



EXECUTIVE SUMMARY



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INTRODUCTION

Water is a prime natural resource, a basic human need and a precious national asset, which is one of the most critical elements in Development Planning according to Indian National Water Policy. Planning and Development of Water Resources and their Use needs to be governed by National Interest.

It has been estimated that out of the Total precipitation around 4000 billion cubic metre in the country, Surface Water availability is about 1780 billion cubic metre. Out of this, only about 50% can be put to beneficial use because of topographical and other constraints. In addition, there is a Ground Water Potential of about 420 billion cubic metre. The availability of water is highly uneven in space and time. Precipitation is confined to only about 3 to 4 months with 20 – 40 significant Rainy days within a year. Hence, there is an imperative need for effective collection of Rain Water for storing in appropriate places like Reservoir, Lakhs, Tanks, Ponds and Aquifers etc. in order to use the stored water efficiently for Economical and Social Purposes.

Agriculture is the dominant section in Indian Economy. Tamil Nadu has poor ground water potential, depends mainly on the Surface Water Irrigation, as well as Ground Water Irrigation. The Surface Water Potential largely depends on the storage of water in Reservoirs, Dams and Tanks only. The state has used the Surface and Ground Water Potentials to maximum limit and hence the future development and expansion depends only on the efficient and economical use of Water Potential and Resources.

To achieve the Water Use Efficiency, it is necessary to improve and upgrade the existing Conveyance and Storage System and also to introduce Modern Irrigation methods.

Considering all these, The World Bank during the Mission in October 2005 indicated that the Irrigated Modernization Project should be taken as Irrigated Agriculture Modernization and Water Resources Management Project (IAMWARM) . This Project has advocated Basin wise Multidisciplinary Approach in its functioning which not only favours productivity in Agricultural and allied sectors but also

expect to increase Benefits to the Farming Community.

Development of Farming Community results in the Prosperity of the Villages as most of the Agricultural activities are being carried out in Villages. As per the views of Father of our Nation, Mahathma Gandhi, *Prosperity of the Nation depends on Prosperity of the Villages.*

Based on the Geographical conditions, there are 16 River Basins in Tamil Nadu. The 16 River Basins are further divided into 42 Sub Basins and the Rough Cost Proposal for these 42 Sub Basins had been submitted by the Tamil Nadu Government to the World Bank.

The World Bank in their observations, have suggested to highlight effectively the benefits of investment by each Department and how the farmers shall stand benefited ultimately and suggested to prepare the estimates selecting one Sub Basin in each of the 16 River Basin in the first year and to prepare the estimates simultaneously for all the Sub Basins.

Agniyar River Basin is one among the River Basins

covering Trichy, Pudukkottai and Thanjavur Districts and has 3 Sub Basins namely

1. Agniyar Sub Basin
2. Ambuliar Sub Basin
3. South Vellar Sub Basin

South Vellar Sub Basin has been selected for preparation of estimate in the first year and The Detailed Project Report for South Vellar Sub Basin is prepared.

SOUTH VELLAR SUB BASIN.

The South Vellar Sub Basin is bounded on North by Agniar and Ambuliyar Sub Basin, East by Bay of Bengal, West by Velamalai Hills and Cauvery Basin and Cauvery Basin and South by Pambar Basin. The Sub Basin is located at the latitude from $10^{\circ} 0' 40''$ N to $10^{\circ} 29' 50''$ N and the Longitude from $78^{\circ} 13' 50''$ E to $79^{\circ} 15' 50''$ E.

The Basin area of the South Vellar Sub Basin is 2010 sq.km.

South Vellar River originates as a stream in Kumarikattai Reserve forest area of Velamalai Hills near Manjinampatti village 20 Kms North west of Thuvarankurichi in Manapparai Taluk of Trichy District.

It begins as a river from the surplus of Vembanoor big Tank in Illuppur Taluk of Pudukkottai District.

The River runs for a distance of 137 Kms from its origin and confluences with the Bay of Bengal near Mumbalai village in Manamelkudi Taluk of Pudukkottai District.

The main Tributaries of South Vellar River are.

1) Nerungikudiyar and

2) Gundar

Nerungikudiyar originates from the surplus of Maravamadurai tank in Thirumayam Taluk of Pudukkottai District. It travels to a distance of 30Km and joins with Vellar River near Kummarkudi Village.

Gundar originates from the surplus of Kavinadu Big tank near Pudukkottai town. It travels to a distance of

7.50Km and joins with Vellar River near Kadayakkudi village in Pudukkottai District.

There is another river called Narasinga Cauvery, originating from the surplus of Narpavalakudi tank and runs on the northern side of South Vellar River. It travels to a distance of 36Km and confluences with the Bay of Bengal near Kattumavadi village in Pudukkottai District.

In the South Vellar Sub Basin, there are 46 Nos of Anicuts, 4 Nos of Open Off – takes from the River and 316 Nos of Minor Irrigation Tanks, having a an ayacut of 21079.18, being maintained by the Water Resource Organization of PWD.

In addition to the above, there are 2086 Nos of Tanks with total ayacut of 15341.39.5 Ha, being maintained by the Panchayat Union.

Hence the total ayacut under the Sub Basin is 36420.57.5Ha

AYACUT DETAILS

Name of river	No.of Anicuts	No.of Open Offtakes	No.of Tanks benefited	Ayacut Ha
Non- System South Vellar River	18	4	164	11766.45.5
Nerunjikudi River	6	-	12	973.56.0
<u>GUNDAR RIVER</u>	2	-	8	253.05.0
<u>NARASINGA CAUVERY</u>	20	-	40	1359.99.5
<u>Sub Total</u> (Non System)	<u>46 NOS</u>	4 Nos	224 Nos	14353.06.0
<u>Rainfed Tanks</u>	-	-	92 Nos	6726.12.0
Total(Maintained by PWD/ WRO)	46 Nos	4 Nos	316 Nos	21079.18.0
Panchayat Union Tanks	-	-	2086 Nos	15341.39.5
Grand Total	46 Nos	4 Nos	2402 Nos	36420.57.5

Out of 2086 Nos of Panchayat Union tanks , 179 N o. of tanks having ayacut more than 20 ha. each with total ayacut of 4828 Ha. are proposed to be renovated under IAMWARM PROJECT.

SOIL CLASSIFICATION :

The Predominant Soil Classification – Taluk wise are shown below.

Sl.No	Name of Taluk	Predominant Soil Type		
		Order	Soil type	Great Group
1.	Manapparai	Entisols	Yellowish shallow	Typic Ustorthents
2.	Illuppur	Alfisols	Red	Ultic Haplustalfs
3.	Thirumayam	Vertisols	Black	Enti Chromusterts
4.	Pudukkottai	Alfisols	Red	Typic Ustorthents
5.	Alangudy	Alfisols	Red	Typic Ustorthents
6.	Aranthangi	Vertisols	Black	Enti Chromusterts
7.	Avudayarkovil	Vertisols	Black	Enti Chromusterts
8.	Manamelkudy	Vertisols	Black	Enti Chromusterts

WATER BALANCE.

WATER POTENTIAL IN THE SUB BASIN

SURFACE WATER.

South Vellar Sub Basin is having 46 Anicuts and 316 Nos of P.W.D. Tanks and 2086 Nos of Panchayat Union tanks . There is no Reservoir in the Sub Basin. The approximate Storage Capacity of the Tanks is 267.13 Mcm.

SURFACE WATER POTENTIAL

The Basin Area of the Sub Basin is 2010 Sq Km.

The 75% Annual Rain fall of the Sub Basin is 634.56 mm.

(SW 279.85mm and NE 257.90mm)

Total Surface Water Potential for 75% probability for South Vellar

River Sub Basin is Given below:

South West Monsoon Surface Water P otential-84.37 Mcm

North East Monsoon Surface Water Potential -77.76 Mcm

Annual Surface Water Potential -191.45 Mcm

GROUND WATER POTENTIAL

The Annual Ground Water Potential of this Sub Basin is 404.99 Mcm.

TOTAL WATER POTENTIAL

Surface Water Potential - 191.45 Mcm

Ground Water Potential - 404.99 Mcm

Total Water Potential - 596.44 Mcm

WATER DEMAND (Without Project)

Sl.No	<u>Description</u>	Water Demand in Mcm
1.	<u>Irrigation Water Demand</u>	640.27
2.	Drinking	13.85
3.	Live Stock	6.52
4.	Industries Small, Medium & Major	13.54
<u>Total Demand</u>		674.18

WATER BALANCE (Without Project)

Total Water Potential - 596.44 Mcm
Total Water Demand - 674.18 Mcm
Deficit - 77.74 Mcm

WATER DEMAND (With Project)

Sl.No	<u>Description</u>	Water Demand in Mcm
1.	<u>Irrigation Water Demand</u>	561.54
2.	Drinking	13.85
3.	Live Stock	6.52
4.	Industries Small, Medium & Major	13.54
<u>Total Demand</u>		595.45

WATER BALANCE (With Project)

Total Water Potential	-	596.44 Mcm
Total Water Demand	-	595.45 Mcm
Surplus	-	0.99 Mcm

Stake holders Meeting

To identify the System deficiencies and to assess the actual requirements to overcome the deficiencies, the following methods were done.

On 25th January 2006, Farmers meeting of entire Agniyar Basin was conducted at Pudukkottai and explained about

IAMWARM Project and the Farmers welcomed this project.

Later, Walk through Survey with Farmers and Line Departments were conducted from 26th July 2006 to 31st July 2006.

During Walk through Survey, to assess the exact deficiencies in this Sub Basin, a Questionnaire has been prepared and distributed among the Farmers of respective Anicuts & Tanks. The Farmers noted the prevailing conditions of Tanks & Anicuts and represented the remedial measures to be done.

Further, Meetings were conducted with Stake holders on 29th July & 2nd August 2006. After detailed discussions, the actual requirements in this Sub Basin are assessed.

WATER USER'S ASSOCIATION

In this Sub Basin, the TNFMIS Act 2001 has not been implemented so far. About 28 Nos of Water User's Associations are functioning in this Sub Basin. They were all registered under Society Act. Action is being taken to form

Water User's Association in the entire area of this Sub Basin.

Total number of WUA to be formed under TNFMIS Act 2001is

74.

OVERALL PICTURE

Components	Constraints	Counter Measures
<u>WATER</u> <u>RESOURCES</u> <u>ORGANISATION</u>	Dilapidated conditions of Sluices and Surplus Weirs in Tanks.	Proposed to reconstruct or repair the sluices and weirs in Tanks as required.
	Poor condition of the Tank Bund.	Proposed to strengthen the Tank Bund by Earthwork excavation in hard soil and formation of Bund upto the Standards and Construction of Protection wall at weak portions.
	Siltingup of Supply channels and deterioration of Channel Banks.	Proposed to desilt the Supply channels and strengthen the bank by Construction of Protection walls.
	Dilapidated condition of Anicuts.	Proposed to repair or reconstruct the Anicuts as required.
	Diversion of water from the river by cross bunding in the River.	Proposed to construct new Anicuts and Groynes wherever needed
	Poor conditions of River Banks	Proposed to strengthen the River Banks with Hard soil and Construction of Masonry Protection walls at vulnerable points.
	Inadequate utilisation of Ground water potential.	Proposed to provide New dug wells and Medium tube wells.

**AGRICULTURAL
MARKETTING**

Production –
Glut/shortage, Output at
the same time,
Lack of available markets,
Poor post harvest
practices, Eg.No
grading/packing
No collective action, -
individual framers go to
market / wholesaler.

Staggered planting of crops
Contract/Link with wholesaler
for off season purchase
Contract farming arrangements
may be made with modern Rice
millers.
WUA – Marketing sub group
market surveys , collective
transport by forming a group
among them, one
representative may come to the
Regulated Market to sell the
reduced to a great extent and
they can get better prices for
their produce.
Capacity building & IEC, On
Practices.
Market kiosk link with BDO's
office computerization, e-
choupal, AIR siot, Mass
media,etc.
Storage (Need based/Crop
based)-construction of storage
godowns are planned.
Handing & Quality – encourage
grading and Quality control
through WUAs by IEC and
Interface with
Wholesaler/Buyers.
Packing – Provision of Crates
to WUAs. There is no need for
supply of crates for these crops.
Agro Processing. Tie up with
existing processing unit. There
are many number of rice mills
and dectricators in the sub
basin to process paddy and
groundnut .
To fetch higher price storage

		<p>and drying yards are necessary.</p> <p>TamilNadu Agricultural University has plan to give education on improver methods of practices and for Entrepreneurship.</p>
<p><u>ANIMAL HUSBANDRY DEPARTMENT</u></p>	<p>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</p>	<p>The establishment of sub basin veterinary unit will ensure delivery of veterinary services at the farmer's door steps or nearest to the farmer's in remote villages and unserved villages of the sub basin area. Provision of veterinary health cover and artificial insemination are the main works at the farmer's door steps. The unemployed veterinary graduate will be given an entrepreneurship training to establish a Sub basin veterinary unit 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.</p>
	<p>Lack of upgraded infrastructure at the Government Institutions leading to constraints in delivery of quality veterinary services.</p>	<p>The Government Veterinary Institutions in the sub basin will be provided with additional essential equipments to deliver quality veterinary services in the sub basin. In addition one veterinary dispensary 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.</p>

	<p>There is a wide gap between the requirement and availability of green fodder needed for the livestock in the sub basin.</p>	<p>To reduce the gap between the requirement and availability of green fodder in the sub basin, it is proposed to cultivate CO3 fodder in 275 hectares of private lands, as a part of cropping plan.</p>
x	<p>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.</p>	<p>To overcome the infertility problems, infertility cum total health cover camps are proposed. The animals having infertility problems will be identified and treated. In addition, mineral mixture supplement will be given to rectify the defects.</p>
	<p>Lack of adequate know-how about the livestock management practices like feeding, breeding, health care and deworming activities.</p>	<p>The farmers in the sub basin will be given on best livestock management practices in livestock breeding activities like signs of oestrus, correct time of artificial insemination, deworming, feeding schedule and other health care measures. In addition, IEC materials will be distributed to farmers in the sub basin. More over hoardings and wall paintings depicting signs of commonly affecting diseases will be erected in places where people congregate in large numbers. Apart from this, quarterly night meetings will be conducted to disseminate information to the farmers in the sub basin.</p>

	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 at Veterinary Colleges to update and refresh their skills and knowledge. They will inturn train the para-veterinarians.
<u>HORTICULTURE</u> <u>DEPARTMENT</u>	Problem soil Existing capacity of the STL at Kudumianmalai is 20000	To overcome the problem soil, the farmers are advised to take up soil sampling and soil testing. Existing capacity of the STL at Kudumianmalai is 20000. Measures to be taken up to augment the organic content of the soil. The crops like Amla and Sapota which can come up in all kinds of soil are suggested in this sub-basin.
	Adverse climatic condition	Drought resistant and high yielding crops of Amal, and Sapota, are suggested in this sub-basin.
	Inferior quality of seed and planting material Farmers are using local and poor quality seeds. Truthful seeds are used by the meager farmers	Quality planting materials supplied through Department of Horticulture. There are Three State Horticulture farms available at Vallathirakottai and Kudumianmalai, Nattumangalam 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 .
	Limited planting material available from Government sources	Seeds are supplied to the farmers by department after procuring the Hybrid Seeds through Tender system.

	Improper irrigation practices (Ridges and Furrows, Basin irrigation)	Drip irrigation and fertigation is going to be introduced by the Agriculture Engineering Department for 455 Ha
	Inadequate extension service	To cater the need technical input providers are proposed to be hired for 144 man months for 5 years. For every 100 Ha of area increase one TIP is proposed.
	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.
	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.
	Risk aversion	Training should be given to the farmers on new techniques.
	Limited processing units :	Entrepreneurs should be motivated through training and seminars to start new processing units.
	Availability of labour	Farm mechanization is essential. Providing farm machineries for drudgery reduction, weeding, spraying, to the WUA is needed.

<u>AGRICULTURE DEPARTMENT</u>	Problem soil	In the basin saline and alkaline soil are available, there is specific recommendation of gypsum application at 50% cost.
	Adverse climatic condition/Drought	On perusing the past rainfall record, drought occurs once in 10 years. Drought tolerant varieties, agronomic practices will be introduced.
	Quality of seeds (Low yielding traditional varieties still prevalent)	High Yielding certified seeds of crops and quality planting materials will be supplied to the farmers through Agrl.Extension Centres, TNAU etc. Low yielding local varieties will be replaced with high yielding varieties during the project period.
	Limited availability and distribution of certified seed from Government source/private and High cost of hybrid seeds	Certified seeds are stocked and distributed in Agricultural Extension Centres as per the SRR prescribed by the Agriculture Department. The private Hybrid seeds costs more and can be utilized. Supply of seeds by NSC and other private sources will also be arranged.
	Improper Irrigation practices (Flood Irrigation)	SRI Technique in paddy crop will be popularized by laying demonstration by TNAU. Drip and sprinkler irrigation is going to be introduced by the Agricultural Engineering Department for all the crops.

	Inadequate extension services	Departmental Extension Workers in all levels are limited in the sub basin. Government extension service is main source. Private extension services like TNAU, Agriculture clinics and Kissan call center can be used.
	Risk aversion	Only a few farmers have known the risk aversion. Many farmers has no idea about this. Farmers will be educated through trainings, and Demonstrations under Centrally Sponsored Schemes Training will impart all improved package of practices to the farmers and demonstrations will act as teaching floor for all farmers.
	Limited Processing Units.	Based on the necessity and demands of the farmers, required units will be set up through private entrepreneurs.
	Availability of labour	To overcome the existing labour problem, required from mechanization like Drips and Fertigation units, can be introduced for sugarcane and all farm implements and equipments can be distributed through subsidy schemes to avail labour unavailability during peak season.

	Adoption of traditional method of cultivation	Introducing new planting method for sugarcane like pit method and paired two method instead of mound planting, Introducing SRI technique for paddy, Bund/inter/mixed cropping for pulses, will be introduced.
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Details of Activities of each Department.

WRO

Approach: to rehabilitate the irrigation system made be as below:

1. Thematic Maps on land use, soils, crops, water bodies, and other Agriculture, and demographic attributes are prepared by IWS.

2. The crop water requirements for the crops without project and for the crops with the project are prepared by IWS, with the crops proposed by Agriculture, Horticulture and Agricultural Marketing Department.

3. The Adequacy of the System, feeder channels to Tanks , distribution system etc, have been checked by the WRO(both regional and Plan Formulation wing) and the following packages are proposed accordingly.

