DETAILED PROJECT REPORT FOR REHABILITATION AND MODERNISATION OF UPPER VELLAR (VASISTANADHI) SUB BASIN UNDER IAMWARM PROJECT

INTRODUCTION:

Government of Tamilnadu have resolved to renovate the Irrigation systems in Tamilnadu by rehabilitating and modernizing the irrigation systems. This endeavor is for the benefit of farming community and the rural masses. So, the Government decided to take up this project with World Bank assistance as an integrated program with the active involvement and participation of 9 line departments under the co-ordination of Water Resources Organization. This World Bank assisted program is named as Integrated Agricultural Modernisation and Water Resources Management (IAMWARM) project. This IAMW ARM project covers all the river basins in the state except Cauvery basin. Among the 48 sub basins, 9 basins are selected for implementation of this IAMWARM project in the first year of the project period.

The WRO Sarabanga Basin Division, Namakkal is entrusted with the task of preparing the estimates pertaining to the Upper Vellar (Vasistanadhi) sub basin as a Nodal officer with the following line Department.

1. Agricultural Engineering Department
2. Agriculture Department
3. Agriculture Marketing and Agribusiness
4. Animal Husbandry Department
5. Tamil Nadu Agriculture University (TNAU)
6. Horticulture Department
7. Fisheries Department
8. Forest Department
9. Environmental Cell

Vellar basin comprises the sub basins of Vasistanadhi, Swedhanadhi, Gomuki and Perambalur Minor Basin. This Vellar is having 6 Tributaries. They are 1.Vasistanadhi,2.Swedhanadhi,3.Kallar 4.Chinnar, 5.Manimukthanadhi, 7.Gomuki. The total length of the river is 150km.

SUB BASIN:

Vasistanadhi is one of the sub basins in Vellar B asin. This Vasistanadhi sub basin comprises the parts of Attur, Salem, Rasipuram and Uthangarai revenue taluks in Salem district, Veppanthattai, Kunnam taluks in Perambalur district and Viruthachalam, Thittakudi taluks in Cuddalore district.

Vasistanadhi originates from southern slopes of Kalvarayan hills on the northern boundary of Attur taluk of Salem district. The initial stretch which is flowing up to the confluence point of Kariakoil is called as Ammapalayam or Anaimaduvu River and beyond that it is ca lled as Tumbal River. Another small tributary which is called as Periyar River, originates in Vellagoundan Village of Salem District. Periyar and Tumbal River confluence at Periyakrishnapuram village in Attur taluk, below which it is called as Vasistanadhi

Vasistanadhi joins with Swedha River at 4km west of Chennai -Dindigul NH 45 near Peraiyur in Perambalur taluk. Beyond this confluence point, the river is called as Vellar River. Vellar River runs for a distance of 73 km in Perambalur, Cuddalore districts and then in falls into Bay of Bengal at Pat nova near Chidambaram in Cuddalore district.

The total length of Vasista River from the point of origin Kalvarayan hills to the point of confluence of Vasista with Swedha is 76.70 km. The total area of Vasista river sub basin is 1772Sq.Km.

DESCRIPTION OF THE SUB BASIN:

GENERAL:

The Vellar river basin is located in the Northern part of Tamil Nadu State in South India, between the latitudes 11° 13'N - 12 00' N and longitude 78° 13'E - 79° 47 E. This basin is in be tween Ponnaiar, Paravanar and Cauvery

river basins. The total area of the basin is 7520.87Sq.Km. The total length of the river is about 150km.

The terrain lying in the Kalrayan hills, Attur Taluk of Salem District is drained by river upper velar, Vasis ta Nadhi known as Upper Vellar joined with to form the Vellar in the Perambalur Taluk of Permabalur District.

UPPER VELLAR SUB-BASIN

The river Vellar is having 6 tributaries. They are 1.Anaimaduvu 2.Swethanadhi 3.Kallar 4.Chinnar 5.Manimukthanadhi 6.Go mukhi. A portion of Dharmapuri, Salem, Namakkal, Perambalur, Trichy, Villupuram and Cuddalore districts are covered in Vellar river basin. Manimukthanadhi, which is the major tributary, also originates from Kalrayan hills in Villupuram district, traverses about 111 km and joins Vellar near Srimushnam in Chidambararm taluk of Cuddalore District. Upper Vellar drains the water from the southern slopes of the Kalrayan hills

On the northern boundary of Attur Taluk of Salem district. It originates at an altitude of 1266m about mean sea level. At its starting point, it is known as Anaimaduvu River and flows southwards for 23km and then south -east wards. One reservoir constructed across Anaimaduvu River is called Anaimaduvu reservoir. Just three kilo meters below this point another tributary known as Thumbal River, formed by two drainages viz., Karyakoil river and Ammapalayam river flowing southwards from Kottaipatti pass on the Kalrayan hills, joins on the left flank. Another stream called Periyar ori ginating in Jalluthu Reserve forest 'just 8km east of Salem taluk joins this stream. As Periyar River approaches Salem - Attur road it bends eastwards and receives on the south, the Singipuram River. Vasistanadi then flows towards southeast for about 26km along with boundary between Attur and Perambalur Taluk of Perambalur district on the one aide and Vridhachalam taluk of Cuddalore district on the other. Near Peraiyur in the Perambalur taluk, it is joined by Swetanadhi 4km to the west of

the Chennai - Trichy National Highway near Tholudur in Cuddalore district. In the reach between the confluence points of Singipuram and Swetanadhi with Vasistanadhi, the tributaries Kallar and Saval Odai join the main rive: on the left flank and Chittar, Koraiyar, Manjani Odai and Ellar Odai on the flank join the Vasistanadhi. The drainage area up to the confluence with the Swetanadhi is 1772 Sq km. An area of l0572.00 hectares is irrigated through 70 tanks and 79 anicuts.

HYDROMETEOROLOGICAL CHARACTERISTICS

GENERAL

The cultivated are of Tamil Nadu is being served with surface irrigation and other area being rain fed with irrigation through wells and the remaining as rain fed. Rainfall is the main input for the agriculture. Rainfall is received during the two monsoon periods namely southwest and northeast. High intensity of rainfall during monsoon periods brings heavy floods in the rivers and causes damages to crops and loss of lives affecting the economy of the state. On the other hand, failure of monsoon also causes crop loss which affects livelihood of cattle and human population

The details of the rainfall over the basin area as well as other hydro meteorological features are very important for water resources analysis. The basic factors, which influence agriculture, are climatologically features such as rainfall, temperature»humidity, wind speed, sunshine and evaporation.

The study now made on the hydro meter® logical characteristics of the Vellar river basin includes analysis of rainfall, temperature, humidity, wind sp eed and sunshine. The study of the rainfall pattern, its distribution in time and space its variability and probability of occurrence is highly useful for water resources planning and also for management of the resources.

RAINFALL

RAINGAUGE STATIONS

There are 24 non-recording rain gauge stations in the basin. Various agencies are maintaining these rain gauge stations, and the number of rain gauge stations maintained by each agency is listed below.

RAINGAGUE STATIONS MAINTAINED IN THE BASIN

Sl .No.	Name of the Agency	Numbers
1.	Public Works Department - WRO	18
2.	Revenue Department	5
3.	Tamil Nadu Agricultural University	1
	Total	**24**

MONSOON AND NON-MONSOON PERIODS

Vellar river basin lies in the tropical monsoon zone. Based on the hydrometer logical feature of the basin. One year is divided into 2 periods (i.e.) 1) Monsoon period from June to December and 2) Non -Monsoon period from January to May. The monsoon period is further sub -divided into Southwest monsoon period from June to September (4months) and Northeast monsoon period from October to December (3 months) similarly, the non -monsoon period is further sub-divided into winter period between January and February (2 Months) and summer period from March to May (3 months). As the monsoon:; bring heavy rainfall, it improves the recharging of groundwater as well as storage of surface water. Hence, the monsoon period is hydrologically significant for water resources analysis. But in the case of non-monsoon, it is insignificant.

MAXIMUM MINIMUM AND AVERAGE RAINFALL

The following rainfall stations are considered for analysis in this Sub basin. The weighted annual average rainfall works out 847.5mm. The details are furnished in the following table

S.\No	Rain gauge stations	25%	50%	75%	90%	Average
1.	Attur	948	741	605	511	817
2.	Kallakurichi	1130	910	739	602	969
3.	Rasipuram	1184	837	618	548	895
4.	Tholudur	1331	1067	773	637	1072

The maximum, minimum and average annual rainfall and season wise rainfall i.e. southwest, northeast , winter for 25% , 50% , 75% and 90% dependability's for various rain gauge stations have been analyzed.

The sub basin wise influencing rain gauge stations, area of influence of each rain gauge station, the annual average rainfall and the annual average weighted rainfall from each sub basin are given in the following table.

The climatologically values of this river basin are given in the following table.

The following rainfall stations are considered for analysis in this Sub basin. The weighted annual average rainfall works out 847.5mm. The details are furnished in the following table

INFLUENCING RAINGAUGE STATIONS OF UPPER VE1JLAR SUB BASIN

S. No.	Sub basin	Rain gauge Station	Rain gauge Sub basin Area	Sub basin Area	Weight in %	Annual Average rainfall in mm	Annual average weighted rainfall for the sub basin in mm
1.	Vasista (or) Upper Vellar	Attur	1415.92	177424	0.80	817	847.5
		Kallakurichi	0.07		0.01	969	
		Rasipuram	197.96		0.11	895	
		Tholudur	160.2		0.08	1072	

TEMPERATURE

The meteorological features of the basin have been studied from the data collected from above weather stations. Temperature is one of the basic factors under climatologically features and it is one of the main parameters to calculate the cr op water requirement (i.e., evapotranspiration). The average of minimum and maximum temperature for the above meteorological stations have been computed and tabulated below.

The maximum and minimum monthly mean temperature observed in the above climatologically station are given below.

CLIMATOLOGICAL PARAMETERS

S.No.	Climatologically Parameter	Lekkur	Managalapuram
1.	Average monthly temperature max./mm.in Celsius	32.30/23.80	32.59/23.78
2.	Average mear temperature in ° Celsius	28.88	27.86
3.	Average minimum temperature	21.30°c (Nov.86)	23.15° c(Dec.94)
4.	Average max. temperature	37.19°c (April,98)	39.98° c(June,90)
5.	Average relative humidity in %	61.94	69.22
6.	Average wind velocity in km/hour	5.90	4.54
7.	Average pan evaporation in mm/month	189.74	179.06
8,	Average Sunshine hours / day	7.39	7.41

RESERVOIR DETAILS

There are two reservoirs in the basin the details of the reservoirs are given in the following table.

S.No.	Name of the Reservoir	Sub basin	
		Gross capacity in Mcum	Ayacut in ha.
1.	Anaimaduvu Reservoir	7.56	2119
2.	Kariyakoil Reservoir	5.38	1457
	Total	**12.94**	**3485**

SURFACE WATER POTENTIAL

Surface run off IS The response of a catchments to precipitation reflecting the integrated effects of a wide range of parameters like catchments, climate and precipitation, intensity , duration, size and shape of the catchments the direction of storm , orientation of the catchments, slope , soil, land use, clima te etc.

Monthly Runoff Simulation (MRS) Model assesses the surface water potential for 75% dependable yield for southwest, northeast and non monsoon periods. The upper reaches are influenced by southwest monsoon and lower reaches are influenced by northeast monsoon.

UPPER VELLAR
Water balance

1. SURFACE WATER :

Available Surface water Potential in this Sub basin =136.03 mm^3

Present storage in 70 Nos of tanks = 70.19 x 0.85 = 59.66 mm^3

Diversion to direct ayacut under 79 Nos. of Anicuts = $\frac{3050 \times 0.9}{100 \times 0.53}$ = 51.79 mm^3

Total **= 111.45 mm^3**

2. GROUND WATER :

Total ground Water potential in this Sub basin area **=318.63 mm^3**

Consider the important blocks in this Sub basins:

1. Valapady Block	=	7.958
2. P.N. palayam Block	=	21.756
3. Attur Block	=	19.218
4. Thalaivasal Block	=	19.653
5. Veppanthattai Block	=	5.235
Total	=	73.82 mm^3

Ground Water available in the command area under consideration = **73.82 mm^3**

Total Surface water + Ground Water Potential = **185.270 mm3**

Water Demand

Sl no	Description	Water Demand without Project	Water Demand With Project
1	Irrigation Water Demand	127.39	111.54
2	Drinking Water Demand	16.96	16.96
3	Live Stock Demand	24.03	24.03
4	Industries Water Demand	15.22	15.22
5	Total Water Demand	183.60	167.75
6	Surplus	1.67	17.52

There are 79 anicuts and 70 tanks in this sub basin, of this, 16 Anicuts are located in the main river and 63 anicuts located are in tributaries. Out of 70 tanks, 49 tanks are PWD fed by anicuts and 21 Panchayat Union tanks are self catchment tanks serving the needs of irrigation in the sub basin. The total irrigated area of this sub basin is 10,572 ha. Details of tanks and Anicuts are Listed below.

Sl.No	Name of Supply Channels
1	Kalleripatti Tank Supply Channel
2	Chinnamasamudram Tank Supply Channel
3	Panai Eri-Umayalpuram Tank Supply Channel
4	Kottavady Tank Supply Channel
5	Panai Eri Surplus Channel
6	Chinnakrishnapuram Tank Supply Channel
7	Abinavam Tank Supply Channel
8	Umayalpuram Raja Eri Supply Channel
9	Erramasamudram Anicut Supply Channel
10	Pannai Eri - Puthiragoundanpalayam Supply Channel
11	Puthiragoundanpalayam Tank Supply Channel
12	Thalavaipatti Tank Supply Channel
13	Belur Kissan Chinna Eri Supply Channel
14	Singipuram Tank Supply Channel
15	Kalleri chockanathapuram - Jungle stream source
16	Lakshmanasamudram Tank Supply Channel
17	Kallanatham Tank Supply Channel
18	Ayyanar Koil Tank Surplus Channel
19	Thulukkanur Tank Supply Channel
20	Thulukkanur Anicut Koraiyaru River Supply Channel
21	Thiyaganur Tank Supply Channel
22	Thalaivasal Tank Supply Channel
23	Ayyanar Koil - Attur New Tank Surplus Channel
24	Navakurichi Tank Supply Channel
25	Vadakumarai Tank Supply Channel
26	Siruvachur Tank Supply Channel
27	Attur New Tank - Attur Big Anicut Supply Channel

28	Attur New Tank - Appamasamudram Supply Channel
29	Deviyakurichi Tank Supply Channel
30	Kalleri Chokkanathapuram Tank - Kalleri Anicut Channel
31	Sarvoy Large Tank Supply Channel
32	Thenkumarai Tank Supply Channel
33	Manivilundan Old Tank Supply Channel
34	Puthur Tank Supply Channel
35	Puliyan Kurichi Tank Supply Channel
36	Chitteri Tank Supply Channel
37	Aragalur Tank Supply Channel
38	Govindampalayam Tank Supply Channel
39	Periyeri Tank Supply Channel
40	Attur New Tank - Malayathu Odai Channel
41	Ayyanar Koil Tank - Anaivari Odai Supply Channel

Out Of the 20 tributaries, the following are main tributaries.

1) <u>KARIYAKOIL RIVER:</u>

It originates from Kalrayan hills and flow for 25 kms and joins with Anaimaduvu river at Tumbal. Kariyakoil Reservoir was formed across this river in the year 1992. The effective storage capacity of this reservoir is 5.38 M.cum with a catchment area of 70.50 sq.km. This reservoir irrigates an ayacuts of 1457 ha.

2) <u>ANAIMADUVU RIVER:</u>

Anaimaduvu reservoir was formed across this river in the year 1992. The effective storage capacity of this reservoir is 7.42 M.cum with a catchment area of 145.020 sq.km. This reservoir irrigates an ayacuts of 2118 ha.

3) PERIYAR RIVER :

It originates in the hilly areas and joins with Tumbal river. The length of this river is 25.40 km. There are 4 anicuts in this river to feed the tanks.

4) SINGIPURAM RIVER:

It originates in the hilly areas and runs for a distance of 22.40 km and joins with Vasista in its right flank. There are 4 anicuts in this river to feed the tanks.

5) KEERIPATTI RIVER :

This is one of the major tributary in this sub basin and joins with Vasista in its right flank. The total length of this river is 21 km. Maliyakarai river and kallar river are the major tributaries to this Keeripatti river. There are 10 anicuts in this river to feed the tanks.

6) KORAIYAR RIVER:

The total length of this Koraiyar river is 8.70 km and joins with Vasista in its right flank just below the Attur town. There are 2 anicuts in this river to feed the tanks.

7) MANJINI RIVER :

This is also one of the Major tributary of the Vasistanadhi. The length of this river is 16 Km and joins Vasistanadhi in its right flank. There are 7 anicuts in this river to feed the tanks.

NECESSITY OF THIS PROJECT:

In this Vasistanadhi sub basin, most of the people rely only on the agricultural and agricultural related activities. Therefore, this irrigation s ystem play a major role in their life. However at present, this system and its tanks serve at most 30 to 40% of its potential. This is due to the century old system, requiring Rehabilitation and Modernisation to attain and utilize its full potential. Obviously, there is no new source to harness, so the available source are required to be revamped to utilize it to its optimum. This was very well replicated in the Micro level studies conducted in this sub basin area by the IWS, Chennai.

PROPOSALS:

The main focus of this IAMWARM project is for optimum use of the available water potential by improving and modernizing the existing irrigation system. In this process of modernization the following works are to be taken up, by water resources organiz ation with an out lay of Rs 2447.7Lakhs.

1) Rehabilitation and Modernisation of Anicut.
2) Improvements and selective linning to supply channels.
3) Rehabilitation and Modernisation of Irrigation tanks.
4) Construction of check dams for ground water recharge.
5) **a) ANICUTS:**

Upstream and Downstream flood banks are proposed to be strengthened and standardized. All masonry structures such as body wall, Abutments, wing walls, Aprons and cutoff walls are proposed to be revamped.

b) SUPPLY CHANNELS:

Earthen supply channels are proposed to be desilted to attain the designed carrying capacity. The banks of the supply channels are proposed to be strengthened and standardized by providing flood banks. It is also proposed to provide cross masonry works such as bed dam, culvert etc. wherever necessary and to desilt the supply channels whereever required.

c) TANKS:

Some of the tank bunds are below standard. These are proposed to b e strengthened and standardized by providing Flood banks. Provisions are made to repair/ reconstruct the sluices and weirs of the tanks. Inside the tanks , the leading channels are proposed from the deep bed level to inlet of sluices Necessary Provision for renewel of S.G. Shutters are also made in this Estimate

D) BEDDAMS:

It is proposed to construct 11 nos. of bed dams, 7 nos of Check dams 1nos of percolation pond to charge the ground water in this sub basin area.

In the process of modernization the following works are likely to be taken up by **Water Resources Organisation** with an outlay of Rs. 2447.7 lakhs.

1) **Water Resources Organisation:**

- Rehabilitation and Modernisation of Irrigation Tanks
- Construction and Reconstruction of Anicuts & Sluices
- Improvements to supply channels
- Construction of Bed dams And Check Dams for ground water improvement
- Catchment Treatment Works

AGRICULTURAL ENGINNERING DEPARTMENT

Will carryout the following works for extending the benefits of irrigation facility to the farmers, with an outlay of Rs. 980.19 lakhs.

- Implementation of On Farm Development Works.
- Implementation of Micro Irrigation System.

- Demonstration & Supply of Farm Machineries.
- Augmentation of Ground Water Potential by providing Farm Ponds
- Construction of Check dams to conserve soil loss.

Agriculture Department has proposed to take up the following works

- Introduction of irrigation water saving technologies
- Agro climatic suitable crops
- Crop diversification
- INM / IPM techniques
- Adoption of increased productivity technologies
- Soil health sustainability
- Ensuring Critical inputs availability the distribution of bio-pesticides, MN mixture to Groundnut and Coconut
- Improving crop economics
- Laying of trials and demonstrations
- Publicity and propaganda

For the above purposes, and investment amount of Rs. 104.88 lakhs has been proposed.

The **Horticulture Department** is planning to take up the following activities under this project with the proposed investment of Rs. 157.65lakhs under this project.

1) Introduction of Hybrid varieties in Vegetables
2) Introduction of Tissue culture Banana and
3) New Area coverage under horticulture crops. (Fruits like mango, sapota etc.).

5. The **Forest Department** has proposed to taken up the following works for improvements of the upper reaches of the sub basin with an investment of Rs. 45.00 lakhs under this project.

- Raising of Nurseries - 55000 Nos.
- Planting of seedlings - 50000Nos.
- Soil work, Semi Circular bund and Catch water Drains - 50000Nos.
- Construction of masonry Check dams - 3Nos.
- Construction of Percolation Ponds - 4Nos.

6. The **Animal Husbandry Department** is planning to take up the following activities under this project for enhancement of the benefits with the proposed investment of Rs. 109.99 Lakhs under this project.

- Establishment of Mobile Veterinary unit - 5 Nos.
- Infrastructure development facilities in the Existing Institutions in the project area - 13 Nos.
- Establishing bulk milk coolers for storage of milk - 2 Nos.
- Augmenting fodder availability in the project area - 350 ha.
- Supplying mineral mixture @ 25g / day / animal for 200animals.
- Veterinary health care camps.
- Conducting Night Meetings.
- Providing training for 2000 formers at Rs.40 each.

Agriculture University:

TNAU has proposed the following activates with an investments of Rs. 703.80 lakhs under his project.

- Promoted water saving technologies (SRI/Drip) in agriculture and

Horticultural crops for large scale adoption.

- Increase the crop productivity and area by diversification and Intensification
- Improved production technologies for groundnut by adopting INM
- Improved production technologies for maize
- Castor improved agro techniques
- Mission mode project
- System of Rice Intensification and Site specific nutrient management
- Mission mode approach in Drip cum fustigation and improved agro techniques in tapioca

Agricultural Marketing and Agribusiness Department:

This department has poised to take up the following activities to promote marketing activities with an investment of Rs. 80.50 lakhs under this project.

- Construction of thrashing floor - 10 Nos.
- Storage Go down - 5 Nos.
- Collection centre - 2 Nos.
- Pack House - 1 Nos
- Agri Business Centre - 1 Nos

Fisheries Department:

Fisheries Departement has proposed the following activiti es with an investment of Rs. 29.00 lakhs under this project.

- Acuaculture is irrigation tanks for establishing fish seed banks
- Acuaculture is Farm ponds and
- Fish seed Rearing in cages

Environmental Cell:

Under this head, an investment of Rs. 20.00 lakhs ha d been proposed to carryout the following works.

- Environmental and social monitoring
- Soiled waste management
- Environmental and social awareness building,
- The overall efficiency of the system is expected to increase after implementation of the project with the support of agricultural and allied sectional personal.

CONCLUSION:

The W R O proposal is prepared adopting the current schedule of the rates for the year 2006-07 for Salem district and the estimate cost works out to Rs 2447.70 lakhs.

By implementing this project, a total ayacut of 10, 145.46 ha will be benefited. A comprehensive attempt to revamp the entire system shall yield the desired result, not the piece meal attempt. So, this is very much essential to implement this project to attain the requir ed system efficiency of the century old system. Ultimately this will improve the life standard of farming community and the rural masses by the way of bridging gap and additional food production.

The Line Department Proposals are also Enclosed.

IAMWARM PROJECT UPPER VELLAR SUB BASIN

GENERAL ABSTRACT

Sl.No.	Departments	Estimate Amount in Lakhs
1.	Public Works Department (WRO)	2447.70
2.	Agricultural Engineering	980.19
3.	Agricultural Department	104.87
4.	Agricultural Marketing	80.50
5.	Horticulture Department	157.65
6.	Agricultural University (TNAU)	703.80
7.	Animal Husbandry	109.99
8.	Forest Department	45.00
9.	Fisheries Department	29.00
10.	Environmental cell(PWD)	20.00
	TOTAL	4678.71

Rupees Forty six crores seventy eight lakhs and seventy one thousand only.

Annexures:

GOVERNMENT OF TAMILN ADU
AGRICULTURAL ENGINEERING DEPARTMENT

ATTUR

IRRIGATED AGRICULTURE MODERNISATION AND WATER RESOURCES MANAGEMENT PROJECT (IAMWARM)

VELLAR RIVER BASIN

UPPER VELLAR RIVER SUB BASIN

REGION	*	**SALEM**
DIVISION	*	**SALEM**
SUB DIVISION	*	**ATTUR**

AGRICULTURAL ENGINEERING DEPARTMENT
IAMWARM PROJECT PROPOSALS
UPPER VELLAR SUB BASIN

INTRODUCTION :

Upper Vellar sub-basin is one of the 9 sub-basins selected for 1st phase of implementation of IAMWARM project in TAMILNADU under WORLD BANK assistance. This sub-basin has the registered ayacut area of 10572 Ha. 10 years average rainfall at the basin is 810mm. But during 2005, the sub-basin received 899mm. The important crops grown in the sub-basin are paddy, sugarcane, tapioca, maize, cotton, vegetables, pulses, arecanut, groundnut, coconut etc.

