**

Physical In Ha

Fin in Lakhs

S.No.	Components	Estimated cost	Financial in lakhs					Total
			I Year	II Year	III Year	IV Year	V Year	
I.	AREA EXPANSION							
A.	Fruits plants							
1	mango	30000	9					9
2	Sapota	30000	9					9
3	Amla	30000	9					9
4	TC Banana	50000	20					20
	Total		47					47
B.	Vegetables crops							
1	Hybrid tomato	30000	7.5	7.5	7.5			22.5
2	Hybrid Bhendi	30000	21	34.5	34.5			90
3	Hybrid Brinjal	30000	15	15	15			45
4	Water Melon	30000	1.5	3	3			7.5
5	Chillies	30000	60	90	90			240
	Total		105	150	150			405
II - 1	Extension support @ Rs. 8000/- per month. (216 man months for 5 years)	96000	3.84	7.68	19.2	19.2	17.28	67.28
2	Advertisement	24000	0.48	0.48	0.48	0.48	0.48	2.4
3	Hiring computers	5000	1	1	1	1	1	5
4	Tansport & conveys		2	2	2	2	1.52	9.52
	Total		7.32	11.16	22.68	22.68	20.28	84.2
III	Organic farming	Amount already proposed in area expansion programme.						
IV	INM / IPM	1000	4.4	5.4	5			14.8
V	Micro irrigation	Implemented by Agricultural Engineering Department.						
	Overall Total		163.7	166.56	177.68	22.68	20.28	551

**Kottakkaraiyar sub-basin , Sivagangai.
Technologies Proposed under Horticulture.**

S. No	Technology / Practices	Existing output tons/ha	Area proposed in ha	Proposed output tons/ha	Percentage of increase	Budget out lay Rs. in lakhs.
I	Varietal Diversification, micro irrigation, INM in fruits.					
1.	mango	5	30	8	60	9.0
2.	Sapota	15	30	25	67	9.0
3	Amla	15	30	25	67	9.0
4	TC Banana	20	40	60	200	20.0
5	Hybrid tomato	20	75	40	100	22.5
6	Hybrid Bhendi	15	300	25	67	90.0
7	Hybrid Brinjal	12	150	20	67	45.0
8	Water Melon	8	25	15	88	7.5
9.	Chillies	1	800	1.5	50	240.0
	Total	111	1480	219.5	766	452

**Kottakkaraiyar sub-basin ,Sivagangai.
REQUIREMENTS OF INPUTS**

S. No	Name of the component	Varities	Area in ha	Seeds and plants require - ment/Ha.	Total Requirement	Source of Planting material
I	Varietal Diversification in fruits.					
1.	mango	Alphonsa	30	100	3000	SHF, Devakkottai, SHF, Nemam
2.	Sapota	L.49	30	160	4800	
3.	Amla	Kanchan, Krishna	30	275	8250	
4	TC. Banana	Grand Nine	40	2500	100000	Private sources
II.	Vegetables					
1	Hybrid tomato	Ruchi,& suruchi	75	0.15	11.25	Private source through tender
2	Hybrid Bhendi	M 10	300	2 kg	600kg	
3	Hybrid Brinjal	Ravaya	150	0.2kg	30kg	
4	Water Melon		25	2.5kg	62.5	Private source through tender
4	Chillies	K1,k2	800	1Kg	800	

OUTCOME OF THE PROJECT

SL.NO	DETAILS	WITHPUT PROJECT	WITH PROJECT	% INCREASE
1	Area in Horticulture crops(Ha)	2390	3740	1480
2	Introduction of micro irrigation(Ha)	0	1130	1130
3	Introduction of IPM/INM(Ha)	0	1480	1480
4	Introduction of Organic Farming(Ha)	0	800	800
5	Average Increase in Production (MT)	16	32.16	101.25

KOTTAKARAIYAR SUB-BASIN

The Sub basin has 315 WRO tanks of which 85 are system tanks and the rest are non system tanks. It is estimated that about 100 tanks suitable for aquaculture which retains water for 4 to 6 month and the total water spread is 4500 ha. Potential water spread area for the purpose of aquaculture is taken at 50% of WSA. The tank received water during North East monsoon. The present estimated fish production is about 50 kg/ha/year. The fishery of the tanks are dominated by uneconomical species like Tilapia, Gobius sp, minor carp, cat fish, and air beating fishes. Only few tanks are utilized for composite fish culture using fast growing carps.

Sivagangai Taluk Inland fishermen Co-operative society (FCS) with 112 members are functioning in this Sub basin, monthly engaged in capture fisheries. There is no private or Government fish seed farm located within the sub basin.

Considering the above existing scenario the following proposals are made for the inland fisheries development of the basin.

1. Fish seed bank:

Availability of advanced fish fingerlings is crucial in promoting aquaculture in the sub basin since the carp breeding season do not synchronize with receipt of water in the tanks. Hence to make available quality carp seeds in the Sub basin itself two fish seed banks are proposed which shall be owned and operated by WUA or members of Fishermen Co-operative society.

The seed bank with a total water spread area of 600m² shall have an output of 3 lakh fingerlings year. The fingerling output of about 6 lakhs per year from the two seed bank will meet the fish seed requirement of 600 ha of effective WSA of the basin. Estimated table fish production at the rate of 300kg/ha of WSA is 180 tonnes.

The investment cost for one seed bank is 14.5 laksh (DPR proposed by Engineering wing Fisheries department). The operational cost for one year per bank is 58000/-

FISH SEED REARING IN CAGES:

Fish seed rearing in net cages is an effective and simple technology. One unit of cage shall have 3 types of cages. Cages will be fixed in tanks having water depth

of more than 5 feet and fish seed reared from early fry to advanced fingerlings. It is proposed to introduce 10 cage units to be operated and managed by WUAs OR Fishermen Co-operative Societies. The investment cost is Rs.14,000/-per unit and operational cost per year/3 cycles is Rs.16,000/- per unit. The estimated production of advanced fingerling from the 10 cage unit is 6 lak h/annum. A net revenue of Rs.32,000shall be generated by operation a single unit of cage. This shall be the stocking material for 600ha of effective water spread in this sub basin. Anticipated table fish production is 300kg/ha and the total production will be 180 tonnes/year.

3. **AQUACULTURE IN FARM PONDS:**

Farm Ponds are excavated in the farmers field as a rain water harvesting storage, and as a source of critical irrigation. The Agricultural Engineering Department is identifying the geographic location and execute the excavation. As a source of additional income generating activity aquaculture will be promoted by providing aquaculture inputs like seed, feed etc. To make the pond retain water for a reasonable period of time (>4 months) a clay layer of about 20cm will be provided on the pond bottom to avoid seepage. The total estimated cost of aquaculture input for one farm pond is Rs. 16,500/- and 50 farm ponds will be brought under aquaculture. One of the farm pond having ground water source will be utilized/encouraged to rear stock size fish seed (about 50g) which will serve as stocking material to 30 farm ponds. The fish production in Farm Pond will be 600Kg/crop and the anticipated net revenue is about Rs. 10,000/ -.

4. **SUPPLY OF FISHING IMPLMENTS:**

The post project scenario with good quality seed materials is expected to produce about 450 tonnes of fish in the Sub basin. For harvesting this fishery effectively fishing implements (Drag net) shall be provided to Fisherman Co -Operative Societies in the sub basin. Ten drag net @ Rs. 20,000/- each is the cost provided

TRAINING AND CAPACITY BUILDING

IAMWARM Project's target groups are mainly the WUA who are agriculturist with little knowledge on aquaculture. Hence training and capacity building on fish seed rearing, culture etc. is highly essential. The IAMWARM project training component shall lay emphasis on planning the aquaculture training.

CONCLUSION:

- The total fish fingerlings estimated to be produced from the two seed banks and ten cage unit is about 12 lakhs.
- This will be the stocking material for stocking 1200 ha of effective water spread area of the Sub basin. In two years fish culture will be covered / demonstrated in 2400 ha. of effective WSA covering about 100 tanks.
- Private investors will be attracted to invest in fish seed rearing units.
- Agriculture farmers shall get an additional income of about Rs.10000/- from aquaculture in farm ponds.

Vision:

1. Increase in overall fish production and unit production.
2. Seed requirement of the Sub basin to be met locally.
3. Additional livelihood and income to agricultural farmer from farm ponds.
4. Increase in per capita consumption of fish.
5. Reduced % of mal-nutrition especially among rural children.

Abstract of proposals

Kottakarayar	Unit	1st Year	2nd year	3rd year	4th year	5th year	Total Rs. In Lakh
Seed bank	2		29.00				29.00
Operational cost			1.16	1.16			2.32
Aquaculture in farm ponds	50		3.30	3.30	1.65		8.25
Supply of fishing implement							0.00
a) Drag Net.	10		2.00				2.00
Fish Seed Rearing in Cages	10		0.70	0.70			1.40
Operational cost			0.80	0.80			1.60
Vehicles Hire charges		0.40	0.40	0.40	0.40	0.40	2.00
Documentation		0.10	0.10	0.10	0.10	0.10	0.50
Total		0.50	37.46	6.46	2.15	0.50	47.07

DETAILS FOR ONE UNIT - FARM POND.

A. Fixed Cost

1. Pond (available)	-	NIL
2. Improvement to pond by providing clayey layer	-	5,000.00

B. Operational Cost (in Rs.)

1. Lime	-	250.00
2. Manure	-	750.00
3. Stock size fish seed @ Rs. 3/- per seed	-	3,000.00
4. Feed (Rs. 4/- per kg of RB 600 kg Rs.12/- per kg of Goc 300 kg)	-	6,000.00
5. Harvesting and Miscellaneous	-	1,500.00

TOTAL 11,500.00

C. Returns

By Sale of 600 kg of fish @ Rs. 35/- per kg	-21,000.00
(Gross Profit) – (C-B)	- 9,500.00

Fish Seed Bank (production and Selling)

Water Spread Area	Sq.m	600			
Culture Period	months	50 to 60 days per cycle. Totally 3 cycles			
Depth of Water	meter	1.0 meter			
With Project					
		Quantity	Financial Unit Price (Rs)	Financial Value (Rs/Pond)	Economic Value (Rs/Pond)
		<u>Units</u>	-		
INPUTS, Fixed costs					
Nursery construction (Masonry)	LS	1300000	1	1300000	1170000
5 HP Motor cost	LS	20000	1	20000	18000
Pumpshed/pipeline Equipments-	LS	50000	1	50000	45000
Nets/Velon/screen	LS	50000	1	50000	45000
Electricity Service Connection	LS	30000	1	30000	27000
				1450000	1305000
INPUTS, Recurrent costs					
Lime	Kg	200	5	1000	900
Cowdung	Ton	1.0	1000	1000	900
Fish early fry	No			0	
Catla/Rogu/Mirgal	Lakh No	6	1000	6000	5400
Common carp	Lakh No	3	1000	3000	2700
Feed Mix	Kg	3000	10	30000	27000
Electricity	LS	6000	1	6000	5400
Rice polish	Kg	0	6	0	
Labour	LS	100	100	10000	9000
Prophylactic measures	LS	1000	1	1000	900
Sub Total	Rs			58000	52200
OUTPUT					
Percentage of recovery					
Fish fingerlings, 7.5 cm each					
Catla/Rogu/Mirgal	%	40%			
Common carp	%	20%			
Fish production					
Catla/Rogu/Mirgal	Lakh No	2.4	80000	192000	172800
Common carp	Lakh No	0.6	80000	48000	43200
Gross Income	Rs			240000	216000
Net Income	Rs			182000	163800
INCREMENTAL NET INCOME	Rs			182000	163800

Fish Seed Cages

Cages Required	cum	40
-----------------------	-----	----

Culture Period	months	45 days per cycle. Totally three cycle s		
Depth of Water	meter	1.5 meter		
-		With Project		
			Financi al	Financial
		Quantity	Unit Price	Value
	<u>Units</u>	-	<u>(Rs)</u>	<u>(Rs/Pond)</u>
INPUTS, Fixed costs				
P40 (10*4*1 meters)	40 cum	1	4500	4500
P16 (10*4*1 meters)	40 cum	1	4000	4000
P 8 (10*4*1 meters)	40 cum	1	3500	3500
Materials (casuarina/wires/buckets)	LS	1	2000	2000
				14000
INPUTS, Recurrent costs				
	Lakh			
Fish early fry	No			
	Lakh			
Catla/Rogu/Mirgal	No	2.00	1000	2000
	Lakh			
Common carp	No	1.00	1000	1000
Feed Mix	Kg	1000.00	10	10000
Labour	LS	20.00	100	2000
Other unforeseen expenditure	LS	1000.00	1	1000
Sub Total	Rs			16000
Procurement/storage/selling				
OUTPUT				
Percentage of recovery				
Advance Fish fingerlings, 7.5 cm each				
Early fry to late fry	%	50%		
Late fry to Fingerlings	%	70%		
Fingerlings to advanced fingerlings	%	60%		
Advance Fish fingerlings	Lakh			
production	No	0.63	80000	50400
Gross Income	Rs			50400
Net Income	Rs			31800
INCREMENTAL NET INCOME	Rs			31800



**Government of Tamilnadu
Public Works Department
Water Resources Organisation**

Proposal for Environmental
Component

Environmental Monitoring on Water and Soil Quality and Creating Awareness &
Updating of “Environmental Social Assesment Report” FOR kottkkariar sub -basin.

EST.RS.25.00LAKHS.

**Water Resources Organisation, PWD,
Environmental Cell Division,
Madurai.**

NO		NO
1	Environment. Details Proforma	1
2	List of Water User Association	3
3	Tanks Severely Affected by Weeds (Annexure -II)	5
4	Sewage discharged into water bodies (Annexure -III)	13
5	Disposal of Solid Waste into Water bodies(Annexure - IV)	15
6	List of Industries in the Sub basin (Annexure -V)	17
7	Details of Surface water quality (Annexure -VI)	21
8	List of Ground water sampling point	25
9	Details of Ground water quality (Annexure -VII)	27
10	Estimate Report	29
11	Abstract Estimate	37
12	Detailed Estimate	41
13	Map showing Water Sampling Points	43

**Name of work: Environmental Monitoring on water and soil Quality and
Creating awareness & updating of “ Environmental and Social Assessment
report ” for kottakkariar sub-basin.**

—————
Estimate Cost Rs 25.00 Lakhs
INTRODUCTION

Environmental challenges influence the well being of all living things directly and more adversely. Water bodies are the principal victims of these environmental challenges against increasing demand, therefore dictate the dire necessity for the almost preservation of available water resources through close monitoring. Considering this, under TNWRCP (with World Bank assistance) special emphasis was given for the first time in WRO, to assess the environmental status and degradation caused for all River basins in Tamilnadu. Accordingly, in these River basins, Environmental impact on the quality of surface and Ground water and Soil was studied by collecting water & soil samples and testing them; Micro level Environmental Status Reports for all the River basins were prepared and World Bank provided assistance for these works up to March 2004.

Also few Awareness programs & Workshops were conducted to create awareness on the Environmental issues & remedies among the public, farmers, Govt. officials and NGOs; Seminars were conducted to find out new techniques and methods developed recently to solve Environmental problems.