Sl.No.	Package No.	Name of Work	Estimate Amount Rs. In Lakhs
1	Package I	Rehabilitation of Irrigation Infrastructure in South Vellar River from Pannai Periyakulam Anicut and its Group of Tanks to Nellikulam Anicut and its Group of Tanks in Trichy District	222.00
2	Package II	Rehabilitation of Irrigation Infrastructure in South Vellar River from Kilikudi Anicut and its Group of Tanks to Sundarappatti Anicut and its Group of Tanks in Pudukkottai District.	1034.00
3	Package III	Rehabilitation of Irrigation Infrastructure in Nerunjikudi River from Sadayampatti Anicut and its Group of Tanks to Kummankudi Anicut and its Group of Tanks Senthamangalam Anicut and its Group of Tanks in South Vellar River and from Chandramathi Anicut and its Group of Tanks to Pitchen Anicut and its Group of Tanks in Gundar River in Pudukkottai District.	1089.00
4	Package IV	Rehabilitation of Irrigation Infrastructures in South Vellar River from Holdworth Anicut and its group of tanks to Narpavalakudi Anicut and its group of Tanks in Pudukkottai District.	976.00
5	Package V	Rehabilitation of Irrigation Infrastructures in Narasinga Cauvery River System and its group of tanks to Panchachi Anicut and its Group of Tanks in South Vellar River in Pudukkottai District.	1043.00
6	Package VI	Rehabilitation of Irrigation Infrastructures in South Vellar River from Veeramangalam Anicut and its group of Tanks to Karunkadu Anicut and its Group of Tanks in Pudukkottai District.	886.00
7	Package VII	Rehabilitation of Irrigation infrastructures in South Vellar River from Manalur Anicut and its group of Tanks to Thandalai Anicut and its Group of Tanks in Pudukkottai District.	816.00
8	Package VIII	Providing Dugwells 10 Nos Medium tube wells 35 Nos with installing pumpsets and Construction of Pump Rooms arrangements in South Vellar Sub Basin in Pudukkottai District.	262.50
		Total	6328.50

OUTCOME:

- ❖ The Irrigation efficiency is expected to improve from the present 40% to 70%.
- ❖ The gap area can be bridged and cultivation of crops in more area.
- ❖ Effective water management
- ❖ Strengthening of PIM activities.
- ❖ Optimization in using the water both Surface and Ground Water for Irrigation.

AGRICULTURE DEPARTMENT

The approach to enhance Agriculture production made be as below.

Approaches

For Paddy

- 10 Ha Demonstration
- Distribution of Bio fertilizers
- Distn. of MN mixture
- Distn. of Gypsum
- Distn. Of Sprayers
- Village Campaign

Compact Block Demonstration for Pulses, Groundnut and Maize.

Cropping Pattern

The existing cropping pattern and other proposed cropping pattern with the project is shown as two different tables.

Outcome

- Productivity of annual crops such as Sugar cane etc will be increased by 16%
- Productivity of perennial crops such as coconut etc will be increased by 15%
- Increase in Productivity of Paddy will be 15%
- Increase in Productivity of Pulses will be 8%
- Increase in Productivity of Ground nut will be 15%

YEARWISE / COMPONENTWISE INPUT REQUIREMENT (PHYSICAL)

S.No.	Name of the component	Unit	I	II	III	IV	V	Total	Source
I	10 Ha demonstration - Paddy	Nos.	62	62	62	62	62	310	
a	Certified paddy seeds	Mt.	37.2	37.2	37.2	37.2	37.2	186.0	Agricultural Extension Centre
b	Pseudomonas (seed treatment)	Mt.	0.4	0.4	0.4	0.4	0.4	2.0	Agricultural Extension Centre
c	Bio fertilizer	Nos.	1550 0.0	15500.0	15500.0	15500. 0	15500. 0	77500	Agricultural Extension Centre
d	M.N Mixture	Mt.	7.8	7.8	7.8	7.8	7.8	39.0	Agricultural Extension Centre
e.	Gypsum	Mt.	310.0	310.0	310.0	310.0	310.0	1550.0	Purchased from ICMS Corporation
f	Weedicide	Litre	1550. 0	1550.0	1550.0	1550.0	1550.0	7750.0	Approved firm
g	Certified pulses seeds (Bund cropping)	Mt.	1.9	1.9	1.9	1.9	1.9	9.5	Agricultural Extension Centre
h	Biocides	Litre	3100. 0	3100.0	3100.0	3100.0	3100.0	15500.0	Agricultural Extension Centre
I	leaf colour charts	Nos.	620.0	620.0	620.0	620.0	620.0	3100	T.N.A.U
j	Light trap	Nos.	620.0	620.0	620.0	620.0	620.0	3100	Approved firm

II	Distribution of Bio fertilizers	Nos.	5950 0	59500	59500	59500	59500	297500	Agricultural Extension Centre
III	Distribution of M.N Mixtures	Mt.	17.00 0	17.000	17.000	17.000	17.000	85.0	Agricultural Extension Centre
IV.	Distribution of gypsum	Mt.	412.0 00	412.000	412.000	412.00 0	412.00 0	2060.0	Approved firm
V	Distribution of seed drum	Nos.	110	110	110	110	110	550	T.N.A.U
VI	Hand operated sprayer	Nos.	1005	1005	1005	1005	1005	5025	Approved firm
VII	Distribution of tarpaulins	Nos.	89	89	89	89	89	445	Approved firm

S.No.	Name of the component	Unit	I	II	III	IV	V	Total	Source
VIII	5 Ha pulses demonstration	Nos.	70	70	70	70	70	350	
a	Pulses certified seeds	Mt.	7.000	7.000	7.000	7.000	7.000	35.000	Agricultural Extension Centre
b	M.N Mixture	Mt.	1.750	1.750	1.750	1.750	1.750	8.750	Agricultural Extension Centre
c	Bio Fertilizers	Nos.	7000	7000	7000	7000	7000	35000	Agricultural Extension Centre
d	D.A.P	Mt.	7.000	7.000	7.000	7.000	7.000	35.000	Agricultural Extension Centre
e.	Biocides	Litre	350	350	350	350	350	1750	Purchased from ICMS Corporation

IX	5 Ha G.nut demonstration	Nos.	50	50	50	50	50	250	
a	Bio fertilizers	Nos.	5000	5000	5000	5000	5000	25000	Agricultural Extension Centre
b	M.N Mixture	Mt.	3.125	3.125	3.125	3.125	3.125	15.625	Agricultural Extension Centre
c	Gypsum	Mt.	50.000	50.000	50.000	50.000	50.000	250.000	Approved firm
d	Certified pulses seeds (Inter crop)	Mt.	1.500	1.500	1.500	1.500	1.500	7.500	Agricultural Extension Centre

X	5 Ha Maize demonstration	Nos.	50	50	50	50	50	250	
a	Maize certified seeds	Mt.	7.350	7.350	7.350	7.350	7.350	36.750	National Seed Corporation
b	Bio fertilizer	Mt.	4.900	4.900	4.900	4.900	4.900	24.500	Agricultural Extension Centre
c	M.N Mixture	Mt.	6.125	6.125	6.125	6.125	6.125	30.625	Agricultural Extension Centre
d	Biocides	Lit.	2450.000	2450.000	2450.000	2450.000	2450.000	12250.000	Approved firm

HORTICULTURE DEPARTMENT

The Horticulture department serves with an objective of increasing the area under horticulture crops substantially with varieties up gradation such as tissue culture and hybrid crops. It also proposed controlled cultivation in shade net and poly green houses. It also proposes to promote inter-cropping. The above are proposed carefully with reference to market linkages especially perishables.

The Approach to achieve these objectives is as follows.

- (i) Improving the knowledge of the farmer in better cultivation techniques through demos, training etc.
- (ii) Encouraging micro irrigation with fertigation and less water intensive.
- (iii) Introduction of maintainable, agro-climatic enterprise, Hybrid Varieties of Horticulture crops.
- (iv) Promoting controlled cultivation etc.

The following table shows the horticulture activities proposed in the sub basins with cost details

SI no	Components	Estimated cost	Financial in lakhs					Total (in lakhs)
			I Year	II Year	III Year	IV Year	V Year	
I.	Area Expansion	.						
A.	<u>Fruits Plants</u>							
1	Amla	30000	3.0	6.0			-	9.0
	Sapota	30000		3.0	6.0	-	-	9.0
1.	<u>Vegetables crops</u>							
B.	Hybrid Brinjal	30000	6.0		6.0	9.0	-	21.0
1.	Hybrid Bhendi	30000	6.0	18.0	18.0	18.0	-	60.0
C.	<u>Species</u>							
1.	Chillies	15000	1.5	4.5	4.5	4.5	-	15.0
D.	<u>Medicinal Plants</u>							
1.	Patchouli	15000		1.5	2.25	-	-	3.75
E.	<u>Tree Crop</u>							
1	Casurina	30000	3.0	3.0	6.0	6.0	-	18.0
	Total		19.5	36.0	42.75	37.5		135.75
II-1	Extension support @ Rs.8000/-per month.(216 man months for 5 years)	96000	0.96	1.92	3.84	4.8		11.52
2	Advertisement	24000	0.24	0.24	0.24	0.24		0.96
3	Hiring computers	5000	0.5	0.5	0.5	0.5	0.5	2.5
	Total		1.7	2.66	4.58	5.54	0.5	14.98
III	Organic farming	Amount already proposed in area expansion programme						
IV	INM/IPM	1000	0.4	0.8	1.20	0.9		3.3
V	Micro irrigation	Implemented by Agricultural Engineering Department						
	Overall Total		21.6	39.46	48.53	43.94	0.5	154.03

The total estimated cost of investment is Rs. 154.03 Lakhs and following increased production shall be achieved with the project as outcome.

OUTCOME

SL.NO	DETAILS	WITHOUT PROJECT	WITH PROJECT	% INCREASE
1	Area in Horticulture crops(Ha)	180	695	286
2	Introduction of micro irrigation(Ha)	0	455	455
3	Introduction of IPM/INM(Ha)	0	330	330
4	Introduction of Organic Farming(Ha)	0	125	125
5	Average Increase in Production (MT)	8	47	48

The other outcomes shall be saving of water to expand the area of cultivation and to increase productivity and farm income. There will be also an increased non-farm employment opportunities through including private sector participation in Agro-processing units to be developments in this sub basin.

AGRICULTURE ENGINEERING DEPARTMENT

With the main objective to bring water directly to root zone of the crop, thus reducing the wastage of water due to flood irrigation, The following are the approaches to achieve these objectives.

Approach:

- Micro Irrigation.
- Precision farming.
- Farm Mechanization
- Pilot Project For Underground PVC Pipe Line Conveyance System With Sump Provision In Canal Command
- Farm ponds with fish culture.

The project component shall be as below

Sl. No.	Components Proposed	Unit	Unit cost (Rs.)	Physical (Ha.)	Fin. (Rs. in Lakhs)
1	MICRO IRRIGATION				
a)	Drip Irrigation with Fertigation				
1	Amla (6m x 6m)	Ha.	33200	30	9.96
2)	Sappato(8mx8m)	Ha.	22900	30	6.87
2	Sugarcane (1.5m x 1.5m)	Ha.	58000	350	203.00
3	Coconut (8m x 8m)	Ha.	22900	150	34.35
4	Casuarina(2mx2m)(Without fertigation)	Ha.	44800	50	22.40
	Total	Ha.		610	276.58
b)	Sprinkler Irrigation System				
1	Groundnut	Ha.	15000	1100	165.00
2	Vegetables	Ha.	15000	140	21.00
3	Chillies	Ha.	15000	80	12.00
4	Medicinal plants (Patchouli)	Ha.	15000	25	3.75
	Total	Ha.		1345	201.75
2	PRECISION FARMING				
	Vegetables	Ha.	75000	100	75.00
3)	PVC Burried Pipe laying For water conveyance and Sprinkler irrigation				
	Cost of Pipe laying	M	12305	50.06	6.16
	Construction of sump&Providing pump with Energisation	Nos.	235000	1	2.35
	Total				8.51
4	Farm mechanisation with advanced user friendly implements				
	Power Weeder	Nos.	75000	10	7.50
	Seed drill for Maize &Groundnut	Nos.	35000	20	7.00
	Groundnut Harvester	Nos.	40000	10	4.00
	Maize Husker cum sheller	Nos.	90000	10	9.00
	Total			50	27.50
5	WATER HARVESTING STRUCTURES				
	Farm Ponds	No	40000	40	16.00
	Grand Total				605.34

OUT COME

- Increased area under Hi-tech Irrigation like Drip and Sprinkler Irrigation.
- Precision Farming practices to an extent of 100 ha. for increased income.
- Increased Farm Productivity per unit area and unit quantity of water.
- Diversification of new crops in the gap area.
- Increase in Irrigation efficiency by laying of PVC underground pipe line system in canal command area
- Technology dissemination to the farmers
- Increase in awareness in Farm Mechanisation
- Supplement income generation by diversified farm activities through fisheries(from Farm Ponds),cattle breeding
- Increase in per capita income to the beneficiary farmers

Thus a sum of Rs 605.34 Lakhs is proposed to be invested by this Department in this sub-basin, to help farmers association to effect substantial saving in water and to help them go in for mechanisation in their farms. 40 numbers of farm ponds, are proposed to augment water resources through rain water harvesting and good recharging of ground water.

TAMIL NADU AGRICULTURE UNIVERSITY

The following table shows the details of demonstration and inputs proposed by TNAU under the Project and Mission mode. The total investment works out Rs. 252.11 Lakhs.

The approach to enhance usefulness of document under be as below.

Approaches:

- Improved production technologies in Groundnut
- Productivity enhancement in Pulses
- SRI
- Drip fertigation in Sugarcane
- Improved crop production technologies for maize .

TOTAL BUDGET FOR SOUTH VELLAR

Sl.No	Particulars	Physical	Financial (in lakhs)
<u>I</u>	<u>Activities</u>		
<u>1</u>	<u>Improved production technology for Groundnut + 3 field days</u>	<u>100 ha</u>	<u>6.80</u>
	<u>Groundnut seed drill and stripper</u>	<u>Each 3 Nos.</u>	<u>1.20</u>
<u>2</u>	<u>Improved production technology for Maize + 3 field days</u>	<u>150 ha</u>	<u>9.30</u>
<u>3</u>	<u>Quality seed production Groundnut, Rice and Black gram</u>	<u>100 ha</u>	<u>1.50</u>
<u>4</u>	<u>Demonstration of organic farming and IFS modal in Model villages</u>	<u>1 No</u>	<u>1.00</u>
<u>5</u>	<u>SRI</u>	<u>300 ha</u>	<u>30.00</u>
<u>6</u>	<u>Sugarcane drip fertigation</u>	<u>200 ha</u>	<u>127.00</u>
<u>7</u>	<u>Production technology for pulses</u>	<u>500 ha</u>	<u>12.50</u>
<u>8</u>	<u>OFD and Skill development</u>	<u>-</u>	<u>4.10</u>
<u>9</u>	<u>Soil testing</u>	<u>-</u>	<u>0.50</u>
		<i>Sub Total</i>	<u>193.90</u>
<u>II</u>	<u>Out Sourcing for technical assistant</u>		
<u>1</u>	<u>6 nos for first 3 years, 3 nos for 4th and 5th year</u>	<u>9000 Salary + 1000 FTA per Month</u>	<u>28.80</u>
		<i>Sub Total</i>	<u>28.80</u>
<u>III</u>	<u>Contingencies</u>		
	<u>a. Vehicle hire charge for Scientists @ Rs.60000/yr</u>		<u>3.00</u>
	<u>b. Documentation and Reporting</u>		<u>1.00</u>
	<u>c. Publicity, exhibits and Stationeries</u>		<u>2.50</u>
		<i>Sub Total</i>	<u>6.50</u>
<u>IV</u>	<u>Equipments</u>		<u>3.00</u>
	<u>Computer, Printer, Scanner, LCD, Copier, Digital moisture meter</u>		
		<i>Sub Total</i>	<u>3.00</u>
		Total	<u>232.20</u>
	<u>Incentive 1% of the total cost</u>		<u>2.32</u>
	<u>Total</u>		<u>234.52</u>
	<u>Institutional charges @ 7.5 %</u>		<u>17.59</u>
	<u>Grand Total</u>		<u>252.11</u>

Outcome:

- At the end of 5th year, nearly 200 ha area of Sugercane will be under drip fertigation with 10 to 15% increased productivity and 30% water saving.
- Productivity Enhancement in Pulses in an area of 500 ha
- Indiscriminate usage of Water will be curtailed by saving upto 50%.
- Improved soil health
- Enhanced productivity level of the crop .

Under project mode, transfer of technologies in major crops, and demonstration of labour saving implements high yielding varieties, scientific irrigation management and high harvesting technologies are proposed.

Under mission mode, large scale implementation of specific technologies of SRI in 300 ha, will be attempted.

These will enhance productivity by 15% and water saving of 30% besides improved soil health and farm income.

AGRICULTURE MARKETING

In the background of stakeholders demand for identifying markets for new and diversified crops, improving existing markets utilization, improving access to market by better collective transport, specialised storages as per crop needs, the following components are the approach.

The table below shows the project component in the below.

Approaches:

- Strengthening the infrastructural facilities. ie. Rural godowns, Drying yards and Agri business centre.
- IT based market information network. ie. Expanding TNAU based DEMIC.
- Contract farming / MOU arrangements. ie. Maize produce with poultry feed manufactures.
- Collective bargaining through FIG, Farmers Commodity Groups.
ie. Gourds cultivators in the Sub basin.
- Capacity building / IEC. ie. Centralized programme.
- Private – Public participation. ie. Interface Workshop of Cultivators / producers by Cell.

Sl.No.	Items	No.	Cost in Lakhs
1.	Rural godowns	10	50.00
2.	Drying yard	10	22.00
3.	Plastic tarpaulins	100	5.00
4.	Weighing scales	10	1.00
Total			78.00

Thus the investment of Rs. 78 Lakhs, will propel agricultural growth from production front to the marketing front thus making the Agriculture sector more profitable and vibrant to face competition both at national and international scene.

Outcome

- Percentage of increase in farm gate sale price.
ie. > 10% increase over 2006-07 level]
- Extent of use of marketing Ki osk.
ie. 10-15% of stakeholders per year.
- Percentage of output taken for agro processing.
ie. 5% increase over 2006-07 level.
- Percentage of diversified crops marketed.
ie. 33% of the produce during 1st year.

FISHERIES

The following proposals is made under IAM WARM project as fisheries component

- Fish Seed Bank
- Fish Seed Rearing in Cages
- Aquaculture in Farm Ponds

ABSTRACT

1.	Seed Bank (2Nos)	=	29.00 Lakhs
	Operational cost	=	2.32 Lakhs
2.	Aquaculture in Farm Ponds(30 Nos)	=	4.95 Lakhs
3.	Suppl;y of Fishing Implements		
	a) Drag net(10Nos)	=	2.00Lakhs

4.	Fish Seed Rearing in Cages(10units)	=	1.40Lakhs
	Operational cost	=	1.60 Lakhs
5.	Vehicle hire charges	=	2.00 Lakhs
6.	Documentation	=	0.50 Lakhs
	TOTAL	=	43.77 Lakhs

Outcome:

- (i) Timely availability of crop fish seeds
- (ii) Additional income Rs. 10000/- per crop farmer and fish production.
- (iii) Hygienic time meeting with better transport facilities for increase price for fish.
- (iv) Increases fish catch efficiency.

The total cost works out to Rs. 43.77 Lakhs.

Animal Husbandry

Improved delivery of Veterinary services, Fodder availability with increased extent of 100 ha, capacity building of farmers on Veterinary health care camps, , and Human resources developments by way of training to farmers and in-service officials etc, are the main areas of concentration of A.H. Development in the sub basin. The following table shows the components and their cost.