BASIN DETAILS:

VELLAR RIVER BASIN :

Vellar River originates in Chitteri hills of Dharmapuri District in Tamilnadu in the name of Anaimaduvu river and Thumbal river.Singipuram river originates in Jalluttu reserve forest area in Salem District joins in this Anaimaduvu River and it flows in Salem, Perambalur and Cuddalore Districts and it drains into Bay of Bengal.

Main Tributaries are Vasistanadhi , Swetha nadhi, Cinnar, Anaivari Odai and Manimutha river..Karia koil Reservoir, Anaimaduvu Reservoir and Gomuki Reservoir are the three Major Reservoirs located in this basin.

The River confluence with Bay of Bengal , In Parankipettai near Chidambarm in cuddalure District.

UPPER VELLAR SUB BASIN :

Upper vellar known as vasista river originates from Kalrayan hills and confluence with Swetha river near Tholudur in Perambalur and becomes Vellar river.

Chittar river, Manjini river and Ammampalayam river are major tributaries to Vasista river. Chittar river and Manjini river are originates from paithur reserve forest and Ammampalayam river originates from Kalrayan Hills.

Length of the Vasista river is 107kms. Drainage area is 412.80 sq.km.

Vasista river sub basin covers Valapadi, Pethanaickenpalayam , Attur and Thalaivasal blocks of Salem District.

Attur and Pethanaickenpalayam blocks are over ground water exploited blocks in this sub basin.

AYACUT AREA DETAILS:

The blocks covered under this basin are valapady, Ayothiya pattinam Pethanaickenpalayam, Attur and Thalaivasal.

DIRECT AYACUTS:

Kariakoil Reservoir : 1457.50.0 Hec

Anaimaduvu Reservoir : 2028.75.0 Hec

IN DIRECT AYACUTS:

Direct sluices (ananicuts) : 79 Nos :3050.00.0 Hec

PWD Irrigation Tanks : 49 Nos : 3609.21.0 Hec

M.I.Tanks (Panchayat Tanks) : 21 Nos : 426.54.0 Hec

Tank wise details are furnished in Annexure I

WATER USER'S DETAILS:

Total Ayacut Area : 10572.00.0 He c

No of WUA s Proposed : 49 Nos

HYDROLOGY:

Total Ayacut Area : 10572 Hec

Taluks Covered :Valapadi,Salem, Attur, Gangavalli, Perambalur.

Panchayat Unions Covered : Ayothiapattana Valapadi,Pethanaickenpalayam, Attur, Thalaivasal, Gangavlli Perambalur.

EXISTING FARMING PARCTICES IN UPPER VELLAR SUB – BASIN

Existing cropping pattern in the sub-basin is: -

1.Paddy-tapioca-groundnut

2.Maize-groundnut-pulses

3.Maize-paddy

4.Sugarcane

5.Cotton-pulses

Existing irrigation potential:

Out of the registered ayacut area of 10572 Ha the present irrigation potential is as below.

Fully irrigated	3150	Ha
Partially irrigated	4276	Ha
Gap	3146	Ha
TOTAL	10572	Ha

SOIL :-

TYPE OF SOIL :-

In this sub basin , due to different stages, weathering & parent material, the soil types are met with in combination of Incept sol, Alfisol and Vertisol. More prominent type is inceptisol.

Inceptil	Red or brown or grey soil with surface horizon more developed than sub surface. They are developing soils, Moderately deep, coarse loamy to loam moderately drained to well drained.	Suited for commonly grown crops with exceptions.	5068.00.0
Alfisol	the red or brown soils having accumulation of alleviated clay in sub surface horizon it well drained. Poor water and nutrient holding capacity.	Suitable for annual crops with shallow roots systems.	1999.00.0
Vertisols	Black soil	Suitable for cotton , Pulses etc	2575.00.0

Problem soil : The PH value of soil has the range from 7.2 to 8.5 and problem soils like saline, alkaline and acidity are not predominantly present in upper Vellar sub – basin area .

WATER:

IRRIGATION PRACTICES :-

The farmers of Upper vellar sub – basin follow flood irrigation method and adopt field to field irrigation while using tank water. During non – seasonal periods, they use well water for irrigation in furrow systems. In tank ayacut area the adoption of micro irrigation systems and other type of specialized irrigation are in minimum area. The farmers do not adopt conjunctive usage of surface and ground water.

ON FARM :-

The condition of distributor canals, supply channels are below standards. They are not lined up to standard specifications. There are no flow measurement devices. the condi8tion of field channels are in damaged condition and also not in proper alignment. The irrigation system is being maintained only by PWD / WRO Department. The Water user Associations are under formation stage and election formalities are to be finalized.

LAND HOLDINGS :-

The details of agriculturist (farmers) based on the land holdings of upper velar sub basin is given below :

Category	Size of holdings	Numbers	Percentage
Marginal	Below 1.00 ha	8352	71.47%
Small	1.00 – 2.00 Ha	2590	22.16%
Medium	2.00 – 5.00 ha	545	4.66%
Big	5.0 ha & above	198	1.71%
Total		11685	100%

LEVEL OF MECHANIZATION :

The preparatory cultivation is being done by the tractors for wet plugging. The Level of mechanization in respect of transplanting, seed sowing, inter cultivation is very poor. There is no awareness among the farmers regarding usage of agricultural machinery for paddy transplanter, seed drills, weeder etc. In respect of plant protection, the farmers use knapsack and power sprayers. For harvesting, the farmers started 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. In the upper velar sub – basin area, there are 750 tractors, 65 Power tillers, 10 Seed drills, 600

sprayers and about 2400 bullock carts available for carrying out farm operations, transport of materials and agricultural produce from villages to the towns.

LABOUR :

As per the 2001 census the total population of Upper velar sub – basin area is about 3,08,000 among them, about 34% of population is agriculture laborers. In view of heavy industrialization viz. Sago factories in the Upper velar sub – basin area, the labour shortage during seasonal period is much acute. The labour force prefers to go to industries due to higher salaries as compared to farm operations and income. Migration of labour to other professions like mason, artisans etc due to intermittent agricultural operations in view of monsoon failures or scanty rainfall.

PRACTICES – GROUND REALITIES :-

There is no adoption of proper fertigation operation by the farming community in upper velar sub – basin . Lot of information on INM/IPM is to be imparted to the farmers for attaining more farm productivity. There are no proper farm roads for transporting of harvested produces and the farmers use tank bunds for transpiration.

CONSTRAINTS OBSERVED IN UPPER VELLAR SUB – BASIN:

The Walk through surveys have been carried out by the line departments viz … Agricultural Engineering, Agricultural Department have carried out walk though survey along with the PWD officials exclusively in each tank. During walkthrough surveys and interactions with the ayacut farmers, the following constraints have been widely observed.

- Lack of efficient on farm water management.
- Poor infra structure facilities.
- Poor / Nil maintenance of field channels.
- No correlation between available water and cropping pattern being followed
- Excess water received at a given point of time, not stored and utilized.
- Non – adoption of modern micro irrigation methods and new agricultural practices.
- Inadequate farm mechanization.
- In adequate coordination of among rural agencies, Government departments and other financial institution etc.
- Lower crop yield.
- Low field application efficiency.

- Traditional method of farming.
- Excess use of chemical fertilizers and pesticides.
- Inadequate post harvest management facilities.

DIVERSIFICATION / FUTURE VISION PROPOSED IN UPPER VELLAR SUB – BASIN:-

In order to achieve more cropping intensity, water saving technologies and optimum cropping pattern should be followed in order to achieve the maximum profitability per unit of water available, by implementing the work components proposed by PWD, Agricultural Engineering, Agriculture, Horticulture, Animal Husbandry, Fisheries departments. Thus, integrated development approach is essential to attain the desired results.

In order to address the problems /grievances evinced by the farming community, the following features should be incorporated in the project for entire development of upper vellar sub – basin.

1. Promotion of conjunctive use of surface and ground water.
2. Assuring supply of water at 3R (Right quantity, Right time and Right Place)
3. Devising water saving technologies.
4. Consolidation of fragmented landholdings through WUA.
5. Introduction of Micro Irrigation system essentially for the gap areas under Agri/ Horti crops proposed by the respective departments.
6. Augmenting the ground water potential by provision of rainwater harvesting structures like farm ponds in tail end areas of the M.I. Tanks.
7. Adoption of optimum cropping pattern to achieve maximum cropping intensity.
8. Promotion of farm mechanization for effective farm operations.
9. Rejuvenation of irrigation wells for augmentation of irrigation potential for second and subsequent crops.
10. Imparting training and skill development to WUA through adaptive trial research plots, demonstration plots on water management, irrigation agriculture technologies, farm machinery, post harvest management, micro irrigation system maintenance, rain water harvesting etc.
11. Provision of alternative / diversified activities like Fisheries Development, Fodder development, Livestock management, SHG promotion for sustained income and uplift of socio – economic status of the farming community.

CHALLENGES THROWN UP BY DIVERSIFICAITON /AREA EXSPANSION ; -

To achieve the diversification, the farmers should be trained and educated to know the following features:

1. Equity distribution of irrigation water from head reach to tail reach.
2. Rotational water supply system.
3. Measurement of irrigation water at each outlets.
4. Significance of Micro irrigation system implementation.
5. Mechanization of farm operations.
6. Rejuvenation of depleted irrigation wells.
7. Catchments area treatment
8. Consolidation of fragmented land holdings.
9. Maintenance of proposed structures by the line departments.
10. Contribution to be made for the beneficiary oriented work compone nts.

SOLUTIONS AND RECOMMENDATIONS ;-

To redress the problems / grievances explained by the ayacut farmers, the solutions should be arrived, for this, active participation of ayacut farmers who are water users, is essentially needed. The Water user s Associations are proposed to be formed on village basis by PWD as per the prescribed rules. 49 WuAs are to be formed in Upper velar sub – basin.

On the basis of the interactions with the ayacut farmers, the following work components are recommended by the field personnel of Agricultural Engineering Department and got oral consent from them. Accordingly, the tank wise work components are arrived to implement the project.

Suitable cropping pattern to be evolved based on the available water and for agricultural/horticulture crops, micro irrigation system is to be implemented to enhance the application efficiency and to fetch more productivity.

Demonstration and supply of farm machineries and equipments like power tiller, Tranplanter, Weeder, Seed drills, Rotary tillers, Reapers, Multi crop thrashers etc to save time and labour during farm operations.

Provision of farm ponds in specific areas such as tail end of the ayacut areas where shortage of irrigation water prevails. Farm ponds are water harvesting structures which would facilitate supplementary irrigation of crops in lean periods, augment ground water potential and to facilitate the farmer to undertake fish culture for additional income.

DETAILS OF DEVELOPMENT COMPONENTS PROPOSED:

In the IAMWARM project, the following work components are proposed on the basis of needs and requirements of water users/beneficiary farmers in view of achieving the project objectives and uplifting the socio economic status of the farmers of the upper vellar sub-basin.

❖ MICRO IRRIGATION:

The Micro Irrigation System components are proposed in accordance with the cropping pattern proposed by the Agriculture and Horticulture Departments in their DPR for Banana, Mango, Sappota, Coconut, sugar cane, vegetables, Arecanut and Tapioca, subject to the assurance of cropping by the concerned departments and availability of water sources. The remaining farmers would be motivated to visit the adjoining areas to witness the benefits of precision farming components so tha t the same may be replicated in their fields.

The benefits of MIS are increase in crop yield, productivity, savings in irrigation water, input items like fertilizer and labour, increase in crop area with available water, controlled weed growth etc., By implementation of MIS, the gap area will be brought under cultivation. The beneficiaries shalll contribute 10% of the total cost of MIS and will be deposited as corpus fund for maintenance. TNAU has proposed MIS for 500 Ha under adaptive research trial demo plots(i.e 250 Ha in Sugarcane and 250 Ha in Tapioca)and it is not overlapped with the area proposed by AED under MIS.

The table showing the crop wise proposed area for micro irrigation system is given below.

AGRICULTURAL ENGINEERING DEPARTMENT

CROPWISE PROPOSED AREA FOR MICRO IRRIGATION SYSTEM

UPPER VELLAR SUB BASIN

Total Project Area = 10572 Hec

Sl. No.	Name of Crop	Post project area in Ha.	Existing area under Drip/ Sprinkler (Ha)	Area Proposed by TNAU (Ha)	Balance area available (Ha)	Proposed by AED for Micro Irrigation (Ha)	
						Drip	Sprinkler
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	Paddy	2271	Nil	Nil	2271		
2	Arecanut	260	50	Nil	210	110	
3	Mango	15	Nil	Nil	15	15	
4	Maize	2658	Nil	Nil	2658		
5	Blackgram	580	Nil	Nil	580		
6	Groundnut	400	Nil	Nil	400		300
7	Banana	50	Nil	Nil	50	50	
8	Coconut	300	50	Nil	250	200	
9	Cotton	300	Nil	Nil	300		
10	Sugarcane	2050	Nil	250	1800	900	
11	Sappota	8	Nil	Nil	8	8	
12	Tapioca	850	Nil	250	600	150	
13	FodderCholam	175	Nil	Nil	175		
14	Green Fodder	200	Nil	Nil	200		
15	Castor	155	Nil	Nil	155		
16	Turmeric	100	Nil	Nil	100		100
17	Vegetables	200	Nil	Nil	200	100	100
TOTAL		**10572**	**100**	**500**	**9972**	**1533**	**500**

DRIP IRRIGATION SYSTEM:

Drip irrigation system with fertigation component a re proposed over an area 433 Ha for horticultural crops like banana, Sapota, Arecanut, Tapioca, Mango, and Vegetables and for agricultural crops like coconut, sugarcane to the extent of 1100 ha and the total extent under Drip Irrigation System would be 1 533 Ha.

Sugarcane is one of the commercial crop with higher water requirement of 2000-2500mm. Unlike surface method of irrigation, the water use efficiency is extremely higher in drip method of irrigation, as this technology helps to supply the required quantity of irrigation water directly to root zone besides reducing conveyance evaporation and distribution losses. The Agriculture Department and TNAU has recommended latest Pit Method for sugarcane for higher yields. Pit Method is more effective only with the adoption of Drip Irrigation System. Under Pit method, the yield will be increased by two to three times of nominal yield obtained from conventional method. To minimize the usage of groundwater and to save the labor costs, the drip irrigation system shall be adopted for sustained income to the farmers.

Sugarcane is the major crop next to Paddy grown in an extent of 2050 Ha which would be increased to 600 Ha in post project period. Out of this, 50% area i.e. 900Ha are proposed under drip irr igation with fertigation. Besides, 80 % of Coconut area to an extent of 200 Ha. out of 250 Ha. would be brought under drip irrigation with fertigation. 50 Ha of the Existing area under Drip Irrigation in coconut is now proposed for Fertigation.

Department of Horticulture & Plantation crops has proposed an increase in area under Arecanut to 60 Hec with an existing area of200Hec to 260 Hec. To irrigate these crops, Drip irrigation system is proposed for 110 Ha. for arecanut crop. 50Ha of Arecanut Crop is already covered under Drip Irrigation System.

Department of Horticulture & Plantation crops has proposed to cover an area of 53 ha. under cultivation of Fruit crops like Mango, Banana & Sapota .Entire area of 53 ha is hence proposed to be irrigated with Drip irrigation system over a period of 3 years.

Department of Horticulture & Plantation crops and Agricultural Department have proposed to cover an area of 850 ha. under cultivation of Tapioca. In this 150 Hec of area is proposed for drip irrigation under Agricultural Engineering Department and the balance area is proposed by Tamilnadu Agricultural University.

SPRINKLER IRRIGATION SYSTEM:

Sprinkler irrigation system component is proposed for vegetables,Groundnut,and Turmeric. Groundnut an important edible oilseed crop is usuallyraised with check basin method of irrigation consuming about 550 mm of water. The Pulses, cotton and other vegetables and Flowers consume 350 - 800 mm. Possibility of water saving and yield enhancement is assured by Micro Irrigation System for these crops. Besides saving 35 - 40 % of water requirement this Micro Irrigation System enables higher soil profile moisture content and greater leaf water potential and resulted in better expression of growth and yield parameters. It has to planned to cover Groundnut (300 Hec), Vegetables (100 Hec) and Turmeric (100 Hes) under sprinkler irrigation. The benefits of the micro irrigation systems will be demonstrated to the other farmers in such a way that they realize the benefits, so that they will switch over to the micro irrigation systems in subsequent years. The unit costs adopted are as per Govt. of India guidelines adding installation cost and earthwork for respective crop spacings.50 % of the cost will be GOI cost and the balance 50 % will be the World Bank cost. 10 % of the estimate cost will be collected from farmers as Corpus Fund and deposited in WUA account. Further maintenance of the micro irrigation systems will be done using the interest accrued from the Corpus Funds.

❖ **PRECISION FARMING:**

Precision farming is a farm practice, in which, all inputs such as water, seed, nutrients, fertilizers, plant protection chemicals, 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. By adopting Fertigation practices through drip irrigation, 25% savings of fertilizers and complete utilisation of applied nutrients by the plants is

noticed by farmers as reported by TNAU. The Horticulture Department has proposed Demos for vegetable crops in Valapadi, Singipuram, Kalicheetiyur, Ramanaickenpalayam, Appmmasamudram, Ammampalayam, Kammakkapalayam, Pattuthurai, Sivasankarapuram, Siruvachur and Aragalur Villages. In these Villages Precision Farming has proposed for 100 Hec of Vegetable crops which will be 100% funded from the project.. Agricultural Engineering Department will install Drip Irrigation for the Vegetable crops.

The tank wise/crop wise area proposed under the above components are furnished in annexure. II

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 are proposed on popularization mode. These implements shall be hired out to the beneficiaries by the WUA and hire charges will b e prescribed by the WUA. The collected hire charges will be utilized for maintenance mechanism.

1. Maize and Groundnut are the major crops proposed to be cultivated in 2658 ha. And 1850 Ha respectively in this basin. To introduce Mechanised cultivation practices among the farmers, the following advanced implement Tractor operated Seed Drill 25 Nos is proposed at a rate of 1 no for 160 Ha of proposed area and to be supplied to the progressive Water Users Association. The WUA will hire out the implements to farmers on nominal charges and meet the maintenance expenditure.

2. Sugar cane is another major crop cultivated in the sub basin. For pitting cultivation method Post hole Digger 10 Nos is proposed. To de - root the sugarcane roots Rotavators are used. By usage of Rotavators the soil texture will be maintained its character. The WUA will hire out the implements to farmers on nominal charges and meet the maintenance expenditure.

3. Tapioca is a popular crop in Upper Vellar area. B ut the farmers could not get the knowledge of their produce. In tapioca the water content is the main factor to fix the cost of tapioca. To measure the correct water content point scales are proposed. The WUA will hire out the implements to farmers on nom inal charges and meet the maintenance expenditure.

BURRIED PVC PIPE LINES FOR WATER CONVEYANCE AND FOR SPRINKLER IRRIGATION:

Adopting new pattern of irrigation(conjunctive use of surface and ground water) i.e., linking of all sluices of the tank by PVC pipe lines and construction of sump for storage of surface water, provision of community well and to store the ground water in the above said sump in non-season periods and installation of drip/sprinkler irrigation by utilizing the water stored in the sump using hydrants. As a demonstrative model **Lakshnamasamudram Tank** has been selected (where no assured supply of irrigation water to all the parts of the ayacut areas) for linking of sluices, construction of sump, provision of community bore well and to install the drip and sprinkler irrigation. 10 % of the estimate cost will be farmer's contribution and the balance 90 % will be World Bank cost. During midterm appraisal the Buried Pipeline system will be evaluated and based on the results the same will be replicated in other tank commands.

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.

Besides, the Farm Ponds shall act as Fish ponds for Fish Production giving additional income to the farmers of the tail end. The Fisheries Department has proposed Fisheries Development activities in 46 Farm Ponds and Fish Culture would yield income of Rs.10,000/- per crop to the farmer. 51 nos. of Farm Ponds are proposed @ Rs.40,000/-. The Farmers who opted for Farm Ponds would be motivated for adopting Drip / Sprinkler irrigation for raising their crops.

The contribution @ 10% of the total cost shall be collected from the beneficiaries of the farm pond for works and the remaining 90% will be borne by world bank.

ABSTRACT OF WORK COMPONENTS PROPOSED:

The tankwise proposed work components in Upper Vellar shown in the annexure separately. The abstract of the work components are shown in the following table:

Sl. No.	Components Proposed	Unit	Unit Cost (Rs.)	Physical	Amount
1	**Micro Irrigation System**				
a	**Drip Irrigation**				
	Sugarcane	Ha.	58000	900	522.00
	Banana	Ha.	52800	50	26.40
	Coconut	Ha.	22900	200	45.80
	Mango	Ha.	21000	15	3.15
	Tapioca	Ha.	60600	150	90.90
	Arecanut	Ha.	52800	110	58.08
	Sappota	Ha.	33200	8	2.66
Total		**Ha.**		**1433**	**748.99**
	Coconut With Fertigation (1 Unit per 2 Hec)	**Ha.**	**4000**	**50**	**1.00**
b	**Sprinkler Irrigation**				
	Groundnut	Ha.	15000	300	60.00
	Turmeric	Ha.	15000	100	15.00
	Vegetables	Ha.	15000	100	15.00
Total		**Ha.**		**600**	**90.00**
2	**Precision Farming**	**Ha.**	**75000**	**100**	**75.00**
3	**Buried Pipeline System**				
	Lakshmanasamudram Tank	Ha.		70.18.	9.55
Total		**Ha.**			**9.55**
4	**Farm Mechanisation**				
a	Seed Drill for Groundnut and Maize	No.	35000	25	8.75
b	Groundnut Harvester	No.	40000	10	4.00
c	Rotavator	No.	90000	10	9.00
d	Posthole Digger	No.	90000	10	9.00
e	Power Weeder attachment for Tractor	No.	75000	20	15.00
f	Point Scale(Tapioca)	No.	15000	30	4.50
Total		**No.**		**105**	**50.25**
5	**Farm Ponds**	**No.**	**40000**	**51**	**20.40**
Grand Total					**980.19**

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.

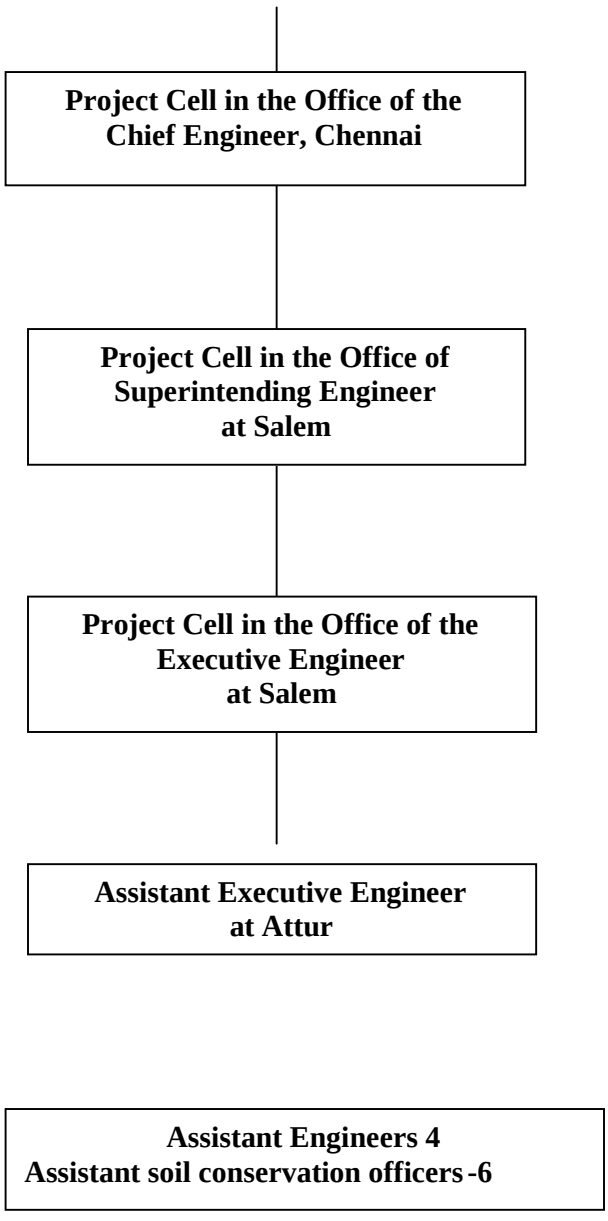
7. IMPLEMENTATION STRATEGY:

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 a vailable field personnel for implementation of IAMWARM project is furnished below:

HR PATTERN



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 OF PROGRESS OF WORK

EE(AE) will review AEE s' once in a fort night and submit the fort night report to CE. CE wil lreview AEE,EE every m onth to review the progress and review report will be sent to PD, MDPU every month.