Now under IAMWARM project, focus is at each sub basin level to identify and prioritize the requirements for improvements to storage structures, rehabilitation, new schemes for water harvest, and diversification of crops. For any new schemes or rehabilitation of existing one, consideration of the environment issues pertaining to that area and remedial action to overcome the problems is must.

About the basin:

This Kottakaraiyar sub basin is bounded by Manimuthar sub basin in North and Vaigai Basin by West & South, by Bay of Bengal in the West. This Kottakaraiyar river basin lies in between 78 23 42 E to 79 1 12.5 E Longitude and 9 29 20 N to 10 2 56 N latitude.

Saruganiar is in the upper reach of this basin originating from Alavaikottai tank of Sivaganga Taluk. Nattarkal and Nattar River are tributaries of Suriyankottaiyar. This Suriyankottaiyar joined with Saruganiar near Maruthavayal. Thereafter the river is called as Kottakaraiyar

The basin extends over a total area of 2232.06 Sq.Km .in the districts of Madurai, Sivaganga and Ramnad.

Environmental problems in this basin:

CATCHMENT DEGRADATION:

There are no hills situated in this sub basin. The river flows in a flat terrain. However, afforestation measures have been under taken in Sivaganga District by the Forest Department

INDUSTRIAL POLLUTION:

There are no major industries situated in this sub basin. Although there are 36 industries in this sub- basin, trade effluent from these industries on water bodies is not much. There is one industrial estate in operation in this basin. It is located at Sivaganga.

SOLID WASTE DISPOSAL:

The problem of Garbage collection and its disposal has assumed importance, in the context of rapid growth of population and urbanization. There is no organised scientific method of disposal in all the Municipalities, town and Village Panchayats.

The main river runs sufficiently away from the main towns, which produce garbage in large quantities. The details regarding quantity of garbage, places where they are dumped are given in Annexure IV

Scheme for Solid waste Management plan is under implementation by Rural Development Department. Under this scheme, collection tank for disposable and undisposable garbage have been constructed. But in most of the panchayats, recycling the waste and converting the solid waste into manure and production of energy is yet to come up. Hence, motivating the local bodies for proper implementation of solid waste management project is must.

SEWAGE DISPOSAL LET INTO WATER BODIES:

Treatment of sewage and arrangements for safe disposal arrangements has not been provided in most of the Villages. Under- ground drainage arrangements have not been provided even in municipalities and town panchayats. Coastal villages discharge the sewage directly into sea. This sewage is washed away and got ponded in the backwaters and unhealthy conditions exit.

The locations of disposal of sewage directly let into water bodies in this sub basin are given in Annexure III

So, creating awareness among the office bearers of the local bodies to prevent the pollution of water resources by transferring technical know how is must. Hence Awareness meeting/workshop including field visits, are to be conducted under the IAMWARM project.

WATER WEEDS:

Juliflora has invaded both the cultivable lands and water bodies ie. Tanks and channels. The area of its coverage in the water bodies can be any where near 13000 Ha. and its water consumption is about 39 M.Cu.m. Hence, these plants need to be eliminated totally for conserving the precious water resources. But on the contrary, in some villages local people desires to grow this plant in the water spread area of tanks. Once in 4 or 5 years they get cutting order from the Revenue authorities, sale the Juliflora or coal produced from it and keep the money for the common expenses like court case for the litigation with the nearby villages, Temple repair and Local festival etc. This is on account of lack of guidance and ignorance of its ill effects. Hence, this problem has to be addressed in all forums for saving the basin from Juliflora disaster.

GROUND WATER QUALITY:

From the chemical composition data for the observation wells, it is found to vary much from the Permissible limits. In the area of the central region of the basin, the quality of the Ground water is found to be moderately saline. In Sivaganga areas the Chloride (1560 mg / l) values exceed the permissible limits. (>350 is inferior for Irrigation purpose).

ACTIVITIES PROPOSED:

To monitor the quality of water and soil and create database regarding the Environmental Status for each sub basin, this proposal has now been proposed with the following activities at sub basin level. The provisions and necessity are explained below.

1. Collection and Testing of Water and soil samples.

Water samples were collected from three locations and tested in Kottakkariar river basin from December 2002. As this is not a perennial river, only very few samples were taken when there was flow. It is now proposed to continue the activities for a period of three years at the following places to assess the Environmental impact on the quality of surface water in this kottakkariar river sub-basin.

- i) D/S of Kottakkariar anicut in Kottakkariar River.
- ii) U/S of confluence point of Saruganiar with kottakkariar.
- iii) D/S of cause way in R.S.Mangalam - Thiruvadana road.

It is proposed to collect water samples once in 3 months during the period of three years for assessing the quality. In addition to the above identified three locations, water samples will also be collected once in a year from tanks and near by wells in five villages where sewage is directly let into tanks mentioned in the Annexure to assess the impact on the quality of surface and ground water in this Sub basin to understand the problems more precisely.

Soil samples are to be collected from selected locations to assess the impact on the quality of soil due to various Environmental problems like use of chemical fertilizer and using the polluted water to determine precisely the impact on the degradation of the quality of the soil. Soil samples will be collected and tested once in a year and will be tested in the Agricultural college. Under this item following provisions have been made.

II.Environmental Social Knowledge base, Analysis and Development

Under the IAMWARM Project, Environmental cells are expected to be functioned as Environmental Social cell. Hence village level data on Environmental and Social aspects have to be collected and analysed by an expert and reporting has to be done.

II. Transfer of Technical Know how for solid waste management system including source Segregation, recycle of dry waste and linkage with user agencies.

Scheme for Solid waste Management plan is under implementation in all municipalities and major Panchayats. Under this scheme, collection tank for disposable and non-disposable garbage have been constructed in most of the Panchayats. But, recycling process for converting the solid waste into manure and production of energy are yet to come up.

Hence, Demonstration and action programs are planned with user agencies and field visits are programmed to transfer Technical know how for proper implementation of Solid waste management system to avoid pollution of water resources.

III. Conducting Environment and Social Awareness meeting, Programme demonstration and Exhibitions on various Environmental and Social related issues including capacity building:

Awareness meeting, Programs are necessary to create awareness among the Water users, Students and Public about Environmental aspects and the action to be taken by them to remove or reduce the impacts due to the Environmental problems. Only one workshop was conducted at Sivaganga in March '03 for the WRO officials, WUA Presidents and NGOs.

Hence, to create and motivate the young generation awareness meetings are proposed in Institutions and for general public, awareness programmes are to be conducted in the villages where sewage is directly let into water bodies. It is now proposed to conduct 9 Nos. of awareness programs and 6 Nos of awareness meetings during the study period of three years covering the following subjects in addition to Placing Stickers, Tin sheets and Pham lets containing messages about Environmental Awareness.

- **Sanitation.**
- **Solid waste treatment.**
- **Sewage treatment and converting the same into Gas**
- **Organic farming and herbal gardens.**
- **Conversion of aquatic weeds into manure etc**

Total Cost.

The total cost works out to **Rs: 25.00 Lakhs (Rupees Twenty Five Lakhs Only)**

**Junior Engineer
E.C. Section 2
Madurai.**

**Assistant Exec. Engineer, WRO
Envn.Cell. Sub Division,
Madurai.**

**Executive Engineer, PWD, WRO,
Environmental cell Division
Madurai.**



ANIMAL HUSBANDRY COMPONENT

IAMWARM PROJECT

KOTTAKARAIYAR SUB BASIN

**Commissionerate of Animal Husbandry & Veterinary Services,
Chennai 600 006**

IAMWARM PROJECT

ANIMAL HUSBANDRY

1. INTRODUCTION

1.1 Our State being an agricultural based economy with more than 60% of the people engaged in animal husbandry, agriculture and allied activities, it forms the backbone of the rural economy. Animal husbandry contributes significantly in supplementing the income of small, marginal farmers and landless labourers many of whom are women who play a major role in the care and management of livestock. Livestock is not only an important source of income to the rural poor but also helps them sustain their livelihood in times of drought and famine. Livestock provide a diverse range of output varying from draught power and organic manure for agriculture, self employment throughout the year especially for women as well as direct production of milk, meat and eggs for human food.

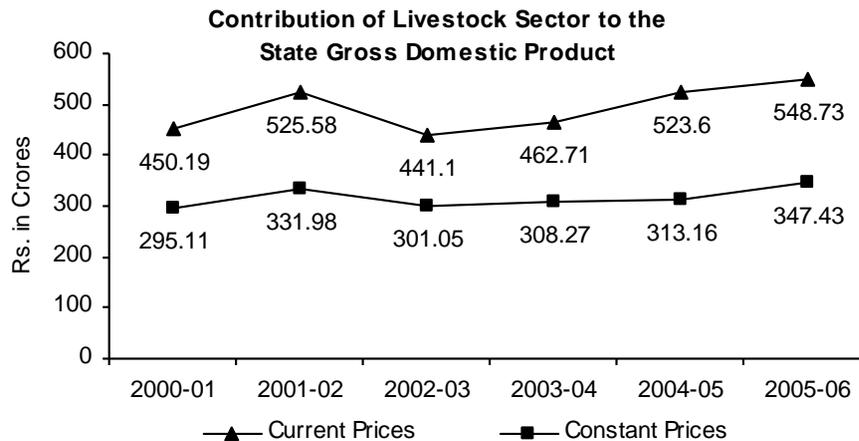
1.2 The contribution of livestock sector to the food basket in the form of milk, eggs and meat to the State has been impressive in fulfilling the animal protein requirement of ever growing human population. The estimated milk production which was 37.91 lakh MT during 1995-96 has increased to 54.74 lakh MT during 2005-06. Similarly the egg production during the same period has increased from 3,048 million numbers to 6,223 million numbers. During the same period, the per capita availability of milk per day went up from 185 gms to 234 grms and eggs per annum from 54 numbers to 97 numbers respectively. The average growth rate of milk and egg during the last decade is 4.4% and 10.4% respectively. According to advance estimates (provisional), the contribution of livestock sector to the Gross State Domestic Product has increased from Rs.523.60 crores during 2004-05 to Rs.548.73 crores during 2005-06, an increase of 4.8%.

Year	Current Prices (In crores)						Constant Prices (In crores)					
	Gross State Domestic Product	GSDP for Agriculture & Allied Activities	GSDP for Livestock Sector	%age Share of Agriculture & Allied Activities to GSDP	%age Share of Livestock Sector to GSDP	%age Share of Livestock Sector to Agriculture	Gross State Domestic Product	GSDP for Agriculture & Allied Activities	GSDP for Livestock Sector	%age Share of Agriculture & Allied Activities to GSDP	%age Share of Livestock Sector to GSDP	%age Share of Livestock Sector to Agriculture
2000-01	14109.98	2042.56	450.19	14.48	3.19	22.04	9101.07	1457.73	295.11	16.02	3.24	20.24
2001-02	14355.54	2056.09	525.58	14.32	3.66	25.56	8901.06	1457.22	331.98	16.37	3.73	22.78
2002-03	15509.93	1646.51	441.10	10.62	2.84	26.79	9170.32	1111.75	301.05	12.12	3.28	27.08
2003-04	16845.72	1700.21	462.71	10.09	2.75	27.21	9495.10	1081.96	308.27	11.39	3.25	28.49
2004-05	18892.11	2025.73	523.60	10.72	2.77	25.85	10324.84	1252.74	313.16	12.13	3.03	25.00
2005-06	20750.28	2097.25	548.73	10.11	2.64	26.16	11198.15	1305.98	347.43	11.66	3.10	26.60

2003-04 : Quick estimates

2004-05 : Advance estimates

2005-06 : Advance estimates(provisional)



1.3 Animal husbandry having a high potential for growth, its hidden potential needs to be explored as this can provide the much needed gainful employment opportunities to the weaker sections of the society and can contribute significantly in regeneration of the rural economy. Animal husbandry can ensure a better quality of life for the rural farmer by not only providing sustainable employment at their location itself but can also act as assets or rural currencies. Animal husbandry thus can act as a powerful instrument for the comprehensive socio-economic transformation of the rural people and can act as an engine for growth and trigger the economy by its multiplying effects.

2. PRESENT STATE SCENARIO

2.1 Tamil Nadu is home to 91.41 lakhs head of cattle, 16.58 lakhs buffaloes, 55.93 lakhs sheep, 81.77 lakhs goats besides 3.21 lakhs pigs and 865.91 lakhs poultry as per the 17th livestock and poultry census. The livestock ownership is more evenly distributed among landless labourers, small and marginal farmers and livestock production systems are based on low cost agro-by-products as nutritional inputs.

2.2 Veterinary assistance, health cover and breeding support to the livestock and poultry in the State is provided by 1,323 Government graduate veterinary institutions. The National Commission on Agriculture has suggested one veterinarian for every 5000 cattle units by the year 2000 A.D. whereas the present scenario is one veterinarian for every 10,000 cattle units. In addition 1,799 subcentres provide first aid and breeding support. Feed and fodder are the major limiting factors in enhancing farm animal productivity. But in the State a huge gap of around 47% exists between the requirement and availability of green fodder. Though farmers are well aware of the artificial insemination programme, their awareness level on best and latest animal husbandry practices, know-how on emerging new diseases and their control are not up to the expected level. More over with changing global scenario, the knowledge level of the veterinarians and para-veterinarians needs to be updated frequently to take the technology instantaneously to the end users- the farmers.

2.3 Though the State is endowed with large livestock population, the breedable age females covered through artificial insemination is only 30-35%. The conception rate under field conditions ranges from 35-40%. This is due to a mixture of various factors like low nutritional status, improper time of insemination and stress due to walking the animals for long distances to the institutions for artificial insemination, shortage of feed and fodder, prevalence of endemic livestock diseases. In the State, the per day average productivity of a non-descript and crossbred cattle is 2.73 kgs. and 6.27 kgs. respectively and that of a buffalo is 4.16 kgs. which is much below the expected yield. The productivity can be enhanced by adopting good management practices, feeding practices, bio security measures, effective disease prevention measures, etc.