	Components	Physical	Financial (In Lakhs)
1	Productivity enhancement by improving delivery of veterinary services		
	<i>a. Establishment of Sub basin Veterinary Units (SBVU) @ Rs.5,72,720/- per unit</i>	2	11.45
	<i>b. Improving the essential infrastructure in the Government institutions (graduate institutions) @ Rs.33,000/-unit</i>	18	5.94
	<i>c. Improving the essential infrastructure in the Government institutions(subcentres) @ Rs.20,000/-unit</i>	18	3.60
	<i>d. Strengthening the diagnostic facilities in the sub basin by providing special diagnostic tools to sub basin referral institutions @ Rs.3,00,000/- per unit</i>	1	3.00
2	Increasing availability of green fodder in private lands (in ha) - Stylo 25 ha. - Co3 75 ha.		10.50

- Kolukattai 175 ha			
3	Out reach programmes.		
	<i>a. Infertility cum Total Veterinary Health Care camps @ Rs.6,000 per camp per month for each SBVU</i>	120	7.20
	<i>b. Distribution of mineral mixture @ Rs.1,82,500 per SBVU</i>	2	3.65
	<i>c.). Information, education and communications campaigns</i>	20	11.00
4	Enhancing the knowledge level of human resource		
	<i>a. Training of Farmers</i>	2000	8.00
	<i>b. Enterpruneship training to 31 unemployed veterinary graduates to be placed as Sub basin Veterinary Extension Officer @ Rs.50,000/- per person</i>	3	1.50
	<i>b. Orientation Training for Sub basin Veterinary Extension Officers @ Rs.1,350/- trainee</i>	2	0.03
	<i>c. In-service Training for Veterinarians @ Rs.2,000/- per person</i>	18	0.36
			66.23

The Approach to achieve these area

- (i) Productivity enhancement by improving delivery of Veterinary services in the project area of the Government and private level (WUA.)
- (ii) Increasing the availability of green fodder for sustainable growth of livestock.
- (iii) Improving the infrastructure and diagnostic facilities in the project area.
- (iv) Improving the knowledge level of the farmers about the livestock activities through various outreaches pr ogrammers, training etc.

Animal Husbandry can nature a better quality of life for the rural farmer by not only providing sustainable employment of their location --- but can also act as assets or rural currencies.

The outcome of these intervention are

- ❖ Bridged improvements in the project area
- ❖ Improvement in health and productivity status of livestock in the project area
- ❖ In area in Milk production and there by increase the economic status.

Environmental Cell

- Water Sample and Soil Sample Collection, Preparation, Testing and Analysis
And other Environmental and Social parameters data collection.
- Environmental and Social Awareness Meeting, Training and Workshop
- Implementing Environmental Projects such as Water Conservation, Prevention
Of Water Pollution, Solid waste management, Eradication of Water Weeds by
Bio Remediation Methods.

Estimated Cost : Rs 30 Lakhs

ECONOMIC ANALYSIS

The project focus on improving water resources management and service delivery to maximize productivity in 21079 Ha of net irrigated area in the project. Only 53% of the area currently full irrigation per year. Water sector related institutional reforms and scheme improvements based on physical interventions in association with Agriculture intensification and diversification will maximize farm profitability and economically sustain the productivity in the project area. The Incremental Rate of return works out to % much above the opportunity cost of 12%. This will yield a net of profit of Rs million during the project cycle of 25 years at 2006 prices. The incremental benefit in the project area is derived from increased irrigation coverage and efficiency, dependable water supplies to high yielding variety of crops and input to other agriculture components of horticulture livestock fisheries etc. besides sustainable environmental benefits.

Project benefits and poverty Alleviation Impeachment

Area Expansion Shifts:

The project shall help maximizing water productivity in its entire 21079 ha. Nearly 84 % of the farmers of marginal and small categories shall be fully benefited with increased food production and farm income.

Technologies Impacts

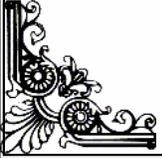
Drip with fertigation for Sugercane crops, SRI techniques for Paddy , and Micro irrigation for Horticulture crops and Sugarcanes are purposed. These not only increase water savings, but also increase the productivity of crops.

Implementation of the project involving civil works shall further add temporary employment opportunities during project impl ementation.



CHAPTER – I

INTRODUCTION



INTRODUCTION

GENERAL:

In continuation of the WRCP Programme funded by the World Bank, the follow on project proposed by the Government of Tamilnadu to a tune of Rs.3900/- crores covering 111 sub basins, has been fully considered by the World Bank in order to extent its financial assistance to fund the Irrigated Agricultural Modernisation and Water Resources Management (IAM WARM) Project with an integrated approach.

This project has been proposed based on the experiences gained through the implementation of WRCP in Tamilnadu as well as the recorded information on pilot project implemented in the Hanumanathi sub basin. It also involves the participation of various line departments and the water using stake holders with a multi disciplinary approach and with a principal objective of improving the water use efficiency, overall system efficiency and increasing the agricultural productivity, along with additional benefits to the farming community.

SOUTH VELLAR SUB BASIN .

The South Vellar Sub Basin is bounded on North by Agniar and Ambuliyar Sub Basin, East by Bay of Bengal, West by Velamalai Hills and Cauvery Basin and Cauvery Basin and South by Pambar Basin. The Sub Basin is located at the latitude from 10⁰ 0' 40" N to 10⁰ 29' 50" N and the Longitude from 78⁰ 13' 50" E to 79⁰ 15'50E

The Basin area of the South Vellar Sub Basin is 2010 sq.km.

South Vellar River originates as a stream in Kum arikattai Reserve forest area of Velamalai Hills near Manjinampatti village 20 Kms North west of Thuvrankurichi in Manapparai Taluk of Trichy District.

It begins as a river from the surplus of Vembanoor big Tank in Illuppur Taluk of Pudukkottai District.

The River runs for a distance of 137 Kms from its origin and confluences with the Bay of Bengal near Mumbalai village in Manamelkudi Taluk of Pudukkottai District.

The main Tributaries of South Vellar River are.

3) Nerungikudiyar and

4) Gundar

Nerungikudiyar originates from the surplus of Maravamadurai tank in Thirumayam Taluk of Pudukkottai District. It travels to a distance of 30Km and joins with Vellar River near Kummankudi Village.

Gundar originates from the surplus of Kavinadu Big tank near Pudukkottai town. It travels to a distance of 7.50Km and joins with Vellar River near Kadayakkudi village in Pudukkottai District.

There is another river called Narasinga Cauvery, originating from the surplus of Narpavalakudi tank and runs on the northern side of South Vellar River. It travels to a distance of 36Km and confluences with the Bay of Bengal near Kattumavadi village in Pudukkottai District.

In the South Vellar Sub Basin, there are 46 Nos of Anicuts, 4 Nos of Open Off – takes from the River and 316 Nos of Minor Irrigation

DETAILS OF ANICUTS AND TANKS

Name of river	No.of Anicuts	No.of Open Offtakes	No.of Tanks benefited	Ayacut Ha
Non- System South Vellar River	18	4	164	11766.45.5
Nerunjikudi River	6	-	12	973.56.0
<u>GUNDAR RIVER</u>	2	-	8	253.05.0
<u>NARASINGA CAUVERY</u>	20	-	40	1359.99.5
<u>Sub Total</u> (Non System)	<u>46 NOS</u>	4 Nos	224 Nos	14353.06.0
<u>Rainfed Tanks</u>	-	-	92 Nos	6726.12.0
Total(Maintained by PWD/ WRO)	46 Nos	4 Nos	316 Nos	21079.18.0
Panchayat Union Tanks	-	-	2086 Nos	15341.39.5
Grand Total	46 Nos	4 Nos	2402 Nos	36420.57.5

Out of 2086 Nos of Panchayat Union tanks , 179 No. of tanks having ayacut more than 20 ha. each with total ayacut of 4828 Ha. are proposed to be renovated under IAMWARM PROJECT.

The details of the Anicuts and the Ayacut benefited is as below : -

Sl.No	Name of Anicut/Tank	Source	No.of. Tanks Benefitted	Ayacut in Ha
1.	PannaiPeriakulam Anicut	South Vellar	1	41.55.0
2.	Nelikkulam Anicut	South Vellar	1	72.43.0
*	Valanadu Big Tank	South Vellar	1	184.41.0
*	Meenaveli Periakulam	South Vellar	1	92.85.0
*	Vembanur Big Tank	South Vellar	1	124.60.0
3.	Meenaveli Anicut (Under Proposai)	South Vellar	1	21.05.0
4.	Kilikudi Anicut	South Vellar	5	207.00.0
5.	Pinnankudi Anicut	South Vellar	3	267.15.0
6.	Visalur Anicut	South Vellar	3	363.44.0
7.	Keemanur Anicut	South Vellar	2	117.63.0
8.	Sundarapathi Anicut	South Vellar	8	307.27.0
9.	Sendamangalm Anicut	South Vellar	2	800.30.0
10.	Holdworth Anicut	South Vellar	22	1556.01.5
11.	Sethukanmai Anicut	South Vellar	10	626.10.0
12.	Kothamangalam Anicut (Under Proposal)	South Vellar	1	100.03.05
13.	Narpavalakudi Anicut	South Vellar	11	855.49.0
14.	Aiapiranthan Anicut (Under Proposal)	South Vellar	1	155.77.5
15.	Panchathi Anicut	South Vellar	23	735.92.0
16.	Veeramangalam Anicut	South Vellar	14	704.17.5
17.	Avudayarkovil Anicut	South Vellar	13	1455.27.0
18.	KarunakaduAnicut	South Vellar	13	802.77.0
19.	Manalur Aniecut	South Vellar	11	777.69.0
20.	Keeranur Anicut	South Vellar	10	816.72.0
21.	Thandalai Anicut	South Vellar	4	441.67.0
22.	Mumbalai Anicut (Under Proposal)	South Vellar	2	139.14.5
a	Sudayampatti Anicut	Nerunjikudiyar	-	48.56.0
*	Karaikannai	Nerunjikudiyar	1	178.42.
b	Athani Anicut	Nerunjikudiyar	2	170.94.0
c	Nerunjikudi Anicut	Nerunjikudiyar	6	299.96.0
d	Gudalur Anicut	Nerunjikudiyar	1	145.10.0
			C/O 174	12609.43.5

Sl.No	Name of Anicut/Tank	Source	No.of. Tanks Benefitted	Ayacut in Ha
			B/F 174	12609.43.5
e	Rarapuram Anicut	Nerunjikudiyar	1	84.22.0
f	Kummangudi Anicut	Nerunjikudiyar	1	46.36.0
I	Chandramath Anicut	Gundar	2	101.31.5
II	PitchanAnicut	Gundar	6	151.73.5
(1)	Head Regular	Narasinga Cauvery	--	--
(2)	Bed Dam 1	Narasinga Cauvery	1	10.04.0
(3)	Bed Dam 2	Narasinga Cauvery	1	7.09.0
(4)	Bed Dam 3	Narasinga Cauvery	3	61.95.0
(5)	Bed Dam 4	Narasinga Cauvery	3	118.86.5
(6)	Bed Dam 5	Narasinga Cauvery	3	75.13.0
(7)	Bed Dam 6	Narasinga Cauvery	3	39.12.0
(8)	Bed Dam 7	Narasinga Cauvery	1	32.20.5
(9)	Bed Dam 8	Narasinga Cauvery	2	57.08.0
(10)	Bed Dam 9	Narasinga Cauvery	3	71.59.0
(11)	Bed Dam 10	Narasinga Cauvery	3	129.02.5
(12)	Bed Dam 11	Narasinga Cauvery	3	63.81.0
(13)	Bed Dam 12	Narasinga Cauvery	1	18.37.0
(14)	Bed Dam 13	Narasinga Cauvery	2	93.72.0
(15)	Bed Dam 14	Narasinga Cauvery	2	89.35.0
(16)	Bed Dam 15	Narasinga Cauvery	2	114.66.0
(17)	Bed Dam 16	Narasinga Cauvery	1	32.66.0
(18)	Bed Dam 17	Narasinga Cauvery	2	100.97.0
(19)	Kalakkamangalam Anicut	Narasinga Cauvery	3	116.41.0
(20)	Enathy Anicut	Narasinga Cauvery	1	127.95.0
		Total	224	14353.06.0
	Rainfed Tanks		92	6726.12.0
		Grand Total	316	21079.18.0

HYDRO METEOROLOGICAL CHARACTERISTICS

The cultivated area under the Basin is being served with the Surface Irrigation and the other area with Irrigation through Wells and the remaining as Rainfed. Rain fall is the main input for the Agriculture. Rainfall is received during the two monsoons called South West monsoon and North East monsoon. High intensity of rain fall during the monsoon periods sometimes brings heavy floods in the River and causes damages to the crops and loss of lives, affecting the economy of the area. 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 Hydro Meteorological features are essential for Water Resources Analysis. The basic factors which influence Agriculture are Climatological features such as Rain fall, Temperature, Humidity Wind Speed, Sun Shine and Evaporation.

The study now made on Hydro Meteorological characteristics of the South Vellar River Sub Basin includes Analysis of Rain fall, Temperature, Humidity, Wind Speed Sun Shine and Evaporation.

The study of the Rainfall Pattern, its distribution in Time and Space and its variability and probability of occurrence is highly useful for Water Resources Planning and Management.

RAIN FALL AND DEPENDABLE RAIN FALL

There are 14 Non recording Rain Gauge Stations having long term record in the Main Basin. The annual average rain fall is 957 mm.

The Sub Basin wise 50% and 75% dependable rainfall is furnished below.

Name of Sub Basin	Rain fall dependability - Units in mm					
	50%			75 %		
	S.W.	N.E	Annual	S.W	N.E	Annual
South Vellar Sub Basin	400.76	335.70	879.83	279.85	257.90	634.56

CLIMATE

The Climatological features of the Basin have been studied from the data available at Kurungulam Weather Station, being maintained by Ground Water wing of P.W.D.

The Climatological features are tabulated below.

Sl.No	Average Climatological factors	S.W Monsoon	N.E Monsoon	Winter	Summer
1.	Monthly Temperature in Celsius max/min.	31.8/29.9	28.3/25.4	27.4/25.7	32.4/29.3
2.	Temperature in Celsius	30.8	26.7	26.5	31.20
3.	Relative Humidity in %	72.5	80.3	78.2	73.3
4.	Wind Speed in Kmph	9.8	4.57	4.1	5.2
5.	Sun Shine hrs/day	6.0	5.6	8.76	8.57

AGRICULTURE

Paddy is the major crop.

Other crops are

- Pulses
- Groundnut
- Maize
- Sugarcane
- Vegetables

Total Registered Ayacut - 21079.18.0 Ha

Fully Irrigated Ayacut - 11098.18.0 Ha

Partially Irrigated Ayacut - 5975.95.0 Ha

Gap - 4005.05.0 Ha

SOUTH VELLAR SUB BASIN CROPPING PATTERN

SL .No	Name of the Crop	Season	WITH OUT PROJECT				WITH PROJECT			
			F1	P1	RF	TOTAL	F1	P1	RF	TOTAL
1	ANNUAL CROPS									
	Surarcane		610	0	0	610	650	0	0	650
	Fodder		0	0	0	0	100	0	0	100
	TOTAL		610	0	0	610	750	0	0	750
2.	PERENNIAL CROPS									
	Coconut		25	0	0	25	175	0	0	175
	Patcholi		0	0	0	0	25	0	0	25
	Amla		0	0	0	0	30	0	0	30
	Sapota		0	0	0	0	30	0	0	30
	Casurina		0	0	0	0	60	0	0	60
	TOTAL		25	0	0	25	320	0	0	320
3	Ist Season									
	Paddy	Sep – Jan	10463	5826	0	16289	12833	0	0	12833
	Pulses	Sep – Nov	0	0	1370	1370	2500	0	0	2500
	Groundnut	Sep- Dec	0	0	1805	1805	2040	0	0	2040
	Cholam	Sep – Dec	0	0	500	500	0	0	0	0
	Cumbu	Sep – Dec	0	0	300	300	0	0	0	0
	Maize	Sep- Dec	0	0	0	0	2266	0	0	2266
	Bhendi	Sep – Jan	0	90	0	90	200	0	0	200
	Brinjal	Sep – Jan	0	60	0	60	70	0	0	70
	Chillies	Sep - Jan	0	0	30	30	100	0	0	100
	Total		10463	5976	4005	20444	2009	0	0	2009
	Grand Total		11098	5976	4005	21079	21079	0	0	21079

4	<u>SECOND SEASON</u>									
	Paddy	Jan – May	2350	0	0	2350	2820	0	0	2820
	Pulses	Jan – May	248	0	0	248	500	0	0	500
	Groundnut	Jan – May	300	0	0	300	420	0	0	420
	Maize	Jan - May	200	0	0	200	280	0	0	280
	<u>TOTAL</u>		3098	0	0	3098	4020	0	0	4020
	<u>GREAT GRAND TOTAL</u>		14196	5976	4005	24177	25099	0	0	25099
	<u>CROPPING INTENSITY</u>	%	127.91	100.00	100.0	114.70	176.8	0.0	0.0	119.07
	<u>GROWTH RATE</u>									4.63%

SOUTH VELLAR SUB BASIN CROPPING PATTERN (WITHOUT PROJECT)

<u>SL. NO</u>	<u>NAME OF THE CROP AND SEASONS</u>	<u>JAN.</u>	<u>FEB.</u>	<u>MAR.</u>	<u>APR.</u>	<u>MAY.</u>	<u>JUNE</u>	<u>JULY</u>	<u>AUG.</u>	<u>SEP.</u>	<u>OCT.</u>	<u>NOV.</u>	<u>DEC.</u>
1	Sugar Cane (Jan - Dec)	(610 FI)											
2	Coconut (Jan - Dec.)	(25 FI)											
3	Paddy - I (sep- Jan)									(10463 FI & 5826 PI)			
4	Paddy -II (Jan - May)	(2,350 FI)											
5	Pulses - I(Sep - Nov.)									(1,370 RF)			
6	Pulses - I(Jan - Mar)	(248 FI)											
7	Ground Nut (Sep - Dec)									(1,805 RF)			
8	GroundNut(Jan - May)	(320 FI)											
9	Cholam (Sep - Dec)									(500 RF)			
10	Kambu (sep - Dec)									(300 RF)			
11	Maize (Jan - May)	(200 FI)											

12	Bhendi (Sep - Jan)										(90 PI)	
13	Brinjal (Sep - Jan)										(60 PI)	
14	Chillies (Sep - Jan)										(30 RF)	

<u>SL. NO</u>	<u>NAME OF THE CROP AND SEASONS</u>	<u>JAN.</u>	<u>FEB.</u>	<u>MAR.</u>	<u>APR.</u>	<u>MAY.</u>	<u>JUNE</u>	<u>JULY</u>	<u>AUG.</u>	<u>SEP.</u>	<u>OCT.</u>	<u>NOV.</u>	<u>DEC.</u>
1	Sugar Cane (Jan - Dec)	(650 FI)											
2	Fodder (Jan - Dec.)	(100 FI)											
3	Coconut (Jan - Dec.)	(175 FI)											
4	Patcholi (Jan - Dec)	(25 FI)											
5	Amla (Jan - Dec)	(30 FI)											
6	Sappotta (Jan - Dec)	(30 FI)											
7	Casurina(Jan - Dec)	(60 FI)											
8	Paddy - 1 (Sep-Jan)										(12833 FI)		
9	Paddy - 2(Jan-May)	(2,820 FI)											
10	Pulses (Sep-Nov)										(2,500 FI)		
11	Pulses (Jan-May)	(500 FI)											
12	Ground Nut(Sep.Dec)										(2,040 FI)		
13	Ground Nut(Jan - May)	(420 FI)											
14	Maize (Sep-Dec)										(2,266 FI)		
15	Maize (Jan-May)	(280 FI)											

**WATER POTENTIAL IN THE SUB BASIN
SURFACE WATER.**

South Vellar Sub Basin is having 46 Anicuts and 316 Nos of P.W.D. Tanks and 2086 Nos of Panchayat Union tanks . There is no Reservoir in the Sub Basin. The approximate Storage Capacity of the Tanks is 267.13 Mcm.