Upper Vellar Sub Basin-Cropping Pattern

Total Regd. Ayacut - 10572 Ha

Season	Crops	Pre Project				Post Project			
		FI	PI	GAP	TOTAL	FI	PI	GAP	TOTAL
Annual	**Coconut**								
	Without drip	---	250	---	250				
	Withdrip	---	50	---	50	300			300
	Sugarcane	---							
	Without drip	30	1420	---	1450				
	Withdrip	20			20	2050			2050
	Banana	20			20	50			50
	Mango	---	10		10	15			15
	Sapota	---	8		8	8			8
	Arecanut	---							
	Without drip	200			200				
	Withdrip	50			50	260			260
	Tapioca	---	400	200	600	850			850
	Total	**320**	**2138**	**200**	**2658**	**3533**			**3533**
Ist crop	(July , Aug to Nov,Dec)								
	Paddy	2790	260		3050	2271			2271
	Cotton		175	125	300	300			300

	Maize		458	500	958	2658			2658
	Fodder Cholam		75		75		175		175
	Green fodder					200			200
	Castor + G.Nut		40		40	40			40
	Castor		10		10	115			115
	Vegetables		140		140	200			200
	Turmeric	40			40	100			100
	Blackgram		580		580	580			580
	Groundnut		400		400	400			400
	Total	**2830**	**2138**	**625**	**5593**	**6864**	**175**		**7039**
II nd Crop	**(Dec to Mar)**								
	Paddy	260			260	260			260
	Cumbu		25		25		25		25
	Blackgram		1205		1205	1000	465		1465
	Groundnut	550	500		1050	1050	400		1450
	Total	**810**	**1730**		**2540**	**2310**	**890**		**3200**
IIIrd Crop	**(June to July)**								
	Paddy	120			120	120			120
	Vegetables	10			10	90			90
	Total	130			130	210			210
	Grand Total	**4090**	**6006**	**825**	**10921**	**12917**	**1065**	**0**	**13982**
	Total of Annual + Ist Crop	**3150**	**4276**	**825**	**8251**	**10397**	**175**	**0**	**10572**

GOVERNMENT OF TAMILN ADU
AGRICULTURAL DEPARTMENT

ATTUR

IRRIGATED AGRICULTURE MODERNISATION AND WATER RESOURCES MANAGEMENT PROJECT (IAMWARM)

UPPER VELLAR RIVER SUB BASIN

REGION	*	**SALEM**
DIVISION	*	**SALEM**
SUB DIVISION	*	**ATTUR**

IAMWARM PROJECT
AGRICULTURE

INTRODUCTION:

SUBBASIN :**UPPER VELLAR**

BASIN :**VASISTA**

DISTRICT: **SALEM**

WRO REGION: **TRICHY**

BLOCK COVERED:

1.VALAPADY 2.PETHANAICKENPALAYAM

3.ATTUR 4.THALAIVASAL 5. AYOTHIYAPATTANAM

Upper Vellar sub-basin is one of the 9 sub-basins selected for 1st year implementation of IAMWARM project in TAMILNADU under WORLD BANK assistance. This sub-basin has the registered ayacut area of 10572 Ha. 10 years average rainfall at the basin is 810mm. But during 2005, the sub -basin received 899mm. The important crops grown in the sub-basin are paddy, sugarcane, tapioca, maize, cotton, vegetables, pulses, arecanut, groundnut, coconut etc.

Existing cropping pattern in the sub-basin is: -

1.Paddy-tapioca-groundnut

2.Maize-groundnut-pulses

3.Maize-paddy

4.Sugarcane

5.Cotton-pulses

Existing irrigation potential:

Out of the registered ayacut area of 10572 Ha the present irrigation potential is as below.

Fully irrigated	3150	Ha
Partially irrigated	4276	Ha
Gap	3146	Ha
TOTAL	10572	Ha

Agricultural infrastructure available:

The details of agriculture infrastructure like AEC, FTC, STL, PTL, subdepots, SSF, SPU, TNAU Regional research station, Regulated Markets, Sago Factories, Modern Rice Mills, etc., are indicated in the sub-basin map.In addition to above details, details of the gap area, area in which diversified crops are proposed etc are also indicated in the sub-basin map enclosed with this.

Developmental components proposed for the sub-basin:

Based on the experience gained and the necessity felt during the joint walk through survey of the crops at sub-basin and also as per the decision taken during the joint meeting with WRO, line departments, WUA/FA and also as per the discussion had with the extension offices at the sub-basin, the following developmental components of activities are suggested. The main object is to improve the productivity / unit of area and also to improve the productivity / unit of irrigation water. This activities may increase the standard of living of the farmers by getting more profit than before.

The physical and financial requirements of developmental components of activities have been worked out for 3 years period.

The cost norms for developmental components of activities have been adopted mostly based on the existing cost norms followed in state / centrally sponsored schemes being implemented by the agricultural department. However certain change in cost norms also been made in certain components based on ground realities and WUA demands.

S.No	Components	Amount (Rs.Lakhs)
1.	Issue of soil health Cards	Rs. 0.400
2.	Crop sequence demonstration (IPM &INM) for paddy , pulses, maize and coconut.	Rs.52.375
3.	Organic farming (vermi compost demonstration)	Rs. 20.000
4.	Distribution of critical inputs	Rs.16.481
	Total	***Rs.89.256***

Full description of the components of activities proposed component wise is enclosed separately in annexure I. The table showing the details of physical & financial aspects of each component of development activities for 3 years is enclosed in annexure-II

II Existing agricultural practices in the sub-basin are:

1.Inputs

(a)Seeds:

Certified / Hybrid / improved / quality seeds and planting materials are used by the farmers to a limited extent only. Only in millets the farmer in certain pockets uses traditional low yielding local varieties. However the area under such millets is limited in the sub-basin. The main source of seeds to the farmers is through the Agricultural extension Centers. Many farmers use their own seeds and also exchange seeds among themselves. Some innovative farmers get the required seeds from the nearby TNAU research stations, KVKS, and private sources also.

(b) Soil:

The soil types are as follows:

S.No	Soil types
1.	Palladam Series
2.	Periyanaickanpalayam series and
3.	Thulukknoor Series

Farmers testing their soils mostly once in a year through the assistance of the agricultural extension staff of the area. The soils are mainly tested through the departmental STL & MSTL available in the district. Farmers rarel y test soil through TNAU and private sources. In view of large number of soil samples proposed to be covered, as a result of intensive cropping, private sources like agri. Clinics, SPIC, MFL etc will be utilized for testing.

(C)Organic Farming:

Organic farming practices are not in practice so for in the sub-basin. Necessary steps are being taken to educate the farmers through demonstrations & other mass media channels. But many farmers apply organic manures to their fields along with chemical fertilizers. However 100% use of only organic manures is not prevalent in the sub-basin. Slowly farmers aware of the benefits of the use of organic manures and it may take few more years to adopt significantly. In future, the chance of application of organic manure is more for Horticulture crops, especially for vegetables, which fetches special prize through elight consumers.

(d)INM &IPM:

Nearly 30 to 40% of the farmers adopt INM & IPM practices.

The percentage of adoption of this practices may increase significantly in future due to the extension efforts being taken by the agricultural department.

(e)Actual Extension services available for ToT:

For transfer of latest farming techniques many extension techniques are being adopted. One of the main extension service is existence of AECS in the entire block Headquarters and sub depots in the needy locations. Through AECS required critical farm inputs, especially seeds, bio-fertilizer, Micronutrients and bio-pesticides and implements are distributed to the farmers mostly under subsidized cost. Besides distribution of inputs required technical advices essential for increased productivity are given to farmers in person. In addition required publicity and propaganda are being made through various media to educate the farmers in time to adopt the latest production technologies to increase the productivity of crops. There is a TNAU regional research station for Tapioca and castor in Yethapur, which caters the technical needs of the farmers of the district. There is no Private extension centre in the sub-basin or in the district. As per the T&V norms, there must be one village level extension worker for every 800 to 1200 farm families. But such norms is not in reality due to lot of vacancies.

2. Practices-Ground Realities:

(a)Irrigation:

The details of water availability, season, sources etc are give below

S.No	Sources	Season	Peirod
1.	Reservoirs	Navari	Dec-Jan
2.	Anicuts	Samba	Sep-Dec
3.	Tanks	Navari	Jan-Mar
4.	Wells	Samba&Navari	Sep-Mar

(b)Micro Irrigation:

Micro Irrigation practices are increasing year by year and popular among the farmers. The detail of area under dripirrigation crop wise is given below.

S.No	Crop	Area under Drip (Ha)
1.	Vegetables	10
2.	Groundnut	25
3.	Pulses	5
4.	Arecanut	50
5.	Coconut	50
6.	Banana	0
7.	Fruits(Amla, sapota, Mango)	5
8.	Sugarcane	20
Total		165

About 5% of the sub-basin farmers adopt micro irrigation.

(c) Fertigation:

Fertigation practices are being followed in the sub-basin and the technology is popular among the farmers. Fertigation is practiced for the crops such as 1.Sugarcane 2.Coconut 3. Arecanut 4. Fruits .

(d)Contract farming:

Contract farming is popular for the crops like 1.Cotton 2. Sugarcane 3. medicinal plants 4. maize.

The details of area under contract farming crop wise is give below.

S.No	Crop	Area(Ha)
1.	Cotton	400
2.	Sugarcane	750
3.	Medicinal Plants	1000
4.	Maize	100

(e)Pre & Post harvest practices adopted:

As for as paddy is concerned, only certified seeds are used by many farmers. IPM and INM practices are also followed considerably. As a post harvest practice, few farmers dry the produce and store for 2 to 3 months before selling and get good price.

Regarding Tapioca the planting sets are dipped in the copper sulphate solution to prevent fungal diseases. All most all the Tapioca harvest is used for sago extraction by the farmers themselves through the number of sago factories available in the district and get more price for sago than selling the tubers as it is.

As for as Groundnut is concerned, the seed materials is treated with Biofertilizer to induce root nodules which helps to fix atmospheric nitrogen in the plants for robust growth and peg formation. Band application of gypsum also practiced followed by hoeing and weeding, which also induces peg formation and bold pod formation. Many farmers stock the harvest for 2 to 3 months to get more price.

(f)Labour Issues:

Labour availability is a problem due to migration to urban areas to get more wages by doing non agricultural works. Many farmers use farming labours in addition to hired labours by paying over wages. Skilled labours are more scares than the unskilled labours.

3.Agri-Processing-Factories, capacity etc:

The details of various agri processing units, factories available in the sub -basin / district is given below with its capacity.

S.No	Details	Numbers	Capacity
1.	Sago Factories	67	2000mt/day
2.	Modern Rice Mills	5	75mt/day
3.	Oil Mills	20	50mt/day
4.	Cotton ginning Mills	11	120Bals/day

III Constraints:

1. Constraints in existing scenario.

a. Problem soil:

This sub-basin has 5% of problem soils in the total sub-basin area which needs reclamation. The location of the problem soil area indicated in the sub-basin map. Required financial provision given in the development component.

b. The temperature is generally high and drought occurs often 2001-02, 2003-04,drought years.2005-06 flood year.

C Low yielding local varieties still prevalent especially in millets. About 5% millet area under traditional varieties.

d. Certified seeds are stored in the AECS as per the percentage norms prescribed by the departmental only. Hybrid seeds costs more, which is not distributed through department.

e. Poor yielding varieties still exist in minor millets.

f. Flood irrigation system still exists with many farmers especially for paddy and sugarcane.

g. Extension workers are limited. Hence inadequate extension services.

h. Low price for produces during heavy harvest seasons and lack of intra support services.

i. Poor adoption of pre & post harvest technologies. The details are as follows.

S.No	Crop	PRACTICES
1.	Paddy	1.More nitrogen fertilizer used. 2.Green and green leaf manure not used. 3.Flood irrigation still followed. 4.closer planting not followed. 5.Line planting not followed.
2.	Sugarcane	1.pit method planting not followed. 2.Flood irrigation still exist. 3.Drip not adopted. 4.Late cutting order by the mill.
3.	Millets	1.Local varieties still used especially in minor millets.
4.	Groundnut	1.Mostly farmers get sales immediately after harvest.
5.	Tapioca	1.Long duration and local varieties still cultivated. 2.Rainfed tapioca yields less

J. Getting farm credit through nationalized banks are cumbersome compared through co-operative.

K. Knowledge of risk aversion is poor with farmers due to non contact of AECS and departmental officers often, due to lack of training, capacity buildings, IEC facilities to aware the new technology in cultivation of crops.

L. Required type of processing units for the required crop not available.

M. Labour availability is aqcusite. Farmers have spend over on labour wages

UPPER VELLAR SUB BASIN - CROPPING PATTERN

Total Regd. Ayacut - 10572 Ha.

Season	Crops	Pre Project				Post Project			
		FI	**PI**	**Gap**	**Total**	**FI**	**PI**	**Gap**	**Total**
Annual	Coconut	0	300	0	300	300	0	0	300
	Sugarcane	50	1420	0	1470	2050	0	0	2050
	Banana	20	0	0	20	50	0	0	50
	Mango	0	10	0	10	15	0	0	15
	Sapota	0	8	0	8	8	0	0	8
	Arecanut	250	0	0	250	260	0	0	260
	Tapioca	0	400	200	600	850	0	0	850
	Total:	**320**	**2138**	**200**	**2658**	**3533**	**0**	**0**	**3533**
Ist Crop (July, August to Nov., Dec.)	Paddy	2790	260	0	3050	2271	0	0	2271
	Cotton	0	175	125	300	300	0	0	300
	Maize	0	458	500	958	2658	0	0	2658
	Fodder Cholam	0	75	0	75	0	175		175
	Green Fodder	0	0	0	0	200	0	0	200
	Castor + G.Nut	0	40	0	40	40	0	0	40
	Castor + G.Nut	0	10	0	10	115	0	0	115
	Vegetables	0	140	0	140	200	0	0	200
	Turmeric	40	0	0	40	100	0	0	100
	Blackgram	0	580	0	580	580	0	0	580
	Groundnut	0	400	0	400	400	0	0	400
	Total:	**2830**	**2138**	**625**	**5593**	**6864**	**175**	**0**	**7039**
IInd Crop(Dec. to March)	Paddy	260	0	0	260	260	0	0	260
	Cumbu	0	25	0	25	0	25	0	25
	Blackgram	0	1205	0	1205	1000	465	0	1465
	Groundnut	550	500	0	1050	1050	400	0	1450
	Total:	**810**	**1730**	**0**	**2540**	**2310**	**890**	**0**	**3200**
IIIrd Crop (June to August)	Paddy	120	0	0	120	120	0	0	120
	Vegetables	10	0	0	10	90	0	0	90
	Total:	**130**	**0**	**0**	**130**	**210**	**0**	**0**	**210**
	Grand Total:	**4090**	**6006**	**825**	**10921**	**12917**	**1065**	**0**	**13982**
	Total of Annual + Ist crop	**3150**	**4276**	**825**	**8251**	**10397**	**175**	**0**	**10572**

1.Post project diversified crops details

Season	Crops	Area increasing (Ha.)	Area decreassing (Ha.)
Annual	Coconut	0	0
	Sugarcane	600	0
	Banana	30	0
	Mango	5	0
	Sapota	0	0
	Arecanut	10	0
	Tapioca	250	0
	Total:	**895**	**0**
Ist crop	Paddy	0	779
	Cotton	0	0
	Maize	1700	0
	Fodder Cholam	100	0
	Green Fodder	200	0
	Castor + G.Nut	0	0
	Castor	105	0
	Vegetables	60	0
	Turmeric	60	0
	Blackgram	0	0
	Groundnut	0	0
	Total:	**2225**	**779**
IInd crop	Paddy	0	0
	Cumbu	0	0
	Blackgram	260	0
	Groundnut	400	0
	Total:	**660**	**0**
IIIrd Crop	Paddy	0	0
	Vegetables	80	0
	Total:	**80**	**0**
	Grand Total:	**3860**	**779**

REASONS FOR DIVERSIFICATION OF CROPS:

I. MAIZE:

The hybrid seeds are available in private shops in enough quantity.

- The Maize crop is preferred by the farmers.
- Less water required.
- Without major pest and disease problem, gives assured yield.

Market demand:

- The market demand for Maize grain is in increasing trend because all cattle and poultry feed production units required Maize grain for feed preparation.
- The companies like SKM, Suguna Broilers and local poultry units are having plan to offer good price to farmers for their produce.

So, an area increase of 1700 ha. Is proposed in the location of Pedhanaickenpalayam, Attur and Thalaivasal Firka areas.

II. SUGARCANE:

An area diversification to Sugarcane about 600 hectares from Paddy area because there is a proposal to start a new Sugar factory in the sub basin area. Hence, farmers are interested to go for more area in Sugarcane.

The seed material will be supplied by the Sugar factories.

III. PULSES:

- Because of the local market demand for pulses, the farmers are interested to grow Pulses in more area.
- The seeds of short duration varieties like T0. Vamban.2, Vamban.3 will be supplied by the Govt. source and also private agro services to some extent.

IV. GROUNDNUT:

An area increase of Groundnut is proposed in the 2 nd crop duration period. Because of availability of 20 Oil mills with a capacity of 50 MT./ day. There will be a demand for the produce.

The new variety seeds will be supplied from department of Agriculture to some extent. The farmers from private sources will directly purchase the remaining quantity of seed.

V. CASTOR:

There is one Tapioca and Castor Research Station located at Yethapur, TNAU also organizing FLDs and trainings to educate the farmers in cultivation of castor.

Hence it is a scope to increase the area under Castor crop. Local market is available for Castor crop.

Fodder Cholam and Green fodder:

To meet the demand for fodder requirement by the increased milch animals, the increased area proposal is given in the project.

HORTICULTURAL CROPS – REASON FOR DIVERSIFICATION:

1. MANGO:

Mango production is mainly used for local consumption. The choice variety like Alphanso, introduced to fetch high yield price.

2. T.C. BANANA:

To increase an area of Tissue culture Banana replacing local varieties, T.C. Banana suckers will be provided to the farmers.

The suckers are available at private sources like Growmore, Spic companies.

The farmers are also directly send the products to the market available at Trichy, Bangalore where the demand is more.

3. VEGETABLES:

The high yielding hybrid seeds are procured from private sources. The local market is available at Vazhappady, Thalaivasal and Attur area.

4. TURMERIC:

The farmers preferred to go for more turmeric area to get more income. The local market rate is available to purchase the processed turmeric product produced by the farmers.

5. ARECANUT:

The farmers preferred to go for more Arecanut area to get more income. The local market is available to purchase processed Arecanut products produced by the farmers. The high yielding and hybrid seedlings will be purchased from private sources by tender method.

6. TAPIOCA:

In the Sub basin Area, there are 67 sago factories with a capac ity of 2000 MT available. Almost all the Tapioca harvest is used for sago and starch extraction. Because of this demand by the sago factories, farmers are willing to grow high yielding tapioca in more area.

V. **Challenges thrown up by diversification/ area expansion**:

1.WRO should ensure quality water availability through out the cropping pattern. WRO should be flexible in giving water during sowing season so the farmers can get water in time for doing various cropping operations as and when they need .

2.Proposed cropping pattern for the project is given in the table .The crops are suggested based on agro –climatic suitability market demand and farmers choice.

3 .Required quality seeds /planting materials will be made available in all the AEC& Regional research station of TNAU and also through private sources

4.Regarding diversion and introduction of new crops /varieties lengthy discussion had with the WUA/FA during the joint walk through the joint meetings and the farmers accepted the new approach .For the mind set of farmers training will be given, demonstration will be arranged, publicity &propaganda through various media.

5.In addition to the available extension services in the sub -basin the services of the Agri–clinicis to be set up with unemployed a gri graduates will be utilized if necessary .The services of NGOS who are already in the agricultural sector will be utilized as and when needed on contract basis. The services of TNAU/KVK will also be utilized.

6.Information Education and Communication(IE C) facilities will be strengthened at AEC level. Required trainings will be imparted both to the farmers and extension workers periodically with the assistance of TNAU ,agri -clinics to be set up, through demonstrations trainings available in Block Develo pment office.

7.Based on the necessity and the farmers demand the details of requirement of micro irrigation system ,hand& power operated sprayers have been worked out. The

drips will be supplied by Agricultural engineering department and the sprayers by the Agricultural department. Required provision are made by the respective department.

8.Solutions and Recommendations

To overcome the constraints and challenges described above ,the issue were discussed during the joint walk through in the sub-basin and also during the joint meeting with WRO, Line department offices and WUA/FA etc.

Joint walk through was held on 27.07.2006&17.08.2006.

Joint meeting was held on 27.07.2006& 07.08.2006

The details of WUA/FA demands [development components and activities] which was finalized during the joint meeting are listed below:

The details of constraints in existing scenario and the counter measures proposed are given below:

Constraints	Counter measures
a. Problem soil about 5% of the problem soils have been identified in the sub- basin area.	Necessary provision made in the Developmental components of activities. Based on soil test recommendation these problem soil will be reclaimed by using chemistry wing of agricultural department and the expertise of TNAU&KVK
b.Adverse climatic condition –drought	Suitable drought resistant varieties in addition to drought proof /cultural practices will be recommended to the needy area.
c.Inferior quality of seeds(Low yielding traditional varieties still prevalent)	Low yielding traditional local varieties are there in the villages under minor millets. Steps will be taken to replace the same with the improved hybrid varieties.
d.Limited availability and distribution of certified seeds from Govt sources /private. High cost of hybrid seeds	Required quality certified seeds will be stored in all the AECS as per the norms for distribution fixed by the department for the crops. To over come the high cost of hybrid seeds, suitable private sources which could supply at cheaper cost will be identifie d and recommended to the farmers in time.

e.Improved varieties	Steps will be taken to replace such varieties by timely supply of improved variety to the farmers.Farmers will be suitably educated to go in for improved varieties -through training and demonstrations.
f.Improved irrigation practices(Flood irrigation)	Farmers will be trained /educated for economic and judicious use of irrigation water through demonstrations and trainings. Micro irrigation will be introduced for the needy crop through AED.
g.Inadequate extension services	If necessary agriclinic will be set up with the help of unemployed agri graduates with the assistance of TNAU and the services will be utilized for various extension activities including collection and testing of soil samples,laying demonstrations, training to farmers etc.
h. Low price of produce	T he cost of produce goes low during harvest periods Hence farmers will be suitably educated and facilities provided through agricultural marketing department To store the produce for few months to get the good price by adoptions post harvest technologies, especially value addition.
i Poor adoption of pre& post harvest technologies. For (eg) excessive use of plant protection chemicals.	Farmers will be educated suitably through trainings and demonstrations, soil testing practices, introduction of IPM&INM practices, micro irrigation practices etc.
j. Limited availability of credit facilities	Necessary steps will be taken to arrange credit facilities (Crop loan) through co-op societies and nationalized banks. Loan on produce stock will be arranged through regulated market.
k. Risk aversion	To overcome the risk aversion farmers will be educated suitably on market demand, yield potential, technology available, price in the district, outside the district, outside of state etc, before choosing particular crop. Recommendation will be made to take up a particular crop after considering the above details on crop. Training, demonstrations will be arranged for capacity building. IEC facilities will be given to the farmers through various media and also through internet facilities available in block development offices.

l. Limited processing units	As far as this sub-basin is concerned, the processing unit is mainly required for tapioca crop. Sufficient number of sago factories are available in the sub-basin/district. Regarding paddy number of modern rice mills are there. Cotton ginning factories also there in the sub-basin. Hence there is no processing constraints in the sub-basin.
m. Availability of labor	Labor is generally scarce in the sub-basin. To overcome labor problem innovation of micro irrigation system, labor saving farm equipments, hand and power operated sprayers will be taken up for which necessary physical and financial provisions are made in the development components proposed in consultations with the WUA/FA, line departments and WRO.

Challenges thrown up by diversification and area expansion :

Challenges	Solution
1. Ensuring water availability for extended area, flexibility, reliability, quality.	The issue has been discussed with WRO during the joint walk through and joint meetings along with line departments and WUA/FA. WRO agreed to supply quality irrigation water throughout the cropping period. WRO ensured flexibility in giving water as per the need of the farmer and assured for reliability in giving water.
2. Identifying suitable crop/varieties according to agro climate suitability.	Proposed cropping pattern for the project is given in the table .The crops are suggested based on agro –climatic suitability, Market demand and farmers choice.
3. Planting materials-quantity / quality.	Required quality seeds /planting materials will be made available in all the AEC& Regional research station of TNAU and also through private sources.
4. Farmers mind set for new crops.	Regarding diversion and introduction of new crops /varieties lengthy discussion had with the WUA/FA during the joint walk through the joint meetings and the farmers accepted the new approach .For the mind set of farmers training will be given, demonstration will be arranged, publicity &propaganda through various media.

5. Pressure on extension services for addressing needs of newly diversified areas.	In addition to the available extension services in the sub-basin the services of the Agrl–clinicis to be set up with unemployed agrl graduates will be utilized if necessary .The services of NGOS who are along in the agrl setup will be utilized as and when needed on contract basis. The services of TNAU/KVK will also be utilized.
6. Information, Education and communication(IEC).	IEC facilities will be strengthened at AED level. Required trainings will be imported both to the farmers and extension workers periodically with the assistance of TNAU ,agrl-clinics to be set up, through demos trainings available in Block development office.
7. To increase the extent of Mechanizations.	Based on the necessity and the farmers demand the details of requirement of micro irrigation system ,hand& power operated sprayers have been worked out. The drips will be supplied by Agricultural engineering department and the sprayers by the Agricultural department. Required provision are made by the respective department.