3. SCENARIO IN THE KOTTAKARAIYAR SUB BASIN

Livestock Population

Cattle	Buffalo	Sheep	Goat	Poultry
83842	4693	119791	104797	50414

Breedable age Female Population

Crossbred Cattle	Non Descriptive cattle	Buffalo	Total
17999	16138	1877	36014

Infrastructure and Man power in Government Veterinary Institutions

No. of Veterinary Institutions		Veterinary institutions filled up	
Graduate Institutions	Subcentres	Graduate Institutions	Subcentres
10	18	5	13

Average Per Day Milk Yield per animal

Crossbred Cattle	Non Descriptive cattle	Buffalo
6.1	2.9	4.6

Milk Procurement

Milk cooperative societies	Present milk procurement (LPD)	Milk Procured by Aavin (LPD)
90	25000	16000

4. Constraints, Challenges and Counter measures proposed:

S. No.	Constraints & Challenges	Countermeasures Proposed
1.	Remote villages and villages situated far away from the Government Veterinary Institutions are not getting sufficient veterinary services like veterinary health cover and artificial insemination facilities	The establishment of sub basin veterinary unit will ensure delivery of veterinary services at the farmer's door steps or nearest to the farmer's in remote villages and unserved villages of the sub basin area. Provision of veterinary health cover and artificial insemination are the main works at the farmer's door steps. The unemployed veterinary graduate will be given an entrepreneurship training to establish a Sub basin veterinary unit (details enclosed vide para 6.1 of page 6) in the sub basin area and disseminate best animal husbandry practices for his earnings and to upgrade animal husbandry practices of farmers in the sub basin area.
2.	Lack of upgraded infrastructure at the Government Institutions leading to constraints in delivery of quality veterinary services.	The Government Veterinary Institutions in the sub basin will be provided with additional essential equipments (details enclosed vide para 6.2.a. & 6.2.b. of page 10) to deliver quality veterinary services in the sub basin. In addition one veterinary dispensary (details enclosed vide para 6.2.c. of page 10) will be upgraded as referral institution for quick and accurate diagnosis of diseases and help in timely treatment thereby preventing economic loss to the farmers.
3.	There is a wide gap between the requirement and availability of green fodder needed for the livestock in the sub basin.	To reduce the gap between the requirement and availability of green fodder in the sub basin, it is proposed to cultivate CO3 and Kolukkattai fodder in 170 hectares of private lands, (details enclosed vide para 6.3.(d). of page 11) as a part of cropping plan.
4.	Main problem affecting the fertility in cross bred cattle is infertility leading to loss of milk production days, ultimately leading to loss to the farmers.	To overcome the infertility problems, infertility cum total health cover camps (details enclosed vide para 6.4.(b) of page 13) are proposed. The animals having infertility problems will be identified and treated. In addition, mineral mixture supplement (details enclosed vide para 6.4.(c) of page 14) will be given to rectify the defects.

S. No.	Constraints & Challenges	Countermeasures Proposed
5.	Lack of adequate know-how about the livestock management practices like feeding, breeding, health care and deworming activities.	The farmers in the sub basin will be given training (details enclosed vide para 6.5.a. of page 15) on best livestock management practices in livestock breeding activities like signs of oestrus, correct time of artificial insemination, deworming, feeding schedule and other health care measures. In addition, IEC materials will be distributed to farmers in the sub basin. More over hoardings and wall paintings depicting signs of commonly affecting diseases will be erected in places where people congregate in large numbers. Apart from this, quarterly night meetings will be conducted to disseminate information to the farmers in the sub basin. (details enclosed vide para 6.4.(d) of page 14)
6.	Lack of update knowledge and skills of the veterinarians and para-veterinarians in the project area.	Veterinarians in the project area will be given trainers training (details enclosed vide para 6.5.(d) of page 16) at Veterinary Colleges to update and refresh their skills and knowledge. They will inturn train the para-veterinarians.

5. OBJECTIVES OF THE PROJECT

5.1 With this background, the main objective of the Animal Husbandry Department will be to intervene in all possible ways utilising the resources to the maximum to improve the production potentialities of the livestock in the sub basin through multi disciplinary approach.

The main interventions will be:

- Productivity enhancement by improving delivery of veterinary services in the project area at the Government and private level.
- Increasing availability of green fodder and other fodder for sustenance.
- Conducting various out reach programmes to enhance productivity.
- Enhancing the knowledge level of human resource in the project area.

5.2 With the above interventions, not only the crossbred population in the sub basin is expected to rise but also the disease outbreaks will be kept under control. Moreover systematic and periodical deworming will lead to a 10% increase in weight gain, thereby increasing the total meat yield per animal. More over the various out reach programmes and enhancing the knowledge level in the sub basin area will lead to better animal husbandry practices. Thus ultimately, the per animal milk yield is expected to increase from 6.1 lts to 7 litres in crossbred, from 2.9 lts to 3.6 litres in indigenous and from 4.6 lts to 5.2 litres in buffaloes, leading to increased total farm income.

6. Productivity enhancement by improving delivery of veterinary services in the project area at the Government and private level.

6.1 Establishment of Sub basin Veterinary Units.

6.1.(a) Though there are 10 graduate veterinary institutions and 18 subcentres operating in the project area, there is still large livestock populations uncovered which is mainly due to the geographical terrain and distance these villages are located from the institutions. In this project, the main aim will be to provide effective veterinary cover and breeding support to these villages at their door steps by establishing Sub basin Veterinary Unit. The main criteria for establishing the unit will be livestock population in the unserved area. Hence to provide effective services in these unserved areas, it is planned to establish 2 Sub basin Veterinary Units in the Project area.

6.1.(b) The details of Sub basin Veterinary Unit to be established, their coverage villages with distance and nearest Government Veterinary institution is furnished below.

Name of the Sub basin :			Kottakaraiyar Basin	
Total number units in Kottakaraiyar Basin:			2	
Name of the Sub basin Veterinary Unit :			1. Sooranam	
Sl. No.	Name of Villages to be Covered	Distance from the Unit (In Kms.)	Nearest Govt. Institution	Distance from the village to Govt. inst. (In Kms)
1.	Sooranam	0	VD., Salaigramam	8
2.	Thugavur	4	VD., Salaigramam	10
3.	Akkavayal	4	VD., Salaigramam	9
4.	Visavanur	5	VD., Salaigramam	8
5.	Alavidankan	5	VD., Salaigramam	10
6.	Vandal	5	VD., Salaigramam	10
7.	Kattanoor	6	VD., Salaigramam	9
8.	Muthur	4	VD., Salaigramam	7
9	Andakudi	10	VD., Salaigramam	10
10	Ilamanur	8	VD., Salaigramam	9
11	Perumacheri	3	VD., Salaigramam	10
12	Valayanendal	6	VD., Salaigramam	10
13	Sirupalai	3	VD., Salaigramam	8
14	Vatakkukeeranur	10	VD., Salaigramam	9
15	Aramanaikarai	5	VD., Salaigramam	8

Villages 1 to 5	Mondays & Thursdays
Villages 6 to 10	Tuesdays & Fridays
Villages 11 to 15	Wednesdays & Saturdays
Sundays will be a reserve day in which IEC campaigns will be conducted. In addition if any villages are left out during the week, it will be covered on the reserve day.	

Sooranam village is about 8 kms from the nearest Veterinary institution namely Veterinary Dispensary, Salaigramam. There are about 15 villages situated in and around Sooranam that are not covered by the Government Veterinary Institution. Further the breedable female population in and around Sooranam that is untapped by the Government veterinary institution is around 3954. Hence Sooranam village is fixed as the headquarters of the Sub basin Veterinary Unit.

Name of the Sub basin Veterinary Unit :			2. Nalukottai.	
Sl. No.	Name of Villages to be Covered	Distance from the Unit (In Kms.)	Nearest Govt. Institution	Distance from the village to Govt. inst. (In Kms)
1.	Nalukottai	0	VD., Idaiyamelur	5
2.	Keelapoongudi	4	VD., Okkur	5
3.	Namanoor	6	VD., Okkur	10
4.	Thirumalai	9	VD., Okkur	10
5.	Kattanipatti	15	VD., Okkur	15
6.	Perungudi	15	VD., Okkur	8
7.	Kanjirangal	10	VH., Sivagangai	4
8.	Allur	15	VH., Sivagangai	6
9.	Panankadi	14	VH., Sivagangai	8
10.	Oyyavandan	18	VH., Sivagangai	8
11.	Kanchipatti	18	VH., Sivagangai	10
12.	Nadamangalam	16	VH., Sivagangai	10
13.	Vembangudi	18	VH., Sivagangai	10

Villages 1 to 5	Mondays & Thursdays
Villages 6 to 9	Tuesdays & Fridays
Villages 10 to 13	Wednesdays & Saturdays
Sundays will be a reserve day in which IEC campaigns will be conducted. In addition if any villages are left out during the week, it will be covered on the reserve day.	

Nalukottai village is about 5 kms from the nearest Veterinary institution namely Veterinary Dispensary, Idaiyamelur. There are about 13 villages situated in and around Nalukottai that are not covered by the Government Veterinary Institution. Further the breedable female population in and around Nalukottai that is untapped by the Government veterinary institution is around 5000. Hence Nalukottai village is fixed as the headquarters of the Sub basin Veterinary Unit.

6.1.(c) An unemployed Veterinary Graduate who will be designated as Sub basin Veterinary Extension Officer will man each Unit. He will be given one month entrepreneurship training at renowned national institutions like IRMA / NDDDB. On completion of this training, the Animal Husbandry Department will give him 5 days orientation training in the nearest veterinary institution. The orientation training will be an over view of the departmental organisation and structure, duties and role of officers, disease endemicity and farmers know-how in the area.

6.1.(d) On completion of training, the unemployed veterinary graduate selected will be given a two wheeler. The two wheeler vehicle will be the property of the Water Users Association. He will be located in the Water Users Association building, which will be his headquarters. He will prepare a weekly route map in consultation with Animal Husbandry Department, Water Users Association and local village panchayats for providing veterinary services. He will visit the villages as per the scheduled programme and provide veterinary services like vaccination, deworming, castration and treatment and breeding support like artificial insemination and pregnancy diagnosis. The route will be reviewed and assessed for intake of the veterinary services by the end users once in 3 months and suitable alterations if necessary will be made.

Flexibility will be given to change the tour programme based on need. The unit will be under the technical control of the Animal Husbandry Department. The sub basin veterinary extension officer will computerize all records regarding artificial insemination like date of artificial insemination done, straw used, sire yield, date of follow up for conception, etc.

6.1.(e) To provide breeding support by artificial insemination necessary inputs like LN2 containers (a 35 lit. and 3 lit.), artificial insemination guns, thawing flasks and straw cutters (one set) will be provided. The funds for the above inputs (LN2 containers, artificial insemination guns, thawing flasks and straw cutters) will be sourced from Tamilnadu Livestock Development Agency (TNLDA). The unit will also be provided with other equipments like microscope, centrifuge, etc. for carrying out preliminary disease diagnosis. Other inputs for breeding like LN2 and frozen semen straws will also be provided for carrying out services at the farmers door step. The unit will also be provided with dewormers, essential surgical items like cotton guage, catguts, intra-uterine infusions, etc., which will be procured from Tamilnadu Medical Services Corporation (TNMSC) for providing veterinary services. In addition a one time revolving fund of Rs.10, 000/- will be provided to the Water Users Association. The above fund will be utilised for stocking of medicines and injectables as per the requirement of the Sub basin Veterinary extension officer. The fund for the above will be sourced from the project. The Animal Husbandry Department will ensure supply of vaccines like Hemorrhagic septicemia, Black quarter, Anthrax, Enterotoxaemia and Sheep pox free of cost for carrying out vaccination in the unit's service area. The Regional Joint Director of Animal Husbandry will be the facilitator for purchase of the above items from TNMSC and will also ensure prompt supply of vaccines.

6.1.(f) The veterinarian will be allowed to collect fees for the artificial insemination and he will remit Rs.25/- per insemination to the Water Users Association and keep the remaining for himself as service charges. In addition, he can collect a nominal fee of Rs.50/- for minor treatments and Rs.100/- for major treatments as professional charges for himself. The cost of medicines utilised for treatment will be borne by the farmer. However if the farmer prefers, the sub basin veterinary extension officer can utilise the medicines and injectables available with the Water Users Association and collect additional charges for medicines utilised which will be remitted to the Water Users Association. The above amount remitted will be used as revolving fund for purchase of medicines. To ensure a wider coverage with increased conception rate, a performance linked incentive for every calf born out of inseminations done by the Unit will be factored, wherein a sum of Rs.25/- will be given during first year and there after a decrease of Rs.5/- per year. The amount remitted by the unit to the Water Users Association will be kept as seed money for sourcing inputs for sustainably running the unit after withdrawal of funds by the lending agency for the project.

6.1.(g) Each unit will be established at a total cost of Rs.5.73 lakhs for 5 years in which Rs.0.99 lakhs will be non-recurring and Rs.4.74 lakhs will be recurring cost. Totally 2 units will be established in the river basin at a total cost of Rs.11.45 lakhs. The financial details and number of units to be established in each river basin is furnished below

**FINANCIAL COST FOR ESTABLISHMENT OF ONE SUB BASIN VETERINARY UNIT
(In Rs.)**

	NON-RECURRING EXPENDITURE/UNIT	1st yr. Rs.					
1	Cost of one 35 lts and 3 lts LN2 container Rs.18,000/- (will be sourced from TNLDA)	0					
2	Cost of A.I. Gun, thawing flask and straw cutter Rs.1 000/- (will be sourced from TNLDA)	0					
3	Purchase of two wheeler and accessories	50000					
4	Cost of other equipments like centrifuge, castrator, etc.	14000					

5	Binocular Microscope	15000					
6	Purchase of furniture, etc	10000					
7	One time revolving fund for purchase of medicines	10000					
	Total	99000					
	RECURRING EXPENDITURE/UNIT	I Year	II Year	III Year	IV Year	V Year	Total cost (In Rs.)
1	Cost of straws @ Rs.15/straw at the rate of 2400/1st yr, 2700/2nd yr, 3000/3rd yr, 3360/4th yr & 3840/5th yr.	36000	40500	45000	50400	57600	229500
2	LN2 @ 250 Lit/year @ Rs.26/lit for I year and there after an increase of Rs.1/- per year	6500	6750	7000	7250	7500	35000
3	Cost of basic medicines, infusions and surgical items @ Rs.20,000/annum	20000	20000	20000	20000	20000	100000
4	Incentive for the veterinarian for each calf born @ Rs.25/- yr and there after an decrease of Rs.5/- per year	4000	19600	16500	12240	6880	59220
5	Miscellaneous Charges for chemicals, glasswares, etc.	10000	10000	10000	10000	10000	50000
	Total	76500	96850	98500	99890	101980	473720
	Recurring Expenditure for 5 years						473720
	Total (Recurring + Non-recurring)						572720

6.1.(g) The above endeavor will ensure that areas hitherto unserved are covered qualitatively by increased breeding cover via artificial insemination coverage, health cover by timely vaccination, deworming and treatment. This will ensure proper disease control and livestock with better genetic potentialities which will lead to increased productivity per animal thereby ultimately leading to better profits between farmers in the project area.

6.2 Improving the essential infrastructure in the Government institutions in the project area.

6.2. (a).1 Graduate Institutions: A good and well-equipped infrastructure is the key to an all round growth and development. There are 10 graduate veterinary institutions and 18 subcentres functioning under the Government fold in the project area. The infrastructure in the graduate veterinary institutions are being strengthened at a cost of Rs.33,000/- per Graduate Institution. The infrastructure that are to be added in each Graduate Institution are Mouth Gag, dentist autoclave, mastitis detector, etc. The 10 institutions will be strengthened at a cost of Rs.3.30 Lakhs.

6.2.(a).2 Mouth gag will help in better diagnosis, dentist autoclave will be handy which can be carried to field for sterilization of equipments, instruments used in routine Veterinary practice while mastitis detector will be useful for detection of sub clinical and clinical mastitis – a disease that causes reduction in milk yield, loss of productive days and prolonged recovery time. The animal does not achieve the peak productivity after mastitis, the early detection of which will prevent economic loss to the farmers. All these measures will help in effective delivery of veterinary services and early diagnosis and facilitate quality and timely treatment of ailments for the livestock in the sub basin area.