SURFACE WATER POTENTIAL

The Basin Area of the Sub Basin is 2010 Sq Km.

The 75% Annual Rain fall of the Sub Basin is 634.56 mm.

(SW 279.85mm and NE 257.90mm)

Total Surface Water Potential for 75% probability for South Vellar

River Sub Basin is Given below:

South West Monsoon Surface Water Potential -84.37 Mcm

North East Monsoon Surface Water Potential -77.76 Mcm

Annual Surface Water Potential -191.45 Mcm

GROUND WATER POTENTIAL

The Annual Ground Water Potential of this Sub Basin is 404.99 Mcm.

TOTAL WATER POTENTIAL

Surface Water Potential	-	191.45 Mcm
Ground Water Potential	-	404.99 Mcm
Total Water Potential	-	596.44 Mcm

WATER DEMAND (Without Project)

Sl.No	Description	Water Demand in Mcm
1.	Irrigation Water Demand	640.27
2.	Drinking	13.85
3.	Live Stock	6.52
4.	Industries Small, Medium & Major	13.54
<u>Total Demand</u>		674.18

WATER BALANCE (Without Project)

Total Water Potential	-	596.44 Mcm
Total Water Demand	-	674.18 Mcm
Deficit	-	77.74 Mcm

WATER DEMAND (With Project)

Sl.No	Description	Water Demand in Mcm
1.	Irrigation Water Demand	561.54
2.	Drinking	13.85
3.	Live Stock	6.52
4.	Industries Small, Medium & Major	13.54
<u>Total Demand</u>		595.45

WATER BALANCE (With Project)

Total Water Potential	-	596.44 Mcm
Total Water Demand	-	595.45 Mcm
Surplus	-	0.99 Mcm

CHAPTER – II

SCOPE OF THE PROJECT

PRESENT STATUS OF THE SYSTEM

GENERAL

The deficiencies in the structure and functions of Irrigation network causes the inefficient functioning of the system and creates hardship to the farming community.

SYSTEM DEFICIENCIES

As Irrigation network is age old, the existing Conveyance Distribution system are functioning with less efficiency. Almost all the Tanks and Supply Channel are silted up. Sluices and Weirs are in dilapidated condition. Most of the Anicut constructed long back are in damaged condition.

Due to outdated old traditional method of Irrigation practices, the water use efficiency is also minimum.

The income of the Farmers is mainly from Agricultural Outputs and thereby living standards of the Farmers and their dependants are not enriched.

Due to inadequate facilities of transporting , storing and marketing the hard work of farmers are not rewarded. This in turn reflects in the growth of the Nation.

SCOPE OF THE PROJECT :

The Irrigation of this Basin fully dependent on Non System Tanks and Rainfed Tanks. The Water Resources Organization will modernize the Irrigation specialty and expect to harness the fullest benefits from the available Water Potential.

The Water Resources Organization with the following Line Departments is proposed to take up the Irrigated Agriculture Modernization and Water Resources Management Project (IAMWARM) for South Vellar River Sub Basin.

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

The entire project is formulated with the Multi Disciplinary Approach and meant to develop the Basin Comm and Area in complete sense. The overall efficiency of the System and the Socio Economic Status of the People are expected to increase on implementation of this Project.



PROJECT PROPOSAL

SOUTH VELLAR SUB BASIN - PROJECT PROPOSAL

WATER RESOURCES ORGANISATION (PWD)

Based on the Micro Level Studies conducted by the I.W.S, Chennai, it is evident that there is no scope for further harnessing Water Resources in this Basin, System Improvements to increase efficiency and a dopting Crop Pattern is the only way to improve the situation in this Basin. The main focus of this project is the optimal use of available Water Potential by improving and modernizing the Irrigation, Agricultural and allied activities.

In the process of Modernization the following works are likely to be taken up by Water Resources Organization with an Outlay of Rs. 6328.50 Lakhs.

1. Rehabilitation and Modernization of Irrigation tanks such as Sluice reconstruction, Weir reconstruction, Strengthening the Tank bund etc.
2. Construction and Reconstruction of Anicuts.
3. Improvements to Supply Channels
4. Selective Lining of field channels
5. Strengthening the River Banks
6. Enlargement of Surplus Course.
7. Construction of Open Wells
8. Providing Medium Tube Wells.

The Project of Rehabilitation of the Components of Works under WRO has been divided into 8 Packages and the Packagewise Abstract and The Componentwise Abstract are given below: -

PACKAGEWISE ABSTRACT -- WRO

Sl.No.	Package No.	Name of Work	Estimate Amount Rs. In Lakhs
1	Package I	Rehabilitation of Irrigation Infrastructure in South Vellar River from Pannai Periyakulam Anicut and its Group of Tanks to Nellikulam Anicut and its Group of Tanks in Trichy District	222.00
2	Package II	Rehabilitation of Irrigation Infrastructure in South Vellar River from Kilikudi Anicut and its Group of Tanks to Sundarappatti Anicut and its Group of Tanks in Pudukkottai District.	1034.00
3	Package III	Rehabilitation of Irrigation Infrastructure in Nerunjikudi River from Sadayampatti Anicut and its Group of Tanks to Kummarkudi Anicut and its Group of Tanks Senthaman-galam Anicut and its Group of Tanks in South Vellar River and from Chandramathi Anicut and its Group of Tanks to Pitchen Anicut and its Group of Tanks in Gundar River in Pudukkottai District.	1089.00
4	Package IV	Rehabilitation of Irrigation Infrastructures in South Vellar River from Holdworth Anicut and its group of tanks to Narpavalakudi Anicut and its group of Tanks in Pudukkottai District.	976.00
5	Package V	Rehabilitation of Irrigation Infrastructures in Narasinga Cauvery River System and its group of tanks to Panchachi Anicut and its Group of Tanks in South Vellar River in Pudukkottai District.	1043.00
6	Package VI	Rehabilitation of Irrigation Infrastructures in South Vellar River from Veeramangalam Anicut and its group of Tanks to Karunkadu Anicut and its Group of Tanks in Pudukkottai District.	886.00
7	Package VII	Rehabilitation of Irrigation infrastructures in South Vellar River from Manalur Anicut and its group of Tanks to Thandalai Anicut and its Group of Tanks in Pudukkottai District.	816.00
8	Package VIII	Providing Dugwells 10 Nos Medium tube wells 35 Nos with installing pumpsets and Construction of Pump Rooms arrangements in South Vellar Sub Basin in Pudukkottai District.	262.50
		Total	6328.50

COMPONENT WISE ABSTRACT -- WRO

SI.NO	Description	Quantity	Amount in Lakhs
I	Anicuts		
a	Construction of Anicuts(at existing offtakes)	2 Nos	54.00
b	Repairs to Anicuts	45 Nos	673.09
c	Construction of Groyne wall in anicut system	1 Nos	34.32
d	Protection walls at vulnerable points	3750 m	340.89
e	Strengthening of River Banks	89.50 km	418.61
II	PWD Tanks		
a	Repairs to Surplus Weir	88 Nos	82.34
b	Reconstruction of Surplus Weir	59 Nos	229.45
c	Repairs to Sluice	258 Nos	149.70
d	Reconstruction of Sluice	437 Nos	469.97
e	Rehabilitation of Supply Channels from Tank	328.18 km	292.98
f	Selective Lining of Field Channels from Tank	52.18 km	810.37
g	Standardisation of Tank bund	502.05 km	2113.84
III	Recharge Structures		
a	New Dug Wells	10 Nos	54.88
b	Medium Tube Wells & Pump Rooms	35 Nos	147.94
IV	Institutional Strengthening	7 Nos	28.21
V	Others	L.S	427.91
	TOTAL		6328.50

AGRICULTURAL ENGINEERING DEPARTMENT will carry out the following works for extending the benefits of Irrigation facility to the Farmers with an Outlay of Rs. 605.34 Lakhs.

1. Micro Irrigation

a. Drip Irrigation with Fertigation in the ayacut area of Sugarcane,

Fruit Crops & Coconut etc

b. Sprinkler Irrigation in the ayacut area of Vegetables & Groundnut etc

2. Farm Mechanisation with advanced User friendly implements

Such as Distribution of Power Weeder, Distribution of Groundnut & Maize seed drill, , Groundnut Harvester & Maize Husker cum Sheller to Water User Association.

3. Construction of Farm Ponds.

AGRICULTURE DEPARTMENT has proposed to take up the following works with an investment of Rs. 399.20 Lakhs.

PADDY

1. 10 Ha. Technology Demonstration

2. Distribution of Bio fertilizer and M.N. Mixtures. Gypsum, Seed drum, Hand Operated Sprayers and Tharpaulin.

3. Village Campaign.

PULSES , GROUND NUT & MAIZE

Compact Block Demonstration

AGRICULTURE MARKETING AND AGRI BUSINESS DEPARTMENT.

The SubBasin is having an area of 21079Ha as registered ayacut in which 11098Ha is under fully irrigated and 5976Ha under partially irrigated condition. The Cropping Pattern is dominated by crops like Paddy, Sugar Cane, Groundnut and Pulses. After Rehabilitation of Irrigation Structures, the fully irrigated and partially irrigated areas will increase and in the revised Cropping Pattern, Vegetable Crop will increase, Value Addition and Marketing Support for these activities will be given the following activities to promote Value Addition and Marketing with an investment of Rs. 78.00 Lakhs will be taken up under this Project.

1. Construction of Rural Godowns.
2. Construction of Thrashing /Drying Yard
3. Supply of Plastic Tharpaulins
4. Supply of Weighing machines
5. Formation of 5kilos centres

ANIMAL HUSBANDRY DEPARTMENT is planning to take up the following activities for enhancement of the benefits with an investment of Rs. 66.23 Lakhs under this Project.

1. Productivity Enhancement by improving delivery of Veterinary Services such as
 - a. Establishment of Sub Basin Veterinary Units.
 - b. Improving the Infrastructure in the Government Institution.
 - c. Providing Special Diagnostic Tools to Sub Basin Referral Institutions.

2. Increasing availability of Green Fodder in Private Lands.
3. Outreach Programmes such as
 - a. Infertility cum Total Veterinary Health Care Camps.
 - b. Distribution of Mineral Mixtures.
 - c. Information, Education and Communication Campaigns.
4. Enhancing the Knowledge level of Human Resource such as
 - a. Training of Farmers.
 - b. Entrepreneurship Training to Unemployed Veterinary Graduates.
 - c. Orientation Training for Sub Basin Veterinary Extension Officers.
 - d. In-Service Training for Veterinarians.

TAMILNADU AGRICULTURAL UNIVERSITY has proposed the following activities with an Outlay of Rs 252.110 Lakhs under this Project.

1. Project Mode Activities such as
Technology Transformation- Improved Crop Production Technology for Maize & Groundnut.- Model Village Concept- Soil Testing- Onfarm Demonstration & Skill Development.
2. Mission Mode –I –Sugarcane fertigation (200ha.)
3. Mission Mode –II –Pulses (500ha.) etc...
4. System of Rice Intensification- 300 ha

HORTICULTURE DEPARTMENT is planning to take up the following activities under this Project with an investment of Rs. 154.03 Lakhs.

1. New area coverage for Vegetables , Fruits, Medicinal Plants and Tree Crops.
2. Human Resources Management (Tip, Computer etc)

FISHERIES DEPARTMENT has proposed the following activities with an Outlay of Rs. 43.77 Lakhs under this Project.

1. Fish Seed Bank
2. Aquaculture in Farm Ponds.
3. Supply of Fishing Implements such as Drag net.
4. Fish Seed Rearing etc.

FOREST DEPARTMENT has proposed to take up the following works with an investment of Rs. 10.50 Lakhs under this Project.

1. Raising Jatropha Curcas Species Nursery for distribution to Ayacutars..
2. Raising EUC Hybrid Nursery for distribution to Ayacutars.
3. Raising miscellaneous Seedlings for distribution to Ayacutars.
4. Raising Teak Nursery and Planting in the Supply Channel.

ENVIRONMENTAL CELL has proposed to take up the following works with an outlay of Rs. 30.00 lakhs under this Project.

1. Periodical Water samples & Soil Samples collection, Preparation, testing and analysis and other Environmental & Social Parameter data collection.
2. Conducting Environmental & Social awareness meeting, Training & Workshop for conserving the natural resources and environment.
3. Implementing Environmental Projects such as Water Conservation, Prevention of Water Pollution, Solid waste Management, Eradication of Water weeds in Water spread Area by Bio- Remediation methods etc.,

SOUTH VELLAR SUB BASIN

GENERAL ABSTRACT

SL.NO	DEPARTMENTS	AMOUNT (Lakhs)
1	Public Works Department / Water Resources Organisation	6328.50
2	Agricultural Engineering	605.34
3	Agriculture Department	399.20
4	Agriculture Marketing & Agri Business	78.00
5	Animal Husbandry	66.23
6	TamilNadu Agricultural University	252.11
7	Horticulture Department	154.03
8	Fisheries Department	43.77
9	Forest Department	10.50
10	Environmental Cell Division	30.00
	Total Cost	7967.68



AGRICULTURAL ENGINEERING DEPARTMENT

**IRRIGATED AGRICULTURE MODERNISATION AND
WATER RESOURCES MANAGEMENT PROJECT
(IAMWARM PROJECT)
IN SOUTH VELLAR SUB-BASIN OF AGNIAR BASIN**

DETAILED PROJECT REPORT

**PREPARED BY:
EXECUTIVE ENGINEER (AGRL.ENGG.),
PUDUKOTTAI**

AGRICULTURAL ENGINEERING DEPARTMENT

DETAILED PROJECT REPORT ON IAMWARM PROJECT IN SOUTH VELLAR SUB-BASIN IN TRICHY AND PUDUKOTTAI DISTRICTS

1. Profiles of South Vellar Sub-Basin:

Agriculture is the dominant section in the Indian economy. Tamil Nadu, which is supposed to be the next state to Rajasthan in poor ground water, depends largely on the surface water irrigation as well as ground water irrigation. The state has used the surface and ground water potentials to the maximum limit and hence the future development and expansion depends only on the efficient and economical use of water potential and resources.

To achieve the water use efficiency it is necessary to improve and upgrade the existing conveyance system and also to introduce modern irrigation methods. With the above objective a comprehensive programme has been proposed with Multi disciplinary approach.

1.1. Description of the South Vellar Sub Basin

The river South Vellar originates in Tiruchirappalli District from the Kumarikatti reserved forest area near Majinampatti village , 20 Km. North west of Thuvankurichi in Manapparai Taluk of Tiruchirappalli District. The origin of the river at a longitude of 78°20' E and latitude of 10°26' N. The Total length of South Vellar river from its origin to its confluence with sea near Manamalkudi of Manamalkudi Taluk in Pudukkottai District covering a length of nearly **140Km.**

The first order of stream initially enters into Pannai Periyakulam and the Surplus of the tank crosses Manapparai - Thuvankurichi road near Karumalai village and gets into Karumalai Periyakulam. The Surplus of Karumalai Periyakulam traverse towards South and Crosses Tiruchirappalli – Thuvankurichi - Madurai Main road near Chockanathampatti runs and falls into Valanadu big tank of Valanadu village of Manapparai Taluk. The surplus of Valanadu Tank goes to Minaveli big tank of Minaveli Village. Again the surplus of Minaveli Big tank goes to vembanur big tank. Below Vembanur Tank South Vellar flows in the South Eastern direction in the form of river and falls into the sea. The length of South Vellar river in the upper South Vellar basin is 91.40 km. (that is from origin to Narpavalakkudi Anicut) through Pudukkottai District. The lower South Vellar river runs (91.40 - 140 km.) 48.6 km. and confluence into sea.

The tributaries like – Nerunjikudar and Gundar, join with South Vellar and the total area of basin is 1931.51 Sq.km.

II. BASIN CHARACTERISTICS

CLIMATE:

Mostly hot weather prevails in the project area. The atmospheric temperature recorded over a period of 70 years (1927-1996) was computed. The mean maximum temperature ranging from 38.2°C to 40.4°C during March to September and cool months being December to February.

RAINFALL:

Rainfall data for the period from 1994 to 2005 is available. The rainfall during the North East monsoon is the highest (i.e, 50%) while the rainfall during the south west monsoon is more than 30% of the Annual rainfall. Rainfall during the winter season is the minimum. The rainfall particulars from 1994 - 2005 are enclosed in the annexure.

Season	Normal Rainfall
1. Winter	50.60mm
2. Summer	119.20mm
3. South West	346.40mm
4. North East	403.20mm
Yearly total	919.40mm

PHYSIOGRAPHY

Pudukkottai district is almost plain land with residual hills in the northern and eastern parts. The land is slightly undulating particularly in the Ponnamaravathi area.

In the Ponnamaravaihi block area of the project laterite and inland plain land forms are noticed. In the avudayar koil and manamelkudi block area riverine land form is noticed except in the tail end of the basin where marine land form is noticed. In the middle reach of the basin laterite land form is noticed.

GEOLOGY:

In the Illuppur and Thirumayam taluk area of the south vellar basin unclassified gnessis, Granites and syenites are found. In the Alangudi, Aranthangi taluk area cuddalore sand stone and warkali beds are seen. Coastal alluvium along the eastern coast and river alluvium along the sides of vellar are found.

AYACUT DETAILS:

Name of River	Name of Anicuts	Noof Open Off takes	Noof Tanks benefited	Ayacut Ha
Non – System				
South Vellar River	18	4	164	11766.45.5
Nerunjikudi River	6	-	12	973.56.0
Gundar River	2	-	8	253.05.0
Narasinga cauvery	20	-	40	1359.99.5
Sub Total	46 Nos	4 Nos	224 Nos	14353.06.0
Rain fed tanks	-	-	92 Nos	6726.12.0
TOTAL	46 Nos	4 Nos	316 Nos	21079.18.0

Water Users Association – Details

Total Command Area	: 21079 Ha
Number of WUAs Existing	: 9 Nos.
Number of WUAs Proposed	: 190 Nos

1.1. Hydrology

- **Total Sub Basin area** : 1931.51 Sq.Km
- **Districts covered** : Trichy, Pudukottai
- **Taluks** : Manaparai, Illuppur, Pudukottai, Alangudi, Thirumayam, Aranthangi, Avudiyarkoil, Manamelkudi
- **Blocks** : Marungapuri, Viralimalai, Annavasal, Pudukottai, Thiruvarankulam, Arimalam, Ponamaravathi, Thirumayam,, Aranthangi, Avudiyarkoil, Manamelkudi

1.2. Irrigation season:

- **Season I** : **September 15th to February 15th**
- **Season II** : **February 15th to June 15th**
- **Season III** : **June 15th to September 15th**

1.3. Existing Ayacut Scenario:

Total Registered Ayacut in Ha	:	21079
Total Irrigated Area in Ha	:	17074
Fully Irrigated	:	11098
Partially Irrigated	:	5976
Average cultivation	:	17074
Gap	:	4005

2. EXISTING FARM PRACTICES

SOIL TYPES AND DETAILS:

The soils in the South Vellar river basin area have been classified into various soil series as described below.

Vayalogam Soil series (Vyg)

This consists of moderately deep, medium textured, acidic brown soils. They are non-calcareous in nature derived from laterite parent material. They are sandy clay barns, acidic and well drained This soil series occurs in the 50% of the Basin area.