ANNEXURE-I

PROPOSAL FOR UPPER VELLAR BASIN BY

AGRICULTURAL DEPARTMENT

I. Issue of Soil health Cards:

In this project it is proposed to take 800 soil samples in this sub -basin every year.

Unit cost / Card @ Rs.10.00

For one year 800 farmers at free of cost = Rs.8000/year

For 5 years = Rs.40000/-

II. Crop Sequence Demonstration including IPM & INM:

The cropping pattern for one year recommended for Upper Vellar basin will be adopted with the following improved package and practices as per the norms of Agricultural department.

The inputs will be given to the farmers at 75% subsidy as followed in National Horticultural Mission Scheme.

a. Paddy:

Sl. No.	Name of component	Kg./Ha.	Rs.	Total Cost (Rs.)
1	Distribution of seeds	50	12	600
2	Seed treatment chemicals 2 g/Kg.	100g.	60	60
3	Distribution of M.N.Mixture	25	12.80	320
4	Distribution of fertilizer and Bio-fertilizer			1520
	TOTAL			**2500**
	75% subsidy cost			1750

b. Pulses:

Sl. No.	Name of component	Kg./Ha.	Rs.	Total Cost (Rs.)
1	Distribution of seeds	20	50.00	1000
2	Distribution of Bio-fertilizers	26 pocket	6.00	156
3	Distribution of M.N.Mixture and Fertilizers			894
4	DAP cost	10	10.00	100
	DAP SPRAYING COST			200
	TOTAL			**2350**
	75% subsidy cost			**1750**

c. Maize

Sl. No.	Name of component	Kg./Ha.	Rs.	Total Cost (Rs.)
1	Distribution of Hybrid seeds	20	100	2000
2	Seed treatment Chemical (2 g. /Kg.)	40g.	60/100g.	24
3	Bio-fertilizer distribution	20 packet	6/packet	120
4	Fertilizer distribution			1856
	TOTAL			**4000**
	75% subsidy cost			**3000**

d. Coconut

Application of Micronutrients, fertilizers and Organic farming @ Rs.54 / tree for 175 tree/Ha. } = Rs.10,000/-

75% subsidy = Rs. 7,500/-

III. Organic Farming – Vermi Compost:

Organic farming practices are not in practi ce so far in the sub-basin. To educate the farmers vermin compost demonstrations are to be laid out as per the norms of coconut development board schemes followed in Agriculture department.

Construction of pits and Structuring(6x3x3')	**=**	**Rs.20000/-**
Construction of Roof	**=**	**Rs. 7000/-**
Purchase of Farm Yard Manure	**=**	**Rs. 5000/-**
Purchase of Earthwarms	**=**	**Rs. 5000/-**
Purchase of Pipes and sieves	**=**	**Rs. 3000/-**
Total:	=	Rs.40000/-
50% subsidy	=	Rs.20000/-

V. Distribution of Critical Inputs:

The critical inputs like Bio-pesticides and Micro Nutrient Mixtures are distributed to the farmers @ 50% subsidy cost as a special case to increase the area of organic farming and also net income of the farmers.

a. Distribution of Bio-pesticides @ 50% subsidy as per department of Agriculture norms:

Full cost	= Rs.250/litre
Recommended dose	= 2 litre / Ha.
Subsidy per ha.	= Rs.250/-

b. Distribution of M.N.Mixtures for Groundnut

Recommended dose	= 12.5 Kg./Ha.
Cost of 1 Kg. M.N.Mixture	= Rs.34/-
Cost per Ha.	= Rs.425/-
50% subsidy	= Rs.212/Ha.

c. Distribution of M.N. Mixture for Coconut

Recommended dose	= 1 Kg./Tree
Cost of 1 Kg. M.N.Mixture	= Rs.35/-
Cost per Ha.	= Rs.6125/-
50% subsidy	= Rs.3062/Ha.

ACTIVITIES PROPOSED TO UPPER VELLAR SUB BASIN

SALEM DISTRICT

Sl.No.	Components	Cost per unit (Rs.)	Subsidy pattern	Proposal for 5 years (Lakh Rs.)			
				Unit (Ha./No.)	Govt. share	Farmers Share	Total cost
1	Issue of Soil health Cards	10	100%	4000	0.400	0	0.400
2	Crop demonstration						
	a. Paddy	2500	75%	600	11.250	3.750	15.000
	b. Pulses	2350	75%	250	4.405	1.470	5.875
	c. Maize	4000	75%	600	18.000	6.000	24.000
	d. Coconut	1000	75%	75	5.625	1.875	7.500
	Total:				**39.280**	**13.095**	**52.375**
3	Organic farming						
	Vermi Compost	40000	50%	50	10.000	10.000	20.000
4	Distribution of Critical Inputs						
	a. Distribution of Bio-pesticides	500	50%	200	0.500	0.500	1.000
	b. Distribution of M/N.Mixture to Groundnut	425	50%	400	0.850	0.850	1.700
	c. Distribution of M.N.Mixture to Coconut	6125	50%	225	6.890	6.891	29.372
	Total:				**8.240**	**8.241**	**32.073**
	Grand Total:				**57.920**	**31.336**	**104.881**

PROPOSAL FOR UPPER VELLAR SUB BASIN – AGRICULTURE

I. ISSUE OF SOIL HEALTH CARDS:

The soil samples will be collected from farmers field and sent for analysis. After obtaining the result the farmers will be provided with soil health card at free of cost. This will help the farmers to avoid indiscriminate use of fertilizers. The soil test based fertilizers application will increase the yield and net income.

II. CROP SEQUENCE DEMONSTRATION INCLUDING IPM & INM:

To have a widespread adoption of IPM & INM technologies which will improve the yield, the proposal in this project for laying demonstrations under INM and IPM are required.

III. ORGANIC FARMING – VERMI COMPOST:

In Organic farming, Vermi composting demonstrations are required to meet the demands of Farm Yard Manure promoting Organic manuring to restore soil health. This composting demonstrations also act as a production unit for farmers use in their fields. This units will become a Commercial Unit slowly to have an additional income to the farmers.

IV. DISTRIBUTION OF CRITICAL INPUTS:

The critical inputs like Bio-pesticides, Micronutrient mixtures are being distributed to the farmers under subsidized cost to increase the area of organic farming and also net income of the farmers.

UPPER VELLAR SUB BASIN - Area, Production, Productivity withou t Project
SALEM DISTRICT

Sl.No.	Crop	Fully Irrigated			Partially irrigated			Gap Area			Total Production (MT.)
		Area (Ha.)	Production (MT.)	Productivity (MT./Ha.)	Area (Ha.)	Production (MT.)	Productivity (MT./Ha.)	Area (Ha.)	Production (MT.)	Productivity (MT./Ha.)	
1	Paddy	3170	15850	5	260	1248	4.8	0	0	0	17098
2	Groundnut	550	550	1	900	810	0.9	0	0	0	1360
3	Maize	0	0	0	458	2061	4.5	500	2000	4	4061
4	Sugarcane	50	600	12	1420	15620	11(Gur)	0	0	0	16220
5	Coconut	0	0	0	300	5.95	68(Nuts)	0	0	0	5.95
6	Blackgram	0	0	0	1785	1071	0.6	0	0	0	1071
7	Cotton	0	0	0	175	175	1	125	125	1	300
8	Cumbu	0	0	0	25	25	1	0	0	0	25
9	Fodder Cholam	0	0	0	75	1500	20	0	0	0	1500
10	Green Fodder	0	0	0	0	0	0	0	0	0	0
11	Castor	0	0	0	50	40	0.8	0	0	0	40
12	Mango	0	0	0	10	100	10	0	0	0	100
13	Sapota	0	0	0	8	120	15	0	0	0	120
14	T.C.Banana	20	800	40	0	0	0	0	0	0	800
15	Tomato	0	0	0	60	2100	35	0	0	0	2100
16	Bhendi	0	0	0	70	1750	25	0	0	0	1750
17	Onion	10	150	15	10	150	15	0	0	0	300
18	Turmeric	40	800	20	0	0	0	0	0	0	800
19	Arecanut	250	750	3	0	0	0	0	0	0	750
	Tapioca	0	0	0	400	15200	38	200	7600	38	22800
	Total:	**4090**	**19500**		**6006**	**41976**		**825**	**9725**		**71201**

UPPER VELLAR SUB BASIN - Area, Production, Productivi ty with Project								
SALEM DISTRICT								
Sl.No.	Crop	Fully Irrigated			Partially irrigated			Total Production (MT.)
		Area (Ha.)	Production (MT.)	Productivity (MT./Ha.)	Area (Ha.)	Production (MT.)	Productivity (MT./Ha.)	
1	Paddy	2651	13785.2	5.2	0	0	0	13785.2
2	Groundnut	1450	1740	1.2	400	480	1.2	2220
3	Maize	2658	13290	5	0	0	0	13290
4	Sugarcane	2050	24600	12 (Gur)	0	0	0	24600
5	Coconut	300	6.56	68 Nuts/Tree	0	0	0	6.56
6	Blackgram	1580	1185	0.75	465	279	0.6	1464
7	Cotton	300	360	1.2	0	0	0	360
8	Cumbu	0	0	0	25	37.5	1.5	37.5
9	Fodder Cholam	0	0	0	175	3500	20	3500
10	Green Fodder	200	6000	30	0	0	0	6000
11	Castor	155	155	1	0	0	0	155
12	Mango	15	150	10	0	0	0	150
13	Sapota	8	120	15	0	0	0	120
14	T.C.Banana	50	2000	40	0	0	0	2000
15	Tomato	100	3500	35	0	0	0	3500
16	Bhendi	170	4250	25	0	0	0	4250
17	Onion	20	300	15	0	0	0	300
18	Turmeric	100	2000	20	0	0	0	2000
19	Arecanut	260	780	3	0	0	0	780
	Tapioca	850	32300	38	0	0	0	32300
	Total:	**12917**	**106521.76**		**1065**	**4296.5**		**110818.26**

COMPARATIVE STUDY OF CROPWISE PRODUCTION AND TOTAL INCOME

		Without Project			With Project		
Sl.No.	Crop	Total Production (MT.)	Average Price (Rs./MT.)	Total Return (L.Rs.)	Total Production (MT.)	Average Price (Rs./MT.)	Total Return (L.Rs.)
1	Paddy	17098	6000	1025.88	13785.2	6000	827.112
2	Groundnut	1360	18000	244.8	2220	18000	399.600
3	Maize	4061	5500	223.355	13290	5500	730.950
4	Sugarcane	16220	10000	1622	24600	10000	2460.000
5	Coconut	5.95	Rs.3/Nut	107.100	6.56	Rs.3/Nut	118.080
6	Blackgram	1071	40000	428.400	1464	40000	585.600
7	Cotton	300	2500	7.500	360	2500	9.000
8	Cumbu	25	8000	2.000	37.5	8000	3.000
9	Fodder Cholam	1500	500	7.500	3500	500	17.500
10	Green Fodder	0	500	0.000	6000	500	30.000
11	Castor	40	1500	0.600	155	1500	2.325
12	Mango	100	10000	10.000	150	10000	15.000
13	Sapota	120	10000	12.000	120	10000	12.000
14	T.C.Banana	800	6000	48.000	2000	6000	120.000
15	Tomato	2100	4000	84.000	3500	4000	140.000
16	Bhendi	1750	4000	70.000	4250	4000	170.000
17	Onion	300	6000	18.000	300	6000	18.000
18	Turmeric	800	6000	48.000	2000	6000	120.000
19	Arecanut	750	80	0.600	780	80	0.624
	Tapioca	22800	2500	570.000	32300	2500	807.500
	Total:	**71200.95**		**4529.735**	**110818.3**		**6586.291**

IAMWARM - SALEM DISTRICT - 2006-2007

SUB-Basin: UPPER VELLAR

PROJECT OUTCOME

Sl.No.	Details	Registered Ayacut area (Ha.)	Cropped area (Ha.)	Cropping Intensity (%)	Production (MT.)
1	Without Project (Existing)	10572	10921	103	71201
2	With Project	10572	13982	132	110818
		Increase in Production			**39617**
		% of increase			**55.64%**
		Increase in Income (lack Rs.)			2036

IRRIGATED AGRICULTURE MODERNISATION

AND

WATER RESOURCES MANAGEMENT

(IAMWARM) PROJECT

AGRICULTURE MARKETING

DETAILED PROJECT REPORT

Proposal for Area Expansion – Horticulture:

Area Expansion under crops like fruits, vegetables, spices and arecanut providing

with high yielding varieties, hybrids proposed in the project. Adoption of new improved techniques like micro irrigation, fertigation to irrigate larger area with available water, thereby the farmers will get sustainable income.

II EXISTING MARKETING SCENARIO

1.REGULATED MARKETS

The Regulated Markets available in this Sub Basin area are 1. Attur

2. Valappadi 3. Thalaivasal. The following infrastructures are available

a. Attur Regulated Market|

This market is functioning in a rented building with a godown capacity of 150 metric tones. The Major arrivals to the market are paddy coconut turmeric maize and vegetables.

a. Valappadi Regulated Market.This market is functioning in a rented building. Godown facility is not available.
b. Thalaivasal Regulated Market. This is functioning in a rented building. Godown facility is not available.

2. CO OPERATIVE MARKETIG SOCIETY.

One at Attur and another at Valapadi are functioning. The main arrivals are cotton, turmeric oil seeds There are two godowns available with a storage capacity of 550 mt each and 500 mt respectively.

3. MARKETS.

Crops	Location	Quantity transacted yearly
Paddy	Attur (Private and regulated market)	70 % of total production.
Cotton	Attur (co-operative society and regulated market)	90 % of total production.
Tapaico	Attur. (Sago factories)	95 % of total production.
Vegetables	Attur Valapadi Thalaivasal (uzavar shandi and private mandies)	80% of total production.
Specializied Markets. For tomato and banana -- at valapadi and Deviyankurichi.. General Market – Weekly Shandies are functioning at Valapadi P uthiragondan Palayam Pethanaicken palayam Attur Thalaivasal and Belur.		

4. INFRASTRUCTURES AVAILABLE OUTSIDE THE REGULATED MARKET .

Apart from the regulated market the Salem market committee has constructed three threshing floors at Manjni Valaya madevi and Attur with a size. of 20m X 20m each. Some farmers are using locally constructed small size threshing floor and godown structures.

DEMAND FOR THE INFRASTRUCTURE.

Total production : 27,075 mt and 3,55,900 nuts.
(for major crops like paddy and maize excluding sugarcane vegetables and fruits which do not require immediate storsge.)

Marketable surplus : 24148 mt and 3342546 nuts

(for major crops like paddy and maize excluding sugarcane vegetables and fruits which do not require immediate storsge.)

Total capacity utilized under the Existing System :21500 mt (two Rotations)

Regulated market	: 150 mt
Co- operative godowns	: 1600 mt
(Small godown structures owned by	: 9000 mt.
farmers which are used for storage)	**Total :10750 mt**
Gap in terms of godowns at the rate of 180 mt / godown in two rotations.	: 8 nos.

5. COMMODITY GROUP.

In this sub basin coleus is a medicinal crop which is cultivated in a large area under contract farming system. A private concern namely M G M is doing this with a great interest. Nearly 10000 hectare being cultivated by the farmers of the commodity group formed by M G M. the above members are spread all over Tamilnadu where as a major portion is covered in this sub basin.

Regarding the marketing of this coleus a buy back arrangement is made between the farmers and the organization. When a decline for demand arises these farmers are advised to go in for other remunerative crops like turmeric and groundnut/ apart from the above commodity group an Ulavazhar Sandhai is functioning in Attur where vegetable growers fetch remunerative price for there produce without the exploitations of the middle man.

The Maize growing farmers are increasing in numbers as there produce is being purchased by the leading cattle feeding manufactures like m/s S K M, SUGUNA. PIONEER. The maize production of this sub basin after the implementation of this project 13,024 mt is much negligible to meet the increase in demand. The diversifi ed cropping area to the tune of 1700 hect in addition to the existing area will benefit the famers positively.

MAIZE PRODUCTION	: 13,290 MT
(With project)	
MAKETABLE SURPLUS	: 13,024 MT
With project)	
EXISTING TOTAL DEMAND	: 18,00,000 MT

(By the cattle and poultry feed manufactures

in and around Namakkal Erode and Coimbatore.)

EXISTIG SUPPLY SOURCE FOR MAIZE : Karnataka 30 %

: Andhra Pradesh 10 %

: Tamilnadu 60 %

5.PRACTICES (PRE-HARVEST AND POST HARVEST)

A. GRADING

In regulated markets for notified crops grading is done by scientific methods where as in mandies and private markets it is lacking .cotton is graded by measuring the staple length .and stored quality wise and staple length wise in p olythene gunnies as well as in gunnies. For Tapioca the traders attached to mills are purchasing the tubers based on its quality marurity and size and accordingly fix the price for it. Tomato is graded size wise and baskets and transport it to nearby marke ts. For other crops no specific grading method is practiced.

B. TRANSPORTATION

No specific difficulty is experienced. The produces are transported generally by lorries for paddy ground nut Tapioca Tomato etc and by two wheelers for vegetables to the nearest marketing centers. From Valapadi area tomato is transported by means of buses to major towns up to Chennai city. For speeding up the transport cargo autos are suggested from interior localities to whole sale points. (it is included in the collection centre component in this project)

C. CONTRACT FARMING:

At present for coleus crop contract farming is in practice. In future it is suggested for crops like cotton maize.

D. SOURCE OF MARKET INFORMATION.

Local news papers television and telephone are the maj or source of market information. AGMARKNET is another network based information source for notified agricultural produces at regulated market level.

III CONSTRAINTS:

1. The Existing Scenario

a. Production: Glut/ Shortage: - In the case of tomato and tapioca often the farmers are getting bitter experiences. In the case of tomato it is still worse. If the production increases the price comes down to very low level i.e. even up to Re.1.00 or below / kg of fruit. If the production decreases the price may go up to even Rs. 20/kg and even more.

In tomato(for making value addition) proper food processing methods like Jam/Jelly preparation etc are to be advocated.

IN CASE OF TAPIOCA, THE PRICE IS BASED ON THE DEMAND FOR IT IN SAGO FACTORIES. SAGO SERVE ALSO PLAYS A ROLE IN IT.

b) Lack of available market: No Such felt difficulties at present. For Speeding up the marketing of produces, local collection centres may be arranged in important places.

c) Poor Post harvest practices: Generally farmers are storing their produces in their own houses which is facilitating for the attack of stored -product pests and rats etc. For over coming this problem, village common godowns, may be contructed in various places. The godowns are to be maintained by Farmers Associations at their own cost.

Grading/Packing: It is being done informally for some crops like cotton, tomato etc(not based on Scientific methods).

d) No collective action-Individual farmers go to Market/Whole Saler:

Individual farmers selling at their own locality is much reduced at present. Generally they are selling their produces through Regulated Markets, Co -operative societies and private mandies. They are very vigilant in knowing present market trends.

However for diversified crops, collective selling is important, to get more bargaining power.

e) Lack of Market Information: At Present market trend is known through newspapers, Radio, TV, and phones by progressive farmers. For improving further, internet facility/Computer facility need to be arranged. A sepa rate proposal for this is being drawn.

IV DIVERSIFICATION PROPOSED

a. Horiticulture

In horticultural crops there is an increase in area to the tune of 875 ha with the following split up details

Crops	***Pre Project area***	***Post Project area***	***Increased Area***
Sugarcane	1470	2050	580
Banana	20	50	30
Mango	10	15	5
Arecanut	250	260	10
Tapioca	600	850	250
TOTAL			**875 ha**

After the implementation of the project the sugarcane production will be 690600 MT in addition to the existing production. This increased prod uction will be absorbed by Mohanur sugar mill and perambalur sugar mill which has a crushing capacity of 2500 MT/day.

For the other crops like Banana, Mango, Areca nut and Tapioca the increase in production will be negligible which can be absorbed by the existing markets.

b) Agriculture

Area increase for the major crops are as given below.

Sl.no	***Crop***	***Pre project area***	***Post project area***	***Increased area***	***Increased production***
1	Ground nut	1450	1850	400	480 MT
2	Maize	958	2658	1700	8500 MT
3	Foddercrops	75	375	300	12000MT (Green fodder)
4	Castor	50	155	105	32 MT
5	Black Gram	1785	2045	260	195 MT
6	Turmeric	40	100	60	1200 MT
7	Vegetables	150	290	140	3500 MT

The increased production in vegetable is 3500MT. it will easily be marketed through UZHAVAR sandhai located in Attur which has transacted a quantity of 2901356 MT during 2005-2006.

Regarding other crops the increased production can easily be marketed through Regulated markets, and co-operative marketing society. Regarding maize contract farming can be encouraged. The poultry feed manufactures of Namakkal area are ready to come forward to purchase the whole production of maize.

V CHALLENGES THROWN UP BY DIVERSIFICATION/AREA EXPANSION:

1. Identifying new market for new crop:- Except for maize, other crops have assured market; hence for maize, contract farming need to be arranged between purchaser and WUAS.

2. For facilitating the farmers and for improving the market utilization in the interior places, the following infrastructure facilities are suggested .

a.Constructing thereshing floors in 10 localities as detail below at the cost of Rs. 2.20 lakhs each. and 5 storage godowns at the cost of Rs. 5 lakhs each and 2 collection centres at the cost of Rs. 10 lakhs each.

Collection Center: - Cost Details:

1.Construction of godowns Rs. 5 lakhs each

2. Two autos for transport at the cost of Rs. 2lakhs each 4 lakhs
3. Crates, Dunnages etc 1 lakhs

Total **10 lakhs**

S.No	***Name of the Place***	***Threshing Floors/ Drying yards***	***Rural godowns***	***Collection Centre***
1	Ramanaikan palayam	1	1	-
2	Kallanathan	1	1	-
3	Ethapur	1	1	-
4	Panamadal	1	1	-
5	Deviakurichi	1	-	1
6	Nathakarai	1	-	-
7	Aragalur	1	-	-
8	Belur	1	1	-
9	Singipuram	1	-	1
10	Thennan gudipalayam	1	-	-
	Total	10	5	2

3. At present there is no IT based Multiple market information system to get the best prices by the farmers. This will be provided by a separate IT proposal.
4. Ensuring collective bargaining/marketing by WUA sub groups. At present it is absent. But a sub group of WUA is to be formed for this pu rpose.

5. Improving access to market by better transport or collective transport included under collection center item.
6. **Specialized Storage:** Storage godowns to cater the needs of paddy, tapioca, cotton areca nut crops etc. are suggested in 5 places, along wit h Threshing floors. In 10 places as required by Stake holders.
7. **Processing/Agro Processing:** With regard to tapioca number of Sago factories which provides processing facilities are well established. With regard to other crops drying and storage are recommen ded with the help of storage godowns and threshing floors / drying yards.
8. **New Practices**: **Product Handling, Grading, packing, On farm process and quality control**:- Collection centres are suggested through which products like vegetables will be collected, cl eaned, graded, packed and transported to wholesale points. Suggested places are Devaikurichi & Singapuram. Quality control aspect will be taken care by the existing Agmark lab at salem.
9. **Information, Education and Communication(IEC): -**

   Included under trainin g components.

VI Solutions and Recommendations:

1. Consultative process undertaken in the sub basin.

MDPU at district level has been formed with WRO/PWD and Line Departments i.e. Agriculture, Horticulture, Agricultural Engineering, 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 on 27.7.06, 16.08.06 and 23.08.06 and Walk Through Survey on 27.7.06.

During the Walk Through Survey the cross section of sub basin has been covered through walking and the farmer's demands were studied.

Along with this, the topography of the area, cropping, water availability, life style, transport etc were also observed. This background facilitated in understanding the stake-holders problems and the solutions suggested. For marketing, simple solutions like godowns, threshing floors and collection centres were suggested by which the farmers hope will go a long way in getting better prices.

2. Stake Holders demands.

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

   a. Storage godowns
   b. Threshing Floors/Drying Yards
   c. Collection Centres.
   d. Market Information
   e. More knowledge about pre ^ post harvest technologies.