6.2.(b) Sub-centres: The infrastructure presently available to subcentres was provided 30 years back are old and needs replacement. It is proposed to provide essential equipments like castrators (large and small), dressing tray, scissors, forceps, wash basin, etc. to each sub centre in the project area at a cost of Rs.20,000/- per sub centre. Totally 18 subcentres in the project area will be provided with essential equipments at a total cost of Rs.3.60 lakhs.

6.2.(c) Strengthening Diagnostic Facilities in Sub-basin Referral Institution: Strengthening the diagnostic facilities in the sub basin by providing special diagnostic tools to one sub basin veterinary institution at a cost of Rs.3.00 lakhs, is also a part of the project. The institution will be designated as Referral Institution for the sub basin. The Veterinary Dispensary at Ilayangudi will be upgraded as the referral institution for the sub basin. In the identified referral institution, semi auto analyzer and accessories will be provided for ensuring complete timely blood analysis.

6.2.(d) Infrastructure improvement in the project area will enhance the quality of delivery in veterinary services and diagnostic facilities contributing to reduction in the incidences of animal diseases, thereby increasing the overall productivity, which can contribute significantly in increasing the farm income of the farmers.

6.3. Increasing availability of green fodder .

6.3.(a) Feed and fodder are the major limiting factors in enhancing farm animal productivity. In our country, fodder production is still deemed ancillary to agricultural production. The green fodder resources for livestock are mainly derived from grazing in grasslands and pastures, fodder crops from cropped lands, weeds, bund grasses, tree leaves and mixed forages. Crop residues mainly sorghum and paddy straws which are poor in nutritive value constitute the major fodder for livestock. The economic viability of livestock husbandry depends on sources of feed and fodder, as feeding cost constitutes 65-70% of the total cost of livestock farming. The availability of green fodder is restricted to selected areas and seasons. Green fodder should be fed throughout the year not only to maintain milk production but also for improving the conception rate. Moreover adequate availability of green fodder will reduce the dependence of farmers on concentrates.

6.3.(b) Generally small ruminants like sheep and goats are not stall-fed. They are allowed for grazing. Hence for calculation of green fodder, only the bovines are taken into account. In the project area a considerable gap exists between requirement and availability of green fodder.

6.3.(c) The requirement, availability and shortage of green fodder for the bovine population in the project area is furnished below.

	Sub basin	Bovine Population	Requirement (In MT)	Availability (In MT)	Shortage (In MT)	%age of Shortage
1	Kotta karaiyar	88535	273872	87500	186372	68%

Hence to reduce the green fodder shortage, around 170 hectares of additional land will to be brought under fodder cultivation in the sub basin area.

6.3.(d) Around 170 hectares of land earmarked for fodder cultivation in the private lands in the project area will be taken up for cultivation of Co3 and kolukattai grass. The farmers will be supplied inputs like seeds and slips. The cost of cultivation will be borne by the farmer. The Animal Husbandry Department will ensure supply of quality seeds and slips. The yield rate and cost of inputs is furnished below.

Sl. No.	Name of fodder	Avg. Yield per year (In tonnes)	Cost of inputs Per Hectare
1.	Co3	300	6,000
2.	Kolukattai	40	3,000

Village Panchayat wise fodder cultivation area proposed (In Hac.)

1.	Alagichipatti	10
2.	Thirumalai	10
3.	Kattanipattl	10
4.	Namanur	10
5.	Paganeri	10
6.	Okkurpudur	10
7.	Nattarasankottai	10
8.	Allur	10
9.	Sundaranadappu	10
10.	Keelakandani	10
11.	Ilayangudi	10
12.	Andakudi	10
13.	Melayur	10
14.	Sooranam	10
15.	Salaigramam	10
16.	Perumacheri	10
17.	Nalukottai	10
	Total	170

6.3.(e) The new area to be brought under fodder cultivation and the status of green fodder in the sub basin after implementation of the project is as follows.

Present Fodder Status :

Fodder maize @ yield rate of 50 tonnes/ha for 1100 ha (In MT)	Co3 @ yield rate of 250 M. tonnes/ha for 130 ha (In MT)	Total availability (IN MT)
55000	32500	87500

Fodder Availability Status after the end of project:

Year	Yield to be added (In MT)					Cost of inputs		
	Co3 fodder @yield rate of 250 tonnes/ha for 70ha @ 30 ha for 2yr, 30 ha for 3rd yr, 10ha for 4th yr	Kolukattai grass @ yield rate of 40 tonnes/ha for 100 ha @ 10 ha for 1st yr, 40 ha for 2nd & 3rd yr, 10 ha for 4th yr	Total Proposed Yield to be added	Total fodder available during the end of the year	shortage of fodder (In MT)	Co3 fodder @ Rs.6000 /ha	Kolu-kattai grass @ Rs.3000 /ha	Total Cost (In Rs.)
I Year	0	400	400	87900	185972	0	30000	30000
II Year	7500	1600	9100	97000	176872	180000	120000	300000
III Year	7500	1600	9100	106100	167772	180000	120000	300000
IV Year	2500	400	2900	109000	164872	60000	30000	90000
V Year	0	0	0	109000	164872	0	0	0

6.3.(f) By the above cropping pattern in the sub basin, the green fodder availability will be increased from 87500 MT to 109000 MT. In addition 45000 MT of green fodder will be available after the harvest of maize. So, totally 154000 MT of green fodder will be available at the end of the project. Ultimately the shortage will be 119872 MT. The above shortage will be met by allowing the animals to graze in the tank bunds, Common Property Resources, etc.

6.4 Improving the knowledge level of the farmers by various out reach programmes.

6.4.(a) The success of the project depends on effective dissemination of information to the field in improving the knowledge level of the farmers on best and latest animal husbandry practices, emerging new diseases and their control and optimum utilisation of fodder resources by various out reach programmes.

The out reach programmes planned in the project area are:

1. Infertility cum Total Veterinary Health Care camps.
2. Distribution of mineral mixture
3. Information, education and communications campaigns.

6.4.(b) *Infertility cum Total Veterinary Health Care camps.*

6.4.(b).1. Under this programme, infertility cum total health cover both preventive and curative will be provided to all livestock and poultry by conducting special camps in each sub -basin Veterinary Unit service area at the rate of one camp per unit per month for 5 years. In these camps, various activities like health care, disease prevention vaccination against endemic diseases, deworming, castration, artificial insemination, pregnancy verification, infertility treatment, etc. will be carried out free of cost. An exhibition depicting various livestock diseases

and preventive measures, fodder development measures, calf rally along with demonstration will also be conducted for creating awareness among the farmers.

6.4.(b).2. Prior wide publicity will be given regarding the village where the camp is to be conducted in the village and near by villages. In addition, the day and place where the camp is to be conducted will be displayed in the Water Users Association building. The services of the veterinarians and para-veterinarians working in the Animal Husbandry Department in the sub basin area will be utilised for conducting the camps. A calf rally will be organised in the camp and best calf / calves will be given prizes which will act as motivation for other farmers. During the camps, pamphlets and leaflets on best and latest animal husbandry practices, emerging new diseases and their control and optimum utilisation of fodder will be distributed.

6.4.(b).3. Each camp will be conducted at a cost of Rs.6,000/-.

Sl. No.	Component	Cost in Rs.
1.	Medicines	3,500
2.	Cost of 50 straws for artificial insemination	750
3.	Publicity and Propaganda	500
4.	Distribution of prizes in calf rally	500
5.	Miscellaneous charges like erection of shamina, etc., for conducting the camp	750
	Total	6,000

6.4.(b).4. Apart from total health cover the camp is expected to achieve, it will help in identifying animals affected by infertility due to mineral deficiency. The total financial cost for this component for 5 years is Rs.7.20/- lakhs.

6.4.(c). Distribution of mineral mixture.

6.4.(c).1. One of the major problems affecting conception is infertility. The major causative factor for infertility in the field is mineral deficiency. Hence to correct this deficiency, which is the vital factor affecting conception and calving, it is proposed to distribute mineral mixtures to needy animals in the project area.

6.4.(c).2. The sub basin veterinary extension officer visiting the villages on the scheduled programme will select the eligible animals during the visit. In addition animals will also be identified during the infertility cum total health cover camps. The eligible animals will be given mineral mixture @ 25 gms per day for 365 days. The sub basin veterinary extension officer will maintain the data of eligible animals covered under this programme and ensure examining the animals regularly for growth parameters. The sub basin wise cost required for distribution of 25 gms. of mineral mixture for 365 days to 100 animals at a cost of Rs.40/- kg per sub basin veterinary extension officer for 5 years is 1.825 lakhs. For 2 units, 3.65 lakhs would be required for this component.

6.4.(c).3. By this the animals will come to estrum early and lead to better conception and calving rates. Moreover this will lead to reduction in inter-calving period there by increasing the productive life of the animal.

6.4.(d). Information, education and communications campaigns

6.4.(d).1. Printing of Pamphlets and leaflets.

Pamphlets and leaflets on best practices in animal husbandry, biosecurity measures to be taken to prevent diseases, economic diseases affecting livestock and their prevention and control measures, optimum utilisation of fodder resources with emphasis on inclusion level of non conventional feeds, etc. will be printed in Tamil for distribution to the farmers in the project area.

6.4.(d).2. Erection of hoardings and wall paintings in the project area.

Posters, hoardings and banners carrying the activities undertaken in the project area will be displayed in all Sub basin Veterinary Units. The same will also be displayed in all Government institutions functioning in the project area. In addition wall paintings depicting signs of commonly affecting diseases will be painted on walls where people congregate in large numbers

6.4.(d).3. Conducting Night meetings

6.4.(d).1.a. Night meetings will be conducted involving the Water Users Association, Animal Husbandry Department and Sub basin veterinary Extension Officer at a common place in the sub basin on a suitable day in each Sub basin Veterinary Unit and Graduate institution area at the rate of one per quarter. The meeting not only enables participation of all the farmers in the sub basin but also acts as a source of information to other farmers.

6.4.(d).1.b. During the night meetings, village people will be enlightened on benefits of rearing livestock and will be motivated to take up livestock rearing. Pamphlets and leaflets will be distributed to the farmers. A small exhibition and method demonstration will be organised for the benefit of the farmers. The services of link agencies like Tamilnadu Veterinary and Animal Sciences University and Tamilnadu Milk Producers Cooperatives Union will be utilised where ever necessary. In the night meetings successful animal husbandry entrepreneurs in the village and neighboring villages will be requested to share their views on their methodology followed for their success.

6.4.(d).4. All the above Information, education and communications campaigns will be conducted in the sub basin at a total cost of Rs.6.60 lakhs.

6.5. Enhancing the knowledge level of human resource in the project area.

Continuing education is the touchstone of success. The project envisages capacity building at all levels like farmer, veterinarian, para-veterinarian operating in the sub basin to achieve the desired results of increased sustainable productivity at the end of the project.

6.5.(a). Training of Farmers

6.5.(a).1. Farmers generally have a traditional knowledge of breeding and management of livestock. The existing awareness, knowledge level and skill in profitable rearing of livestock with latest animal husbandry techniques among majority of farmers are minimum in the project area. Hence it is essential to impart training to upgrade the skills and knowledge level for profitable animal husbandry rearing.

6.5.(a).2. Under this programme, elite farmers interested in animal husbandry activities will be selected and given training on best practices in livestock rearing. They will also be enlightened on importance of feeding and cultivation of fodder crops. Emphasis will be given to enlighten the farmers on feeding of unconventional feeds and their inclusion level. Moreover they will be briefed about the diseases generally affecting the livestock in the basin and their symptoms and control measures. In addition they will be enlightened on the importance of deworming, vaccination and clean milk production. The farmers trained will be utilised for dissemination of the above information to their counterparts in the villages.

6.5.(a).3. For the above purpose, progressive farmers @ 400 per year interested in animal husbandry activities in the sub basin will be selected for 3 day training. They will be divided into batches of 25 per batch. Training will be provided in the nearest veterinary institution. They will be given a training incentive of Rs.100/day as they will have to attend the training programme foregoing their normal daily earning. During the training, each trainee will be given study material

worth Rs.50/-. To motivate the trainer, a trainer honorarium of Rs.250/- per day will be provided. In addition miscellaneous charges of Rs.500/- will be provided for each batch. A total cost of Rs.10,000/- will be required for training each batch. During the project period of 5 years, a total of 2000 farmers (80 batches of 25 farmers per batch) in the sub basin will be trained at a cost of Rs.8.00 lakhs.

6.5.(b). *Entrepreneurship Training to unemployed Veterinary Graduates :*

3 Unemployed Veterinary Graduates are to be trained for the Kottakaraiyar Sub basin. 2 River basin veterinary units are proposed in the sub basin area. One unemployed Veterinary graduate is trained additionally for the future in case there is any drop out. The entrepreneurship training is given to the unemployed veterinary graduate for sustainable animal husbandry activities.

6.5.(c). *Orientation Training for Rural Veterinary Extension Officers*

6.5.(c).1. Though the sub basin veterinary extension officers are basically veterinarians who may possess a sound theoretical knowledge on animal husbandry and veterinary treatment, their field experiences and exposure may be minimum. To attain the desired field results in a short term, it is essential to know the terrain and problems faced by the farmers in the basin. Hence 5 days orientation training is proposed for the sub basin veterinary extension officer selected to work in the Sub basin Veterinary Unit.

6.5.(c).2. Training will be provided to each Sub basin Veterinary Extension Officer in the nearest veterinary institution in the sub basin which will be identified by the Regional Joint Director and Assistant Director of Animal Husbandry of the concerned jurisdiction. They will be given a training incentive of Rs.150/day. During the training, each will be given study material worth Rs.100/-. To motivate the trainer, a trainer honorarium of Rs.500/- will be provided. A total cost of Rs.1,350/- will be required for training each Sub basin Veterinary Extension Officer. Thus in the project area to train 2 Sub basin Veterinary Extension Officers, Rs.2700/- would be required.

6.5.(d). *In-service Training for 10 Veterinarians*

6.5.(d).1. Veterinarians have an overall knowledge of breeding, management, diagnosis and treatment of livestock. With advancing science and technology, the techniques followed may have become obsolete. Moreover, new and simple techniques have evolved in animal husbandry management, breeding, diagnosis and treatment. Hence it is essential to update the knowledge and skills of the veterinarians in Government institutions in the project area.

6.5.(d).2. The 10 veterinarians working in the Government institutions in the sub-basin will be given a trainers training at Madras Veterinary College / Namakkal Veterinary College at a cost of Rs.2000/- per individual. The total cost for training the 10 veterinarians in the sub-basin would be Rs.20000/-

7. Ensuring marketing tie up for the products.

With the rapid urbanisation, changing life styles and increasing purchasing power of the people, the demand for livestock and livestock products is expected to rise steadily. Hence marketing the livestock and livestock products in the sub basin will not be a major problem.