Illuppur Soil series (IIP)

This is extremely deep, brownish yellow, mildly alkaline and calcareous soil derived from laterite gneissic rock. They are fine sandy barns, mixed and poorly drained.

Pattukkottai Soil Series (Pkt)

It comprises extremely deep, yellowish, brown, acidic to neutral, Sandy Loams occupying the upper portion of the Catenary sequence. They are fine loamy and well drained.

Madukkur Soil Series (Mdk)

This group consists of very deep, brown neutral soils with conspicuously reduced mottles in the sub-soil. They are sandy barns, mixed and moderate to poorly drained.

Avudaiyarkoil series: (Avk)

It comprises very deep, medium textured yellowish brown soils developed from laterite parent material. Lime concretions are very common in this soils and the soils are mildly alkaline. This soil series occurs 30% of the basin area.

Valuthakkudi Soil series

This series comprises very deep dark yellowish brown light textured soils formed by the tidal deposits. It is fine sandy, hyper thermic, very deep and excessively drained.

PERMEABILITY:

Permeability of soil is slow wherever Avudayarkoil, kavi nad and Alathur series soil are prevalent. Permeability of soil is moderately rapid where Ibbupur and Visalur series of soils are noticed. Permeability of soil is rapid wherever vayalogam series soil is noticed. Vayalogam series soil is the leading soil type covering more area in the riverbasin whereas Avudayarkoil series soil is the second major soil series in the river basin.

WATER HOLDING CAPACITY:

The water holding capacity of the soil is very low i.e. 0-20% in the tail end of the river basin where Valuthakkudi series soil is found waterholding capacity of the soil is (21-50%) i.e., medium range wherever Vayalogam, Iluppur, Kavinad, Alathur and Mangalathupatti series soils are found. The waterholding capacity of the soil is high that is more than 50% in Avudayarkoil area where Avudayarkoil series soil is present.

SOIL DEPTH:

The effective soil depth in the Iluppur and Thirumayam taluks is 25 -50cm. In the Pudukkottai, Alangudi, Aranthangi and avudayarkoil taluk area the effective soil depth is more than 100cm.

SOIL EROSION:

Slight or no erosion is noticed wherever Avudayarkoil, Illupur, Visalur, Kavinad and Alathur series soil is present. In the lower vellar basin mostly Avudayarkoil series soil is noticed, other series soils are in the upper vellar region. Severe soil erosion is noticed in the basin area wherever Vayalogam and Mangalathupatti series soils are present.

PRODUCTIVITY OF SOIL:

2. The productivity of soil is average wherever Pattukkottai, Mathukkur, Kavinad and Perungalur series soils are found. In the Avudayarkoil and Manamelkudi taluk area where Avudayarkoil series soil is present. The productivity of soil is poor.

LEVEL OF MECHANIZATION:

The fragmented land holdings in the south vellar sub basin area is a major constraint for mechanization. The agricultural operations starting from seedbed preparation to the harvesting and post harvesting operations are done mainly with Manpower. By forming WUA mechanization can be facilitated to the entire stretch by Training and Demonstration.

LABOUR:

Availability of agricultural labours for carrying out agricultural operations during the paddy harvest season is inadequate and not upto the requirement. The farmers in the Aranthangi, Avudayarkoil and Manamelkudi area engage labours of neighbouring villages and other villages of the districts for labours from other villages of the districts for planting, harvesting and post harvesting and planting operations. Sometimes labours from neighbouring district are also engaged. The availability and utility of family labours for doing agricultural operation is minimum and family labour is sufficient only to supervise the agricultural operations. The farmers mostly engage hired labours by giving wages either by cash or kind.

PREPARATORY CULTIVATION:

Initial Ploughing in the preparatory cultivation is done with tractors or country Melur ploughs. After the initial ploughing, paddling operation is mostly done with country ploughs. In the Aranthangi, Avudayarkoil and Manamelkudi taluk wetland area, tractor is widely used compared with other area of the basin where tractors are

used only to a lesser extent.

As far as the inter cultivation operations concerned mechanization is very poor. In the sub basin area as far as the spraying of plant protection liquids is concerned, Knapsack, Sprayers, are widely used. Plant protection powders are dusted manually in the sub basin area.

In the Avudayarkoll, Aranthangi and Manamelkudi taluks harvesting of paddy is done using harvesters while in the other area of the basin harvesting is done with harvesters only to a lesser extent. Mostly private machineries are used in the ploughing, plant protection and harvesting operations because of meagre availability of government machineries compared to the requirements. In the recent years purchase of tractors by farmers for use in agricultural operation has increased considerably. Financial assistance by the Nationalised Banks have encouraged the Farmers to go for easy purchase of Tractors.

FERTIGATION

Fertigations for almost all the crops are done only manually.

TRANSPORT

The transport of harvested produce is done - by either bullock carts or by tractors. The manual transport of farm produce is minimised.

CONSTRAINTS OF THE EXISTING SCENARIO

The farmers in the sub basin area almost adopt flooded bed surface irrigation method for all the crops except for sugarcane where flooded furrow irrigation method is adopted.

In the traditional surface irrigation method, the irrigation efficiency is only 30 - 50%. The reason for this low efficiency is that the irrigation water is lost much during conveyance and by way of deep percolation and seepage besides evaporation losses. More labour is required for applying water in the above method of irrigation.

In the sub basin there are so many rain fed tanks but there are not sufficient enough rainwater harvesting structures. The ground water also has been tapped to the maximum extent. The excess irrigation -water should be saved and excess run off from rain water should be harvested to supplement the tank water irrigation for crops.

DIVERSIFICATION:

After the implementation of the IAM WARM project, water saved by adopting drip and sprinkler irrigation methods and will be useful for irrigating more area by less water consuming crops like groundnut, pulses and vegetables. Paddy is a more water consuming crop compared to groundnut pulses and vegetables. If the farmers cultivate alternative crops in place of paddy with the same quantity of irrigation water, more area could be cultivated there by producing more quantity of produce which in turn give more remuneration to the farmers.

The excess run off from the rain water is saved and stored in the small farm ponds. The harvested water could be utilized for supplementary irrigation for the crops in the critical periods to save loss of crops due to deficiency of tank irrigation water - In the farm Ponds fishes can also be grown to improve the income of the farmers. In the porous soils the water harvested in farm ponds will recharge the ground water.

CHALLENGES PROVEN UP BY DIVERSIFICATION AREA EXPANSION

In order to bridge the gap area in the tank irrigated Ayacut. Water saving technologies like drip and sprinkler systems are adopted then the required quantity of irrigation water could be applied in the right place in right time and in right quantity to the crops. Sprinkler irrigation is suitable for closely spaced crops like groundnut and vegetables and drip irrigation is suitable for all widely row crops. In the cultivation of sugarcane by adopting drip method not less than half of the irrigation water is saved there by increasing cultivated area and bridging the gap area. The yield of sugarcane is also doubled because of the frequent application of controlled stream of water there by avoiding water stress for the crops.

To overcome the labour crisis during the harvest of crops like groundnut in the post project scenario a package of implements could be issued to the water user association in the groundnut cultivated area, there by the labour crisis could be overcome with the help of labour saving implements in the agricultural operations.

SOLUTIONS AND RECOMMENDATIONS:

Water user association should be formed in all the irrigated area and the water users should be trained and educated on alternative cropping pattern, to use water saving irrigation devices and how to increase the income by growing fishes in the farm ponds. The user should be educated on how to get vegetable required for their own consumption by growing vegetables in their own land besides selling them for remuneration.

In order to encourage farmers to switch over to cultivation of less water consuming crops like groundnut and vegetables, package of implements consisting of seed drill, groundnut harvester maize husker and power weeder could be issued to the water user associations depending upon the area cultivated in that associations Jurisdiction. The demonstration of all the implements should be arranged to popularize their usage in the groundnut and maize cultivated area.

CONSTRAINTS AND CHALLENGES:

At present farmers mostly cultivate paddy in the tank irrigated Ayacut area of the south vellar basin. Only a very few farmers go in for a second crop of groundnut or vegetables. By introducing water saving irrigation systems i.e., micro irrigation not only savings in water is achieved but increase in the production is also achieved. Thus introduction of water saving technologies help the farmers not only in overcoming water losses but also to increase the production of good quality of produce. Drip irrigation is proposed. for coconut, fruit trees, and sugarcane. The cost of drip irrigation system component is arrived by taking into consideration crops spacing, crop density, irrigation source and ground water availability. The cost of irrigation of sprinkler irrigation system would be Rs: 15,000/ Ha.

In the south vellar sub basin during the north east monsoon around 50% of the annual rainfall is received. The excess run off from the rain fall received during the season could be stored by formation of farm ponds of size 30m X 30m, with 1.5m depth. The water stored in the farm ponds could be utilized for the supplementary irrigation for crops during critical period as life irrigation for saving the crop from wilting. The stored water could also be used for irrigating vegetables grown on the bunds of the farm pond or even on the fields.

The farm ponds dug in the porous soils of the basin could be used for recharge ground water storage structures. If a layer of clay soil is laid in the bottom of the farm pond the pond could be used for rearing fish also. If the fish culture is to be adopted there should be a permanent water source for maintaining the water level in the farm pond. The cost of farm pond is arrived at Rs.40,000 /1 No. In one farm pond 1350 m³ of run off or drained water can be harvested in one filling. Assuming three fillings at average in a year, the total volume of 4050 m³ of water can be stored and utilized for irrigating for an average area of 5.4 Ha. under pulses or maize with an estimated grain production of 18.9 T to 35 T. This

would be generated in a year with the life saving irrigation from one farm pond.

A total of 40 Nos of farm ponds is proposed in the project. Out of this 30 sites having water source are suitable for promoting fish culture, By rearing fish in one farm pond Rs. 10000/ of additional net income can be generated in season / year. The farm ponds could be dug only to those farmers who come forward to install drip or sprinkler irrigation in their farm. This kind of strategy could be adopted only to encourage adoption of both schemes. met with a good.

MECHANISATION:

The mechanization of the sub basin area is to be improved. Then only timely sowing and harvesting could be done to avoid wastage of farm produce and to get maximum yield. It has been proposed to adopt alternate crops like groundnut instead of paddy to reduce water consumption and increase income of the farmers in the sub basin area. To encourage groundnut crop cultivation, implements like seed drill for groundnut and maize, power weeder, maize husker and sheller are to be issued to the groundnut cultivating water user associations in this project. The associations have to hire out the implements at a concessional rate and the amount is to be remitted to the water user's association fund.

2. 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 South Vellar sub-basin.

7.1. 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 (with project) and minimum of 54 % - maximum of 100% of the crop area in respect of Amala, Sappotta, Casurina, Coconut, sugar cane, vegetables, Chillies, Medicinal plants, and Groundnut 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 that 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 MIS will be implemented with 50% project investment from world bank and 50% assistance by GOI. The beneficiaries shall contribute 10% of the total cost of MIS and will be deposited as corpus fund for maintenance. TNAU has proposed MIS for 200Ha under adaptive research trial demo plots 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

**CROPWISE PROPOSED AREA FOR MICRO IRRIGATION SYSTEM IN
SOUTH VELLAR SUB BASIN UNDER IAMWARM PROJECT**

Ayacut Area 21079Ha

Sl. No.	Name of Crop	With 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	Amla	30	0	0	30	30	
2	Sappota	30	0	0	30	30	
3	Casuarina	60	0	0	60	50	
4	Fodder	100	0	0	100	0	
5	Coconut	175	0	0	175	150	
6	Sugarcane	650	0	200	450	350	
7	Paddy	12833	0	0	12833	0	
8	Vegetables	100	0	0	100	100	
9	Groundnut	2040	0	0	2040		1100
10	Vegetables	170	0	0	170		140
11	Chillies	100	0	0	100		80
12	Pulses	2500	0	0	2500		0
13	Maize	2266	0	0	2266		0
14	Medicinal plants	25	0	0	25		25
	Total	21079	0	0	21079	710	1345

a. Drip Irrigation System:

Drip irrigation systems with fertigation component are proposed over an area of 560 Ha for horticultural crops and for agricultural crops like Amala, Sappotta, coconut and sugarcane, and 50 Ha of casuarinas area is proposed for Drip irrigation method with out fertigation.

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 more than two 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 610 Ha which would be increased to 650 Ha in post project period. Out of this, 350 Ha are proposed under drip irrigation with fertigation. 86% of Coconut area to an extent of 150Ha. out of 175Ha. would be brought under drip irrigation with fertigation. Besides 100% of Amala and Sappotta area to an extent of 60 Ha out of 60 Ha would be brought under drip irrigation with fertigation.

a. Sprinkler Irrigation System:

Sprinkler irrigation system component is proposed for vegetables, chillies, medicinal plants and Groundnut to the extent of 1345 hectares for economic usage of irrigation water to attain the field capacity for effective growth of crops. The conveyance and application efficiency will be enhanced with the adoption of sprinkler irrigation system. The pests are also effectively controlled by the sprinkler irrigation in the case of vegetables, chillies and Groundnut.

7.2. 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 are noticed by farmers as reported by TNAU.

Out of 270Ha. proposed under Vegetables by Horticulture Department, 140 Ha has been proposed under Sprinkler Irrigation and 100 Ha is proposed under Precision Farming, which will be 100% funded from the project. The beneficiaries contribution shall be 10% of the total cost and deposited in corpus fund for maintenance of the Precision Farming Systems.

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

7.3. 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 be prescribed by the WUA. The collected hire charges will be utilized for maintenance mechanism .

. Power Weeders would be useful for irrigated dry crops and hence proposed. Seed Drills, for Groundnut, maize are proposed.

Due to this, the farm operations shall be effectively carried out by the farmers without excess dependence on labor force, since the urbanization and industrialization being occurred in South Vellar sub-basin areas.

The total farm implements and equipments will be procured and kept by the Department at the entry level of project period and will be hired out of use by the farmers till the formation and registration of water users association. The same implement will be handed over to the WUA after this registration by forming clusters group with proper written understanding and strategy for hiring will be worked out.

7.4. BURIED PVC PIPE LINES FOR WATER CONVEYANCE AND FOR SPRINKLER IRRIGATION:

Adopting new pattern of irrigation (conjunctive use of surface and ground water) as executed in Hanumanadhi sub-basin, 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.

The Public Works Department has proposed to sink 35 Bore wells in the selected tanks of the Basin. It has been decided to go for an alternative and efficient system of underground pipeline for irrigation in one of the proposed Bore well ie. Nambukuzhi Tank in Nambukuzhi village of Thiruvankulam Block.

As a demonstrative model, **Nambukuli Tank(50.06 Ha)** 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.

7.5 FARM PONDS:

The Farm Ponds are ideal water harvesting structures, proposed in tail end areas of the ayacut area. The excess run off in the ayacut area 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 30 Farm Ponds and Fish Culture would yield income of Rs.10,000/- per crop to the farmer. About 40nos. 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 estimate cost will be collected from the beneficiaries for the work component.

8.ABSTRACT OF WORK COMPONENTS PROPOSED:

The tankwise proposed work components South Vellar sub-basin is 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 (Ha.)	Fin. (Rs. in Lakhs)
1	MICRO IRRIGATION				
a)	Drip Irrigation with Fertigation				
1	Amla (6m x 6m)	Ha.	33200	30	9.96
2)	Sappato(8mx8m)	Ha.	22900	30	6.87
2	Sugarcane (1.5m x 1.5m)	Ha.	58000	350	203.00
3	Coconut (8m x 8m)	Ha.	22900	150	34.25
4	Casuarina(2mx2m)(Without fertigation)	Ha.	44800	50	22.40
	Total	Ha.		610	276.58
b)	Sprinkler Irrigation System				
1	Groundnut	Ha.	15000	1100	165
2	Vegetables	Ha.	15000	140	21.00
3	Chillies	Ha.	15000	80	12.00
4	Medicinal plants(Patchouli)	Ha.	15000	25	3.75
	Total	Ha.		1345	201.75
2	PRECISION FARMING				
	Vegetables	Ha.	75000	100	75.00
3)	PVC Burried Pipe laying For water conveyance and Sprinkler irrigation				
	Cost of Pipe laying	M	12305	50.06	6.16
	Construction of sump&Providing pump with Energisation	Nos.	235000	1	2.35
	Total				8.51
4	Farm mechanisation with advanced user friendly implements				
	Power Weeder	Nos.	75000	10	7.50
	Seed drill for Maize &Groundnut	Nos.	35000	20	7.00
	Groundnut Harvester	Nos.	40000	10	4.00
	Maize Husker cum sheller	Nos.	90000	10	9.00
	Total			50	27.50
5	WATER HARVESTING STRUCTURES				
	Farm Ponds	No	40000	40	16.00
	Grand Total				605.34

8. 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.

9. CONTRIBUTION BY THE BENEFICIARIES:

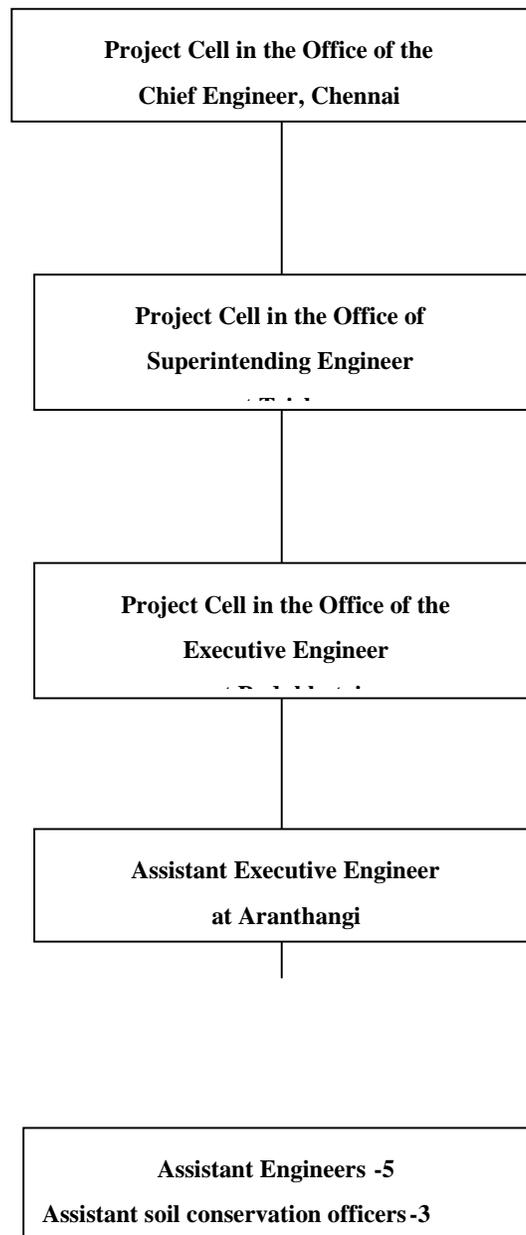
The beneficiaries are motivated to contribute for the works component proposed for their effective participation in the project. The work components like Micro Irrigation System implementation are individual oriented benefit schemes and so it was insisted to contribute 50% contribution during WUA/Farmers' 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, 10% contributions shall be collected as beneficiaries' contribution which is appraised with the ayacut farmers during WUA meeting.

10. IMPLEMENTATION STRATEGY :

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

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

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



HR Pattern

The Work components viz. 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.