3. Marketing interventions proposed with reference to identified constraints and challenges.

S.NO	CROP	*Constraint & Challenges*	*Counter Measures*
	Tomotta, tapioca, maize	Production glut/shortage	Linkage with traders on contract farming, Food processing methods.
		Lack of available market	No Such difficulty, for Speeding up the marketing collection centres and formation of marketing, sub groups at WUA level for this purpose are suggested.
		Poor post harvest Practices	Capacity building, village common godowns and threshing floors are suggested.
		No collective action	For diversified crops, collection centres are suggested
		Lack of Market information	IT methods are suggested
		Diversification/Future vision proposed	10% area under paddy proposed to be diversified to maize. 40% area under Horticulture Crop is to be covered under Gap area and about 100 Ha under fooder crop. The remaining area will be covered by agrl crops like maize, groundnut and Tapioca.
		Identifying new markets and new crops	For maize contract farming arrangements to be made.
		Improving existing market Utilization	Suitable suggestions are made under V(2)
		Providing Multiple Market Information	Separate IT Proposal is suggested
		Ensuring Collective Bargaining/marketing	Sub group of WUA is to be formed for this purpose.
		Improving access to market by better transport or collective	Included in collection center item and also by encouraging private transport arrangements

		transport	
		Processing and Agro processing	Suitable recommendations are made for gowowns and threshing floors/drying yards.
		New practices in quality control	Quality control is attended by Agmark lab Salem.
		Information Education and Communication	Included under training component.

INTRODUCTION

Upper Vellar Sub basin is dependent on non system chain of tanks. The water use efficiency of the system is around 53% which is sub economic and being improved by WRO/PWD. The annual average weighted rainfall is around 847 mm. and below state average.

The sub basin is a deficit one. i.e. 305.548 mm.

The cropping system is dominated by paddy, pulses, sugarcane, tap ioca cotton and vegetables. Arecanut is the dominant plantation crop. Due to presence of hard rock sbstrata, deep-rooted horticultural crops are difficult to cultivate.

The marketing infrastructure consists of 3 Regulated Markets 1 Farmer's Market, 3 Storage godowns and 3 threshing floors besides number of private mundies. The transportation is through private vehicles. Grading and quality control are limited, and one agmark Lab is functioning to cater the needs of private packers. No specialized storage godown available, IT based market information system and Agro based industry except sago industry are absent.

The marketing stategy is based on the following 3 items:

1. Survey of existing cropping/ marketing scenario.
2. Stake Holder's 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.

		Amount Rs. in Lakhs
1. Threshing floor / Drying Yard	10 Nos	22.00
2. Storage godown	5 Nos	25.00
3. Collection Centres	2 Nos	20.00
4. Pack house	1 No	2.5
5. Agri Business Centre	1 No	11.00
Total	→	**80.50**

Rupees Eighty Lakhs and Fifty Thousand Only.

During the field visit the stake holders enthusiastic participation indicates the success of the project during implementation.

ANIMAL HUSBANDRY COMPONENT

IAMWARM PROJECT

UPPER VELLAR SUB BASIN

Commissionerrate of Animal Husbandry & Veterinary Services, Chennai 600 006

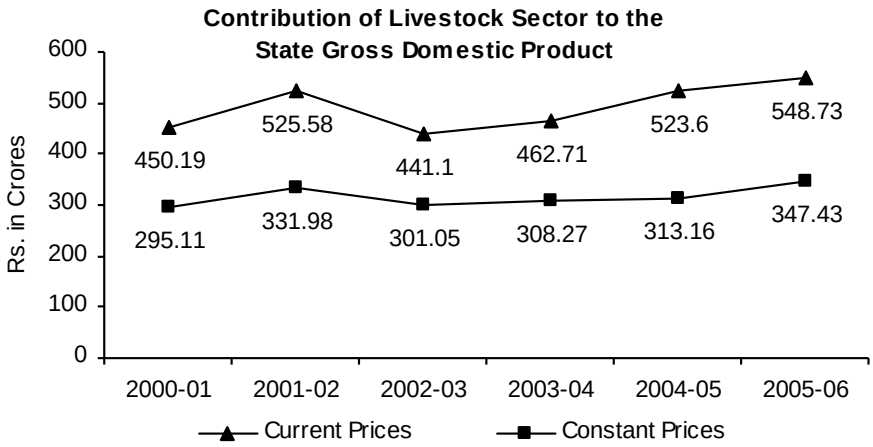
1. INTRODUCTION

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 o rganic 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 durin g 2004-05 to Rs.548.73 crores during 2005-06, an increase of 4.8%.

	Gross State Domestic Product	Year	Current Prices (In crores)	Constant Prices (In crores)	%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 excepted 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. Adopting good management practices, feeding

practices, bio security measures, effec tive disease prevention measures, etc, can enhance the productivity.

3. SCENARIO IN THE UPPER VELLAR SUB BASIN

Livestock Population

Cattle	Buffalo	Sheep	Goat	Poultry
94071	15903	23449	107108	84247

Breedable age Female Population

Crossbred Cattle	Non Descriptive cattle	Buffalo	Total
36906	5425	7156	49487

Infrastructure and Man power in Government Veterinary Institutions

No. of Veterinary Institutions		Veterinary institutions filled up	
Graduate Institutions	Subcentres	Graduate Institutions	Subcentres
13	13	13	8

Average Per Day Milk Yield per animal

Average Per Day Milk Yield per animal (In Kgs.)		
Crossbred Cattle	Non Descriptive cattle	Buffalo
6.38	3.00	4.20

Milk Procurement

Milk cooperative societies	Present milk procurement (LLPD)	Milk procured by Aavin (LLPD)
227	3.0	1.3

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 unserviced 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 12) to deliver quality veterinary services in the sub basin. In addition one veterinary dispensary (details enclosed vide para 6.2.c. of page 12) 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 vide 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 fodder-fodder maize and kolukattai grass in 425 hectares of private lands by supplying inputs (details enclosed vide para 6.3.(d). of page 13) 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 18) 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 19) 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 20) on best livestock management practices in livestock breeding activities like signs of oestrum, 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 19)
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 21) 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 6.38 ts to 10 litres in crossbred, from 3.0 lts to 3.60 lts. in indigenous and from 4.20 to 7 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 13 graduate veterinary institutions and 13 sub centres 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 unserviced area. Hence to provide effective services in these unserved areas, it is planned to establish 5 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 :			Upper velar	
Total number units in Upper vellar Basin :			Five	
Name of the Sub basin Veterinary Unit :			1. Thukkiampalayam	
Sl. No.	Name of Villages to be Covered	Distance from the Head Quarters (in Kms.)	Nearest Govt. Institution	Distance from the village to Govt. inst. (In Kms)
1.	Thukkiampalayam	0	Belur	4
2.	Athanurpatti	4	Belur	6
3.	Renganur	5	Belur	4
4.	Kurichi	6	Belur	5
5.	Puluthikuttai	9	Belur	6
6.	C. N. Palayam	7	Belur	6
7.	Chandrapillai vasalu	5	Belur	4
8.	Pallathathanur	4	Belur	5
9.	Mainnayakanpatti	4	Valapadi	4
10.	Muthampatti	6	Valapadi	4
11.	Puthupalayam	6	Valapadi	3
12.	Singipuram	8	Valapadi	4
13.	Somampatty	9	Valapadi	5
14.	Vilaripalayam	12	Valapadi	7
15.	Thekkalpatti	15	Valapadi	10

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.	

Thukkiampalayam village is about 7 kms from the nearest Veterinary institution namely Veterinary Dispensary, Valapadi. There are about 15 villages situated in and around Thukkiampalayam that are not covered by the Government Veterinary Institution. Further the breedable female population in and around Thukkiampalayam that is untapped by the Government veterinary institution is around 2,012. Hence Thukkiampalayam village is fixed as the headquarters of the Sub basin Veterinary Unit.

Name of the Sub basin Veterinary Unit :			2. Thennampillayur	
Sl. No.	Name of Villages to be Covered	Distance from the Head Quarters (in Kms.)	Nearest Govt. Institution	Distance from the village to Govt. inst. (In Kms)
1.	Thennampillayur	0	Peddanaickampallayam	6
2.	Ottampatty	1	Peddanaickampallayam	4
3.	Talavaipatty	1	Ariyapalayam	3
4.	Chinnamasmudram	4	Ariyapalayam	3
5.	Muthagoundanur	5	Peddanaickampallayam	4
6.	Kalarampatty	4	Ariyapalayam	4
7.	W.Rajaapalayam	6	Ariyapalayam	3
8.	Vaithigoundan pudur	5	Ariyapalayam	5
9.	Karadipatti	18	Yethapur	5
10.	Umayalpuram	5	P.G.puram	4
11.	Panamadal	22	Thumpal	4
12.	Kalyanagiri	12	Yethapur	5
13.	Sekkadipatty	15	Yethapur	5
14.	Gopalapuram	5	Mallikarai	4
15.	Kumarapalayam	20	Thandanoor	4

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.	

Thennampillayur village is about 6 kms from the nearest Veterinary institution namely Veterinary Dispensary, Peddanaickenpalayam. There are about 15 villages situated in and around Thennampillayur that are not covered by the Government Veterinary Institution. Further the breedable female population in and around Thennampillayur that is untapped by the Government veterinary institution is around 2,918. Hence Thennampillayur village is fixed as the headquarters of the Sub basin Veterinary Unit.

Name of the Sub basin Veterinary Unit :			3. Kallanatham	
Sl. No.	Name of Villages to be Covered	Distance from the Head Quarters (in Kms.)	Nearest Govt. Institution	Distance from the village to Govt. inst. (In Kms)
1.	Kallanatham	0	Attur	7
2.	Thennagudipalayam	5	Attur	8
3.	Ramanaickanpalyam	12	Attur	7
4.	Narasingapuram	5	Attur	4
5.	Akkichettipalayam	5	Attur	5
6.	Muttal	3	Kattukottai	8
7.	Thuluganoor	2	Kattukottai	7
8.	Pongavadi	13	Manjini	5
9.	Pongavadi Pudur	15	Manjini	6
10.	Paithur	5	Manjini	5

11.	Thandavarayapuram	8	Attur	4
12.	Sokkanathapuram	9	Attur	5
13.	Echempatty	10	Mallikari	4
14.	Seeliyampatty	10	Mallikari	4
15.	Aarsanatham	15	Mallikari	4

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.	

Kallanatham village is about 7 kms from the nearest Veterinary institution namely Veteri nary Hospital, Athur. There are about 15 villages situated in and around Kallanatham that are not covered by the Government Veterinary Institution. Further the breedable female population in and around Kallanatham that is untapped by the Government veterin ary institution is around 2,887. Hence Kallanatham village is fixed as the headquarters of the Sub basin Veterinary Unit.

Name of the Sub basin Veterinary Unit :			4. Manivizulanthan	
Sl. No.	Name of Villages to be Covered	Distance from the Head Quarters (in Kms.)	Nearest Govt. Institution	Distance from the village to Govt. inst. (In Kms)
1.	Manivizulanthan	0	Kattukottai	5
2.	Sadasivapuram	15	Sathapadi	5
3.	Vadakumarai	5	Sathapadi	4
4.	Thenkumari	5	Sathapadi	6
5.	Sarvoipudur	8	Sathapadi	8
6.	Sarvoi	5	Sathapadi	5
7.	Pattudurai	4	Thallaivasal	8
8.	Deveyakurichi	3	Thallaivasal	6
9.	Navakkurichi	6	Thallaivasal	5
10.	Nathakarai	8	Thallaivasal	4
11.	Punalvasal	20	Sathapadi	8
12.	Navallur	16	Sathapadi	8
13.	Othiathur	25	Thallaivasal	9
14.	Naduvallur	30	Thallaivasal	10
15.	Orniyanpatti	35	Thallaivasal	12

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 addit ion if any villages are left out during the week, it will be covered on the reserve day.	

Manivizulanthan village is about 6 kms from the nearest Veterinary institution namely Veterinary Dispensary, Arraganur. There are about 15 villages situated in and ar ound Manivizulanthan that are not covered by the Government Veterinary Institution. Further the breedable female population in and around Manivizulanthan that is untapped by the

Government veterinary institution is around 2988. Hence Manivizulanthan village is fixed as the headquarters of the Sub basin Veterinary Unit.

Name of the Sub basin Veterinary Unit :			5. Puliyankurichi	
Sl. No.	Name of Villages to be Covered	Distance from the Head Quarters (in Kms.)	Nearest Govt. Institution	Distance from the village to Govt. inst. (In Kms)
1.	Puliyankurichi	0	Illypanatham	4
2.	Pallipalyam	6	Illypanatham	5
3.	Pakadaipadi	3	Illypanatham	4
4.	Vellaiyur	4	Illypanatham	5
5.	Govindanpalyam	5	Illypanatham	6
6.	Sitheri	5	Aragalur	5
7.	Periari	9	Aragalur	4
8.	Aagrahram	7	Aragalur	4
9.	Thaiyganur	9	Aragalur	5
10.	Veppamponndi	5	Aragalur	6
11.	Nattarmangalam	6	Thalaivasal	6
12.	Laddivadi	10	Veeraganur	6
13.	Pillankulam	8	Veeraganur	8
14.	Kamakkapalyam	7	Veeraganur	7
15.	Kaikallathur	5	Veeraganur	5

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 o n the reserve day.	

Puliyankurichi village is about 8 kms from the nearest Veterinary institution namely Veterinary Dispensary, Thalaivasal. There are about 15 villages situated in and around Puliyankurichi that are not covered by the Government Veterinar y Institution. Further the breedable female population in and around Puliyankurichi that is untapped by the Government veterinary institution is around 2,200. Hence Puliyankurichi 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 Mann each Unit. He will be given one month entrepreneurship training at renowned national institutions like IRMA / NDDB. On completion of this tr aining, 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 ende micity and farmers know-how in the area.

6.1.(d) On completion of training, the unemployed veterinary graduate selected will be a 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 Departm ent. 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' doorstep. 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 sup ply 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 re volving 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.5.99 lakhs for 5 years in which Rs.0.99 lakhs will be non-recurring and Rs.5.00 lakhs will be recurring cost. Totally 5 units will be established in the river basin at a total cost of Rs. 29.99 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.1000/- (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, stc	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 2700/1st yr, 3000/2nd yr, 3300/3rd yr, 3600/4th yr & 4080/5th yr.	40500	45000	49500	54000	61200	**250200**
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	4500	22000	18300	13400	7360	**65560**
5	Miscellaneous Charges for chemicals, glasswares, etc.	10000	10000	10000	10000	10000	**50000**
	Total	**81500**	**103750**	**104800**	**104650**	**106060**	**500760**
	Recurring Expenditure for 5 years			**500760**			
	Total (Recurring + Non-recurring)			**599760**			

6.1.(g) The above endeavor will ensure that areas hitherto unserviced 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 institu tions 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 13 graduate veterinary institutions and 13 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 and mastitis detector. The 13 institutions will be strengthened at a cost of Rs.4.29 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 u sed 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 huge economic losses 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 and wash basin to each sub centre in the project area at a cost of Rs.20,000/ - per sub centre. Totally 13 subcentres in the project area will be provided with essential equipments at a total cost of Rs. 2.60 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 two sub basin veterinary institutions at a cost of Rs.3.00 lakhs each, is also a part of the project. The institution will be designated as Referral Institution for the sub basin. The Veterinary hospital at Attur and Veterinary Dispensary at Pethanaikanpalayam will be upgraded as the referral institutions for the sub basin. In the identified referral institution, semi auto analyzer and accessories will be provided for ensuring complete timely blood analysis. Totally Rs.6.00 lakhs will be required for this component of work.

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 nutritiv e 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 restri cted 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 con centrates.

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 requi rement 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	upper vellar	109924	340190	51900	288290	84%

Hence to reduce the green fodder shortage, around 425 hectares of additional land will be brought under Co3 fodder sorgum and kolukattai fodder cultivation in the sub basin area.

6.3.(d) Around 425 hectares of land earmarked for fodder cultivation in the private lands in the project area will be taken up for cultivation of Co3, fodder cholam 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 slips. The yield rate and cost of inputs is furnished below.

Sl. No.	Name of fodder	Avg. Yield per ha per year (In tonnes)	Cost of inputs Per Hectare
1.	Co3	200	6,000
2.	Fodder Cholam	45	1,000
3.	Kolukattai grass	40	3,000

Villagewise fodder cultivation area proposed (In Hac.)

Sl. No.	**Revenue village name**	**Area in Hac.**
1	Kothampady	3
2	Vaithy goundan pudur	3
3	Valapadi	2
4	Atthapur	3
5	Thandanur	3
6	Pappanaickenpatty	3
10	Kalyana giri	3
12	Sitheri	3
13	Govindampalayam	3
14	Pallipalayam	3
15	Kalleri patty	3
16	Keeraipatti	3
18	Abinavam	2
20	Mettudaiyam palayam	3
21	Puluthikuttai	2
22	Jalluthupatty	2
23	Kammalapatty	3
24	Periya krishna puram	3
25	Kurichy	3
26	Chinna krishnapuram	3
28	Vadugathampatty	3
29	Kolathukombai	3
30	Puthiragoundampalayam	3

31	Neermullikuttai	2
33	Umayalpuram	3
34	Thumbal	3
36	A.karadi patty	3
37	Thamayanur	3
38	Kadambur	3
39	West rajapalayam	3
40	Gangavalli	1
41	Kalarampatty	3
42	Naduvallur	3
43	Ariyapalayam	3
44	Othiyathur	3
45	Thennam pillaiyur	3
46	Anayampatty	3
47	Muthagoundanur	3
48	Thedavur	1
49	Errama samudram	1
50	Veeragoundanur	3
52	Periagoundapuram	3
53	Thirumalai nama samudram	2
55	Chinnama samudram	2
56	Lathuvadi	3
57	Petthanaickan palayam	1
58	Vellaiyur	3
59	Kalpaganur	3
60	Nattar agraharam	3
61	Olapady	3
62	Illupanatham	3
63	Odda patty	3
64	Mettupatty	3
65	Veppampoondi	3
66	Thalavaipatty	3
68	M.perumapalayam	3
69	Puliyankurichy	3
70	Mattupalayam	3
71	Kattuveppilaipatty	3
72	Pagadapadi	3
74	Jari kothambadi	3
75	Cenrayam palayam	3
76	Palania puram	3
77	Vellalagundam	3
78	Edayapatty	3
80	Thirumanur	3
81	Akkichettipalayam	3
82	Udayampatti	2

84	Thandavarayapuram	3
85	Karungalpatti	3
87	Sokkanathapuram	3
88	Thekkalpatty	3
89	Echampatty	3
90	Kumarapalayam	3
91	Seeliampatty	3
93	Malliakarai	3
94	Rangappanaickanpalayam	3
95	Veppilaipatty	3
96	Gopalapuram	3
97	Ponnarampatty	3
98	Arasanatham	3
99	Singhipuram	3
100	Panamadal	3
101	Periyavelampatti	3
102	Keeri patti	3
103	Muthampatty	3
104	Paithur	3
107	Mannaickenpatty	3
108	Narasingapuram	3
109	Chandrapillaivalasu	3
110	Thennankudipalayam	3
111	Kumarasamiyur	3
112	Appamasamudram	3
113	Vettaikaranur	3
114	Lakshmana samutram	3
115	Pelur	3
116	Azhaga puram	3
117	Athanurpatty	3
118	Thukkiampalayam	3
119	Ramanaickenpalayam	3
120	Mannur	3
121	Agrahara valapadi	3
122	Sekkadi patty	3
125	Pudupalayam	3
126	Mannarpalayam	3
127	Vilaripalayam	3
128	Karia kovil valavu	3
129	Mettur	3
130	Somampatty	3
135	Adhiyanur	3
137	Keel avarai	3
138	Muttal	3
139	Ammampalayam	3

140	Kallanatham	3
141	Kumarapalayam	3
143	Atthur	3
144	Thulukkanur	3
145	Valaiyamadevi	3
146	Manjini	3
147	Pungavadi	3
148	Sathasivapuram	3
149	Sadasivapuram	3
150	Sarvoy	3
151	Kattukottai	3
152	Manivilunthan	3
154	Siruvachur	3
155	B.karadi patty	3
157	Navakurichy	3
158	Pattuthurai	3
159	Deviyakurichy	3
160	Vadakumarai	3
161	Thenkumarai	3
162	Sathapady	3
163	Kottavadi	3
164	Pallikadu	3
165	Punavasal	3
166	Navalur	3
167	Kamakkapalayam	3
168	Arathi agraharam	3
169	Thiyaganur	3
170	Mummudi	3
171	Thalaivasal	3
172	Nandhakarai	3
173	Periyeri	3
174	Aragalur	3
175	Sarvoy pudur	3
176	Vellapatty	3
	Total	**425**

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 :

Maize @ yield rate of 50 tonnes/ha for 958 ha (In MT)	Fodder Cholam @ yield rate of 45 tonnes/ha for 75 ha (In MT)	cumbu @ yield rate of 25 tonnes/ha for 25 ha (In MT)	Total availability (IN MT)
47900	3375	625	51900

Fodder Availability Status after the end of project:

Year	Yield to be added (In MT)					
	Fodder Cholam @ yield rate of 45 tonnes/ha for 175 ha @ 25 ha for 1st yr, 60 ha for 2nd & 3rd yr, 20 ha for 4th yr & 10 ha for 5th yr.	Co3 fodder@yield rate of 250 tonnes/ha for 200ha @ 70 ha for 2yr, 80 ha for 3rd yr, 40 ha for 4th yr and 10 ha for 5th yr	Kolukattai grass @ yield rate of 40 tonnes/ha for 50 ha @ 5 ha for 1st yr, 15 ha for 2nd & 3rd yr, 10 ha for 4th yr and 5 ha for 5th yr.	Total Proposed Yield to be added	Total fodder available during the end of the year	shortage of fodder (In MT)
I Year	1125	0	200	1325	53225	235065
II Year	2700	17500	400	20600	73825	214465
III Year	2700	20000	400	23100	96925	191365
IV Year	900	10000	400	11300	108225	180065
V Year	450	2500	200	3150	111375	176915

Cost of inputs for the cultivation of fodder in the proposed area

Year	Fodder Cholam @ Rs.1000/ha	Co3 fodder@ Rs.6000/ha	Kolukattai grass @ Rs.3000/ha	Total Cost (In Rs.)
I Year	25000	0	15000	40000
II Year	60000	420000	45000	525000
III Year	60000	480000	45000	585000
IV Year	20000	240000	30000	290000
V Year	10000	60000	15000	85000
			Total	1525000

6.3.(f) By the above cropping pattern in the sub basin, the green fodder availability will be increased from 51,900 MT to 111375 MT. In addition 85,000 MT of green fodder will be available after the harvest of maize. Totally 196375 MT of green fodder will be available in the sub basin at the end of the project. Ultimately the shortage will be 143815 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.18.00/- 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 v eterinary 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 da ys to 100 animals at a cost of Rs.40/- kg per sub basin veterinary extension officer for 5 years is 1.825 lakhs. For 5 units, 9.13 lakhs would be required for this component.

6.4.(c).3. By this the animals will come to estrum early and lead to better conc eption 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 i nclusion 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 activitie s 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 Of ficer 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 sou rce 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 wherever 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 an d communications campaigns will be conducted in the sub basin at a total cost of Rs.9.90 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 :

6 Unemployed Veterinary Graduates are to be trained for the upper vellar Sub basin. 5 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 5 Sub basin Veterinary Extension Officers, Rs.0.07/- lakhs would be required.

6.5.(d). In-service Training for 13 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 13 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 13 veterinarians in the sub-basin would be Rs.0.26/- lakhs.

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.

UPPER VELLAR SUB BASIN

The breedable age female population in the UPPER VELLAR Sub Basin is 109974, which include 82014 crossbred, 12057 indigenous cattle and 15903 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 % in buffaloes, there will be 69712 crossbred, 11454 indigenous and 15108 buffaloes.
2) At present there are 13 Graduate Veterinary Institutions and 13 Sub centres functioning under Government fold doing artificial insemination work of which 4 subcentres are vacant.
3) The above Government Institutions have carried out an average artificial insemination of 24740 in crossbred, 7068 indigenous and 3534 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 are 8836 crossbred, 2524 indigenous and 1071 buffaloes.
5) Thus the breedable age female population unserved by the Government institutions is 60876 crossbred, 8930 indigenous and 14037 buffaloes.
6) For of the above animals unserved, 5 sub basin veterinary units will be established in the sub basin each covering around 15 villages.
7) During the first year 2700, second year 3000, third year 3300, 4th year 3600, 5th year 4080 and from then on 4080 artificial inseminations will be done by each sub basin veterinary unit.
8) It is assumed that 50% crossbred (6750), 40% indigenous (5400) and 10% (1350) buffaloes will be targeted by the above 5 units during the first year.

Yearwise Number of animals targeted

Year	AI done by the unit (50% crossbred, 40% Indigenous, 10% buffalo)		
	Crossbred	Indigenous	Buffalo
I Year	6000	4800	1200
II Year	6750	5400	1350
III Year	7500	6000	1500
IV Year	8400	6720	1680
V Year	9600	7680	1920

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

Year	Conception Rate in Cow	Conception Rate in Buffalo
0001st 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 2411 crossbr ed, 1929 indigenous and 409 buffaloes.

Year	**Yearwise Number of animals covered**		
	Crossbred	Indigenous	Buffalo
I Year	2143	1714	364
II Year	2700	2160	482
III Year	3409	2727	600
IV Year	4200	3360	764
V Year	4800	3840	960

11) By the work done by these 5 units during the first year, out of the total 4340 cattle (2411 crossbred, 1929 indigenous) conceived, 50% (2170) heifer calves will be born. Similarly out of 409 buffaloes, 205 buffalo heifer calves will be born.