KOTTAKARAIYAR SUB BASIN

The breedable age female population in the Kottakaraiyar Sub Basin is 3 6014 which include 17999 crossbred, 16138 indigenous cattle and 1877 buffaloes.

ASSUMPTIONS:

- 1) Available breedable female population in the basin after reducing for mortality, sterility etc., at the rate of 15% in crossbred, 5 % in indigenous and 5 % i n buffaloes, there will be 15299 crossbred, 15331 indigenous and 1783 buffaloes.
- 2) At present there are 10 Graduate Veterinary Institutions and 18 Sub centres functioning under Government fold doing artificial insemination work of which 5 Graduate Veteri nary Institutions and 5 subcentres are vacant.
- 3) The above Government Institutions have carried out an average artificial insemination of 6110 in crossbred, 9160 in indigenous and 300 in buffaloes.
- 4) Assuming 2.8 (35%) inseminations are required for consumption in cattle and 3.3 (30%) inseminations are required for conception in buffaloes, the actual animals covered is 2182 crossbred, 3271 indigenous and 91 buffaloes.
- 5) Thus the breedable age female population unserved by the Government institutions is 13117 crossbred, 12060 indigenous and 1692 buffaloes.
- 6) For of the above animals unserved, two sub basin veterinary units will be established in the sub basin each covering around 28 villages.
- 7) During the first year 2,400, second year 2,700, third year 3,000, 4th ye ar 3,360, 5th year 3,840 and from then on 3,840 artificial inseminations will be done by each sub basin veterinary unit.
- 8) It is assumed that 45% crossbred (2160), 50% indigenous (2400) and 5% (240) buffaloes will be targeted by the above two units during th e first year.

Yearwise Number of animals targeted

Year	AI done by the unit (45% crossbred,50% Indigenous,5% buffalo)		
	Crossbred	Indigenous	Buffalo
I Year	2160	2400	240
II Year	2430	2700	270
III Year	2700	3000	300
IV Year	3024	3360	336
V Year	3456	3840	384

- 9) The conception rate for the Sub basin veterinary unit is as follows:

Year	Conception Rate in Cow	Conception Rate in Buffalo
1st year	35% (2.8)	30% (3.3)
2nd year	40% (2.5)	35% (2.8)
3rd year	45% (2.2)	40% (2.5)
4th year	50% (2.0)	45% (2.2)
5th year	50% (2.0)	50% (2.0)

- 10) Taking a conception rate of 35% for cattle and 30% for buffalo during the first year, the actual animals covered by the unit will be 857 crossbred, 686 indigenous and 145 buffaloes.

Year	Yearwise Number of animals covered		
	Crossbred	Indigenous	Buffalo
I Year	771	857	73
II Year	972	1080	96
III Year	1227	1364	120
IV Year	1512	1680	153
V Year	1728	1920	192

- 11) By the work done by these two units during the first year, out of the total 1628 cattle (771 crossbred 857 indigenous) conceived, 50% (814) heifer calves will be born. Similarly out of 73 buffaloes, 37 buffalo heifer calves will be born.

Year	Yearwise Number of heifer calves born	
	Crossbred	Buffalo
I Year	814	37
II Year	1026	48
III Year	1296	60
IV Year	1596	77
V Year	1824	96

- 12) Now calf mortality is taken as 5% for crossbred and 10% for buffaloes. Therefore out of the 814 crossbred heifer calves, 41 will be lost. Similarly out of 37 buffalo calves, 4 will be lost during the first year.

Year	Yearwise Number of heifer calves lost	
	Crossbred	Buffalo
I Year	41	4
II Year	51	5
III Year	65	6
IV Year	80	8
V Year	91	10

- 13) The actual crossbred animal in milk created in the sub basin by intervention by these units during first year will be 1628 (771 Crossbred plus 857 Indigenous cattle). Similarly 73 buffaloes will be in the milk.

Year	Yearwise Number of animals in milk		
	Crossbred	Indigenous	Buffalo
I Year	771	857	73
II Year	972	1080	96
III Year	1227	1364	120
IV Year	1512	1680	153
V Year	1728	1920	192

- 14) The average milk yield in the project area will be increased to 7 litres in crossbred, 3.6 litres in indigenous and 5.2 litres for buffaloes.
- 15) During the first year, the total milk yield in the sub basin by intervention by these units will be 14.11 lakh litres by crossbred (assuming 6.1 lts. is the average yield), 6.96 lakh litres (assuming 2.9 lts. is the average yield) by indigenous and 1.01 lakh litres (assuming 4.6 lts. is the average yield) by buffalo.

Year	Average Milk Yield/day (In Lts.)			Total Milk Yield/ lactation (In lakh Lts.)		
	Crossbred	Indigenous	Buffalo	Crossbred (300 days lactation)	Indigenous (280 days lactation)	Buffalo (300 days lactation)
I Year	6.1	2.9	4.6	14.11	6.96	1.01
II Year	6.3	3.1	4.8	18.37	9.37	1.38
III Year	6.5	3.3	5.0	23.93	12.60	1.80
IV Year	6.7	3.5	5.1	30.39	16.46	2.34
V Year	7.0	3.6	5.2	36.29	19.35	2.99

- 16) Thus the value of milk in the sub basin will be Rs.200 lakhs during the first year (cost of cow milk is Rs.9/- and buffalo milk is Rs.10/-).

Year	Value of Milk (In lakh Rs.)			
	Crossbred	Indigenous	Buffalo	Total
I Year	127	63	10	200
II Year	165	84	14	263
III Year	215	113	18	346
IV Year	274	148	23	445
V Year	327	174	30	531

- 17) Thus economic return at the end of the project by way of milk will be Rs.531lakhs, an increase of Rs.331 lakhs.

18) The cattle heifer calves born during the first year is brought into breeding stock during the 3rd year. Similarly in buffalo 1st year heifer calves is brought into 4th year breeding stock.

Year	Yearwise Female Breeding stock created		
	Crossbred	Indigenous	Buffalo
I Year	13117	12060	1692
II Year	13117	12060	1692
III Year	13890	12060	1692
IV Year	14865	12060	1725
V Year	16096	12060	1768

19) The main advantages of the programme

- ☞ Provides service at the farmer's doorstep or nearest to the farmer's doorstep.
- ☞ Increased coverage
- ☞ Better conception rate
- ☞ Reduced stress to the animals
- ☞ Timely treatment
- ☞ Reduced recovery time from illness
- ☞ Ensuring coverage of animals with vaccination and deworming
- ☞ Saving the man hours of the farmers
- ☞ Genetic potential improvement (crossbred)
- ☞ Timely artificial insemination, thereby not only increasing conception and calving rate, but also reducing the inter-calving period.
- ☞ Timely artificial insemination and calving, leads to more production days during the productive life cycle of the animal.
- ☞ Reducing scrub bulls born out of natural service.
- ☞ Avoiding diseases like Trichomonosis, brucellosis, etc., affecting the uro-genital tract of females, leading to abortion, sterility, etc., when the animals are put into natural service.
- ☞ For natural service, the chance of the same bull serving the mother and dam is higher which may lead to inbreeding, but if frozen semen is used, the semen can be rotated nullifying the chances of inbreeding.
- ☞ Increasing the per animal milk production potential, leading to a substantial increase in milk production
- ☞ Increasing the farmers income through animal husbandry.

OUTCOMES EXPECTED

Sl. No.	Project Year	I Year	II Year	III Year	IV Year	V Year	Total
1	Artificial Insemination Done (In Nos.)	4800	5400	6000	6720	7680	30600
2	Calves Born (In Nos.)	1700	2148	2710	3346	3840	13744
3	Heifer calves born (In Nos.)	850	1074	1355	1673	1920	6872
4	Milk Yield (In lakh Lts.)	22.08	29.13	38.33	49.20	58.64	197.38
5	Value of Milk (In Lakh Rs.)	200	263	346	445	531	1785

Note: Out of the total value of milk, 70-75% will be the cost of inputs like feed, fodder, healthcare etc.,

**ESTIMATE FOR ANIMAL HUSBANDRY COMPONENT TO BE INCLUDED IN IAMWARM
PROJECT REPORT**

KOTTAKARAIYAR SUB BASIN

	Components	Physical	Financial (In Lakhs)
1	Productivity enhancement by improving delivery of veterinary services		
	<i>a. Establishment of Sub basin Veterinary Units (SBVU) @ Rs.5,72,720/- per unit</i>	2	11.45
	<i>b. Improving the essential infrastructure in the Government institutions (graduate institutions) @ Rs.33,000/-unit</i>	10	3.30
	<i>c. Improving the essential infrastructure in the Government institutions(subcentres) @ Rs.20,000/-unit</i>	18	3.60
	<i>d. Strengthening the diagnostic facilities in the sub basin by providing special diagnostic tools to sub basin referral institutions @ Rs.3,00,000/- per unit</i>	1	3.00
2	Increasing availability of green fodder in private lands (in hac) Kolukattai grass - 100 hac; Co3 - 70 hac.		7.20
3	Out reach programmes.		
	<i>a. Infertility cum Total Veterinary Health Care camps @ Rs.6,000 per camp per month for each SBVU</i>	120	7.20
	<i>b. Distribution of mineral mixture @ Rs.1,82,500 per SBVU</i>	2	3.65
	<i>c. Information, education and communications campaigns</i>	12	6.60
4	Enhancing the knowledge level of human resource		
	<i>a. Training of Farmers</i>	2000	8.00
	<i>b. Enterpruneship training to 31 unemployed veterinary graduates to be placed as Sub basin Veterinary Extension Officer @ Rs.50,000/- per person</i>	3	1.50
	<i>b. Orientation Training for Sub basin Veterinary Extension Officers @ Rs.1,350/- trainee</i>	2	0.03
	<i>c. In-service Training for Veterinarians @ Rs.2,000/- per person</i>	10	0.20
			55.73

Tamil Nadu Agricultural University



Irrigated Agriculture Modernization and Water Resource Management

Sub basin Plan – Kottakaraiyar TNAU component

**Nodal Officer (IAMWARM)
Director
Water Technology Centre
TNAU, Coimbatore-3**

Irrigated Agriculture Modernization and Water Resource Management (IAMWARM)
TNAU component –Kottakaraiyar Sub Basin

a. About The Institute

- Agricultural College and Research Institute, Madurai (AC & RI) is a constituent college of Tamil Nadu Agricultural University, Coimbatore. The Agricultural College and Research Institute was started at Madurai in 1965 to provide agricultural education to aspirants in southern districts of Tamil Nadu
- The college is situated at twelve kilometers away from the Madurai City on Madurai - Trichy National Highway. The college is the second biggest campus of TNAU with an area of 154.14 hectares.
- Agricultural College and Research Institute, Madurai was adjudged as the best College among Tamil Nadu Agricultural University for the year 2002.
- The major strength of this institute are viz.,
 - Released 5 Paddy varieties - among that MDU 5 is famous in the dry tracts of southern Tamil Nadu.
 - One KVK is exclusively functioning for catering the farmers of southern Tamil Nadu.
 - One Home science college is offering courses and trainings for value addition and women empowerment.
 - All India coordinated water management project is functioning for the past 30 years and is undertaking exclusive water management and OFTs in farmers field.
 - Excellent Laboratories in different disciplines of Agriculture

Technology developed and their present status

It is clearly indicated that seasonal stress coupled with soil stresses play a major role in choice of short duration varieties like PMK (R) 3 I RMD (R) 1, MDU 5 etc. The latest trend of the farmers is that they do not prefer medium duration varieties because the rainfall received is not sufficient throughout the crop period to get optimum yield. The scanty rainfall received during September is just sufficient for seed germination and seedling growth for a short period and subsequently a dry spell of 30 -40 days prevails. The local land races are able to recover and regenerate quickly after the receipt of north -east monsoon rains, but the yield was found to be less (1 - 2 tonnes/ha.). Presently the latest rice variety PMK (R) 3 is said to be a high yielding variety over the existing local genotypes always gives better yield (3.5 to 4 tonnes/ha) under stress conditions. Besides the extra early (85 - 90 days) pre release cultures Viz., PM 03 002, PM 02 015 are also found to be promising under OFT during severe drought conditions.

Crop Improvement

PMK 1 RICE

- ✓ Drought tolerant and non-lodging
- ✓ Matures in 120 -125 days
- ✓ Best suited for semi-dry Condition
- ✓ Yield: 2650 kg/ha under moisture stress conditions

PMK 2 RICE

- ✓ Matures in 110 - 115 days
- ✓ Drought tolerant and non-lodging
- ✓ Tolerant to water inundation
- ✓ Grain yield: 3200 kg/ha under rainfed condition
- ✓ Suitable for both dry and semi-dry systems of cultivation

PMK (R) 3 RICE

- ✓ Matures in 105-110 days.
- ✓ Higher productivity (3.2-3.5 Uha- 13 % higher yield than PMK 2)
- ✓ Suitable for direct seeding in Rainfed cultivation

- ✓ Drought tolerant
- ✓ Semi dwarf, non lodging and non shattering
- ✓ Long bold white rice
- ✓ Tolerant to blast and sheath rot
- ✓ Suitable for Ramanathapuram and Sivagangai districts.

PMK 1 CHIILLI

- ✓ Suitable for rainfed conditions
- ✓ Yield: 2400 kg dry pods per hectare (53% increased yield over the local)
- ✓ Duration: 200 days
- ✓ Conical fruits with attractive red colour
- ✓ Fruits contain 0.36% capsaicin

CROP MANAGEMENT

- ✓ Thirty ninth standard week found to be (Second fortnight of September) suited for direct sowing of rice in Ramnad District
- ✓ Pre-emergence application of Sofit @ 1.2 litre/ha is most effective in controlling weeds in rainfed paddy
- ✓ Pre-emergence application of Basalin @ 2.5 litre./ha is most effective in controlling weeds in rainfed chilli
- ✓ Application of 50: 25: 25 Kg/Ha. Of NPK along with enriched FYM @ 750 Kg/ha and 4 kg (20 pkts) each of Azosprillum and Phosphobacteria found to be good for attaining higher yield under semi-dry paddy
- ✓ During aberrant weather situations cultivation of maize, ragi, kudiraivali are found to be alternative remunerative crops for rainfed condition

CROP PROTECTION

- ✓ Neem oil 1 % or neem cake extract 5% was effective in controlling chilli aphids
- ✓ Dimethoate 0.03% or neem oil 1 % or neem cake extract 5% was effective in controlling chilli thrips
- ✓ Dicofol 0.03% or Phosalone 0.07% was effective in containing yellow mites in chilli
- ✓ Ethanolic and Hexane extract of Neem Seed Kernel were effective at 1 % in controlling aphids and thrips in Chilli
- ✓ Basal application of neem cake @ 100 kg/ha, release of *Trichogramma chilonis* @ 5 cc/ha on 40,47,54 and 61 DAS and *T. japonicum* on 67,74,81 and 88 DAS and spaying NSKE 5% at 50% ETL controlled the major pests of Semidry Paddy

b. About the sub basin:

Kottakkaraiyar is one of the sub basin in Pambar-Kottakkaraiyar basin which is located in between Agniyar basin in the North and Vaigai basin in the south. This sub basin is a rapid, wide and old system and comprises of flood carriers such as Nattarkal river, Nattar supply channel and Subbankal. The Nattarkal river is formed by the surpluses of Alankulam, Kandani Kanmoy and Velangai Kanmoy and found located near kandani village of Sivagangai. The length of river is 24 km and it passes through Akkavayal and Viswanur tank and finally to RS Mangalam Big tank. Nattar river joins with Saruganiar near Marudhavayal.