11.OUTCOME INDICATORS:

1. The Crop Diversification and crop intensity in post project period due to installation of Drip & Sprinkler Irrigation systems in the extent of 2055 Ha.
2. Increased area under Hi-Tech Irrigation like Drip and Sprinkler Irrigation.
3. Precision Farming practices in an extent of 100 Ha. for increased income.
4. Increased Farm Productivity per unit area and unit of irrigation water
5. Irrigated Agriculture in gap area.
6. Technology dissemination to the farmers.
7. Increase in awareness in farm mechanization
8. Supplement income generation by diversified farm activities through fisheries(from farm ponds), cattle breeding(fodder development).
Increase in per capita income to the beneficiary farmers.

'IAMWARM'

DETAILED PROJECT REPORT



SOUTH VELLAR RIVER BASIN, PUDUKKOTTAI DISTRICT

**Joint Director of
Agriculture, Pudukkottai.**

ESTIMATED RETURN (CROP WISE)

S.No.	Name of the crop	Unit	Without project				With Project				Additional Return
			F1	P1	RF	Total	F1	P1	RF	Total	
1	Annual crops										
	Sugarcane	Rs.1064 / Mt	811.3	0	0	811.3	1002.82	0	0	1002.82	191.52
	Fodder	Rs.600/Mt	9.6	0	0	9.6	15	0	0	15	5.4
	Total		820.9	0	0	820.9	1017.82	0	0	1017.82	196.92
2	Perennial crops										
	Coconut	Rs.3.5 Nut	4.7845	0	0	4.7845	38.514	0	0	38.514	33.7295
	Total		4.7845	0	0	4.7845	38.514	0	0	38.514	33.7295
3	1st season										
	Paddy	Rs.5/kg	2312.5	644	0	2956.5	3262	0	0	3262	305.5
	Pulses	Rs.30/kg	0	0	150	150	450	0	0	450	300
	Groundnut	Rs.15/kg	0	0	364.5	364.5	877.5	0	0	877.5	513
	Cholam	Rs.6/kg	0	0	19.2	19.2	0	0	0	0	0
	Cumbu	Rs.6/kg	0	0	21	21	0	0	0	0	0
	Maize	Rs.6/kg	0	0	0	0	679	0	0	679	679
	Total		2312.5	644.0	554.7	3511.2	5268.5	0.0	0.0	5268.5	1797.5
	Second season										
	Paddy	Rs.5/kg	519.5	0	0	519.5	717	0	0	717.00	197.5
	Pulses	Rs.30/kg	45.0	0	0	45	195	0	0	195.00	150
	Groundnut	Rs.15/kg	112.5	0	0	112.5	180	0	0	180.00	67.5
	Maize	Rs.6/kg	24.6	0	0	24.6	84	0	0	84.00	59.4
	Total		701.6	0	0	701.6	1176	0	0	1176	474.4
	Grand Total		3839.785	644.0	554.7	5038.485	7500.83	0.0	0.0	7500.83	2502.5

- Name of the River : AGNIAR Basin

2. Name of the sub-basin:South Vellar

3. a) Length of the River : 137 Km.

b) Total Basin Area : 1931.51. Sq.km

4. Districts covered :Pudukkottai and
Tiruchirappalli

SOIL CLASSIFICATION:

The Predominant Soil Classification – Talukwise

S.No.	Name of Taluk	Predominant Soil Type	
		Order	Soil type
1.	Manapparai	Entisols	Red yellow brown in colour shallow soil to loamv.
2.	Illuppur	Alfisols	Red or Brown coarse loamy to fine loamy, clay loam to clay
3.	Thirumayam	Vertisols	Heavy texture clay soil very deep Black soil
4.	Pudukkottai	Alfisols	Red or Brown coarse loamy to fine loamy, clay loam to clay
5.	Alangudy	Alfisols	Red or Brown coarse loamy to fine loamy, clay loam to clay
6.	Arantangi	Vertisols	Heavy texture clay soil very deep Black soil
7.	Avudaiarkoil	Vertisols	Heavy texture clay soil very deep Black soil
8.	Manamelkudy	Vertisols	Heavy texture clay soil very deep Black soil.

LAND HOLDINGS FOR SOUTH VELLAR SUB BASIN

Marginal <1 Ha. Nos.	Small 1-2 Ha. Nos.	Medium 2-5 Ha. Nos.	Big >5 Ha. Nos.	Total Nos.
96002 (77.95)	15521 (12.60)	9930 (8.06)	1707 (1.39)	123160 (100%)

DETAILS OF ANICUTS AND TANKS

Name of river	No.of Anicuts	No.of open off takes	No.of tanks benefited	Ayacut Ha.
Non-System South Vellar River	18	4	164	11766.45.5
Nerunjikudi River	6	--	12	973.56.0
Gundar River	2	--	8	253.05.0
Narasinga Cauvery	20	--	40	1359.99.5
Sub Total (Non system)	46 Nos.	4 Nos.	224 Nos.	14353.06.0
Rainfed Tanks	--	--	92 Nos.	6726.12.0
Total	46 Nos.	4 Nos.	316 Nos.	21079.18.0

AGRICULTURE

Paddy is the major crop.

Other crops are

- ❖ Pulses
- ❖ Groundnut
- ❖ Maize
- ❖ Sugarcane
- ❖ Vegetables

Total Registered Ayacut- 21079.18.0 Ha.

Fully Irrigated Ayacut- 11098.18.0 Ha.

Partially Irrigated Ayacut- 5975.95.0 Ha.

Gap Area 4005.05.0 Ha.

Sl.No	Name of the crop	Season	WITHOUT PROJCT				WITH PROJECT			
			FI	PI	RF	Total	FI	PI	RF	Total
1	ANNUAL CROPS									
	Sugarcane		610	0	0	610	650	0	0	650
	Fodder		0	0	0	0	100	0	0	100
	Total		610	0	0	610	750	0	0	750
2	PERENNIAL CROPS									
	Coconut		25	0	0	25	175	0	0	175
	Patcholi		0	0	0	0	25	0	0	25
	Amla		0	0	0	0	30	0	0	30
	Sapota		0	0	0	0	30	0	0	30
	Casurina		0	0	0	0	60	0	0	60
	Total		25	0	0	25	320	0	0	320
3	1st Season									
	Paddy	Sep-Jan	10463	5826	0	16289	12833	0	0	12833
	Pulses	June-July	0	0	1370	1370	2500	0	0	2500
	Groundnut	June-July	0	0	1805	1805	2040	0	0	2040
	Cholam	June-July	0	0	500	500	0	0	0	0
	Cumbu	June-July	0	0	300	300	0	0	0	0
	Maize	June-July	0	0	0	0	2266	0	0	2266
	Bhendi	June-July	0	90	0	90	200	0	0	200
	Brinjal	June-July	0	60	0	60	70	0	0	70
	Chillies	June-July	0	0	30	30	100	0	0	100
	Total		10463	5976	4005	20444	20009	0	0	20009
	Grand total		11098	5976	4005	21079	21079	0	0	21079
4	Second Season									
	Paddy	Jan-May	2350	0	0	2350	2820	0	0	2820
	Pulses	Jan-Mar	248	0	0	248	1000	0	0	1000
	Groundnut	Jan-May	300	0	0	300	420	0	0	420
	Maize	Jan-May	200	0	0	200	280	0	0	280
	Total		3098	0	0	3098	4520	0	0	4520
	GREAT GRAND TOTAL		14196	5976	4005	24177	25599	0	0	25599
	Cropping Intensity	%				114.70				121.44

Cropping efficiency

126%

141%

Major crop and varieties grown in South Vellar basin

Crop	Varieties Grown
Paddy I(Sep-Jan)	ADT.39, ADT.45, ADT.46, White Ponni. MDU.5. ASD.18.
Paddy II(Jan-	ASD.18, ASD.19, ADT.36,
Pulses(Jan-	T9, Vamban.1, Vamban.2 and
Ground	TMV.7, VRI.2, VRI.3, VRI.4,
Groundnut	TMV.7, VRI.2, VRI.3, VRI.4,
Maize (July-	Co.1, CoMH.4, Super 900,
Maize (Jan -	Co.1, CoMH.4, Super 900,
Cumbu (Aug -	KM.2,
Vegetables (Jan-Mav)	Co.1 Co2 Tomato, Co1 Co.2 Brinial. Co1 MDU1 Arca
Sugar cane	Co.86032, COC90063,
Green Fodder (Aug - Feb)	Co.3 cumbu Napier grass, Stylo santhus

Reason for the increasing the area of sugarcane, Coconut, Paddy, Pulses and Groundnut.

Paddy:

Due to the availability of sufficient water by this project, the partially irrigated paddy area is diverted to full irrigated paddy.

The second crop paddy is grown in Kavinadu, Vallathirakottai, Seranur, Mirattunilai, Vanniyampatti, Ilanjavur.

The farmers preferred cultivation of paddy if sufficient water is available.

Pulses:

Short duration varieties are available in plenty due to higher market price, the farmers preferred to cultivate the Pulses crop.

Groundnut:

Short duration varieties are available in plenty due to higher market price, the farmers preferred to cultivate the Groundnut crop.

Sugarcane:

Due to higher profitability and labour saving, stable market by sugar mills and availability of EID parry sugar mill in this basin. Farmers preferred the sugarcane cultivation varieties with high percentage of sugar content are recommended.

Maize:

Due to higher profitability low water requirement, short duration, high yielding hybrid seeds the farmers preferred to cultivate the maize cultivation.

Casurina:

Due of higher profitability and labour saving, saline resistance the farmers preferred the casurina cultivation in coastal areas.

Arrangements of Seeds and other inputs paddy:

The certified paddy seeds will be distributed by the Agriculture department through Agrl.Extension Centre for 17% of the total area in the basin. The remaining 83% will be covered by the private seed dealers and through farmers exchange.

Pulses:

The certified pulses seeds will be distributed by the Agriculture Department through Agrl.Extension Centre in the basin.

The pulses seeds with improved varieties will be supplied through National Pulses Research Centre, Vamban and National Seed Corporation and private dealers.

Groundnut:

The groundnut seeds with improved varieties will be supplied through Agrl. Extension Centre, National Seed Corporation and private dealers in the basin.

Maize:

Hybrid maize seeds will be distributed by the Department of Agriculture through Agrl.Extn.Centre, National Seed Corporation and private seed distributors.

AGRICULTURE

Paddy is the major crop.

Other crops are

- Pulses
- Groundnut
- Maize
- Sugarcane
- Vegetables

Total Registered Ayacut	-	21079.18.0 Ha.
Fully Irrigated Ayacut	-	11098.18.0 Ha.
Partially Irrigated Ayacut	-	5975.95.0 Ha.
Gap	-	4005.05.0 Ha.

Existing Agriculture Practices

Inputs

Seed

High Yielding Varieties are used which is supplied from Agriculture Department and Private. Seeds supplied from 17% from Department, 40% from Private Dealer 43% from seed villages.

Soil Testing:

Soil Testing Laboratory at Kudumianmalai is available for analyzing the samples.

INM and IPM

INM and IPM implemented in paddy crop 20-30% of the area covered in ICDP schemes.

Extension

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

Tamil Nadu Agricultural University



Irrigated Agriculture Modernization and Water Resource Management

Sub basin Plan – South Vellar TNAU component

Nodal Officer (IAMWARM)

Director

Water Technology Centre

TNAU, Coimbatore-3

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

1. Introduction

A. About the station

B.

Krishi Vigyan Kendra, Pudukkottai is located at National Pulses Research Centre campus at Vamban 12 km from Pudukkottai to Pattukottai Road. The main mandate of the KVK is conducting on farm testing , front line demonstrations, conducting on campus and off campus trainings to farmers and capacity building to extension functionaries of Pudukkottai district.

Technology developed by National Pulses Research centre, Vamban

Varieties released

Blackgram - Vamban 1, (1987),Vamban 2(1996), Vamban 3(2000), VBN(Bg)4(2003),
Greengram - Vamban 1 (1989), VBN(Gg) 2 (2001),
Redgram - Vamban 1 (1992), Vamban 2 (1999), Vamban 3 (2000),
Cowpea - Vamban 1 (1997), Vamban 2 (1998),

Crop management

- Under red lateritic soil condition, sowing pulses during the second week of July recorded maximum grain yield
- Application of 25 kg and 12.5 kg of potash to irrigated and rainfed pulses respectively and sulphur at 20 kg/ha increased the yield of blackgram and greengram
- Application of Zinc sulphate @ 25 kg/ha in addition to recommended N & P boosted the pulse yield by 18 per cent
- Pre-emergence application of weedicide, fluchloralin (1.5 lit/ha) or pendimethalin (2.0 lit/ha) was highly effective in controlling broad leaved weeds
- Seed pelleting with 40g DAP and 250g of gypsum per kg of seed was found to improve the early vigour and crop stand in red lateritic soil
- Application of 2% DAP as foliar spray at pre-flowering, flowering and pod filling stages significantly influenced the grain yield of Grean gram and Black gram
- Combined inoculation of *Rhizobium*, Phosphobacteria and PGPR (Plant growth promoting rhizobacteria) improved the grain yield of blackgram and greengram.

Crop protection

- In redgram, an integrated pest management package consisting of the following components reduced the pod borer damage and enhanced the grain yield
- Early sowing (not later than June 3rd week)
- Placing bird perches @ 50/ha to provide niche for the predatory activity of the birds
- Mechanical removal of affected flowers and larvae
- Spraying of NSKE 5% at flowering
- Spraying of *Ha* NPV (500LE/ha) during evening hours
- Need based application of Endosulfan 0.07%

B. About the sub basin:

(i) Area

Fully irrigated	: 11098 ha
Partially irrigated	: 5976 ha
Gap	: 4005 ha
Total area	: 21079 ha

(ii) Rainfall

The annual average rainfall is 957 mm.

(iii) Climate

The Climatological features are tabulated below:

S.No	Average Climatological factors.	S.W Monsoon	N.E Monsoon	Winter	Summer
1.	Monthly Temperature in Celsius max/min.	31.8/29.9	28.3/25.4	27.4/25.7	32.4/29.3
2.	Relative Humidity in %	72.5	80.3	78.2	73.3
3.	Wind Speed in Kmph	9.8	4.5	4.1	5.2
4.	Sun Shine hrs/day	6.0	5.6	8.76	8.57

(iv) Soil Type:

Auvdayarkovil and Aranthangi taluk soils are moderately alkaline. The other soil related problem in the sub basin area are shallow in depth, light textured surface soils, rapid permeability, slight sheet erosion, low water holding capacity, acidic soil reaction in some locations, low organic matter content, poor to medium nutrient status, sub soil hardening, low P use efficiency in red soil, low to medium salinity.

(v) Cropping pattern

Sl.No	Name of the crop	Season	WITHOUT PROJCT				WITH PROJECT			
			FI	PI	RF	Total	FI	PI	RF	Total
1	Annual									
	Sugarcane		610	0	0	610	650	0	0	650
	Fodder		0	0	0	0	100	0	0	100
	Total		610	0	0	610	750	0	0	750
2	Perennial									
	Coconut		25	0	0	25	175	0	0	175
	Patcholi		0	0	0	0	25	0	0	25
	Amla		0	0	0	0	30	0	0	30
	Sapota		0	0	0	0	30	0	0	30
	Casurina		0	0	0	0	60	0	0	60
	Total		25	0	0	25	320	0	0	320
3	I st Season									
	Paddy	Sep-Jan	10463	5826	0	16289	12833	0	0	12833
					137					
	Pulses	June-July	0	0	0	1370	2500	0	0	2500
					180					
	Groundnut	June-July	0	0	5	1805	2040	0	0	2040
	Cholam	June-July	0	0	500	500	0	0	0	0
	Cumbu	June-July	0	0	300	300	0	0	0	0
	Maize	June-July	0	0	0	0	2266	0	0	2266
	Bhendi	June-July	0	90	0	90	200	0	0	200
	Brinjal	June-July	0	60	0	60	70	0	0	70
Chillies	June-July	0	0	30	30	100	0	0	100	
	Total		10463	5976	400	20444	20009	0	0	20009
	Grand total		11098	5976	400	21079	21079	0	0	21079
4	II nd Season									
	Paddy	Jan-May	2350	0	0	2350	2820	0	0	2820
	Pulses	Jan-Mar	248	0	0	248	1000	0	0	1000
	Groundnut	Jan-May	300	0	0	300	420	0	0	420
	Maize	Jan-May	200	0	0	200	280	0	0	280
	Total		3098	0	0	3098	4020	0	0	4520
	GRAND TOTAL		14196	5976	400	24177	25099	0	0	25599
	Cropping Intensity	%				114.70				121.44

(vi). Objectives

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

2. Issues

- Low productivity in groundnut - 1348 kg/ha (State average 2493 kg/ha)
- Less area in pulses – 1370 ha
- Non adoption of SRI in paddy
- Non adoption of drip fertigation for sugarcane

3. Counter proposed

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

I. PROJECT MODE ACTIVITIES

1. Technologies for transformation

a. Improved crop production technologies for maize

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

Technology

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

Special features of CO-H(M) 4

Minimum water requirement (650 mm)

Shorter duration (95-100 days)

Higher yield @ 6.25 t/ha

Suited for both irrigated and rainfed at all seasons

Justification

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

Linkage

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

Sl. No.	Technology	Area, Ha	Unit cost	Budget Rs. in Lakhs	Location
I.	Improved production technologies in Maize	150	Rs. 6000/ ha	9.00	Attached in Activity chart
	Field days for 3 years		Rs.10000/year	0.30	

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	:	
	Azospirillum and Phospho bacteria @ 10 pockets each	:	120.00
	Total cost		6070.00

b. Improved production technologies in Groundnut

Objective - Popularizing the improved technologies like adoption of seed drill, stripper in Groundnut growing areas of Pudukottai district.

Justification and Linkage

Micro irrigation is provided for 500 ha of groundnut by Agricultural engineering department. Demonstrating the usefulness of the machineries like seed drill and stripper in these areas will result in the cumulative effect on the yield. Based on that TNAU introduces demonstration of 100 ha in which 2 seed drills and 2 ground nut strippers will be purchased and handed over to 3 associations in Vallanadu periya kulam, Mirattu nilai kanmoi and Sethu kanmoi.

Sl. No.	Technology	Area, Ha	Unit cost	Budget Rs. in Lakhs	Location
I	Improved production technologies in Groundnut	100	Rs. 6500/ha	6.50	Attached in Activity chart
	Tractor drawn seed			1.20	Vallanadu

	drill- 3 Nos Groundnut stripper – 3 Nos				periyakulam, Mirattunilai kanmoi and Sethu kanmoi
	Field days for 3 years		Rs.10000/year	0.30	

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

e. Model village concept

Name of the tank : Vallanadu periyakulam

Crop/Technology	Area Proposed	To cover	Budget Rs. in lakhs
Supply of quality seed			
Rice – ADT 39	50 Ha	3000 ha	0.30
Black gram – VBN (BG)4	20 ha	1000 ha	0.20
Groundnut – VRI 2	20 ha	200 ha	1.00
Demonstration of technology			
Organic Farming & IFS model in Rice	1 ha		1.00

f. Soil Testing

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

g. On farm demonstration and skill development

Details	Duration	No/ Batch	Total Batch	Budget /Batch	Total (Lakh)
SRI techniques	1	50	5	20000	1.0
New improved cultivation	1	50	2	20000	0.4

techniques for groundnut					
New improved cultivation techniques for Black gram	1	50	3	20000	0.6
New improved cultivation techniques for Maize	1	50	2	20000	0.4
Soil sampling techniques	1	50	2	20000	0.4
Drip irrigation and fertigation	1	50	2	20000	0.4
Farm mechanization in groundnut cultivation	1	50	2	20000	0.4
Training to labours on SRI transplanting	1	100	5	10000	0.5
Total					4.10

Venue : Krishi Vigyan Kendra, Vamban, Pudukkottai

h. Budget for Project Mode

S. No	Activities	Amount (Rs. in Lakhs)
1	a. Technology transformation	17.30
	b. Seed Production	1.50
	Demonstration on IFS and Organic Farming	1.00
	c. Soil Testing	0.50
2	OFD and skill development	4.10

II. MISSION MODE ACTIVITIES

a. sugar cane fertigation

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

Totally 600 ha of sugarcane will be covered in post project period . The department of Agricultural Engineering providing drip for 325 ha. Under mission mode TNAU covers 200 ha under drip fertigation.