Year	**Yearwise Number of heifer calves born**	
	Crossbred	Buffalo

I Year	1929	182
II Year	2340	241
III Year	3068	300
IV Year	3780	382
V Year	4320	480

12) Now calf mortality is taken as 5% for crossbred and 10% for buffaloes. Therefore out of the 2170 crossbred heifer calves, 109 will be lost. Similarly out of 205 buffalo calves, 21 will be lost during the first year.

Year	**Yearwise Number of heifer calves lost**	
	Crossbred	Buffalo
I Year	96	18
II Year	122	24
III Year	153	30
IV Year	189	38
V Year	216	48

13) The actual crossbred animals in milk created in the sub basin by intervention by these units during first year will be 4340 (2411 Crossbred plus 1929 Indigenous cattle). Similarly 409 buffaloes will be in the milk.

Year	**Yearwise Number of animals in milk**		
	Crossbred	Indigenous	Buffalo
I Year	2143	1714	364
II Year	2700	2160	482
III Year	3409	2727	600
IV Year	4200	3360	764
V Year	4800	3840	960

14) The average milk yield in the project area will be increased to 7 litres in crossbred, 800 ml or maximum of 3.6 litres in indigenous and 4.5 litres for buffaloes.
15) During the first year, the total milk yield in the sub basin by intervention by these units will be 46 lakh litres by crossbred (assuming 6.38 lts. is the average yield), 16 lakh litres (assuming 3 lts. is the average yield) by indigenous and 5 lakh litres (assuming 4.2 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	6.38	3.0	4.2	46	16	5
II Year	6.5	3.1	4.4	59	21	7
III Year	6.7	3.3	4.6	75	28	9
IV Year	6.9	3.5	4.8	93	35	12
V Year	7.1	3.6	5.0	109	41	15

16) Thus the value of milk in the sub basin will be Rs.608 lakhs (cost of cow mil k is Rs.9/- and buffalo milk is Rs.10/-).

Year	Value of Milk (In lakh Rs.)			
	Crossbred	Indigenous	Buffalo	Total
I Year	410	146	52	608
II Year	527	187	71	785
III Year	678	249	91	1018
IV Year	838	318	118	1274
V Year	978	370	153	1501

17) Thus economic return at the end of the project by way of milk will be Rs.1501 lakhs, an increase of Rs.893 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 brough t into 4th year breeding stock.

Year	Yearwise Female Breeding stock created		
	Crossbred	Indigenous	Buffalo
I Year	60876	8930	14037
II Year	60876	8930	14037
III Year	61565	8930	14037
IV Year	62537	8930	14092
V Year	63931	8930	16178

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.)	13500	15000	16500	18000	20400	**83400**
2	Calves Born (In Nos.)	4750	5936	7410	8918	10200	**37214**
3	Heifer calves born (In Nos.)	2111	2581	3368	4162	4800	
4	Milk Yield (In lakh Lts.)	67	87	112	140	165	**571**
5	Income by milk (In Lakh Rs.)	608	785	1018	1274	1501	**5186**
6	Fodder Production (in Metric Tonnes)	1325	21925	45025	56325	59475	**184075**
7	Income (In Lakh Rs.)	0.93	15.35	31.52	39.43	41.63	**128.86**
8	**Total income generated (In lakh Rs.)**	**608.93**	**800.35**	**1049.52**	**1313.43**	**1542.63**	**5314.9**

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

UPPER VELLAR SUB BASIN

	Components	Physical	Financial (In Lakhs)
1	**Productivity enhancement by improving delivery of veterinary services**		
	a. Establishment of Sub basin Veterinary Units (SBVU) @ Rs.5,99,760/- per unit	5	29.99
	b. Improving the essential infrastructure in the Government institutions (graduate institutions) @ Rs.33,000/-unit	16	5.28
	c. Improving the essential infrastructure in the Government institutions(subcentres) @ Rs.20,000/-unit	17	3.40
	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	2	6.00
2	**Increasing availability of green fodder in private lands (in acres)**		15.25
3	**Out reach programmes.**		
	a. Infertility cum Total Veterinary Health Care camps @ Rs.6,000 per camp per month for each SBVU	300	18.00
	b. Distribution of mineral mixture @ Rs.1,82,500 per SBVU	5	9.13
	c. Information, education and communications campaigns	21	11.55
4	**Enhancing the knowledge level of human resource**		
	a. Training of Farmers	2000	8.00
	b. Enterpruneship training to 31 unemployed veterinary graduates to be placed as Sub basin Veterinary Extension Officer @ Rs.50,000/- per person	6	3.00
	b. Orientation Training for Sub basin Veterinary Extension Officers @ Rs.1,350/- trainee	5	0.07
	c. In-service Training for Veterinarians @ Rs.2,000/- per person	13	0.32
			109.99

Tamil Nadu Agricultural University

Irrigated Agriculture Modernization and Water Resource Management

Sub basin Plan – Upper Vellar
TNAU component

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

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

a. About the centre

- Tapioca and Castor Research Station, Yethapur located at North western zone of Tamil Nadu and undertake basic and strategic research in Tapioca and castor
- In Tapioca nearly 200 accessions and in Castor 450 accessions were collected world wide and maintained
- Drought prone area programme was implemented successfully
- Var. / hybrids and disease free materials were multiplied and distributed to farmers
- Established Vermi-compost model unit and training given to needy farmers and self help groups.
- Introduced hybrid varieties of castor
- Training programme was organized to other state farmers through pr ivate agency schemes.

b. About the sub basin

Total Ayacut Area – 10572 (Ha)

Cropping Pattern

Season	Crops	Pre Project				Post Project			
		FI	PI	GAP	TOTAL	FI	PI	GAP	TOTAL
Annual	Coconut								
	Without drip	---	250	---	250				
	Withdrip	---	50	---	50	300			300
	Sugarcane	---							
	Without drip	30	1420	---	1450				
	Withdrip	20			20	2050			2050
	Banana	20			20	50			50
	Mango	---	10		10	15			15
	Sapota	---	8		8	8			8
	Arecanut	---							
	Without drip	200			200				
	Withdrip	50			50	260			260
	Tapioca	---	400	200	600	850			850
	Total	320	2138	200	2658	3533			3533
Ist crop (July , Aug to Nov,Dec)	Paddy	2790	260		3050	2271			2271
	Cotton		175	125	300	300			300
	Maize		458	500	958	2658			2658
	Fodder Cholam		75		75		175		175
	Green fodder					200			200
	Castor + G.Nut		40		40	40			40
	Castor		10		10	115			115
	Vegetables		140		140	200			200
	Turmeric	40			40	100			100
	Blackgram		580		580	580			580
	Groundnut		400		400	400			400

	Total	2830	2138	625	5593	6864	175		7039
II nd Crop (Dec to Mar)	Paddy	260			260	260			260
	Cumbu		25		25		25		25
	Blackgram		1205		1205	1000	465		1465
	Groundnut	550	500		1050	1050	400		1450
	Total	810	1730		2540	2310	890		3200
IIIrd Crop (June to July)	Paddy	120			120	120			120
	Vegetables	10			10	90			90
	Total	130			130	210			210
	Grand Total	4090	6006	825	10921	12917	1065	0	13982
	Total of Annual + Ist Crop	3150	4276	825	8251	10397	175	0	10572

Climate

S.No.	Climatological Parameter	Attur
1.	Average monthly temperature max./min.in º Celsius	32.30/ 23.80
2.	Average mean temperature in º Celsius	28.88
3.	Average minimum temperature	21.30º c (Nov.86)
4.	Average max. temperature	37.19º c (April,98)
5.	Average rainfall	817mm
6.	Average relative humidity in %	61.94
7.	Average wind velocity in km/hour	5.90
8.	Average pan evaporation in mm/month	189.74
9.	Average Sunshine hours / day	7.39

Soil type

- Sandy
- Sandy loam
- Clay
- Clayey loam

Constraints

- Poor soil health
- Non-availability of quality seed material
- Improper Irrigation practices
- Non availability of labour in time
- Low productivity

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 crop productivity and area by diversification and intensification
- ♦ To converge with WRO and other line departments in over all improvement in total farm income

d. Specific issues:

- Non adoption of water saving technologies in paddy and tapioca
- Lack of crops diversification with maize in the place of paddy
- Scope for improving the productivity level of tapioca, elimination of tuber rot and ICMV
- In groundnut low productivity with 1200 kg per hectare as against district average of 2100 per hectare.

e. Counter measures proposed

- ❖ SRI
- ❖ Drip fertigation in sugarcane and tapioca
- ❖ Improved production Technologies for groundnut
- ❖ Improved production Technologies for maize
- ❖ Improved production Technologies for castor

I. PROJECT MODE ACITIVITES

1. Technologies for transformation

a. Improved production Technologies for groundnut

Improved technologies viz., seed drill sowing, gypsum application and micro nutrient spray will be demonstrated.

Justification

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 100 ha in which 2 seed drills and 2 ground nut strippers will be purchased and handed over to 2 associations in Abinavam and Yettapur .

Linkage:

Department of Agricultural Engineering demonstrating sprinkler irrigation method in groundnut. Over imposing the improved agro techniques in the same field will pave way for improved productivity.

Sl.No	Technology	Total area ha)	Unit cost (Rs.)	Total cost (lakhs)
1.	Improved Production Technology for groundnut	200	6500	13.00
2	Groundnut seed drill	3	25,000	0.75
3	Groundnut stripper	3	15,000	0.45

Justification for the unit cost

Sl.No	*Particulars*		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		
	(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

b. Improved production technologies in maize

The technologies are hybrids (COH M 5), balanced nutrition and scientific water management. Under this the cost of critical inputs like seeds, seed drill and nutrients are included. The cost on field days and publicati ons showing the success of the technology are included.

Justification:

Recent market demand for maize in poultry feed industry makes sudden spurt increase in area is noticed. By educating the new agro techniques will pave way for yield enhancement starting from sowing to harvest all the need based improved techniques will be demonstrated.

Linkages:

Water resource Organization will provide water facility through tank modernisation and provides water to the gap areas where maize could be successful ly cultivated.

Sl.No	Technology	Total area ha)	Unit cost (Rs.)	Total cost (lakhs)
1.	Improved Production Technology for maize	200	6000	12.00
	Maize sheller (1ton)	1	50,000	0.50

Justification for the unit cost

Sl.No	*Particulars*		Amount in (Rs.)
1	Hybrid Seed cost with seed treating chemicals (20kg/ha) @ Rs. 80 /kg	:	1800.00
2	Cost of fertilizers (150:75:75 kg NPK / ha)	:	
	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	:	625.00
	Cost of Bio fertilizer	:	
	Azozpirillum and Phospho bacteria @ 10 pockets each	:	120.00
	Total cost		6070.00

c. Castor improved agro techniques

In overall scenario of existing cropping system at upper vel lar sub basin continues to exploit the natural resources in unjustified manner. Diversification through introduction of new crop which fetch more return without much affecting the natural resources. Castor is high income earning crop which have an stabilis ed market price. Introduction of castor hybrid TMVCH-1 as alternate crop will certainly pave way to earn more in the river basin.

Justification:

High net income earning crop will be introduced to improve socio -economic status of the farmers in upper ve llar sub basin area

Linkages:

Water resource Organization will provide water facility through tank modernization and provides water to the gap areas where castor could be successfully cultivated.

Sl.No	Technology	Total area ha)	Unit cost (Rs.)	Total cost (lakhs)
Technology transformation mode				
1.	Castor Improved. Agro techniques	50	4000	02.00
2	Field days for 3 years for crops			0.30
	Castor Sheller	3	10,000	0.30

CASTOR		
1. Seed cost hybrid 4 kg @ Rs. 150/kg	-	600.00
2. Seed treatment	-	200.00
3. Fertilizers (60:30:30 kg NPK/ha)	-	1900.00
4. Pesticide	-	1450.00
Total	-	4150.00

g. Model village (Kalleripatti)

Quality seed production				
1.	Paddy	20 ha	600	00.12
2.	Groundnut	40 ha	5000	02. .00
			Total	**02.12**
Demonstration of technologies				
1.	Organic farming and IFS in rice	1 ha		1.00
			Total C	**1.10**

h. On farm demonstration and skill development

Sl.No.	Details	Duration (days)	No/Batch	Total Batch	Budget / Batch	Total (lacs)
1.	SRI techniques	1	50	5	20,000	1.0
2.	New improved Agro techniques for groundnut	1	50	2	20,000	0.4
3.	New improved Agro techniques for maize	1	50	2	20,000	0.4
4.	New improved Agro techniques for castor	1	50	2	20,000	0.4
5.	Drip cum fetigation and improved Agro techniques in Tapioca	1	50	2	20,000	0.4
6.	Training for labours for SRI transplanting	1	100	20	10,000	2.0
					Total	4.6

Venue – Tapioca and Castor Research Station, Yethapur

i. Project mode budget abstract (lakhs)

Sl.No.	Particulars		Budget (lakhs)
1.	Tech. transformation mode	:	30.40
2.	Seed village	:	2.12
3.	Model village	:	1.00
4.	On farm demonstration and skill development	:	4.60

II. MISSION MODE ACTIVITIES

1. Technologies for large scale adoption

a. System Rice Intensification

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.

Justification

To increase the yield of rice in first crop season and to off set the production loss due to reduced rice area in post project. To minimize the indiscriminate usage of under ground water. To improve the productivity level of Rice .

Area of Implementation : 500 ha
Period : 5 years
Implementation : 3 years
Area Expansion : Fourth and fifth year

Sl.No	Title	Area (ha)	Budget/ha (Rs)	Total Cost (Lakh)
1	System rice intensification (Cost of critical inputs, nursery, transplanting, weeding, etc.,)	500	10,000	50.00

Justification for the 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, rosecan, 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	:	415.00

	$ZnSO_4$ 25 kg @ Rs. 25 / kg	:	625.00
	Cost of Bio fertilizer	:	120.00
	Azozpirillum and Phospho bacteria @ 10 pockets each	:	
7.	Cost of Plant protection chemicals	:	
	Pseudomononas 2.5 kg / ha @ Rs. 75 /kg		200.00
	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		14,410.00

b. Drip cum fertigation and improved agro techniques in tapioca

Drip Irrigation and fertigation lowered the weed density and weed biomass at different growth stages of tapioca. The percent reduction in weed density ranged from 30.0 to 45.0 per cent compared to the farmer's practice and the maximum reduction was noticed at 6 th month. The tuber yield was enhanced to a tune of 25 per cent by drip irrigation cum fertigation the starch content of tuber was increased by 15 per cent over the farmer's practice. The increase in the WUE due to drip irrigation and fertigation was 177 per cent. The nutrient use efficiency was also markedly improved. By up scaling the above technology through demonstration to the tapioca growers will result in higher productivity and net returns. Drip irrigation cum fertigation is to be followed for higher productivity, water and nutrient use efficiency in Tapioca. The same has to emphasize among the farmers through the conduct of demonstration trials in the upper velar sub basin.

Project to be implemented **:** 500 ha
Period **:** 5 years
Implementation : 4 years
Area Expansion : Fifth year

Justification

Hi tech input utilization can be promoted, Efficient utilization of available water and to realize the maximum possible potential yield output from cassava

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

Sl.No	Title	Area (ha)	Budget/ha (Rs)	Total Cost (Lakh)
1	Drip Fertigation for Tapioca			
	Cost of drip system @75,000/drip	250	60000	151.50
	Nutrients for fertigation	250 ha	4000	10.00
	Production of ICMV disease free setts	250 ha	8000	20.00
	Tapioca chipper	5	10,000	0.50
	Tapioca point scale	5	10,000	0.50

Justification for unit cost

Tapioca			
1. Sett cost @ Rs. 3/ 6 sett 11,000 setts Rs.5500			
Nursery management	Rs.2500	-	8000.00
2. Fertilizers		-	4000.00
	Mn spray	-	12000.00

Drip fertigation in Sugarcane

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 – 1 ¼ feet

Distance – 5 feet

Lateral spacing – 3 m

Micro tube with on line drippers 8 lph

Justification and Linkage

Water saving 30 %

S.No	Particulars	Project cost (50 % of drip cost)	Budget (Rs. in lakh)
Budget For Mission Mode I - Sugarcane fertigation (250 ha)			
1	Cost of drip fertgation system	72.50	145.00
2	Cost of nutrients @ 5500/ha		13.75
	Sub Total A		**158.75**

Justification for the unit cost

Sl.No	*Particulars*		Amount in (Rs.)
1	Drip system	:	**58000.00**
2	Fertigation		
	Urea 598 kg @ Rs. 5 /kg	:	3000.00
	Super Phosphate - 400 kg @ Rs. 4 /kg		1600.00
	Muriate of Potash – 187.4 kg @ Rs.4.75/ kg	:	890.00
			5490.00
	Total		**63490.00**

IV. YEAR WISE ACTIVITY

Year	Project Mode (ha)				Mission Mode (ha)		
	Groundnut	Maize	Castor	Seed/Model village	SRI	Tapioca	Sugarcane
I	70	60	25	20	121	-	100
II	100	105	25	20	278	100	100
III	30	35	Monitoring & area spreading	22	101	100	50
IV	Monitoring & area spreading	Monitoring & area spreading	Monitoring & area spreading	Monitoring & area spreading	Monitoring & area spreading	50	Monitoring & area spreading
V	Monitoring & area spreading	Monitoring & area spreading	Monitoring & area spreading	Monitoring & area spreading	Monitoring & area spreading	Monitoring & area spreading	Monitoring & area spreading

Finance (Rs. In Lakhs)

S.No	Particulars	I	II	III	IV	V	Total
I	Activities						
1	a.Improved production technologies in groundnut b. Field days	4.55 0.10	6.50 0.10	1.95 0.10	-	- -	13.00 0.30
2.	a.Improved production technologies in maize b. Field days	3.6 0.1	6.3 0.1	2.1 0.1	-	-	12.00 0.30
3	Improved production technologies in castor Field days	1.2 0.1	1.2 0.1	- 0.1	-	-	2.40 0.30
3	Seed production -Rice Groundnut	0.06 1.00	0.06 0.50	- 0.50	-	-	0.12 2.00
4	Castor Sheller	0.30	-	-	-	-	0.30
5	Demonstration of technologies a. Organic farming and IFS rice	1.000	-	-	-	-	1.00
5	OFD and skill development	4.60	-	-	-	-	4.60
6	SRI	12.10	27.80	10.10	-	-	50.00
7	Drip fertigation tapioca with ICMV disease free setts	72.60	72.60	36.30	-	-	181.50
8	Drip fertigation in sugarcane	63.50	63.50	31.75	-		158.75
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	**464.87**

Expected output

Activity	Demonstration Area (Ha)	Area spread for adoption (Ha)	Additional productivity (kg/ha)	Additional production (in tonnes)	Additional revenue (Rs. in lakhs)	Water saving million (m^3)
Improved production technologies in maize	200	1000	1000	1000	100.00	-
Improved production technologies in groundnut	200	1500	180	270	54.00	-
System Rice Intensification in rice	500	2500	1200	3000	150.00	10.00

Improved production technologies in castor	50	200	150	30	1.00	-
Drip fertigation in sugarcane	250	1000	20 tonnes/ha	2000	200	7.00
Drip fertigation in sugarcane	250	800	3	2400 tonnes	72.00	1.60

TOTAL BUDGET FOR SOUTH VELLAR

Sl.No	Particulars	Physical	Financial (in lakhs)
I	Activities		
1	**Improved production technology for Groundnut + 3 field days**	**200 ha**	**13.30**
	Groundnut seed drill and stripper	**Each 3 Nos.**	**1.20**
2	**Improved production technology for Maize + 3 field days**	**200 ha**	**12.30**
	Maize sheller	**1 No**	**0.50**
3	**Improved production technology for castor + 3 field days**	**50**	**2.30**
	Castor sheller	**1 No**	**0.30**
4	**Quality seed production Groundnut, Rice**	**60 ha**	**2.1**
5	**Demonstration of organic farming and IFS modal in Model villages**	**1 No**	**1.00**
6	**SRI**	**500 ha**	**50.00**
7	**Drip fertigation - tapioca**	**250 ha**	**181.50**
8	**Sugarcane drip fertigation**	**250 ha**	**158.75**
9	**OFD and Skill development**	**-**	**4.60**
		Sub Total	*427.87*
II	Out Sourcing for technical assistant		
1	**10os for first 3 years, 4nos for 4th and 5th year**	**9000 Salary + 1000 FTA/ Month**	**45.60**
		Sub Total	***45.60***
III	Contingencies		
	a. Vehicle hire charge for Scientists @ Rs.60000/yr		**3.00**
	b. Documentation and Reporting		**1.00**
	c. Publicity, exhibits and Stationeries		**2.50**
		Sub Total	***6.50***
IV	Computer, Printer, Scanner, LCD, Copier, Digital moisture meter		4.00
		Sub Total	*4.00*
		Total	**483.97**
	Incentive 1% of the total cost		**4.84**
	Total		488.81
	Institutional charges @ 7.5 %		**36.66**
	Grand Total		525.47

Impact

- Crop: Rice
- Technology: SRI
- Area under demonstration: 500ha
- Area under adoption : 2500 ha

- Crop: Groundnut
- Technology: Improved production technologies in groundnut
- Area under demonstration: 200 ha
- Area under adoption : 1500 ha

- Crop: Castor
- Technology: Improved production technologies in castor
- Area under demonstration: 50 ha
- Area under adoption : 200 ha

- Crop: Maize
- Technology: Improved production technologies in maize
- Area under demonstration: 200 ha
- Area under adoption : 1000 ha

- Crop: Sugarcane
- Technology: Drip fertigation
- Area under demonstration: 250 ha
- Area under adoption : 1000 ha

- Crop: Tapioca
- Technology: Drip fertigation
- Area under demonstration: 250 ha
- Area under adoption : 800 ha

e. Activity Chart

(i) Groundnut (200 ha.)

S.N	Name of the tank	Area (ha)	I Yr.	II Yr.	III Yr.	IV Yr.	V Yr.
1	ARP – LMC	25	10	10	5	-	-
2	ARP – RMC	50	10	30	10	-	-
3	KKRP – RMC	25	5	15	5	-	-
4	KKRP – LMC	25	5	15	5	-	-
5	Alunaram	5	5	-	-	-	-
6	ChinnaKrishnapuram	5	5	-	-	-	-
7	PeriaKrishnapuram	5	-	5	-	-	-
8	Puthagoundampalayam	5	-	5	-	-	-
9	Umayalpuram	5	-	5	-	-	-
10	Kallar	5	5	-	-	-	-
11	Kumbiyar	5	5	-	-	-	-
12	Ramanaickenpalayam	5	5	-	-	-	-
13	Appamasamuthram	10	5	5	-	-	-
14	Kallam chokhandha	15	5	5	5	-	-
15	Attur pudu Eri	10	5	5	-	-	-

(ii) Maize (200 ha)

S.N	Name of the tank	Area (ha)	I Yr.	II Yr.	III Yr.	IV Yr.	V Yr.
1	ARP – LMC	25	5	15	5	-	-
2	ARP – RMC	50	10	30	10	-	-
3	KKRP – RMC	25	5	15	5	-	-
4	KKRP – LMC	50	15	20	15	-	-
5	Arayapalayam	10	5	5	-	-	-
6	Reddy	10	5	5	-	-	-
7	Kalleri	10	5	5	-	-	-
8	Eachampatty	10	5	5	-	-	-
9	Attur pudu	10	5	5	-	-	-

(iii) Castor (50 ha)

S.N	Name of the tank	Area (ha)	I Yr.	II Yr.	III Yr.	IV Yr.	V Yr.
1	ARP – LMC	10	5	5	-	-	-
2	ARP – RMC	10	5	5	-	-	-
3	KKRP – RMC	10	5	5	-	-	-
4	KKRP – LMC	10	5	5	-	-	-
5	Kalleripatty	10	5	5	-	-	-
6	Chinnamasamuth	10	5	5	-	-	-

2. Activity chart

a. Paddy (500 ha)

S.N	Name of the tank	Area (ha)	I Yr.	II Yr.	III Yr.	IV Yr.	V Yr.
1	ARP – LMC	10	2	6	2	-	-
2	ARP – RMC	25	5	15	5	-	-
3	KKRP – RMC	25	5	15	5	-	-
4	KKRP – LMC	25	5	15	5	-	-
5	Kumarapalayam	6	5	-	-	-	-
6	Chinnamasamuthram	15	5	5	5	-	-
7	Vellalagundam	5	-	5	-	-	-
8	Kalyanagiri	25	5	15	5	-	-
9	Abunavam	25	5	15	5	-	-
10	Puthinagoundam palayam	25	5	15	5	-	-
11	Umayalpuram	10	2	6	2	-	-
12	Erumasamuthiam	10	2	6	2	-	-
13	Ayyanarkoil	25	5	15	5	-	-
14	Attu pudubi	25	5	15	5	-	-
15	Ammampalayam	25	5	15	5	-	-
16	Ayerpadi	25	5	15	5	-	-
17	Kattukottai	25	5	15	5	-	-
18	Marivelanthan	40	10	20	10	-	-
19	Sarvay large	25	5	15	5	-	-
20	Sitteri	25	5	15	5	-	-
21	Devylkurchi	20	5	10	5	-	-
22	Thenkumarai	10	5	5	-	-	-
23	Thalairasal	15	5	5	5	-	-
24	Thiyaganur	15	5	5	5	-	-
25	Aragalur	10	5	5	-	-	-
26	Goundampalayam	10	5	5	-	-	-

b. Tapioca (250 ha)

S.N	Name of the tank	Area (ha)	I Yr.	II Yr.	III Yr.	IV Yr.	V Yr.
1	ARP – LMC	20	-	5	10	5	-
2	ARP – RMC	15	-	5	5	5	-
3	KKRP – RMC	25	-	5	15	5	-
4	KKRP – LMC	20	-	5	10	5	-
5	Kalleripatty	10	-	5	5	-	-
6	Chinnamasamuth	15	-	5	5	5	-
7	Erumasamuth	15	-	5	5	5	-
8	Kallchettugu	15	-	5	5	5	-
9	Lakshmasamuth	15	-	5	5	5	-
10	Kerripatty	20	-	5	10	5	-
11	Kalleri chorkenatha	20	-	5	10	5	-
12	Kattanathan	25	-	5	15	5	-
13	Ammapalayam	20	-	5	10	5	-
14	Kattu kottai	15	-	5	5	5	-

b. Sugarcane (250 ha)

S.N	Name of the tank	Area (ha)	I Yr.	II Yr.	III Yr.	IV Yr.	V Yr.
	Othiyathur	25	-	5	15	5	-
1	Manivelundan old	20	-	5	10	5	-
2	Manivelundan new	35	-	10	15	10	-
3	Sitteri	15	-	5	5	5	-
4	Arathiagraharan	15	-	5	5	5	-
5	Pulurankuruchi	10	-	5	5	-	-
6	Thalarvasal	10	-	5	5	-	-
7	Puthur	25	-	5	15	5	-
8	Umathur	10	-	5	5	-	-
9	Periya eri	15	-	5	5	5	-
10	Thiyaganur	15	-	5	5	5	-
11	Aragalur	25	-	5	15	5	-
12	Kai kalathur	10	-	5	5	-	-
13	Korakkavadi	10	-	5	5	-	-
14	Melakalpondi	10	-	5	5	-	-

IRRIGATED AGRICULTURE MODERNIZATION AND WATER RESOURCES MANAGEMENT PROJECT

UPPER VELLAR - SUB-BASIN

IAMWARM

PROPOSAL

SALEM DISTRICT

Assistant Director of Horticulture,
Salem.