The Kottakkaraiyar sub basin extends over a total area of 1427.20 sq. km covering the districts of Madurai, Sivagangai and Ramnad. It lies in between 78 ° 23' 43" E to 79 ° 1' 12.5" E longitude and 9 ° 29' 20" N to 9 ° 55' 00" N latitude.

Current area

Total registered ayacut	-17, 424 ha
Fully irrigated area	- 4, 988 ha
Partially irrigated area	- 9, 434 ha
Gap	- 3, 002 ha

Climate

The Climatological features are tabulated below:

- **Annual average rainfall is 878 mm.**

S.No.	Average climatological factors	S.W Monsoon	N.E Monsoon	Winter	Summer
1.	Monthly Temperature in °C	30.8	26.7	26.5	31.2
2.	Relative Humidity in %	72.5	80.3	78.2	73.3
3.	Wind Speed in kmph	9.8	4.5	4.1	5.2
4.	Sunshine hrs/day	6.0	5.6	8.8	8.6

Soil Type

S.No.	Taluk	Soil Type	Major soil series
1.	Sivaganagai	Red	Kallal, Singampunari, Nerupugapatti, Sembanoor,
2.	Ilayankudi	Red	Sembanoor, Hanumanthakudi, Milaganur, Tiruppuvanam

Cropping Pattern

Sl.No	Name of the crop	WITHOUT PROJÉT				WITH PROJECT			
		FI	PI	RF	Total	FI	PI	RF	Total
I	ANNUAL								
1.	Sugarcane	0	960	0	960	1000	0	0	1000
2.	Banana	40	20	0	60	100	0	0	100
3.	Fodder	0	30	0	30	100	0	0	100
	Total	40	1232	0	1272	1562	0	0	1562
II	PERENNIAL								
1.	Coconut	0	100	0	100	150	0	0	150
2.	Mango	0	70	0	70	100	0	0	100
3.	Sapota	0	0	0	0	30	0	0	30
4.	Amla	0	20	0	20	50	0	0	50
5.	Guava	0	32	0	32	32	0	0	32
	Total	0	222	0	222	362	0	0	362
III	Ist Season								
1.	Paddy	4948	5412	1500	11860	10662	0	0	10662
2.	Maize	0	100	0	100	1000	0	0	1000
3.	Bhendi	0	240	0	240	500	0	0	500
4.	Tomato	0	25	0	25	100	0	0	100
5.	Brinjal	0	100	0	100	250	0	0	250
6.	Watermelon	0	25	0	25	50	0	0	50
7.	Chillies	0	2000	0	2000	2800	0	0	2800
8.	Groundnut	0	300	200	500	500	0	0	500
	Total	4948	8202	1700	14850	15862	0	0	15862
9.	Fallow	0	0	1302	1302	0	0	0	0
	Grand total	4988	9434	3002	17424	17424	0	0	17424
IV	IInd Season								
1.	Cotton	0	600	0	600	0	700	0	700
2.	Gingelly	0	50	0	50	0	60	0	60
3.	Groundnut	0	30	0	30	0	50	0	50
4.	Pulses	0	400	0	400	0	580	0	580
5.	Bhendi	0	0	0	0	40	0	0	40
	Total	0	1080	0	1080	40	1390	0	1430
	Grand Total	4988	10514	1700	17202	17464	1390	0	18854
	Cropping Intensity (%)				98				108

c. Objectives

- ◆ To promote water saving technologies (SRI / Drip) in agriculture and horticultural crops for large scale adoption
- ◆ To enhance crop and water productivity
- ◆ To increase the cropped area by diversification
- ◆ To converge with WRO and other line department s in over all improvement in total farm income

d. Issues

Rice

- Low yield due to use of traditional cultivars and low water use efficiency
- Improper use of nutrients
- Poor population maintenance
- Non adoption of SRI in paddy

Groundnut

- Poor yield due to improper nutrient management in rainfed condition
- Problem of pest and diseases
- Poor population maintenance

Sugarcane

- Wide spread iron deficiency
- Borer and red rot incidence
- Improper nutrient management and traditional varieties
- Non adoption of drip fertigation for sugarcane

Maize

- Less area in maize

Counter measures proposed

- SRI
- Improved production technologies in Groundnut
- Drip fertigation in Sugarcane
- Improved crop production technologies for maize

I. PROJECT MODE ACTIVITIES

1. Technologies for transformation

a. Improved crop production technologies for Maize

Objective:

Popularising improved crop production technologies with maize hybrid Co H -4

Technology

Maize is an alternate crop for the areas in which the water scarcity is a common problem. Since the farmers cultivating private hybrids with higher seed cost, there is a need to introduce TNAU hybrids in this sub basin

Special features of CO-H (M) 4

Minimum water requirement (650 mm)

Shorter duration (95-100 days)

Higher yield @ 6.25 t/ha

Suited for both irrigated and rainfed

Justification

Maize is introduced in Kottakaraiyar under diversification in an area of 2000 ha. To popularize and familiarize the technologies TNAU introduces demonstration for 150 ha.

Linkage

The water Resource Organization will rehabilitate the tanks and increase the water availability in the tanks. The gap area will be brought under irrigation with low water requirement crop maize.

Sl. No.	Technology	Area (ha)	Unit cost	Budget Rs.(lakhs)	Location
I.	Improved production technologies in Maize	150	Rs. 6000/ ha	9.00	Attached in Activity chart
	Field days for 3 years		Rs.10000/yr	0.30	

Justification for the unit cost

Sl.No	Particulars		Amount in (Rs.)
1	Hybrid Seed cost with seed treating chemicals (25kg/ha) @ Rs. 80 /kg	:	2000.00
2	Cost of fertilizers (150:75:75 kg NPK / ha)	:	0
	Urea - 330 kg @ Rs. 5 / kg	:	1650.00
	Super Phosphate - 469kg @ Rs. 4 /kg	:	1875.00
	Muriate of Potash - 83 kg @ Rs.4.75/ kg	:	394.25
	Cost of Bio fertilizer	:	0
	Azospirillum and Phospho bacteria @ 10 pockets each	:	120.00
	Total cost		6039.25

b. Improved crop production technologies for Groundnut

Objective

Popularizing the improved technologies like adoption of seed drill, groundnut stripper in Groundnut

Justification and Linkage

Micro irrigation is provided for 500 ha of groundnut by Agricultural engineering department. Demonstrating the usefulness of the machineries like seed drill and stripper in these areas will result in the cumulative effect on the yield. Based on that TNAU introduces demonstration of 50 ha in which 2 seed drills and 2 groundnut strippers will be purchased and handed over to 2 associations in Thayamangalam tank and Marakkathur tank and to Keelayur - Melayur WUA (SVG 45).

Sl. No.	Technology	Area (ha)	Unit cost	Budget Rs.(lakhs)	Location
I	Improved production technologies in Groundnut	50	Rs. 6500/ha	3.25	Attached in Activity chart
	Tractor drawn seed drill- 2 Nos - Groundnut stripper-2 Nos			0.80	Marakkathur tank
	Field days for 3 years		Rs.10000/year	0.30	-

Justification for the unit cost

Sl.No	Particulares	Amount in (Rs.)
1	Seed cost with seed treating chemicals (125kg/ha) @ Rs. 40 /kg	5000.00
2	Soil application of Trichoderma viride 2.50 kg @ Rs. 150 /kg	375.00
	Gypsum application @ 400 kg/ha @ Rs. 1.50 /kg	600.0
3	Micronutrient spray	0
	(DAP - 2.5 kg, Ammonium sulphate – 1 kg, Borax – 500g and Planofix – 375 ml) @ Rs. 200/ spray for 3 sprays	600.00
	Total cost	6575.00

Budget for technology transformation

Sl. No.	Technology	Area (ha)	Unit cost	Budget Rs.(lakhs)	Location
I.	Improved production technologies in Maize	150	Rs. 6000/ ha	9.00	Attached in Activity chart
	Field days for 3 years		Rs.10000/yr	0.30	
II	Improved production technologies in Groundnut	50	Rs. 6500/ha	3.25	Attached in Activity chart
	Field days for 3 years		Rs.10000/year	0.30	-
	Tractor drawn seed drill- 2 Nos - Groundnut stripper-2 Nos			0.80	Marakkathur tank
Total				13.65	

c. Model village concept

The main objective of this activity is to promote the concept of conservation of natural resources such as soil and water. Adoption of organic farming and IFS are the practices to achieve this concept. Besides demonstration of water saving irrigation practices, aid in conservation of irrigation water. Keeping these aspects in view under IAMWARM project TNAU adopts one village in each basin and will demonstrate the sustainable agricultural practices in an area of 20 ha.

Name of the tank: Emanaswar am Tank

Crop/Technology	Area Proposed	To cover	Unit cost /ha	Budget Rs. in lakhs
Supply of quality seed				
1. Rice	50 ha	3000 ha	600	0.30
2. Groundnut – VRI 2	20 ha	200 ha	5000	1.00
Demonstration of technology				
Organic farming , IFS in rice & improved water management practices	20 ha		5000	1.00

Soil Testing

Soil testing to issue soil health card for 1000 farmers - 0.50 lakhs

d. On farm demonstration and skill development

Details	Duration (Days)	No / Batch	Total Batch	Budget / Batch	Total (Lakh)
SRI techniques	1	50	5	20000	1.0
New improved cultivation techniques for groundnut	1	50	2	20000	0.4
New improved cultivation techniques for Maize	1	50	2	20000	0.4
Soil sampling techniques	1	50	2	20000	0.4
Drip irrigation and fertigation	1	50	2	20000	0.4
Farm mechanization in groundnut cultivation	1	50	2	20000	0.4
Training to labours on SRI transplanting	1	100	5	10000	0.5
Total					3.50

Venue: Agricultural College and Research Institute, Madurai and KVK Madurai**II. MISSION MODE ACTIVITIES****Transformation technologies for large scale adoption****a. Mission mode on sugar cane fertigation**

The productivity of water is the inter-dependent relationship between the amount of water used and the economic yield realised, which is also termed as Water Use Efficiency (WUE) at different levels. The productivity of water could be increased in field level either by reducing the water requirement without detrimental effect on yield or by increasing the production per unit water by controlling loss of water through conveyance, distribution, application, seepage, percolation *etc.*, Micro irrigation techniques like drip irrigation in sugarcane improves the Water Use Efficiency

Technology

Pit diameter – 3 feet

Depth – 11/4 feet

Distance – 5 feet

Lateral spacing – 3 m

Micro tube with on line drippers 8 lph

Justification and Linkage

Totally 1000 ha of sugarcane will be covered in post project period. The department of Agricultural Engineering providing drip 325 ha. Under mission mode TNAU covers 200 ha under drip fertigation.

Water saving 30 %

Yield increase 20%

S.No	Particulars	Project cost (50 % of drip cost)	Budget (Rs. in lakh)
Budget For Mission Mode I- Sugarcane fertigation (200 ha)			
1	Cost of drip fertigation system	58.00	116.00
2	Cost of nutrients @ 5500/ha		11.00
	Sub Total A		127.00

Justification for the unit cost

Sl.No	Particulars		Amount in (Rs.)
1	Drip system	:	58000.00
2	Fertigation		
	Urea 597kg @ Rs. 5 /kg	:	2985.00
	Super Phosphate 400 kg @ Rs. 4 /kg		1600.00
	Muriate of Potash – 187 kg @ Rs.4.75/ kg	:	890.00
	Micro nutrient mixture and biofertilizers		200.00
			5675.00

b. System of Rice Intensification

Objectives

1. To minimize the usage of water
2. To improve the productivity of rice and enriching the soil
3. To obtain higher net return

Technology

Scientific management technique of allocating irrigation water based on soil and climatic condition to achieve maximum crop production per unit of water applied over a unit area in unit time is very much essential under present condition. System Rice Intensification (SRI) is one among the scientific management tool. Under conventional system of rice cultivation the rice yield will be low due to poor weed management increases competition among crop and weeds, Poor aeration affects the root activity and tiller production and Poor water management increases the water requirement. SRI does not require the purchase of new seeds or the use of new high-yielding varieties and SRI dose require skillful management of the factors of production and at least initially, additional labor input – between 25 and 50% particularly for careful transplanting and for weeding. Square planting ensures Rotary weeder operation in either direction. Rotary weeder operation incorporates the weed biomass and aerates the soil for better root activity and tillering. Efficient water management reduces the irrigation water requirement.

As farmers gain skill and confidence in SRI methods, labor input decreases and can eventually become the same or even less compared with conventional rice-growing methods.

The SRI technique has the following features

- ❖ Young and robust seedling (14-15 days)
- ❖ One seedling per hill
- ❖ Square planting under wider spacing (22.5 x 22.5 cm)
- ❖ Rotary weeding up to 40 days at 7-10 days interval.
- ❖ Irrigation after the disappearance of ponded water
- ❖ “N” management through Leaf Colour Chart

SRI technique has the following advantages

- Saving of seed material 50-65 kg /ha.
- Saving of 300-400 mm of irrigation water Saving of 12-16 women laborers in weeding
- Saving of 15-45 kg N/ha. by following LCC method of N management Rotary weeder has the following advantages

- ✓ Improves soil structure
- ✓ Increases soil aeration,
- ✓ Enrichment of O₂ near the root zone,
- ✓ Increases the microbes population,
- ✓ Better nutrient availability and uptake by the plants,
- ✓ More tillering ability

Justification and Linkage
Adoption of SRI in rice system reduces the water requirement with an yield increase of 15-20%. In this Manimuttar sub basin area under rice will be reduced by 4000 ha in first season. To offset the production loss introduction of SRI will be the best option for maintaining

overall production. TNAU introduce a demonstration of 100 ha which helps in large scale adoption.