Water saving 30 %

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

Justification for the unit cost

Sl.No	Particulars		Amount in (Rs.)
1	Drip system	:	58000.00
2	Fertigation		
	Urea 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

b. Mission mode on productivity enhancement in Pulses

It is proposed to bring 2500 ha of pulses under south vellar sub basin in the post project period. With the support of the National Pulses Research Centre, vamban, located in the sub basin the yield of pulses could be enhanced substantially. The technologies developed by NPRC vamban will be popularized in large scale area of 500 ha under pulses.

- Variety VBN(Bg)4
- Seed pelleting with 40g DAP and 250g of gypsum per kg of seed was found to improve the early vigour and crop stand in red lateritic soil
- Application of 2% DAP foliar spray at pre-flowering, flowering and pod filling stages significantly influenced the grain yield of Green gram and Black gram.

S.No	Particulars	Budget (Rs. in lakh)
Budget For Mission Mode II- Pulses (500 ha)		
1	Cost of critical inputs seeds and nutrients @ 2500/ha	12.50
	Sub Total B	12.50

Justification for the unit cost

Sl.No	Particulars		Amount in (Rs.)
1	Seed cost with seed treating chemicals (20kg/ha) @ Rs. 50/kg	:	1000.00
2	DAP 10 kg / ha @ Rs.11/kg		110.00
	Super Phosphate - 312.5 @ Rs. 4 /kg	:	1250.00
	Muriate of Potash – 41.5 kg @ Rs.4.75/ kg	:	210.00
			2570.00

c. System of Rice Intensification

Adoption and implementation of SRI system for rice cultivation

Objectives

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

TECHNOLOGY

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

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

The SRI technique has the following features

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

SRI TECHNIQUE HAS THE FOLLOWING ADVANTAGES

- Saving of seed material 50-65 kg /ha.
- Saving of 10 laborers in planting
- Saving of 300-400 mm of irrigation water
- Saving of 12-16 women laborers in weeding
- Saving of 15-45 kg N/ha. by following LCC method of N management

Rotary weeder has the following advantages

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

Outcome

- Indiscriminate usage of water will be curtailed by saving up to 50 %
- Improved soil health
- Enhanced productivity level of the crop

Jusification and Linkage

Adoption of SRI in rice system reduce the water requirement with an yield increase of 15-20%. In this south vellar sub basin area under rice will be reduced by 4000 ha in first season. To offset the production loss introduction of SRI will be the best option for maintaining overall production. TNAU introduce a demonstration of 100 ha which helps in large scale adoption.

Convergence

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

S.No	Particulars	Budget (Rs. in lakh)
Budget For Mission Mode III - SRI in Rice(300 ha)		
1	Cost of critical inputs seeds and nutrients @ 10000/ha	30.0
	Total	30.0

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, roscan, 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
	Azospirillum and Phospho bacteria @ 10 pockets each	
7.	Cost of Plant protection chemicals	
	Pseudomonas 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

e. BUDGET for Mission mode

S.No	Particulars	Budget (Rs. in lakh)
Budget For Mission Mode I- Sugarcane fertigation (200 ha)		
1	Cost of drip fertigation system (75 % cost)	102.00
2	Cost of nutrients @ 5500/ha	11.00
	Sub Total A	113.00
Budget For Mission Mode II- Pulses (500 ha)		
1	Cost of critical inputs seeds and nutrients @ 2500/ha	12.50
	Sub Total B	12.50
Budget For Mission Mode III - SRI in Rice(300 ha)		
1	Cost of critical inputs seeds and nutrients @ 10000/ha	30.0
	Sub Total C	30.0

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	150	600	1000	600	60.00	-
Improved production technologies in groundnut	100	1000	363	363	54.45	-
System Rice Intensification in rice	300	1500	1010	1500	75.00	6.00
Improved production technologies in pulses	500	2000	50	100	25.00	-
Drip fertigation in sugarcane	200	600	19 tonnes/ha	11400	91.20	4.20

IV. YEAR WISE ACITVITIES

Year	Project mode		Mission mode		
	Maize	Groundnut	Sugarcane drip fertigation	Pulses	SRI in paddy
I	-	-	-	-	115 ha
II	55 ha	46 ha	90 ha	190 ha	103 ha
III	55 ha	35 ha	75 ha	205 ha	82 ha
IV	40 ha	19 ha	35 ha	105 ha	Adoption
V	Adoption and monitoring				
Total	150 ha	100 ha	200 ha	500 ha	300 ha

Finance (Rs. In Lakhs)

S.N	Particulars	I	II	III	IV	V	Total
I	Activities						
1	a.Improved production technologies in Maize	-	3.30	3.30	2.40	-	9.00
	b. Field days		0.10	0.10	0.10	-	0.30
2.	a.Improved production technologies in groundnut	-	2.990	2.275	1.235	-	6.50
	b. Field days		0.100	0.100	0.100		0.30
3	Seed production						
	Rice	0.06	0.15	0.09	-	-	0.30
	Groundnut	0.30	0.60	0.10			1.00
	Blackgram	0.05	0.10	0.05			0.20
4	Demonstration of technologies						
	a. Organic farming and IFS in rice	1.000	-	-	-	-	1.000
	b. Improved production technologies in groundnut	0.065		-	-	-	0.065
	c. Groundnut seed drill (3Nos) and Groundnut stripper (3 Nos)	1.200					1.200
5	Soil testing	0.50	-	-	-	-	0.50
6	OFD and skill development	4.10	-	-	-	-	4.10
7	SRI	-	11.50	10.30	8.20	-	30.00
8	Productivity enhancement in Blackgram	-	4.75	5.125	2.625	-	12.50
9	Sugarcane fertigation	-	57.15	47.625	22.225	-	127.00
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 BUDGET FOR SOUTH VELLAR

Sl.No	Particulars	Physical	Financial (in lakhs)
<u>I</u>	<u>Activities</u>		
<u>1</u>	<u>Improved production technology for Groundnut + 3 field days</u>	<u>100 ha</u>	<u>6.80</u>
	<u>Groundnut seed drill and stripper</u>	<u>Each 3 Nos.</u>	<u>1.20</u>
<u>2</u>	<u>Improved production technology for Maize + 3 field days</u>	<u>150 ha</u>	<u>9.30</u>
<u>3</u>	<u>Quality seed production Groundnut, Rice and Black gram</u>	<u>100 ha</u>	<u>1.50</u>
<u>4</u>	<u>Demonstration of organic farming and IFS modal in Model villages</u>	<u>1 No</u>	<u>1.00</u>
<u>5</u>	<u>SRI</u>	<u>300 ha</u>	<u>30.00</u>
<u>6</u>	<u>Sugarcane drip fertigation</u>	<u>200 ha</u>	<u>127.00</u>
<u>7</u>	<u>Production technology for pulses</u>	<u>500 ha</u>	<u>12.50</u>
<u>8</u>	<u>OFD and Skill development</u>	<u>-</u>	<u>4.10</u>
<u>9</u>	<u>Soil testing</u>	<u>-</u>	<u>0.50</u>
		<i>Sub Total</i>	<u>193.90</u>
<u>II</u>	<u>Out Sourcing for technical assistant</u>		
<u>1</u>	<u>6 nos for first 3 years, 3 nos for 4th and 5th year</u>	<u>9000 Salary + 1000 FTA per Month</u>	<u>28.80</u>
		<i>Sub Total</i>	<u>28.80</u>
<u>III</u>	<u>Contingencies</u>		
	<u>a. Vehicle hire charge for Scientists @ Rs.60000/yr</u>		<u>3.00</u>
	<u>b. Documentation and Reporting</u>		<u>1.00</u>
	<u>c. Publicity, exhibits and Stationeries</u>		<u>2.50</u>
		<i>Sub Total</i>	<u>6.50</u>
<u>IV</u>	<u>Equipments</u>		<u>3.00</u>
	<u>Computer, Printer, Scanner, LCD, Copier, Digital moisture meter</u>		
		<i>Sub Total</i>	<u>3.00</u>
		Total	<u>232.20</u>
	<u>Incentive 1% of the total cost</u>		<u>2.32</u>
	<u>Total</u>		<u>234.52</u>
	<u>Institutional charges @ 7.5 %</u>		<u>17.59</u>
	<u>Grand Total</u>		<u>252.11</u>

Impact

- ❖ **Crop:** Rice
- ❖ **Technology:** SRI
- ❖ **Area under demonstration:** 300 ha
- ❖ **Area under adoption :** 1500 ha

- ❖ **Crop:** Groundnut
- ❖ **Technology:** Improved production technologies in groundnut
- ❖ **Area under demonstration:** 100 ha
- ❖ **Area under adoption :** 1000 ha

- ❖ **Crop:** Black gram
- ❖ **Technology:** Improved production technologies in pulses
- ❖ **Area under demonstration:** 500 ha
- ❖ **Area under adoption :** 2000 ha

- ❖ **Crop:** Maize
- ❖ **Technology:** Improved production technologies in maize
- ❖ **Area under demonstration:** 150 ha
- ❖ **Area under adoption :** 600 ha

- ❖ **Crop:** Sugarcane
- ❖ **Technology:** Drip fertigation
- ❖ **Area under demonstration:** 200 ha
- ❖ **Area under adoption :** 600 ha

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

Annexure

Activity chart

Project mode 1. Improved production technologies in Maize

	Name of the tank	Area (Ha)	I st year	II nd year	III rd year	IV th year
1	Valanadu Big tank	15	-	5	5	5
2	Meenaveli periyakulam	15	-	5	5	5
3	Visalai kanmoi	10	-	5	5	-
4	Kavinadu Big tank	30	-	10	10	10
5	Mangalam tank	10	-	5	5	-
6	Vallanadu periyakulam	25	-	10	10	5
7	Mirattunilai vemban mugudan kanmoi	30	-	10	10	10
8	Perumanadu periyakulam	15	-	5	5	5
	Total	150		55	55	40

Project mode 2. Improved production technologies in Groundnut

	Name of the tank	Area (Ha)	I st year	II nd year	III rd year	IV th year
1	Seranai kanmoi	10	-	5	5	-
2	Vayalogam periyakulam	10	-	5	3	2
3	Vallanadu periyakulam	20	-	10	5	5
4	Mirattunilai vemban mugudan kanmoi	20	-	5	5	10
5	Sethu Kanmoi	10	-	5	3	2
6	Samuthiram kanmoi	10	-	5	5	-
7	Pudur peria and Chinnakulam	10	-	5	5	-
8	Perambur periyakulam	5	-	3	2	-
9	Perumanadu periyakulam	5	-	3	2	-
	Total	100	-	46	35	19

d. Activity Chart

Mission mode. Sugarcane Fertigation

	Name of the tank	Area (Ha)	I st year	II nd year	III rd year	IV th year
1	Vayalogam periyakulam	10	-	5	5	-
2	Vallanadu periyakulam	25	-	10	10	5
3	Mirattunilai vemban mugudan kanmoi	10	-	5	5	-

4	Narpavalakudi tank	10	-	5	5	-
5	Karai kanmoi	20	-	10	5	5
6	Pudur peria and Chinnakulam	20	-	10	5	5
7	Mangudi periyakulam	10	-	5	5	-
8	Maravamadurai periykulam	10	-	5	5	-
9	Melathaniyam periyakanmoi	10	-	5	5	-
10	Ayinkudi	15	-	5	5	5
11	Konnai kanmoi	15	-	5	5	5
12	Kurumbur	20	-	10	5	5
13	Kavinadu big tank	25	-	10	10	5
	Total	200	-	90	75	35

Mission mode2. Productivity enhancement in Black gram

	Name of the tank	Area (Ha)	Ist year	IInd year	IIIrd year	IVth year
1	Valanadu Big tank	10	-	5	5	-
2	Serani kanmoi	20	-	5	10	5
3	Vaylogam periyakulam	25	-	10	10	5
4	Kavinadu Big tank	75	-	30	30	15
5	Palaiyur	10	-	5	5	-
6	Mirattunilai vemban mugudan kanmoi	25	-	10	10	5
7	Sethukanmoi	20	-	10	10	-
8	Narpavalakudi tank	40	-	10	20	10
9	Alapirandan tank	15	-	5	5	5
10	Panchathi tank	15	-	5	5	5
11	Thanji kanmoi	10	-	5	5	5
12	Pachalur tank	10	-	5	5	-
13	Veeramangalam tank	25	-	10	10	5
14	Karai kanmoi	25	-	10	10	5
15	Pudur periya & Chinna kulam	20	-	10	10	-
16	Perumanadu periyakulam	30	-	10	10	10
17	Manjakudi	30	-	10	10	10
18	Vallanadu periyakulam	70	-	25	25	20
19	Samuthiram kanmoi	15	-	5	5	5
20	Rettaiyalam	10	-	5	5	-
	Total	500	-	190	205	105

Mission mode 3. System of Rice Intensification

	Name of the tank	Area (Ha)	I st year	II nd year	III rd year	IV th year
1	Kavinadu big tank	20	5	10	5	-
2	Vallanadu periakulam	15	5	5	5	-
3	Palaiyur	10	3	4	3	-
4	Miratunilai vemban mugudan kanmoi	15	5	5	5	-
5	Sethu kanmoi	10	4	4	2	-
6	Samuthiram kanmoi	10	3	4	3	-
7	Odakulam	15	5	5	5	-
8	Kothamangalam big tank	15	10	3	2	-
9	Meenaveli periyakulam	10	5	3	2	-
10	Veeramangalam tank	10	5	2	3	-
11	Karrupur tank	15	5	5	5	-
12	Nellikulam anicut	15	5	5	5	-
13	Vembanur big tank	10	3	2	5	-
14	Vayologam periyakulam	15	5	5	5	-
15	Sunddarakulam	10	5	3	2	-
16	Nerayakulam	15	5	5	5	-
17	Mangulam tank	15	8	4	3	-
18	Alinji kanmoi	10	4	3	3	-
19	Isugukudi kanmoi	15	5	6	4	-
20	Kongudi tank	15	6	6	3	-
21	Narpavalakudi tank	15	6	6	3	-
22	Samandan kanmoi	10	4	4	2	-
23	Kulathur tank	10	4	4	2	-
	Total	300	115	103	82	-



ANIMAL HUSBANDRY COMPONENT

IAMWARM PROJECT

SOUTH VELLAR SUB BASIN

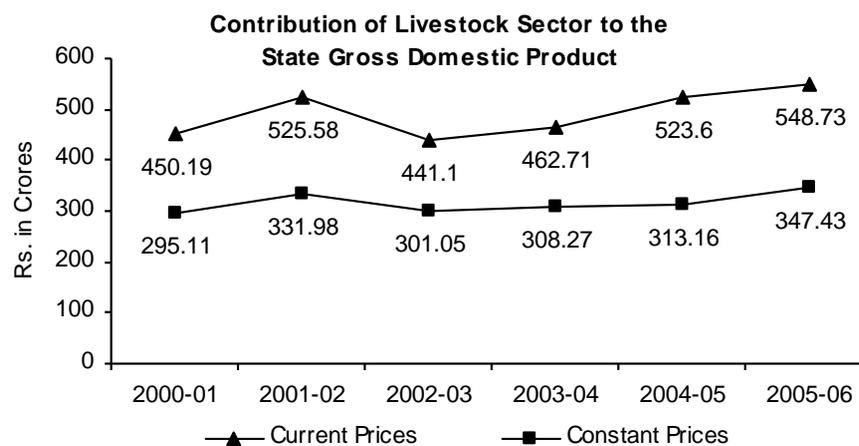
IAMWARM PROJECT
ANIMAL HUSBANDRY

1. INTRODUCTION

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

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

Year	Current Prices (In crores)						Constant Prices (In crores)					
	Gross State Domestic Product	GSDP for Agriculture & Allied Activities	GSDP for Livestock Sector	%age Share of Agriculture & Allied Activities to Livestock Sector	%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 Livestock Sector	%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



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

2. PRESENT STATE SCENARIO

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

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

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

3. SCENARIO IN THE SOUTHVELLAR SUB BASIN

Livestock Population

Cattle	Buffalo	Sheep	Goat	Poultry
142130	18236	60230	58920	18487

Breedable age Female Population

Crossbred Cattle	Non Descriptive cattle	Buffalo	Total
12565	39082	9118	60765

Infrastructure and Man power in Government Veterinary Institutions

No. of Veterinary Institutions		Veterinary institutions filled up	
Graduate Institutions	Subcentres	Graduate Institutions	Subcentres
18	18	10	12

Average Per Day Milk Yield per animal

Crossbred Cattle	Non Descriptive cattle	Buffalo
5.71	2.76	4.59

Milk Procurement

Milk cooperative societies	Present milk procurement (LPD)	Milk Procured by Aavin (LPD)
54	60000	28000

4. Constraints, Challenges and Counter measures proposed:

S. No.	Constraints & Challenges	Countermeasures Proposed
1.	Remote villages and villages situated far away from the Government Veterinary Institutions are not getting sufficient veterinary services like veterinary health cover and artificial insemination facilities	The establishment of sub basin veterinary unit will ensure delivery of veterinary services at the farmer's door steps or nearest to the farmer's in remote villages and unserved villages of the sub basin area. Provision of veterinary health cover and artificial insemination are the main works at the farmer's door steps. The unemployed veterinary graduate will be given an entrepreneurship training to establish a Sub basin veterinary unit (details enclosed vide para 6.1 of page 6) in the sub basin area and disseminate best animal husbandry practices for his earnings and to upgrade animal husbandry practices of farmers in the sub basin area.