HORTICULTURE

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

SUB - BASIN – Upper Vellar

DISTRICT : Salem

Taluk covered – Valapady, Attur

Block covered - Valapady,Ayothiapattinam, Attur,Pedhanaickenpalayam and Thalaivasal.

I. Existing Horticulture Crop Scenario

The following horticulture crops are grown in the sub basin.

Name of the crop	Varieties	Area (Ha.)	Production (MT)	Productivity (MT)
Mango	Bangalora, Neelam	10	70	7
Sapota	PKM-1	8	120	15
Banana	Poovan	20	500	25
Tapioca	H165,MVD1	600	22800	38
Tomato	PKM 1	60	1200	20
Bhendi	Arka anamika	70	700	10
Onion	C0 1	20	300	15
Arecanut	Local	250	250	1
Turmeric	BSR-1	40	520	13
Total		**1078**	**26460**	**-**

II. Existing Horticulture Practices:

Existing cropping pattern and Season :

1.	Mango, Sapota, Arecanut	-	Perennial
2.	Vegetables	-	June to September, Adipattam
3.	Tapioca	-	June – July to December
4.	Turmeric	-	June – July

Proposed Generic Cropping Pattern

1.	Mango,	-	June - December
2.	Banana	-	November - December
3.	Vegetables	-	June to September, December – February
4.	Tapioca	-	October - December
5.	Turmeric	-	June – July
6.	Arecanut	-	July – December

Existing Irrigation Potential:

Out of the registered Ayacut area of 10572 Ha. the present irrigation potential is

Fully Irrigated	3150 Ha.
Partially Irrigated	4276 Ha.
Gap	3146 Ha.

	10572 Ha

Proposed Irrigation Facilities:

Out of 1078 Ha. under Horticulture Crops, an area of 683 Ha. is proposed to cover micro irrigation with fertigation by the Agricultural Engineering Depar tment (vide page number-)

INM & IPM :

None of the farmers adopting INM but only few farmers are adopting IPM in pre project. It is proposed to adopt INM in 30 Ha. under fruits and IPM in 150 Ha. under vegetables.

1. Inputs:

a. Seed:

Certified seeds High Yielding varieties locally available seeds which are used by farmers. Regarding the Planting materials Plants are available in Government farms, Horticulture research station and private sources. Sufficient planting material and seeds are available.

b. Soil :

In Upper Vellar sub-basin mostly the soil is red loam, sandy loam and black soils with PH- ranges from 7 to 8.9 soil is tested by soil testing laboratory at Salem. Few farmers are practicing the STL recommendation and mobile soil laboratory at Salem. The climate is mainly tropical in nature with the temperature ranges from 28 to 34 °c and relative humidity ranges from 66 to 94%.

C. Prevalence of Organic farming :

Organic farming is practiced by few farmers, less than 5 Hac.

It is proposed to cover 60 Ha. under Organic farming in turmeric.

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

Available extension officers	- Horticulture Officer,Attur	-	1No
	Assistant Agriculture Officer		
	1) Valapady	-	1no
	2) Pedhanaickenpalayam	-	3nos
	3) Attur	-	1no
	4) Thalaivasal	-	1 no

Available extension officers provide extension service to the farmers which are inadequate. Need for more extension personnels are required.

For transfer of latest farming techniques, many extension methods are being adopted. Besides distribution of inputs, required technical advise 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 372 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 usi ng drip irrigation.

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 1078 Ha. under Horticul ture Crops, an area of 633 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 Micro Irrigation
A.	**Drip Irrigation**	
1.	Mango	15
2.	Banana	50
3.	Sapota	8
4.	Vegetables	100
5.	Tapioca	150
6.	Arecanut	110
B.	**Sprinkler Irrigation**	
1.	Vegetables	100
2.	Turmeric	100
	Total	**633**

c. Fertigation :

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

d. Contract farming :

Contract farming is not practiced in fruits and vegetables crop in the command area. But it is popular and being practicesed in medicinal plants.

e. Pre & Post harvest practices adopted :

Regarding Tapioca the planting sets are dipped in the copper sulphate solution to prevent fungal diseases. All most all the Tapioca harvest is used for sago extraction by the farmers themselves through the number of sago factories available in the district.

f. Labour issues :

Availability of labour is very scarce. Labour availability is a problem due to migration of labours to urban area to get more wages by doing non agricultural works. Spining mill, Sago factories, Oil mills, Modern Rice mills are more popular in the sub basin. Hence labour availability is a problem for farm work. Many farms use family labours in addition to hired labours by paying over wages. Skilled labours are more scarce than the un skilled labour.

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

There is no processing centres for fruits and vegetables in this sub-basin. There are two regulated markets with two storage Godown, the fruits marketed through middle men to local markets of Thalaivasal and Valapady. Vegetables are marketed to local markets in Thalaivasal, Attur, Valapady. There are 67 sago factories with capacity of 2000 mt / day.

The major production of TC Banana (about 10000 MT) would be marketed in Bangalore/Chennai besides at terminal market proposed at Salem. The production of Vegetables and fruits would be marketed at the terminal market proposed during this project (page no 7 of Agriculture marketing project report). Staggered planting methods are recommended to the farmers to maintain price fall in Vegetables especially during peak period of harvest.

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 durin g South West monsoon.

c. Inferior quality of seed and planting material :

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

Quality planting materials are supplied through Department of Horticulture. There are four State Horticulture farms located at Kalrayan hills and Mulluvadi 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.

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 un known 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 719 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.Hence to cater the need of Technical Input Providers for Attur,Peddanaicken palayam,Thalaivasal and Vazhapady. It is proposed to hire TIP for 216 man months for 5 years.

h. Low price for produce :

There is price fluctuation for fruits and vegetables due to un organized 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

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 trainin ATTUR g to the farmers.

j. Limited availability of Credit faci lities :

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 essentia l.

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 awarenes s of the new technologies in cultivation of crops and price trend of the produces at various levels are low.

l. Limited processing units :

Fruits and Vegetables Processing units are not available in the sub -basin area. But sago factories are 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						Production MT	Productivity MT	
		I Year	II Year	III Year	IV Year	V Year	Total		EXISTING	PROPOSED
I.	**AREA EXPANSION**									
A.	**Fruit plants**									
1.	TC Banana	15	15	-	-	-	30	1200	25	40
B.	**Vegetable crops**									
1.	Hybrid tomato	20	25	-	-	-	45	1575	20	35
2.	Hybrid Bhendi	35	40	30	-	-	100	2500	10	25
C.	**Spices**									
1.	Turmeric	30	30		-	-	60	1200	13	20
D.	**Plantation Crop**									
1.	Arecanut		10	-	-	-	10	30	1	3
E.	**Tapioca**	75	100	75	-	-	250	9500	20	38
	Total	**175**	**220**	**105**	**-**	**-**	**500**	**16055**		

Upper Vellar Sub-basin
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.	T.C. Banana(G.9)	30	Vazhapadi,Puthiragoundampalayam, RamanaickenpalayamMulluvadi,Ammampalayam
II.	**Vegetables**		
1.	Tomato(Ruchi,& suruchi)	45	Vazhapadi, Vellalagundam, Ammampalayam.
2.	Bhendi M10	105	Vazhapadi, Vellalagundam, Singipuram, Kalpaganur, Ramanaickanpalayam, Appamma Samuthiram, Ammampalayam, Ayerpadi, Manjini, Pattuthurai, Siruvachur, Aragalur.
III.	**Spices**		
1.	Turmeric	60	Vazhapadi, PN Palayam, Ramanaickanpalayam, Appamma Samuthiram, Arasanatham, Mulluvadi, Manivilundan.
IV.	**Plantation Crops**		
1.	Arecanut	10	Kalyanagiri, Abinavam.
E.	**Tapioca**	250	Belur, Kottavadi, Abinavam, PN Palayam, Puthiragoundampalayam, Umayalpuram, Ariyapalayam, Mulluvadi, Ayerpadi.
	Total	**500**	

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 judicially 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.

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.

3. 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.

4. 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. Strengtherning 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 in sufficient in extension personnel can be overcome by employing TIP. Outsourcing of tip for 60 man months for 3 years period is proposed in this project.

	I YEAR	II YEAR	III YEAR	IV YEAR	V YEAR	TOTAL
TARGET /YEAR(HA)	175	220	105	-	-	500
Number of TIP	2	2	1	-	-	5
LOCATION	ATTUR, PN PALAYAM	THALAIVA-SAL, ATTUR	ATTUR	-	-	-
MANMONTHS PER YEAR	24	24	12	-	-	60

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. Consultative process undertaken in the sub basin :

The walk through survey was conducted on 27.7.2006 and 17.08.2006 at Ethapur Village. Discussion was held on27.07.2006 and 07.08.2006 with farmers and their requirement was heard. Then after discussion among the officers the decision taken up, accordingly the cropping pattern revised and updated .

6. 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.

7. Marketing intervention proposed with reference to identified constraints :

S.No.	Constraint & Challenges	Counter Measures
1.	Problem soil	To overcome the problem soil, the farmers are advised to take up soil sampling and soil testing. Measures to be taken up to augment the organic content of the soil. The crops like Mango 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, 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 four State Horticulture farms available, three at Karumandurai and one at Mulluvadi 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 683 Ha.
6.	Inadequate extension service :	To cater the need technical input providers are proposed to be hired for 120 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.
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 UPPER V ELLAR SUB-BASIN

Physical In Ha

Fin in Rs.

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.	TC Banana	50000	37500	12500	15	15	-	-	-	30
	TOTAL				**15**	**15**	**-**	**-**	**-**	**30**
B.	**Vegetables crops**									
1.	Hybrid tomato	30000	22500	7500	20	25	-	-	-	45
2.	Hybrid Bhendi	30000	22500	7500	35	40	30	-	-	105
	TOTAL				**55**	**65**	**30**	**-**	**-**	**150**
C.	**Spices**									
1.	Turmeric	15000	11250	3750	30	30	-	-	-	60
	TOTAL				**30**	**30**	**-**	**-**	**-**	**60**
D.	**Plantation Crops**									
1.	Arecanut	15000	11250	3750	-	10	-	-	-	10
E.	Tapioca	30000	22500	7500	75	100	75	-	-	250
	GRAND TOTAL				**175**	**220**	**105**	**-**	**-**	**500**

PROJECT ON DRIP IRRIGATION F OR HORTICULTURE CROPS

S.No	Crop	Area Proposed to Cover Under Micro Irrigation(Ha.)	Implemented by
A.	**Drip Irrigation**		
1.	Mango	15	AGRICULTURAL ENGINEERING DEPARTMENT
2.	Banana	50	
3.	Sapota	8	
4.	Vegetables	100	
5.	Tapioca	150	
6.	Arecanut	110	
B.	**Sprinkler Irrigation**		
1.	Vegetables	100	AGRICULTURAL ENGINEERING DEPARTMENT
2.	Turmeric	100	
	Total	**633**	

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.	TC Banana	1000	1000	15	15	-	-	-	30
	TOTAL			**15**	**15**	**-**	**-**	**-**	**30**
B.	**Vegetables crops**								
1.	Hybrid tomato	**1000**	**1000**	**20**	**25**	**-**	**-**	**-**	**45**
2.	Hybrid Bhendi	**1000**	**1000**	**35**	**40**	**30**	**-**	**-**	**105**
	TOTAL			**55**	**65**	**30**	**-**	**-**	**150**
	GRAND TOTAL			**70**	**80**	**30**	**-**	**-**	**180**

PROJECT ON ORGANIC FARMING

S.No	Components	Fin in Rs.	Physical target in Hectares					
			I Year	II Year	III Year	IV Year	V Year	Total
C.	**Spices**	**Financial proposal already given in area expansion programme**						
1.	Turmeric		30	30	-	-	-	60
	Total		**30**	**30**	**-**	**-**	**-**	**60**

PROJECT ON DEVELOPMENT OF HORTICULTURE CROPS IN UPPER VELLAR SUB-BASIN
Fin in Lakhs

S.No.	Components	Estimated cost	Financial in lakhs					Total (in lakhs)
			I Year	II Year	III Year	IV Year	V Year	
I.	**AREA EXPANSION**							
A.	**Fruits plants**							
1.	TC Banana	50000	7.5	7.5	-		-	**15.0**
B.	**Vegetables crops**							
1.	Hybrid tomato	30000	6.0	7.5	-	-	-	**13.5**
2.	Hybrid Bhendi	30000	10.5	12.0	9.0	-	-	**31.5**
C.	**Spices**							
1.	Turmeric	15000	4.5	4.5	-	-	-	**9.0**
D.	Plantation Crops							
1.	Arecanut	15000	-	1.5	-	-	-	**1.5**
E.	**Tapioca**	30000	22.5	30.0	22.5	-	-	**75.0**
	Total		**51.0**	**63.0**	**31.5**	-	-	**145.5**
II - 1	**Extension support @ Rs. 8000/- per month. (60 man months for 3 years)**	96000	1.92	1.92	0.96	-	-	4.80
2	Advertisement	24000	0.24	0.24	0.24	-	-	0.72
3	Hiring computers	5000	0.5	0.5	0.5	-	-	1.50
	Total		**2.66**	**2.66**	**1.70**	**-**	**-**	**7.02**
III	**Organic farming**	Amount already proposed in area expansion programme.						
IV	**INM / IPM**	1000	0.70	0.80	0.30	-	-	1.80
V	**Micro irrigation**	Implemented by Agricultural Engineering Department.						
	Overall Total		**54.36**	**66.46**	**33.50**	**-**	**-**	**154.32**

Upper vellar sub-basin , Salem.
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.	T.C. Banana(G.9)	30	Vazhapadi,Puthiragoundampalayam, Ramanaickenpalayam Mulluvadi,Ammampalayam
II.	**Vegetables**		
1.	Tomato(Ruchi,& suruchi)	45	Vazhapadi, Vellalagundam, Ammampalayam.
2.	Bhendi M10	105	Vazhapadi, Vellalagundam, Singipuram, Kalpaganur, Ramanaickanpalayam, Appamma Samuthiram, Ammampalayam, Ayerpadi, Manjini, Pattuthurai, Siruvachur, Aragalur.
III.	**Spices**		
1.	Turmeric	60	Vazhapadi, PN Palayam, Ramanaickanpalayam, Appamma Samuthiram, Arasanatham, Mulluvadi, Manivilundan.
IV.	**Plantation crops**		
1.	Arecanut	10	Kalyanagiri, Abinavam.
E.	**Tapioca**	250	Belur, Kottavadi, Abinavam, PN Palayam, Puthiragoundampalayam, Umayalpuram, Ariyapalayam, Mulluvadi, Ayerpadi.
	Total	**500**	

Upper vellar sub-basin , Salem.
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.	T.C. Banana(G.9)	25	30	40	60	15.0
II.	**Varietal Diversification, micro irrigation, and IPM in Vegetables**					
1.	Tomato(Ruchi,& suruchi)	20	45	35	75	13.50
2.	Bhendi M10	10	105	25	150	31.50
III.	**Varietal Diversification, micro irrigation, Organic farming i n Spices**					
1.	Turmeric (BSR-1)	13	60	20	54	9.0
IV.	**Varietal Diversification, micro irrigation – Plantation crops**					
1.	Arecanut	1	10	3	50	1.5
V.	**Varietal Diversification**					
1.	Tapioca- H.165	20	250	38	90	75.0
	Total		**500**			**145.5**

Vellar sub-basin , Salem.
REQUIREMENTS OF INPUTS

S. No	Name of the component	Varities	Area in ha	Seeds and plants require - ment/Ha.	Total Requir e ment	Source of Planting material
I	**Varietal Diversification in fruits.**					
1.	T.C. Banana	Grand Nine	30	2500	75000	Private source through tender.
II.	**Vegetables**					
1.	Tomato	Ruchi,& suruchi	45	0.150Kg	6.750	Private source through tender
2.	Bhendi	M10	105	4kg	404	Private source through tender
III.	**Spices**					
1.	Turmeric	BSR-1	60	2000Kg	120000	Private source through tender, TNAU
IV.	**Plantation crops**					
1.	Arecanut	Mangala,Mo hitnagar	10	1320 Nos.	13200	SHF, Private source through tender
V.	**Tapioca**	H.165	250	17000 Nos.	425000 0	Private source through tender, TNAU

OUTCOME OF THE PROJECT

SL. NO	DETAILS	WITHOUT PROJECT	WITH PROJECT	% INCREASE
1	**Area in Horticulture crops(Ha)**	**1050**	**1500**	**48**
2	**Introduction of micro irrigation(Ha)**	**0**	**683**	**683**
3	**Introduction of IPM/INM(Ha)**	**0**	**180**	**180**
4	**Introduction of Organic Farming(Ha)**	**0**	**60**	**60**
5	**Average Increase in Producti on (MT)**	**15**	**27**	**80**

Upper Vellar Sub Basin Input Requirements

CROP	Phy sica l In Ha.	Urea MT	Sup er MT	Potas h MT	Vermi Compo st MT	Azospri ll Um Numbe r	Phosph o Bacteri a Numbe r	Tricoder m A Viridi Kg	Pseud o Mona s Kg	VAM Kg	Fu rad on Kg	Min Mixture Kg
I Year											57 0	
TC Banana	15					750	750	150	150	750		
Tomato	20	8.8	31.2	8.0	30					2000		

CROP	Physical In Ha.	Urea MT	Super MT	Potash MT	Vermi Compost MT	Azospirill Um Number	Phospho Bacteria Number	Tricoderm A Viridi Kg	Pseudo Monas Kg	VAM Kg	Furadon Kg	Min Mixture Kg
Bhendi	35	15.4	21.7	5.6	70	1750	1750	-	-	700		
Turmeric	30				7.5	1500	1500	120	120	900		
Tapioca	75	15	42	30	150	3750	3750	300	300	5625		
INM / IPM	70	-	-		-	-	-	280	280			**700**
Total	**245**	**39.2**	**94.9**	**43.6**	**257.5**	**7750**	**7750**	**570**	**850**	**9975**	**570**	**700**
II Year												
TC Banana	15					750	750	150	150	750	570	
Tomato	25	11	39	10	37.5					2500		
Bhendi	40	17.6	24.8	6.4	80	2000	2000	-	-	800		
Turmeric	30				7.5	1500	1500	120	120	900		
Arecanut	10					600	550					
Tapioca	100	20	56	40	200	5000	5000	400	400	7500		
INM / IPM	80							320	320			800
Total	**300**	**48.6**	**119.8**	**56.4**	**325**	**9850**	**9800**	**670**	**670**	**12450**	**570**	**800**
III Year												
Bhendi	30	13.2	18.6	4.8	60	1500	1500	-	-	**600**		
Tapioca	75	15	42	30	150	3750	3750	300	300	**5625**		
INM / IPM								120	120			300
Total	**105**	**28.2**	**60.6**	**34.8**	**210**	**5250**	**5250**	**300**	**300**	**6225**	**0**	**300**
Grand Total	**650**	**116**	**275.3**	**134.8**	**792.5**	**22850**	**22800**	**1540**	**1820**	**28650**	**1140**	**1800**

Upper Vellar Sub Basin – Plants / Seeds Requirements

CROP	I Year	II Year	III Year	Total
Plants in Nos				
TC Banana	45000	45000	-	90000
Arecanut		13200		13200
Turmeric	60000	60000		120000
Tapioca	1275000	1700000	1275000	4250000
Seeds in Kg				
Tomato	3	3.75	-	6.75
Bhendi	140	160	120	420

FISHERIES DEPARTMENT I AM WARM PROPOSAL

(UPPER VELLAR)

FISHERIES DEPARTMENT UPPER VELLAR FISHRIES PROPOSAL

This sub basin with two reservoirs and seventy nine tanks offer good scope for development of aquaculture. Apart from the natural fisheries (Tilapia, minor carps, catfishes etc.,) existing in these waters Indian major carps and Exotic carps are also can be cultured extensively in these tanks. However the culture technology followe d is stock and capture without any scientific management, or monitoring and hence the unit production is very low. Another area of concern is lack of extension of scientific aquaculture practices to the agriculture farmers.

There are no fish seed farms located in this sub basin fish seeds are to be transported from Mettur Dam. The non-synchronisation of major carp breeding season (May to July) and receipt of water in the tanks is a major set back which however can be overcome by establishing fish seed b anks currently the sub basin has traditional fish marketing facilities which offer reasonable price for the fresh water fishes.

Considering the above status of the basin the following project proposals are made.

1. **Aquaculture in farm ponds**

Farm ponds are been proposed to be excavated in this sub basin by the Agriculture Engineering Department, primarily as rain water harvesting and storage tank in the farmers field, without intervening in the irrigation/agriculture activities. Aquaculture shall be take n up in these ponds in the water retention period of about 4 months Aquaculture input like fish seeds, feed, manure etc., shall be provided to the farmers and the unit cost is Rs 16,500/- per pond. By providing a clay layer at the bottom of the pond, the seepage loss will be minimized. Fish stocking density of 1/m^2 is proposed and the fish seeds will be advanced fingerlings/stock size of 75 g so that the shorter culture period shall be over comed to get a better production. The agricultural farmers will get an additional income of about Rs 10,000/- from this activity without intervening in the irrigation activity.

In this sub basin it is proposed to excavate 30 Numbers farm ponds in the farmers field. For this purpose Rs 4.95 lakhs is required, which s hall be spread over three years.

2. Aquaculture in irrigations tanks by establishing fish seed banks

As mentioned earlier the basin do not have any fish seed production center or seed rearing unit. The tanks in this sub basin shall be supplied with qual ity fish seeds at the appropriate time if seed banks (fish seed rearing unit) are established in this basin. The proposed fish seed banks shall rear fish seed from early fry stage to advanced fingerlings size. The water user Association will own, operat e and maintain this unit and proposed to supply 3 lakhs fingerlings.

Apart from the direct revenue from sale of fish seeds the fish production of the basin will substantially increase.

For this purpose An amount of Rs 14.5 lakhs is required.

3. Fish Seed rearing in cages

One unit of cage will consists of 3 cages of different mesh sizes (p40, P16, P8). Fish seeds will be reared from early fry to advances fingerlings in these cages, that will be fixed or floated in irrigation tanks having water depth of more than 4 feet in the lakes or in the reservoir. The cages shall be owned operated and maintained by water users Association.