Convergence

- The technologies resulted in the complementary effect of the water augmentation and micro irrigation methods
- Adoption of technologies resulted in over all standard of living of basin farmers

S.No	Particulars	Budget (Rs. in lakh)
Budget For Mission Mode –II Rice (100 ha)		
1	Cost of critical inputs seeds and nutrients @ 10000/ha	10.0

Justification for unit cost

Sl.No	Particulars	Amount in (Rs.)
1	Seed cost with seed treating chemicals (8kg/ha) @ Rs. 25 /kg	: 200.00
2	Raising nursery (wooden frame, rose can, polythene sheet)	: 1000.00
3	Square transplanting cost @ 50 B/ha @ Rs.80/labour (Labour cost should be borne by the farmers)	: 4000.00
4	Rotary weeder 5 No. Rs.500/no for square planting	: 2500.00
5	Cost of row marker for planting (One no.)	: 1000.00
6	Cost of fertilizers (150:50:50 kg NPK / ha)	:
	Urea - 330 kg @ Rs. 5 / kg	: 1650.00
	Super Phosphate - 312.5kg @ Rs. 4 /kg	: 1250.00
	Muriate of Potash - 83 kg @ Rs.4.75/ kg	: 395.00
	ZnSO ₄ 25 kg @ Rs. 25 / kg	: 625.00
	Cost of Bio fertilizer	: 120.00
	Azospirillum and Phospho bacteria @ 10 pockets each	:
7.	Cost of Plant protection chemicals	:
	Pseudomonas 2.5 kg / ha @ Rs. 75 /kg	: 190.00
	Monocrotophos 1.5 litre/ha @ Rs. 300 /litre	: 450.00
	Quinylphos 2 litres / ha @ Rs. 250 / litre	: 500.00
	Mancozeb 2 kg/ha @ 250 / kg	: 500.00
	Total	14380.00

C. Pulse production technology - 60 ha

Pulse crop will be raised in sequence after the harvest of I season rice (Sep -Oct). Fifty percent of SRI demo area will be covered this programme. The amount allotted under SRI will be utilized for purchasing pulse seed and it will be broadcasted in to standing rice crop (10 days prior to harvest). Introduction of pulses in rice field offers following advantages.

- Increases cropping intensity
- Maintain soil fertility
- Additional income to the farmer
- Reduce pest / disease load

The area under pulses is expected to increase both under SRI and Non SRI areas also.

Expected output

Activity	Demonstration Area(Ha)	Area spread for adoption(Ha)	Additional productivity(kg/ha)
Improved production technologies in maize	150	600	1000
Improved production technologies in groundnut	50	500	791
System Rice Intensification in rice	100	1500	1100
Improved production technologies in pulses	50	2000	50
Drip fertigation in sugarcane	200	400	20 tonnes/ha

IV. ACTIVITY CHART

Year	Project mode		Mission mode	
	Maize	Groundnut	Sugarcane drip fertigation	SRI in paddy
I	48 ha	13 ha	78 ha	20 ha
II	52 ha	21 ha	62 ha	30 ha
III	50 ha	16 ha	60 ha	40 ha
IV	--	-	-	10 ha
V	Adoption and monitoring			
Total	150 ha	50 ha	200 ha	100 ha

Adoption rate year wise (ha)

Activity	I	II	III	IV	V	Total
Improved production technologies in maize	-	100	150	250	-	500
Improved production technologies in groundnut	-	100	150	250	-	500
System Rice Intensification in rice	-	200	300	400	600	1500
Drip fertigation in sugarcane	-	100	150	150	-	400
Pulse production technology	-	150	200	250	-	600

V. Year Wise Finance (Rs. In Lakhs)

Sl. No	Particulars	I	II	III	IV	V	Total
I	Activities						
1	a. Improved production technologies Maize	2.88	3.12	3.00	-	-	9.00
	b. Field days	0.10	0.10	0.10	-	-	0.30
2.	a. Improved production technologies in groundnut	0.845	1.365	1.04	-	-	3.25
	b. Field days	0.100	0.100	0.10	-	-	0.30
3.	Tractor drawn seed drill (2 Nos.), Stripper – 2 Nos	0.80	0	-	-	-	0.80
4	Seed production						
	Rice	0.06	0.15	0.09	-	-	0.30
	Groundnut	0.30	0.60	0.10	-	-	1.00
5	Organic farming , IFS in rice and improved water management practice	1.00	0	-	-	-	1.00
6	Soil testing	0.50	0	-	-	-	0.50
7	OFD and skill development	3.50	0	-	-	-	3.50
9	SRI in rice	2.0	3.0	4.0	1.0	-	10.00
10	Sugarcane fertigation	49.53	39.37	38.10	-	-	127.00
	Total	61.615	47.805	46.53	1.0	0	156.95
II	Out Sourcing	7.20	7.20	7.20	3.60	3.60	28.80
III	Contingencies	2.00	1.50	1.00	1.00	1.00	6.50
IV	Equipments	3.00	-	-	-	-	3.00
	Total	74.45	56.505	54.73	5.60	4.60	195.25

TOTAL BUDGET FOR KOTTAKARAIYUR

Sl.No	Particulars	Physical	Financial (in lakhs)
I	Activities		
1	Improved production technology for Groundnut + 3 field days	50 ha	3.55
	Groundnut seed drill and stripper	Each 2 Nos.	0.80
2	Improved production technology for Maize + 3 field days	150 ha	9.30
3	Quality seed production Groundnut and Rice	70 ha	1.30
4	Demonstration of organic farming and IFS model and improved water management practices	20 ha	1.00
5	SRI	100 ha	10.00
6	Sugarcane drip fertigation	200 ha	127.00
	Pulse production technology	60 ha	-
7	OFD and skill development	-	3.50
8	Soil testing	-	0.50
		<i>Sub Total</i>	<i>156.95</i>
II	Out Sourcing for technical assistant		
1	6 nos for first 3 years, 3 nos for 4th and 5th year	9000 Salary + 1000 FTA per Month	28.80
		<i>Sub Total</i>	<i>28.80</i>
III	Contingencies		
	a. Vehicle hire charge for Scientists @ Rs.60000/yr		3.00
	b. Documentation and Reporting		1.00
	c. Exhibits and stationeries		2.50
		<i>Sub Total</i>	<i>6.50</i>
IV	Equipments		3.00
	Computer, Printer, Scanner, LCD, Copier		
		<i>Sub Total</i>	<i>3.00</i>
		Total	195.25
	Incentive 1% of the total cost		1.95
		Total	197.20
	Institutional charges @ 7.5 %		14.79
		Grand Total	211.99

* 50 % of the drip cost for sugarcane - 58 lakhs

Impact

- ❖ **Crop:** Rice
- ❖ **Technology:** SRI
- ❖ **Area under demonstration:** 100 ha
- ❖ **Area under adoption :** 1500 ha

- ❖ **Crop:** Groundnut
- ❖ **Technology:** Improved production technologies in groundnut
- ❖ **Area under demonstration:** 50 ha
- ❖ **Area under adoption :** 500ha

- ❖ **Crop:** Maize
- ❖ **Technology:** Improved production technologies in maize
- ❖ **Area under demonstration:** 150 ha
- ❖ **Area under adoption :** 500 ha

- ❖ **Crop:** Sugarcane
- ❖ **Technology:** Drip fertigation
- ❖ **Area under demonstration:** 200 ha
- ❖ **Area under adoption :** 400 ha

- ❖ **Crop:** Pulse
- ❖ **Technology:** Production technology
- ❖ **Area under demonstration:** 60 ha
- ❖ **Area under adoption :** 600 ha

**Nodal Officer – IAMWARM
and Director (WTC)
TNAU, Coimbatore.**

Annexure

Activity chart

Project Mode 1. Improved production technologies in Maize

	Name of the tank	Area (Ha)	Ist year	IInd year	IIIrd year	IVth year
1	Viswanur Tank	10	3	4	3	-
2	Thugavur Tank	10	2	3	5	-
3	Kalanagathankottai Tank	10	3	5	2	-
4	Salaigramam Tank	15	5	5	5	-
5	Keelayur Meelayur Tank	15	5	5	5	-
6	Emaneswaram Tank	15	5	5	5	-
7	Melakaikudi Tank	10	3	3	4	-
8	Therkuvadi Tank	15	5	5	5	-
9	Aliur Tank	15	5	5	5	-
10	Mudikarai Tank	15	5	5	5	-
11	Maravaman Galam Tank	10	4	3	3	-
12	Thavasikudi Tank	10	3	4	3	-
	Total	150	48	52	50	-

Project Mode 2. Improved production technologies in Groundnut

	Name of the tank	Area (Ha)	Ist year	IInd year	IIIrd year	IVth year
1	Salaigramam	8	2	3	3	-
2	Vadakku Keeranur	8	3	2	3	-
3	Ilayankudi	8	2	4	2	-
4	Thayamangalam	7	2	3	2	-
5	Thiruvallur Big	7	2	3	2	-
6	Keelpatti	7	2	3	2	-
7	Mudikarai	5	-	3	2	-
	Total	50	13	21	16	

Mission mode 1. Sugarcane Fertigation

S. No	Name of the tank	Area (Ha)	I st year	II nd year	III rd year	IV th year
1	Munaivendri	15	5	5	5	-
2	Emaneswaram	10	3	4	3	-
3	N. Valayarendal	10	3	4	3	-
4	Kanjipatti	15	5	5	5	-
5	Nettur	15	9	3	3	-
6	Vijayamanikkam	10	5	2	3	-
7	Vadakkuchandanur	15	5	5	5	-
8	Ayyanarkulam	15	5	5	5	-
9	Maravamangalam	10	3	2	5	-
10	Maruthanganullur Pudukanmoi	15	5	5	5	-
11	Melapidavur	10	4	3	3	-
12	Kolayanur	15	5	5	5	-
13	N. Puliyan kulam	15	8	4	3	-
14	Parayankulam	10	4	3	3	-
15	Elunuthimangalam	10	4	4	2	-
16	Thiruvallur Big	10	4	3	2	-
	Total	200	79	62	60	-

Mission mode 2. System of Rice Intensification

S. No	Name of the tank	Area (Ha)	I st year	II nd year	III rd year	IV th year
1	Nettur	10	-	5	5	-
2	Periyakannanoor	5	-	5	-	-
3	T. Pudukottai	10	5	-	5	-
4	Maruthanganullur	10	5	-	5	-
5	Keelayakudi	10	-	-	5	5
6	Salaigramam	10	5	5		
7	Keelayur Melayur	10	-	5	5	-
8	Ilayankudi	10	-	5	5	-
9	Gudalur	10	5	-	5	-
10	Karuvi	5	-	5		
11	Thiruvallur Big	10	-		5	5
	Total	100	20	30	40	10

Agricultural Marketing and Agri Business

Detailed Project Report (DPR)
Irrigated Agriculture Modernization and
Water Resources Management
(IAMWARM)

(Agricultural Marketing and Agri. Business component)

Kottakaraiyar Sub Basin.

NODAL OFFICER
ASSISTANT DIRECTOR OF AGRICULTURE (C&E)
RAJAPALAYAM.

LOCATION OF THE AREA.

Kottakaraiyar sub basin is a wide and old system and comprises of flood carriers such as Nattarkal River, Nattar supply channel and Subbankal. The Nattarkal River is also fed by the surpluses of Alankulam, Kandani and Velangai Kanmoys located near Kandani village of Sivagangai. The length of river is 35 Km and it passes through Akkavayal and Viswanur tank and finally to RS Mangalam big tank and falls into Palk Bay at south of Thondi in Puthukadu. Nattar River joins with Saruganiar near Marudhavayal.

The Kottakaraiyar sub basin extends over a total area of 1427.20 sq.

Longitude : 78° 23' 43" E to 79° 1' 12.5" E

Latitude : 9° 29' 20" to 9° 55' 00" N

District

Sivagangai and
Ramnad.

Blocks.

Sivagangai,
Parts of Kalayarkovil
Ilayamkudy,
Manamadurai,
Ramnad,
Thiruvadanaï,
Nainarkovil.
Parts of Ramnad and
Parts of Paramakudy.

EXISTING CROPPING SCENARIO:

Total Registered Ayacut:	17424 Ha.
Fully Irrigated Area:	4988 Ha.
Partially Irrigated Area:	9434 Ha.
Gap Area:	3002 Ha

I. EXISTING SCENARIO.

1) **INFRA STRUCTURE:** At present the available infra structures are very minimal and insufficient. The available infrastructures are as listed below.

II. Markets – Specialized / General Markets. Whole Sale Commission Mandies are functioning in the following places

S. No	Location	Produces dealt	Size
1	Sivaganga.	Paddy, Cotton, Chillies, Pulses, Millets, Groundnut, Oil Seeds Etc.	Commission Mandies and Traders are functioning with minimum infrastructure and facilities.
2	R.S.Mangalam.		
3	Salaigaraman		
4	Nattarasankottai		
5	Kalayarkovil		
6	Ananthur		
7	Illayankudy		
8	Parthibanur		

III. Regulated Markets.

S. No.	Location	Infra Structure Available	Notified Crops	Receipts and Expenditure for the last 2 years (Rs in lakhs.)			
				2004 - 2005		2005 - 2006	
				Receipts	Expenses	Receipts	Expenses
1	Sivaganga	All facilities like godowns Drying yards etc Available	Cotton, Groundnut, Chillies, Paddy, Cholam, Ragi, Sugarcane, Jaggery, BlackGram Corriander and Coconut.	7.23	2.81	9.53	3.84
2	R.S.Mangalam.			5.88	1.68	9.39	1.83
3	Paramakudy			35.25	3.79	33.70	5.44
4	Illayankudy			3.05	1.06	5.57	1.69

The Storage Facilities of the above Regulated Markets are

1.Sivaganga

Godown size : 25 * 18 Mts.
 Nos. : 2
 Capacity : 1000 Mt.each
 Total capacity : 2000 Mt.

2. R.S.Mangalam.

Godown size : 25 * 18 Mts.
 Nos. : 1
 Capacity : 1000 Mt.each
 Total capacity : 1000 Mt.

3.Paramakudi.

Godown size : 25 * 18 Mts.
 Nos. : 3
 Capacity : 1000 Mt.each
 Total capacity : 3000 Mt.

4.Ilayankudy.

No Godown facility available

In addition to this Co-operative societies have five Godowns located at Sivaganga, Nattarasankottai, Maravar Mangalam, Ananthur and R.S. Mangalam with a storage capacity of 500 Mt each totaling to 2500 Mt of storage facility.

Drying yards cum Threshing Floors. There are Three Threshing floors available located one in each of Sivagangai, R.S.Mangalam and Paramakudi. Where there is no pucca drying yard and Threshing floors, farmers use earthen drying yards and threshing floors for their drying and threshing operations. They also use Highways and Village roads road for threshing operations causing inconvenience and public hazard to the general public besides causing adulteration and loss of quantity.

IV. Glut / Scarcity Seasons.

S No	commodities	Glut Season	Scarcity Season.	
1	Paddy	Jan-March	April-Dec	
2	Chillies	Feb-June	Jan, July-Dec	
3	cotton	May-Aug	Jan-April	Sep-Dec
4	Maize	Jan-April	May-Dec.	
5	Millets	Jan-April	May-Dec	

II.EXISTING MARKETING SCENARIO:

1.INFRA STRUCTURE TYPE AND LOCATION.

Only General Markets are available. Paddy which is the main crop of this area, and other produces such as Pulses Maize, Millets, etc Except vegetables and sugarcane other produces find their market through local whole sale commission mandies located in the respective area with major mandies located at Sivaganga, R.S. Manga lam , Salaigramam, Nattarasankottai, Kalayarkovil ,Ananthur, Ilayankudy and Parthibanur.

For vegetables, there are separate commission mandies in the respective areas in addition to weekly shandies which are spread throughout the area. The weekly sh andies for vegetables are at Kalayarkovil, Maravarmangalam, Sivaganga, Ananthur, Sanaveli, R.S.Mangalam, Salaigramam and Ilayankudy.

Regulated markets are located at Sivagangai, R.S.Mangalam, Ilayankudi and Paramakudi.