One unit of cage shall have an output of about 60,000 numbers of advances fingerlings worth about Rs 45,000/- in three operations per season. The fish seed will be stocked in suitable water bodies of the sub basin for further rearing. For this purpose , the finance needs is Rs 0.70 lakh.

Fishing Implements.

The fishing implements or fish farm implements will be a supp orting item in fish seeds transport and harvest. The Water Users Association should own these implements.

Benefits.

- Additional income to the agriculturalists through aquaculture in fish ponds without intervening in any irrigation (or) agriculture act ivities.
- Increase in overall fish production and rate of production.
- Timely availability of fish seeds.
- Increase in per capita consumption of fish leading to better human health.

Herewith enclosed the proforma for Financial requirements, Tem plate, Estimation of Fish seed Bank construction, for the kind perusal and consideration.

UPPER VELLAR - FISHERIES PROPOSAL

S/No	Particulars	No of units	1st year	2nd year	3rd year	4th year	5th year	Total in Lakhs
1.	Fish seed bank	1		14.50				14.50
	Operational			0.58	0.58			1.16
2	Fish seed rearing in cages	5		0.70				0.70
	Operational cost			0.80				0.80
3.	Aquaculture in farm ponds	51		3.30	3.30	1.81		8.41
4	Fishing implement.	5		0.60	0.40			1.00
4.	Vehicles hire charges		0.40	0.40	0.40	0.40	0.40	2.00
5.	Documentation		0.10	0.10	0.10	0.10	0.10	0.50
	Total		**0.50**	**20.98**	**4.78**	**2.31**	**0.50**	**29.07**

TEMPLATE – FISHERIES

I. EXISTING SCENARIO

1. CULTURE FISHERIES:

(a) Area under culture (WSA) -
(b) Production (kg/ha) - 600kg/ha/4-6 months

2. CAPTURE FISHERIES:

(a) Source of exploitation - Tanks in the sub basin.
(b) Fish landing per year - 500-1000 kgs/ha/year

II EXISTING AQUACULTURE PARCTICES:

1. INPUTS:

(a) Seed source and species - From Fish seed bank owned by WUA. Indian Major corps and Exotic carps.

(b) Manure - Cow dung, super phosphate, urea.

(c) Feed - Ground net oil cake, Rice bran

(d) Extension services available - Government State Fisheries For TOT(Go vt/private) Department.

(e) Quality of water - Good quality of PH 7.5-8.5

(f) No of fisherman co-op.Societies : 16
and No of members ___ : 5752

2. PRACTICES (Area In ha) :

(a) Stock and Capture - 37 PWD lakes

(b) Manure, Stock, Feed, Monitor Harvest - 3 ha
(c) Polyculture including scambi
(d) Composite fish culture Indian - Compatible Species of Major corps and exotic carps.

(e) Any other type of farming - --

(f)	Ornamental fish culture	-	--
(g)	Contract farming as in Ornamental fish culture	-	--

III. 1. EXISTING MARKETING SCENARIO

(a)	Traditional markets	-	Local sales
(b)	Bunks/kiosks	-	--
(c)	Street Vendors	-	--
(d)	Vending through cycles	-	Through cycles.
(e)	Export Market	-	--

2. PRE AND POST HARVEST PRACTICE.

(a)	Icing	-	Ice from near by Salem city
(b)	Fresh	-	On the spot sales.
(c)	Mode of transports	-	By Three wheelers.

IV. CONSTRAINTS

(a) Inadequate extension service.

(b) Non availabilities of quality seed at appropriate time.

(c) Limited fish species suitable for commercial aquaculture.

(d) Inadequate water retention period.

(e) Relatively low price consideration superior quality of protein.

(f) Power is priced highly (As SSI) for aquaculture.

V. CHALLENGES:

(a) Providing quality seed at the appropriate time.

(b) Retaining water for reasonable period.

(c) Pressure on extension for TOT.

(d) Hygienic marketing facilities.

(e) Overcoming social problem.

VI. FUTURE VISION.

1. Seed requirement to be met fully.
2. All the water bodies retaining water for reasonable period. (> 4 month) to be brought under aquaculture.

3. Aquaculture to e integral part of Agriculture.
4. Wherever possible shifting of aquaculture practice from stock and capture to stock, feed, monitor and harvest.
5. Unit fish production should be increased to more than 3 times the existing level.

VII. BENEFITS.

1. Increase in overall fish production and unit production (kg/ha).
2. Increase in per capita consumption of fish.
3. Reduced % of mal-nutrition especially among rural children.
4. Additional livelihood and income to agriculture farmers.
5. Healthy hobby of aquarium keeping which has proved to be a stress

reliever and give peace of mind shall spre ad in house holds.

CONSTRAINS	SOLUTIONS
(a) Inadequate extension services	Providing information and extension service through extension workers and mass media.
(b) Seed availability at appropriate time	Establishing seed banks in sub basins
(c) Limited species available	CIFA, FC and RI should introduce suitable fast growing species.
(d) Inadequate water retention period	Provide cheaper technology for retention of water through lining, turning etc
(e) Relatively low price for F.W Fish	Create awareness about the superior quality of fish protein, fat, etc, among animal protein. Facilitate fresh marketing facility.
(f) High price of power	Govt. should extend free electricity to fresh water aquaculture or provide concession power.

ROUGH COST ESTIMATE

NAME OF WORK : CONSTRUCTION OF MASONRY NURSERIES TOWARDS PROJECT PROPOSAL OF FISHERIES DEPARTMENT UNDER **I AM WARM** PROJECT

Lakhs ESTIMATE : RS 14.50 LAKHS

Report accompany the Rough cost estimate for the construction 0f Nursery Masonry ponds toward projects proposal of Fisheries Department under **I AM WARM** project

Estimate Rs 14.50 Lakhs

The Special Commissioner of Fisheries in Lr No : MDU/F10/2006 dt 11.07.2006 instructed to prepare an estimate for construction of Nursery masonry ponds towards project proposals of Fisheries Department under I AM WARM project. It is proposed to construct nurseries 6 Nos each size of 10mx5m for stock early fry and 2 Nos each size of 15mx10m for late try to advanced finger bring.

This estimate is prepared with the following structural provisions.

(i) Earth work excavation adopting balance cutting method (50% above ground level).

(ii) Side walls and cross wall of nurseries with brick work in cementar1:3 having bottom width of 75cm and t op width of 45cm and plastering with C.M 1:3

(iii) Foundation of nurseries with sand filling and C: C:1: 4:8 to a thickness 30cm each.

(iv) Bottom of pond covered with wearing coat using C: C:1: 2:4 to a thickness of 0.10m over which plastering with C: M 1;3 is proposed.

GI pipes of 4" dia proposed to be used for inlet and outlet arrangements

Following LS provisions are also made in this estimate .

(a) Providing bore well to sufficient depth.

(b) 5 HP electric motor with pump of sufficient capacity.

(c) Drainage to outlet arrangement.

This estimate is prepared based on current schedule of rates for the year 2005-
06 and works out of Rs 14.50 lakhs

DETAILED ESTIMATE

S/No	Description of work	NO	L	B	D	Qty
1.	Earth work excavation for foundation					
	For fish pond- 6 Nos	1x1	22.15	17.60	1.30	506.79
	For fish pond- 2 Nos	1x1	22.15	16.70	1.30	480.87
						2.34

						990.00

2.	Plain cement concrete 1:4:8 using 40mm HBG metal					
	For fish pond - 6 Nos	1x1	22.15	17.60	0.30	116.95
	For fish pond - 2 Nos	1x1	22.15	16.70	0.30	110.97
						2.08

						230.00m^3

3	Filling the foundation and basement with river sand					
	For fish pond - 6 Nos	1x1	22.15	17.60	0.30	116.95
	For fish pond - 2 Nos	1x1	22.15	16.70	0.30	110.97
						2.08

						230.00m^3

4.	Plain cement concrete 1:2:4 using20mm HBG metal					
		1x4	9.85	4.85	0.10	19.11
	For fish pond inside- 6 Nos	1x2	9.85	4.70	0.10	9.26
		1x2	15.00	9.85	0.10	29.55
	For fish pond inside- 6 Nos					2.08

	For fish pond - 2 Nos					60.00m^3

5.	Brick work in cement mortar 1:3					
	For fish pond-6 Nos	1x1	74.50	0.75+0.45	1.60	71.52

	outer			$\frac{0.75+0.45}{2}$		
	Alround inner cross wall	1x2 1x3	20.45 5.00	$\frac{0.75+0.45}{2}$	1.60	39.26
	-do-			$\frac{0.75+0.45}{2}$	1.60	14.40
	For fish pond- 2Nos outer	1x1	72.30	$\frac{0.75+0.45}{2}$	1.60	69.41
	Alround inner cross wall	1x1	15.00	$\frac{0.75+0.45}{2}$	1.60	14.40 3.02 --- 212.00m^3
6.	Plastering in cement mortar 1:3, 20mm thick					
	For fish pond inside- 6 Nos	1x6 1x2	30.00 50.00	- -	1.50 1.50	270.00 150.00
	For fish pond inside- 2 Nos					10.00 --- 330.00m^3
7.	Plastering in cement mortar 1:5:12mm thick					
	For fish pond 6 Nos out side & top cross wall	1x1 1x2	77.50 20.45	- -	1.75 0.45	135.62 18.40
top		1x3	5.00	-	0.45	6.75
	- do-	1x1	75.70	-	1.75	132.47
	For fish pond 2 Nos out side & top cross wall	1x1	15.00	0.45	-	6.75 10.01
top						--- 310.00m^3
8.	Floor finishing with C:M:1:3,20mm thick					
	For fish pond -6 Nos	1x6	10.00	5.00	-	300.00
	For fish pond -2 Nos	1x2	15.00	10.00	-	300.00 10.00 --- 610.00m^3
9.	Supplying and fixing of 4" ⌀ GI Pipe `B' class					
	For fish pond	1x8	1.50	-	-	12.00

10.	Supplying and fixing of 4” ⊖ GI gate value For fish pond	1x8	-	-	-	8 Nos
11.	Provision for motor room cum store room 10’x10’					LS
12.	Provision for bore well					LS
13.	Provision for 5 HP jet motor					LS
14.	Provision for drainage and out let chamber					LS
15.	Provision for electrification and service connection					LS
16.	Provision for water supply arrangements					LS
17.	Provision for unforeseen items					LS

ABSTRACT ESTIMATE

S/No	Qty	Description of work	Rate	Per	Amount
1.	990m^3	Earth work excavation for foundation	17.00	M^3	16,830
2.	230m^3	Plain cement concrete 1:4:8, wing 40mm metal	1302.00	M^3	2,99,460
3.	230m^3	Filing the foundation and basement with river sand	245.00	M^3	56,350
4.	60m^3	Plain cement concrete 1:2:4 using 20mm HBG metal	1983.00	M^3	1,19,025
5.	212.00m^3	Brick work in cement mortar 1:3	1683.75	M^3	3,56,955
6.	330m^2	Plastering in cement mortar 1:3, 20mm thick	120.90	M^2	39,897
7.	310m^2	Plastering in cement mortar 1:5 12mm thick	52.35	M^2	16,229
8.	610m^2	Floor finishing with C:m 1:3,20mm thick	110.00	M^2	67,100
9.	12Rm	Supplying and fixing	456.00	Rm	5,472

		of 4" O GI pipe `B' class			
10.	8 Nos	Supplying and fixing of 4" O G.M gate value	5700.00	E	45,600
11.	L.S	Provision for motor room cum store room (10'x10')	L.S		70,000
12.	L.S	Provision for bore well	L.S		60,000
13.	L.S	Provision for 5 H.P jet motor	L.S		20,000
14.	L.S	Provision for drainage and out let chamber	L.S		1,00,000
15.	L.S	Provision for electrification and service connection	L.S		1,00,000
16.	L.S	Provision for water supply arrangements	L.S		50,000
17.	L.S	Provision for unforeseen item	L.S		27,082
					14,50,000

IRRIGATED AGRICULTURE MODERNIZATION AND WATER RESOURCES MANAGEMENT PROJECT

UPPER VELLAR - SUB-BASIN

IAMWARM

PROPOSAL

SALEM DISTRICT

FOREST DEPARTMENT

Proposal for implementation of Forestry activities along the Vasista River Basin in Attur Taluk of Salem District.

The Vasista River drained from Kalrayan hills of Thumbal Reserved Forest, Mannur Reserved Forest, Nagalur Reserved Forest, Pattimedu Reserved Forest, Pattimedu Extension Reserved Forest, Jadayagoundan Reserved Forest and Paithur Reserved Forest. Then the said river passes through the area in Attur Taluk to a length of about 60 Kms. In Salem District.

Teak, Neem, Bamboo, Pungan, Vagai, Red Sandal seeds and Jatropha curcas are collected and raised in 30 x 45cm. size Poly sock and maintained in the nurseries for a period of over one year to a height of 2 mts. 50,000 Nos. of seedlings are planted in 60 cum pits in the buffer area of Reserved Forest and the lower portion of Reserved Forest along the river course of Vasista River Scrap weeding for 1m. dia and soil working to a depth of 15cm., Formation of Semi Circular bunds around the plants, Formation of Catch water drain to a size of 90 x 45 x 30cm. are to be carried out in the plantation areas. These type of water harvesting works are to save the water and conserve the soil in the Forest areas. Further Catch water pits and Semi Circular bunds are to store the water and indirectly support the wells to increase the water level and direct support to the plants planted by this department. The fruits from trees, used for food for birds. Neem and Pungan seed oil used for medicine. Jatropha oil used for production of bio diesel for moter vechicles.

The rain water drained from Reserved Forest and hills are collected in the proposed Checkdams and Percolation Ponds. The water stored in this structures also boost the water level in the agricultural wells and its are useful for changing the crap pattern, ie Production of dry crops to wet crops such as Paddy, Sugarcane, Bannana, Turmeric etc.,

To arrest the soil erosion and save the moisture the Forestry Activities such as raising of Nurseries, Planting of seedlings along the river bed and the boundries of adjoining Reserved Forests, Soil and moisture conservation works, catch water drains, weeding and soil works, semi circular bund, Constructions of Masonry Checkdams, Percolation Ponds etc., are proposed.

For the above Forestry activities the funds required are as follows: -

Sl. No.	Details of works	Quantity	Amount required
	Raising Nurseries and Planting works		
1	Raising of Nurseries	55000 Nos.	8,50,000
2	Planting of seedlings (including Replacement of causalities 10%)	50000 Nos.	10,15,000
	Soil Moisture and Conservation works		
3	Soil work, Semi Circular bund and Catch water Drains	50000 Nos.	4,85,000
4	Construction of masonry Checkdams	3 Nos.	8,50,000
5	Construction of Percolation Ponds	4 Nos.	13,00,000
	Total		45,00,000

IRRIGATED AGRICULTURE MODERNIZATION AND WATER RESOURCES MANAGEMENT PROJECT

UPPER VELLAR - SUB-BASIN

IAMWARM

PROPOSAL

SALEM DISTRICT

ENVIRONMENTAL DEPARTMENT

ENVIRONMENTAL COMPONENT OF UPPER VELLAR SUB BASIN FOR IAMWARM PROJECT

INTRODUCTION

The main activities of the Environmental cell Division, functioning at Chennai from 1.1.2001 as per the direction of Staff Appraisal Report (SAR) and Mid- Term Review of World Bank are generally classified as below.

1. River Basin Monitoring
2. Preparation of Environmental Status Report
3. Preparation of Environmental Impact Assessment
4. Preparation of Environmental Action Plan
5. Preparation of Conducting Pilot Studies on Environmental Issues
6. Implementing the Eco-restoration works in River Basins
7. Conducting Environmental workshops/seminars/meetings and Public awareness Programmes

The following river basins are allotted for EAP works for Environmental cell Division, Chennai which covers 10 districts.

Name of Basin		Districts covered
Palar	----	Kancheepuram, Vellore& Tiruvannamalai
Chennai	----	Chennai, Tiruvallur & Kancheepuram
Pennaiyar	----	Dharmapuri, Tiurvananmalai, Villupuram & Cuddalore
Varahanadhi	----	Kancheepuram, Tiruvannamalai &Villupuram
Vellar	----	Dharmapuri, Salem, Perambalur, Villupuram & Cuddalore

Under TNWRCP, with World Bank assistance, special emphasis was given for the first time 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 and workshops 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 a must.

DESCRIPTION OF VELLAR RIVER BASIN:

1. General

Vellar river basin is a medium river basin of area 7659 sq.km. The Vellar River originates from the Southern slopes of Kalrayan hills, at the northern boundary of Athur Taluk of Salem district. In the initial stage, the river is known as Ammapalayam and it flows in a southwest direction for about 21kms until Kariyakoil joins it. Thereafter the river attains its name Vellar. The total length of the river is about 150km. The basin covers partly four districts namely Salem, Perambalur, Villupuram and Cuddalore districts. Thirty-three blocks are fully or partly covered in this basin. The river Vellar drains into Bay of Bengal near Porto novo in Chidambaram taluk of Cuddalore district.

The river Vellar is having six tributaries namely Anaimadavu, Swetha Nadhi, Kallar, Chinnar, Manimukta nadhi and Gomukhi. There are 7 sub basins namely Upper Vellar (or) Vasistanadhi, Gomukhi nadhi, Manimukta nadhi, Swetha nadhi, Chinnar, Anaivari odai and Lower Vellar sub basins.

1.1. Description of Upper Vellar or Vasistanadhi Sub basin:

Vasistanadhi originates from the southern slopes of the Kalrayan hills on the Northern boundary of Athur taluk of Salem district, at an altitude of about 1266 m. At its starting point, it is known as Anaimadavu River and flows southwards for 23 km and then south-eastwards. Anaimadavu reservoir across Anaimadavu River near Valapadi town falls in this sub basin and its ayacut area is 3980.65 acres. Just three kilometers below this point, another tributary known as Thumbal river, formed by two drainages Kariyakoil river and Ammapalayam river flowing southwards from Kottaipetti pass the Kalrayan hills, joins on the left flank. Another stream called Periyar originating in Javvathu Reserve Forest in Salem taluk joins this stream. As Periyar approaches Salem -Athur road it

bends eastwards and receives on the south the Singipuram River. Vasistanadhi then flows towards southeast for about 26 km along the boundary between Attur and Perambalur taluk of Trichy district on the one side and Kallakurichi and Virudhachalam taluks on the other. Near Peraiyur in the Perambalur taluk Swethanadhi joins it 4 km to the west of the Chennai Trichy National Highway near Tholudur in Villupuram District. In the reach between the confluence points of Singipuram and Swethanadhi with Vasistanadhi, the tributaries Kallar and Saval Odai on the left flank and Chittar, Koraiyar, Manjani Odai and Ellar Odai on the right flank join the Vasistanadhi. The drainage area upto the confluence with the Swethanadhi is 1722 Sq. Km.

2. Tanks Polluted by Aquatic Weeds:

An ayacut of 5489 hectare is irrigated in this sub basin through two reservoirs namely Anaimadavu and Kariyakoil reservoir and 51 tanks. Prosopis Juliflora is found in the tank bunds through out the sub basin and also found inside the tanks. Some tanks are affected by Ipomoea. The tanks are not severely affected by aquatic weeds.

3. Domestic Sewage and Municipal Solid Waste:

Sewage is not being treated by the Municipality or Town Panchayats in this sub basin. The one and only municipality available in this sub basin is Athur and its population is 58150. Athur municipality disposes the sewage at various points in Vasistanadhi in Athur taluk. Solid waste generated is 21 MT / day and disposed in the land. Panamarathupatti, Belur, Vazhapadi, Yethapur, Keeripatti, Narasingapuram, Pethanaickenpalayam and Thedavur are the town Panchayats falling in this sub basin. The sewage is being leached into the ground or directly into the nearby drains and streams. Practically there is no sewage discharge of domestic effluent in the case of villages and they create non point pollution. It is essential to conduct awareness programmes in the sub basin to avoid domestic pollution in the sub basin. **It is also essential to give training to make use of the waste as worth manure by Vermicomposting techniques.**

Overall, the Tanks / River in the sub basin are not severely affected by domestic pollution.

4. Industries:

The major industry found in this sub basin is Sago industry. Out of 262 orange small industries, 192 are sago industries. The effluent generated is let out directly into the nearby drains which ultimately reach the River or supply

channels of tanks in Athur taluk. There is no treatment plant for sago industries in the Sub basin. Special attention is needed for treating the effluent to avoid water pollution in the sub basin.

List of Industries category wise in Upper Vellar Sub basin: -

Category	Large	Medium	Small
Red	5	3	40
Orange	6	18	262

To know the exact impact of sago industries on water resources, A **"Study on assessment of Environmental Impact of Sago industries in the sub basin by research is found essential".**

5. Sand mining:

Sand mining problem is seen in several locations along the river Vasistanadhi. Action has been taken by WRO to minimize the problem by selecting the mining locations judiciously. The result of this action is expected to minimize the issue in due course.

6. Water Quality Status:

6.1 Ground Water:

Overall the ground water quality is not affected by any external pollution. The blocks under this sub basin are declared as over exploited except Kalrayan hills. The Ground water quality of the sub basin is moderate except Veeraganur of Athur taluk which shows poor quality due to high TDS value ranging from 1900 to 2700 mg /l. Overall the water is fit for drinking and irrigation, except Veeraganur.

6.2 Surface Water:

Only during North East monsoon, flow occurs in the river. During the flow period the surface water is found to be good and fit for irrigation. The water is also fit for drinking with minimum treatment.

7. Social Issues:

The social problems identified in the sub basin are Seasonal migration, reduction in Livestock, Poor drinking water supply, poor sanitation and poor marketing facilities.

8. ACTIVITIES PROPOSED

To monitor the quality of water and soil and create database regarding the environmental status for each sub basin, the following activities are proposed at the sub basin level.

8.1 Collection and testing of water and soil samples:

Water samples were collected and tested in the sub basin at identified sampling points regularly from the year 2002. Water samples will be collected and tested in the identified sampling points and also at polluted tanks in the sub basin. Soil samples will be collected according to the necessity arising in the sub basin.

Water samples and soil samples were collected in the main river during 2005-06. The test results are not received from Ground water and Soil Mechanics and Research Division, Chennai due to non-payment of testing charges.

The Chief Engineer (Plan Formulation) has addressed the Government for the waiver of testing charges due to Ground Water and SM&R divisions for the samples taken during 2005-06.

Continuance of collection and testing of water samples is essential, as good and long range data will enable to understand the problems more precisely. Hence, now it is proposed to collect and test water samples at identified points in addition for a period of five years to assess the environmental impact on the quality of surface water of this sub basin more accurately.

In addition to the above identified locations, water samples will also be collected and tested at regular intervals from tanks and nearby wells to estimate the level of pollution where sewage is directly let into tanks and channels to assess the impact of pollution on the quality of surface and ground water.

Soil samples are to be collected from the selected locations to assess the impact on the quality of soil due to various environmental problems like use of chemical fertilizer and pesticides and using the polluted water. From these locations, number of samples at regular one year interval has to be collected and tested to determine precisely the impact on the degradation of the quality of the soil. Therefore testing of soil samples are found essential.

Under this item, following provisions have been made:

1. Testing charges for water and soil samples
2. Provision of labour charges , purchase of materials, conveyance , hiring of Jeep driver, computer operator etc.,

8.2 Environmental and social knowledge base analysis and development

Village level environmental and social data will be collected to dissipate knowledge amongst villagers for development activities.

8.3Transfer of technical know-how for solid waste management system including source segregation, recycle of dry waste and linkage with user agencies.

Now a new scheme for solid waste management plan is under implementation in all municipalities and Panchayats. Under this scheme, collection tank for disposal and non-disposable garbage have been constructed in most of the local bodies. But recycling the waste and converting the solid waste into manure and production of energy from them are yet to be come up.

Hence demonstration and action programs are planned with user agencies and necessary field visits are programmed to transfer of technical know how for solid waste management system.

8.3 Conducting Environmental and social Awareness meeting, Programme, demonstration and exhibitions on various environmental and social related issues including capacity building:

Awareness programmes are essential to create awareness among the public about environmental aspects and the action to be taken by them to remove or reduce the impacts due to the environmental problems.

Hence to create and motivate the people, awareness programmes are to be conducted in the villages of the sub basin. It is also proposed to conduct awareness meetings in school / institutions and also for WRO officials/ line department officials, conduct workshops at sub basin level and at Region level, provide exposures and field visit to eco friendly practices, during the study period of three years covering the following subjects in addition to placing stickers, tin sheets and pamphlets containing messages about environmental awareness.

- Sanitation
- Solid waste treatment
- Sewage treatment and converting the same into Gas
- Natural farming ,herbal gardening
- Conversion of aquatic weeds into manure etc.,

The major problem in the sub basin that requires immediate attention is to avoid industrial pollution mainly due to cluster of sago industries in and around Athur.

8.4 Total Cost:

River basin monitoring and Environmental awareness should be given throughout the sub basin for conserving the quantity and quality of water. In order to achieve this objective, an estimate has been prepared. The estimate cost works out to Rs 20.00 lakhs (Rupees twenty lakhs only).