There are Three Threshing floors available located one in each of Sivagangai, R.S.Mangalam and Paramakudi. A few drying and Thrshing floors were constructed in the remote villages by Ramnad Market Committee and handed over to the concerned village panchayats for their usage and Maintenance. The available infrastructures are insufficient and inaccessible to the framers away from the Regulated Markets. Where there is no pucca drying yard and Threshing floors, farmers use earthen drying yards and threshing floors for their drying and threshing operations. They also use Highways and Village roads road for threshing operations causing inconvenience and public hazard to the general public besides causing adulteration and loss of quantity.

2. MARKETS.

Regulated Markets are available at Sivaganga, R.S.Mangalam, Ilayankudy and Paramakudy. Among the notified crops major transactions are for Groundnut, Chillies and Paddy.

There are whole sale private Markets at Sivaganga, R.S. Mangalam , Salaigramam, Nattarasankottai, Kalayarkovil ,Ananthur, Ilayankudy and Parthibanur.

For vegetables, there are separate commission mandies in the respective areas in addition to weekly shandies which are spread throughout the area. The weekly sh andies for vegetables are at Kalayarkovil, Maravarmangalam, Sivaganga, Ananthur, Sanaveli, R.S.Mangalam, Salaigramam and Ilayankudy.

Sakthi sugars located in Padamathur purchase the sugarcane directly from the Farmers through contract farming.

The crushing capacity of M/S.Sakthi sugars is around 4 thousand mt per day and at present only 3 thousand mt per day is crushed for 270 days per year. There fore there are ample chances to cover the increased production of 18000 mt of sugarcane produced additionally per year.

3.MARKET FEASIBILITY FOR THE CROPS PROPOSED IN DIVERSIFICATION IN THE SUB BASIN

1.CHILLIES:

For chillies the Virudhunagar chillies merchant M/S.V.P.S and Sons have set up a chillies oil extraction plant at Virudhungar. The requirement for this plant is around 2 to 5 thousand mt per year.Further discussions with them revealed that their total requirement is around 40 thousand mt. and of this 20 thousand is procured from Karnataka and 12 thousand mt from Andra Pradesh, leaving the balance of 8 thousand mt per year which is procured from our state. Thus there is ample chance to market the enhanced chilli production . They have their purchase centers located in this sub basin area through the commission agents and private mandies.The local market has a very good demand for green chillies.

M/S.Arumuga group of companies located in Rajapalayam have erected one export oriented ground spices masala factory in Rajapalayam.They also come forward to procure chillies from this sub basin.They have been contacted by the marketing officials and no difficulty in marketing the entire product is anticipated.

2.MAIZE:

The total requirement of maize in our State is around 18 lakhs mt. At present we are producing only 6 lakh mt per year in this State. We procure maize from Karnataka and Andhra Pradesh. Maize is harvested during Nov-Dec in Karnataka while in Tamil Nadu the harvest is in

Jan-Feb and during this period there is a heavy demand since it is in off season . So it fetches remunerative price to the farmers. The main purchasers are M/s.Suguna,and M/S.Pioneer, based at Coimbatore and M/S.S.K.M based at Namakkal Even the additional production will actually be less than the requirement of our State and hence the marketability will be bright and assured with remunerative prices around Rs. 6 to 7 per Kg.

The Production of paddy is estimated at 42648 M..T. with a marketable surplus of 34417M.T. The average Rate per Quintal prevailed at Rs. 600/= per Quintal.

The production of Sugarcane is estimated 105000 MT and it was purchased by M/s. Sakthi Sugars at the rate of Rs.1000/= per tonne.

The Market Prices for other commodities are:

1. Ragi. Rs.350-400 per quintal.
2. Cumbu. Rs.375-425 per quintal.
3. Cotton. Rs.1500-1700 per quintal.
4. Pulses. Rs.1400-1600 per quintal.
5. Chilli Rs.2500-2800 per quintal
6. Groundnut Rs.1000-1200 per quintal
7. The rate of vegetables ranged from Rs.6 to 10 per kg.

4) PRACTICES (PRE AND POST HARVEST)

a.Grading.

Grading is not at all done and if done not in a scientific way. The grading practices in vogue are as follows

CHILLIES:

The farmers segregate the discoloured, Pest and disease attacked and Immatured Chillies Manually and heap them separately while the good chillies are heaped separately. The chillies are sun dried in earthen drying yards.

COTTON:

Here again the good kappas and the pest and disease attacked ones are segregated manually and heaped separately. The Kappas in shade dried before storing them in the storage available with in the house hold.

PADDY:

Proper manual winnowing is done to segregate immatured , chaffy grains and foreign matters. Sun drying is practiced

AGRONOMIC PARCTICES.

1.SUGARCANE:

For sugar cane thrashing of leaves and packing of soil in the root zone is practiced. Stacking the sugarcane with each other is also practiced in few areas to avoid wind damage.

2.GROUNDNUT:

For Ground nut weeding and packing of soil near the root zone is practiced for better pod formation.

3.COTTON:

For Cotton soil packing is done near the root zone to ward off the stem weevil attack.

B). TRANSPORTATION.

No Specific difficulty is experienced. For all produces common public transport facilities such as hired vehicles, tractors, bullock carts,(When the quantity is small mopeds and cycles) and passenger buses are utilized for transportation.

Vegetables to weekly shandies are mainly transported by mopeds ,cycles and head loads.

C). CONTRACT FARMING is done in sugarcane. M/S.Sakthi sugars enters in to contract with the farmers for the cultivation and purchase of Sugarcane at the rate fixed by the Government ie Rs.1000 per mt at 8.5 % sugar recovery.

D). SOURCE OF MARKET INFORMATION For all crops except sugarcane is only through hear say and as such there is no other means of marketing information except a few prices of specific commodities given in daily news papers and AIR which of course has little impact on the farmers of this area.

The price of sugarcane is fixed by the M/S.Sakthi Sugars as indicated above and it is let known to the farmers through the factory cutting orders.

III. CONSTRAINTS.

1. CONSTRAINTS in the Existing scenario

- a. The output is almost at the same time due to seasonal cultivation of crops.
For storing the produces in Glut season storage godowns are proposed.
- b. No collective action in marketing and individual farmers take their chances.
Agricultural Business Canters may be introduced for collective marketing and better Bargaining power.
- c. No commodity is graded scientifically and rough methods only are used.
- d. But for hear say the people have no access to market information through IT etc.
- e. Transportation becomes laborious in remote villages and at the mercy of bullock carts.
- f. Blind faith with traditional market methods and based on the relationship developed with the whole sale mandies over years.
- g. The need for immediate cash and the binding to sell the produce with the particular wholesale mandy for loans taken from them for croppin

IV. DIVERSIFICATION / FUTURE VISION PROPOSED

1)In order to save water and bring the 3002 Ha of gap area under irrigation, following diversifications are proposed by the Departments of Horticulture and Agriculture as shown in the table above. The major area under diversification is as given below

CROP	Suggested area
Chillies	800 Ha.
Maize	900 Ha
Sugarcane	1000 Ha

. 2.Approximate location of diversified crops

The locations are decided in consultation with Agriculture / Horiculture departments and based on tank wise and sluice wise details.

3.Agricultural Business Centre :

Location: Maravarmangalam.

Crop : Chillies.

It is proposed to setup one Agricultural Business Centre at Maravarmangalam village where chillies are grown in an area of 250 Ha. This village sits in the centre of Kottakaraiyar sub basin and it is 27 Km from Devakottai Regulated market, 22 Km from Sivaganga Regulated market, 25 Km from Manamadurai Regulated market, 22 Km from Illayankudi Regulated market and 24 Km from R.S.Mangalam Regulated market.

The annual production of chillies is expected to be 400 mt. The Water user's Association of the neighbourhood could be combined together to form a federation. They can carry out the collective marketing of the chillies.

V.S.S.A Group of Virudhunagar who are the leading chillies merchants in south India could be linked for purchase of the chillies produced here. At present V.P.S.A. groups needs 40 thousand mt of chillies annually, while their procurement (The availability is only that much) is only 8 thousand mt from Tamil Nadu and the balance quantity of 32 thousand mt is procured from Karnataka and Andhra Pradesh.

So the available 400 mt of chillies produced in this sub-basin area could be marketed at ease.

It is proposed to setup one information Kiosk at this village and this work will be carried out by the Tamil Nadu Agricultural University.

V. CHALLENGES THROWN UP BY DIVERSIFICATION / AREA EXPANSION.

Identifying new market for new crop

For maize the total requirement of our State is around 18 lakhs mt. At present we are producing only 6 lakh mt per year in this State. We procure maize from Karnataka and Andhra Pradesh. Maize is harvested during Nov-Dec in Karnataka while in Tamil Nadu the harvest is in Jan-Feb and during this period there is a heavy demand since it is in off season. So it fetches remunerative price to the farmers. The main purchasers are M/s.Suguna, and M/S.Pioneer, based at Coimbatore and M/S.S.K.M based at Namakkal. Even the additional production will actually be less than the requirement of our State and hence the marketability will be bright and assured with remunerative prices around Rs. 6 to 7 per Kg.

The production of Sugarcane is estimated 105000 MT and it was purchased by M/s. Sakthi Sugars at the rate of Rs.1000/= per tonne. The crushing capacity of M/S.Sakthi sugars is around 4 thousand mt per day and at present only 3 thousand mt per day is crushed for 270 days per year. Therefore there are ample chances to cover the increased production of 18000 mt of sugarcane produced additionally per year.

1. Better utilization of existing markets especially the Regulated Markets.
2. To ensure better bargain Multiple Market Information may be provided to the farmers for all crops.
3. Collective Marketing may be admonished (through WUA sub groups)
5. Collective transportation of commodities instead of individual transportation in small quantities.
6. Dissemination of information, education, and communication about new methods of product handling, grading, packing of farm produces and quality control standards.

VII. SOLUTIONS AND RECOMMENDATIONS:

1.Consultative process undertaken in the sub basin:

MDPU at district level has been formed with WRO/PWD and line Departments Ie. Agriculture, Horticulture, AgriculturalEngineering, Agricultural University, Agricultural Marketing, Animal Husbandry, Fisheries and Forest.

Informal WUAs were formed based on farmer's Membership. However, Elections are to be conducted within a short period. These Associations are consulted by the MDPU and walk through surveys have also been made. The meetings were conducted along with walk through survey.

During the walk through survey the cross section of sub basin has been covered through walking and the farmers' demands were studied.

Along with this the topography of the area, Cropping, water availability, life style, transport etc were also observed. This background facilitate in understanding the stakeholders problems and the solutions suggested. For marketing, simple solutions like godowns, threshing floors and Agricultural Business Centers were suggested repeatedly by which the farmers hope, will go a long way in getting better prices.

2. Stakeholders Demands:

The stake holders in different parts of the sub basin repeatedly requested the following improvements.

- 1.Storage sheds.
2. Thrashing Floor cum drying yards.
3. Agricultural Business centre and
4. Information Kiosk.

3. Marketing interventions proposed with reference to the identified constraints.

S No	Crops	Constraints and Challenges.	Counter Measures.
1	Paddy Pulses Millets Ground - nut, Chillies	a. Production: Out put at the same time	1. Storing the commodities in storage Godowns after proper drying and packing to sell them in off season when the prices are at peak.
		b. Poor post Harvest practices.	By providing proper threshing and drying yards and educating the farmers about healthy post harvest techniques this problem could be solved.
		c. No collective action.-Individual farmers go to market / Wholesaler.	The WUA of that area may be given IEC through TNAU experts about collective marketing.
		Improving existing market utilization.	1. Multiple market information may be provided through AIR, News letters and through block offices. 2. Farmers may be educated to understand the use and better benefits of collective marketing. 3. They may advised to have a single and big transport mode for their group rather than having them for each farmer. 4. The WUA may be motivated to bargain price for their produce rather than the trader dictating the terms. 5. The WUA can be motivated to sell the produce through Regulated Market where there will be no commission, weighing charges, mahimai etc. They may advised to avail the pledge loan facilities of the Regulated market by which the urgent need for money may be met with.
2.	Vegetables	Production Glut / Shortage.	1. Staggered planting so as to ensure uniform supply of all vegetables throughout the year. 2. The farmers may use uzhavar shandai. to sell the vegetables where there will be no commission, and the farmers are at liberty to sell their produces at the price fixed by the uzhavar shandai which will fetch them good remuneration. The transport is also cheap and timely since the Govt. is plying special buses to uzhavar shandhai. 3. Mixed vegetable cultivation may be done instead of one single vegetable.

OUT COME INDICATORS.

1. Percentage of increase in farm gate sale price
2. Extent of use of Marketing Kiosk
3. Percentage of increase in the out put taken for agro processing
Percentage of increase in diversified crops marketed.

PART II

Agriculture is the back bone of the Indian economy. Kottakarayar basin area is dominated by paddy, maize and groundnut by improving water use efficiency we can improve the cropping pattern to an extent.

The marketing infrastructure consists of three regulatory markets besides number of private mundies. The transportation is by means of private channels. Grading and quality control is very limited. Specialized storage godowns, market information system and agro based industries are absent in this basin area.

The marketing strategy is based on the following three items.

1. Survey of existing cropping /marketing scenario
2. Stack holders consultation
3. Deciding on suitable marketing components based on gap area Cropping and diversification

Thus the following components were decided and included in the project.

SI. No.	Item	Numbers	Cost in Lakhs
1.	Storage godown	2	10
2	Drying yards	5	11
3	Agricultural Business Centre	1	11
4	Information Kisok	(To be done by T.N.A.U.)	
Total			32

ESTIMATE FOR AGRICULTURAL BUSINESS CENTRE.

S.No.	COMPONENTS	COST IN LAKHS
1	Lab cum Admin	1.00
2	Grading cum Storage Shed	5.00
3	Electricity, Water supply	1.50
4	Drying yard	2.20
Equipments		
5	Moisture meter, Weighing machine	0.30
6	Dunnage (At Rs. 2000 each * 30 Nos.)	0.60
7	Tarpaulin (At Rs.5000 each * 2 Nos.)	0.10
8	Recurring Expenses	0.30
TOTAL		11.00

A total sum of Rs.32 lakhs is to be provided for this project.

The Detailed estimates for the above infrastructures are enclosed herewith.

The Sub basin map is also enclosed.

Phasing of Expenditure

The expenditure will be phased out as follows:

S No.	Component	Year					Total	Amount in lakhs
		I	II	III	IV	V		
1	Storage Godown			2			2	10
2	Threshing floors			5			5	11
3	Agricultural Business Centre			1			1	11
TOTAL				8			8	32

Locations.

Based on the intensity of cropping and consequent availability of harvested produce ascertained based on tank-wise details, the following locations for marketing infrastructures are proposed.

The Storage Godowns are proposed to be built in,

1. Kalayarkovil
2. Illynkudy

Threshing floors cum Drying yard are proposed to be laid at

1. Kalayarkovil
2. Sooranam.
3. Sanaveli.
4. Salaigramam.
5. Solandur.

The Agricultural Business Centre and Information Kiosk is proposed to be built in

1. Maravarmangalam.