S. No.	Constraints & Challenges	Countermeasures Proposed
2.	Lack of upgraded infrastructure at the Government Institutions leading to constraints in delivery of quality veterinary services.	The Government Veterinary Institutions in the sub basin will be provided with additional essential equipments (details enclosed vide para 6.2.a. & 6.2.b. of page 10) to deliver quality veterinary services in the sub basin. In addition one veterinary dispensary (details enclosed vide para 6.2.c. of page 10) will be upgraded as referral institution for quick and accurate diagnosis of diseases and help in timely treatment thereby preventing economic loss to the farmers.
3.	There is a wide gap between the requirement and availability of green fodder needed for the livestock in the sub basin.	To reduce the gap between the requirement and availability of green fodder in the sub basin, it is proposed to cultivate CO3 fodder in 275 hectares of private lands, (details enclosed vide para 6.3.(d). of page 11) as a part of cropping plan.
4.	Main problem affecting the fertility in cross bred cattle is infertility leading to loss of milk production days, ultimately leading to loss to the farmers.	To overcome the infertility problems, infertility cum total health cover camps (details enclosed vide para 6.4.(b) of page 13) are proposed. The animals having infertility problems will be identified and treated. In addition, mineral mixture supplement (details enclosed vide para 6.4.(c) of page 14) will be given to rectify the defects.
5.	Lack of adequate know-how about the livestock management practices like feeding, breeding, health care and deworming activities.	The farmers in the sub basin will be given training (details enclosed vide para 6.5.a. of page 15) on best livestock management practices in livestock breeding activities like signs of oestrus, correct time of artificial insemination, deworming, feeding schedule and other health care measures. In addition, IEC materials will be distributed to farmers in the sub basin. More over hoardings and wall paintings depicting signs of commonly affecting diseases will be erected in places where people congregate in large numbers. Apart from this, quarterly night meetings will be conducted to disseminate information to

S. No.	Constraints & Challenges	Countermeasures Proposed
		the farmers in the sub basin. (details enclosed vide para 6.4.(d) of page 14)
6.	Lack of update knowledge and skills of the veterinarians and para-veterinarians in the project area.	Veterinarians in the project area will be given trainers training (details enclosed vide para 6.5.(d) of page 16) at Veterinary Colleges to update and refresh their skills and knowledge. They will inturn train the para-veterinarians.

5. OBJECTIVES OF THE PROJECT

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

The main interventions will be:

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

5.2 With the above interventions, not only the crossbred population in the sub basin is expected to rise but also the disease outbreaks will be kept under control. Moreover systematic and periodical deworming will lead to a 10% increase in weight gain, thereby increasing the total meat yield per animal. Moreover 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 5.7 lts to 9 litres in crossbred, from 2.7 lts to 3.5 litres in indigenous and from 4.5 lts to 5.5 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 18 graduate veterinary institutions and 18 subcentres operating in the project area, there is still large livestock populations uncovered which is mainly due to the geographical terrain and distance these villages are located from the institutions. In this project, the main aim will be to provide effective veterinary cover and breeding support to these villages at their door steps by establishing Sub basin Veterinary Unit. The main criteria for establishing the unit will be livestock population in the unserved area. Hence to provide effective services in these unserved areas, it is planned to establish 2 Sub basin Veterinary Units in the Project area.

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

Total number units in South Vellar basin :			2	
Name of the Sub basin Veterinary Unit :			1. Sevalur 2. Meenavelli	
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)
<u>Sevalur - Monday</u>				
1.	Sevalur	0	Manapparai VH	10
2	Malaiyadipatti	8	Manapparai VH	8
3	Chettiyapatti	10	Manapparai VH	7
4	Venkaikurichi	9	Manapparai VH	10
5	Vadugapatti	10	Manapparai VH	10
<u>Sevalur - Tuesday</u>				
1.	Poigaipatti	7	Manapparai VH	10
2	Karupur	7	Manapparai VH	12
3	Madhampatti	7	Manapparai VH	11
4	Puthalatham	6	Manapparai VH	12
<u>Sevalur - Wednesday</u>				
1.	Sigampatti	9	Manapparai VH	12
2	Usilampatti	8	Manapparai VH	11
3	Adampatti	7	Manapparai VH	10
4	Suliyapatti	6	Manapparai VH	10

5	Sampatti	7	Manapparai VH	11
<u>Sevalur - Thursday</u>				
1.	Vadugapatti	10	Manapparai VH	10
2	Malaiyadipatti	8	Manapparai VH	8
3	Chettiyapatti	10	Manapparai VH	7
4	Venkaikurichi	9	Manapparai VH	10
5	Sevalur	7	Manapparai VH	10
<u>Sevalur - Friday</u>				
1.	Poigaiatti	7	Manapparai VH	10
2	Karupur	7	Manapparai VH	12
3	Madhampatti	7	Manapparai VH	11
4	Puthalatham	6	Manapparai VH	12
<u>Sevalur - Saturday</u>				
1.	Sigampatti	9	Manapparai VH	12
2	Usilampatti	8	Manapparai VH	11
3	Adampatti	7	Manapparai VH	10
4	Suliyapatti	6	Manapparai VH	10
5	Sampatti	7	Manapparai VH	11

Sevalur village is about 10 kms from the nearest Veterinary institution namely Veterinary Hospital, Manapparai. There are about 26 villages situated in and around Sevalur that are not covered by the Government Veterinary Institution. Further the breedable female population in and around Sevalur that is untapped by the Government veterinary institution is around 2,207. Hence Sevalur village is fixed as the headquarters of the Sub basin Veterinary U nit.

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)
<u>Meenaveli - Monday</u>				
1.	Sithrampatti	4	Viralimalai VD	10
2	Uthukuli	4	Viralimalai VD	20
3	Mettupatti	5	Viralimalai VD	20
<u>Meenaveli - Tuesday</u>				
1.	Theravoor	12	Viralimalai VD	20
2	Matharapatti	10	Viralimalai VD	20
3	Keela Inpampatti	10	Viralimalai VD	20
4	Meela Inpampatti	20	Viralimalai VD	20
<u>Meenaveli - Wednesday</u>				
1.	Agarapatti	9	Viralimalai VD	20
2	Kasavanoor	12	Viralimalai VD	20

3	Therkumothampatti	20	Viralimalai VD	20
4	Vadakumothampatti	18	Viralimalai VD	20
<u>Meenaveli - Thursday</u>				
1.	Sithrampatti	4	Viralimalai VD	10
2	Uthukuli	4	Viralimalai VD	20
3	Mettupatti	5	Viralimalai VD	20
<u>Meenaveli - Friday</u>				
1.	Theravoor	12	Viralimalai VD	20
2	Matharapatti	10	Viralimalai VD	20
3	Keela Inpampatti	10	Viralimalai VD	20
4	Meela Inpampatti	20	Viralimalai VD	20
<u>Meenaveli - Saturday</u>				
1.	Agarapatti	9	Viralimalai VD	20
2	Kasavanoor	12	Viralimalai VD	20
3	Therkumothampatti	20	Viralimalai VD	20
4	Vadakumothampatti	18	Viralimalai VD	20

Meenavelli village is about 10 kms from the nearest Veterinary institution namely Veterinary Dispensary, Viralimalai. There are about 26 villages situated in and around Meenavelli that are not covered by the Government Veterinary Institution. Further the breedable female population in and around Meenavelli that is untapped by the Government veterinary institution is around 2,207. Hence Meenavelli village is fixed as the headquarters of the Sub basin Veterinary Unit.

Sundays will be a reserve day for the sub basin veterinary units, 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.

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

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

pregnancy diagnosis. The route will be reviewed and assessed for intake of the veterinary services by the end users once in 3 months and suitable alterations if necessary will be made. Flexibility will be given to change the tour programme based on need. The unit will be under the technical control of the Animal Husbandry Department. The sub basin veterinary extension officer will computerize all records regarding artificial insemination like date of artificial insemination done, straw used, sire yield, date of follow up for conception, etc.

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

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

6.1.(g) Each unit will be established at a total cost of Rs.5.73 lakhs for 5 years in which Rs.0.99 lakhs will be non-recurring and Rs.4.74 lakhs will be recurring cost. Totally 2 units will be established in the river basin at a total cost of Rs.11.46 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, etc	10000					
7	One time revolving fund for purchase of medicines	10000					
	Total	99000					
	RECURRING EXPENDITURE/UNIT	I Year	II Year	III Year	IV Year	V Year	Total cost (In Rs.)
1	Cost of straws @ Rs.15/straw at the rate of 2400/1st yr, 2700/2nd yr, 3000/3rd yr, 3360/4th yr & 3840/5th yr.	36000	40500	45000	50400	57600	229500
2	LN2 @ 250 Lit/year @ Rs.26/lit for I year and there after an increase of Rs.1/- per year	6500	6750	7000	7250	7500	35000
3	Cost of basic medicines, infusions and surgical items @ Rs.20,000/annum	20000	20000	20000	20000	20000	100000
4	Incentive for the veterinarian for each calf born @ Rs.25/- yr and there after an decrease of Rs.5/- per year	4000	19600	16500	12240	6880	59220

5	Miscellaneous Charges for chemicals, glasswares, etc.	10000	10000	10000	10000	10000	50000
	Total	76500	96850	98500	99890	101980	473720
	Recurring Expenditure for 5 years						473720
	Total (Recurring + Non-recurring)						572720

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

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

6.2. (a).1 Graduate Institutions: A good and well-equipped infrastructure is the key to an all round growth and development. There are 18 graduate veterinary institutions and 18 subcentres functioning under the Government fold in the project area. The infrastructure in the graduate veterinary institutions are being strengthened at a cost of Rs.33,000/- per Graduate Institution. The infrastructure that are to be added in each Graduate Institution are Mouth Gag, dentist autoclave, mastitis detector, etc. The 18 institutions will be strengthened at a cost of Rs.5.94 Lakhs.

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

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

6.2.(c) Strengthening Diagnostic Facilities in Sub-basin Referral Institution: Strengthening the diagnostic facilities in the sub basin by providing special diagnostic tools to one sub basin veterinary institution at a cost of Rs.3.00 lakhs, is also a part of the project. The

institution will be designated as Referral Institution for the sub basin. The Veterinary hospital at Manaparai will be upgraded as the referral institution for the sub basin. In the identified referral institution, semi auto analyzer and accessories will be provided for ensuring complete timely blood analysis.

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

6.3. Increasing availability of green fodder .

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

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

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

	Sub basin	Bovine Population	Requirement (In MT)	Availability (In MT)	Shortage (In MT)	%age of Shortage
1	South vellar	160366	496072	30000	466072	94%

Hence to reduce the green fodder shortage, around 275 hectares of additional land will be brought under fodder cultivation in the sub basin area.

6.3.(d) Around 275 hectares of land earmarked for fodder cultivation in the private lands in the project area will be taken up for cultivation of Stylo, Co3 and kolukattai grass. The farmers will be supplied inputs like seeds and slips. The cost of cultivation will be borne by the farmer. The

Animal Husbandry Department will ensure supply of quality seeds and slips. The yield rate and cost of inputs is furnished below.

Sl. No.	Name of fodder	Avg. Yield per year (In tonnes)	Cost of inputs Per Hectare
1.	Co3	300	6,000
2.	Kolukattai	40	3,000
3.	Stylo	45	3,000

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

1.	Vannapatti	27.5
2.	Melapaluvanthi	27.5
3.	Illuppur	27.5
4.	Mettupatti	27.5
5.	Meenaveli	27.5
6.	Chithampatti	27.5
7.	Vandakottai	27.5
8.	Vallathirakottai	27.5
9.	N.Poolampatti	27.5
10.	Malaiyadipatti	27.5
	Total	275

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

Present Fodder Status :

Fodder Cholam @ yield rate of 45 tonnes/ha for 500 ha (In MT)	Cumbu @ yield rate of 25 tonnes/ha for 300 ha (In MT)	Total availability (IN MT)
22500	7500	30000

Fodder Availability Status after the end of project:

Year	Yield to be added (In MT)					
	Stylo @ yield rate of 45 tonnes/ha for 25 ha @ 0 ha for 1st yr, 10 ha for 2nd & 3rd yr, 5 ha for 4th yr.	Co3 fodder@yield rate of 250 tonnes/ha for 75ha @ 30 ha for 2yr, 30 ha for 3rd yr, 10ha for 4th yr and 5 ha for 5th yr	Kolukattai grass @ yield rate of 40 tonnes/ha for 175 ha @ 10 ha for 1st yr, 70 ha for 2nd & 3rd yr, 15 ha for 4th yr and 10 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	0	0	400	400	30400	465672
II Year	450	7500	2800	10750	41150	454922
III Year	450	7500	2800	10750	51900	444172
IV Year	225	2500	600	3325	55225	440847
V Year	0	1250	400	1650	56875	439197

Cost of inputs for cultivation of fodder in the proposed area

Year	Stylo @ Rs.3000/ha	Co3 fodder@ Rs.6000/ha	Kolukattai grass @ Rs.3000/ha	Total Cost (In Rs.)
I Year	0	0	30000	30000
II Year	30000	180000	210000	420000
III Year	30000	180000	210000	420000
IV Year	15000	60000	45000	120000
V Year	0	30000	30000	60000

6.3.(f) By the above cropping pattern in the sub basin, the green fodder availability will be increased from 30000 MT to 56875 MT. In addition 127300 MT of green fodder will be available after the harvest of maize. Totally 184175 MT of green fodder will be available in the sub basin at the end of the project. Ultimately the shortage will be 311897 MT. The above shortage will be met by allowing the animals to graze in the tank bunds, Common Property Resources, etc.

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

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

The out reach programmes planned in the project area are:

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

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

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

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

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

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

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

6.4.(c). Distribution of mineral mixture.

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

6.4.(c).2. The sub basin veterinary extension officer visiting the villages on the scheduled programme will select the eligible animals during the visit. In addition animals will also be

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

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

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

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

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

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

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

6.4.(d).3. *Conducting Night meetings*

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

6.4.(d).1.b. During the night meetings, village people will be enlightened on benefits of rearing livestock and will be motivated to take up livestock rearing. Pamphlets and leaflets will be distributed to the farmers. A small exhibition and method demonstration will be organised for

the benefit of the farmers. The services of link agencies like Tamilnadu Veterinary and Animal Sciences University and Tamilnadu Milk Producers Cooperatives Union will be utilised where ever necessary. In the night meetings successful animal husbandry entrepreneurs in the village and neighboring villages will be requested to share their views on their methodology followed for their success.

6.4.(d).4. All the above Information, education and communications campaigns will be conducted in the sub basin at a total cost of Rs.11.00 lakhs.

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

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

6.5.(a). *Training of Farmers*

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

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

6.5.(a).3. For the above purpose, progressive farmers @ 400 per year interested in animal husbandry activities in the sub basin will be selected for 3 day training. They will be divided into batches of 25 per batch. Training will be provided in the nearest veterinary institution. They will be given a training incentive of Rs.100/day as they will have to attend the training programme foregoing their normal daily earning. During the training, each trainee will be given study material worth Rs.50/-. To motivate the trainer, a trainer honorarium of Rs.250/- per day will be provided. In addition miscellaneous charges of Rs.500/- will be provided for each batch. A total cost of Rs.10,000/- will be required for training each batch. During the project period of

5 years, a total of 2000 farmers (80 batches of 25 farmers per batch) in the sub basin will be trained at a cost of Rs.8.00 lakhs.

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

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

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

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

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

6.5.(d). *In-service Training for 18 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 18 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 18 veterinarians in the sub -basin would be Rs.36000/-

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.

SOUTHVELLAR SUB BASIN

The breedable age female population in the south vellar Sub Basin is 60765 which include 12565 crossbred, 39082 indigenous cattle and 9118 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 10680 crossbred, 37128 indigenous and 8662 buffaloes.
- 2) At present there are 18 Graduate Veterinary Institutions and 18 Sub centres functioning under Government fold doing artificial insemination work of which 6 subcentres and 8 graduate veterinary institutions are vacant.
- 3) The above Government Institutions have carried out an average artificial insemination of 3367 in crossbred, 10452 in indigenous and 486 in buffaloes.
- 4) Assuming 2.8 (35%) inseminations are required for consumption in cattle and 3.3 (30%) inseminations are required for conception in buffaloes, the actual animals covered is 1203 crossbred, 3733 indigenous and 147 buffaloes.
- 5) Thus the breedable age female population unserved by the Government institutions is 9477 crossbred, 33395 indigenous and 8515 buffaloes.
- 6) For of the above animals unserved, two sub basin veterinary units will be established in the sub basin each covering around 22 to 27 villages.
- 7) During the first year 2,400, second year 2,700, third year 3,000, 4th year 3,360, 5th year 3,840 and from then on 3,840 artificial inseminations will be done by each sub basin veterinary unit.
- 8) It is assumed that 50% crossbred (2400), 40% indigenous (1920) and 10% (480) buffaloes will be targeted by the above two 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	2400	1920	480
II Year	2700	2160	540
III Year	3000	2400	600
IV Year	3360	2688	672
V Year	3840	3072	768

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

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

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

Year	Yearwise Number of animals covered		
	Crossbred	Indigenous	Buffalo
I Year	857	686	145
II Year	1080	864	193
III Year	1364	1091	240
IV Year	1680	1344	305
V Year	1920	1536	384

- 11) By the work done by these two units during the first year, out of the total 1,543 cattle (857 crossbred, 686 indigenous) conceived, 50% (772) heifer calves will be born. Similarly out of 145 buffaloes, 73 buffalo heifer calves will be born.

Year	Yearwise Number of heifer calves born	
	Crossbred	Buffalo
I Year	772	73
II Year	972	97
III Year	1228	120
IV Year	1512	153
V Year	1728	192

- 12) Now calf mortality is taken as 5% for crossbred and 10% for buffaloes. Therefore out of the 772 crossbred heifer calves, 39 will be lost. Similarly out of 73 buffalo calves, 7 will be lost during the first year.

Year	Yearwise Number of heifer calves lost	
	Crossbred	Buffalo
I Year	39	7
II Year	49	10
III Year	61	12
IV Year	76	15
V Year	86	19

- 13) The actual crossbred animal in milk created in the sub basin by intervention by these units during first year will be 1,543 (857 Crossbred plus 686 Indigenous cattle). Similarly 145 buffaloes will be in the milk.

Year	Yearwise Number of animals in milk		
	Crossbred	Indigenous	Buffalo
I Year	857	686	145
II Year	1080	864	193
III Year	1364	1091	240
IV Year	1680	1344	305
V Year	1920	1536	384

- 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 14.65 lakh litres by crossbred (assuming 5.7 lts. is the average yield), 5.19 lakh litres (assuming 2.7 lts. is the average yield) by indigenous and 1.96 lakh litres (assuming 4.5 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	5.7	2.7	4.5	14.65	5.19	1.96
II Year	5.9	2.9	4.7	19.12	7.02	2.72
III Year	6.3	3.1	4.9	25.78	9.47	3.53
IV Year	6.6	3.3	5.3	33.26	12.42	4.85
V Year	7.0	3.5	5.5	40.32	15.05	6.34

- 16) Thus the value of milk in the sub basin will be Rs.199 lakhs during the first year (cost of cow milk is Rs.9/- and buffalo milk is Rs.10/-).

Year	Value of Milk (In lakh Rs.)			
	Crossbred	Indigenous	Buffalo	Total
I Year	132	47	20	199
II Year	172	63	27	262
III Year	232	85	35	352
IV Year	299	112	48	459
V Year	363	135	63	561

- 17) Thus economic return at the end of the project by way of milk will be Rs.561lakhs, an increase of Rs.362 lakhs.
- 18) The cattle heifer calves born during the first year is brought into breeding stock during the 3rd year. Similarly in buffalo 1st year heifer calves is brought into 4th year breeding stock.

Year	Yearwise Female Breeding stock created		
	Crossbred	Indigenous	Buffalo
I Year	9477	33395	8515
II Year	9477	33395	8515
III Year	10210	33395	8515
IV Year	11133	33395	8581
V Year	12300	33395	8668

- 19) The main advantages of the programme

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

OUTCOMES EXPECTED

Sl. No.	Project Year	I Year	II Year	III Year	IV Year	V Year	Total
1	Artificial Insemination Done (In Nos.)	4800	5400	6000	6720	7680	30600
2	Calves Born (In Nos.)	1690	2138	2696	3330	3840	13694
3	Heifer calves born (In Nos.)	845	1069	1348	1665	1920	6847
4	Milk Yield (In lakh Lts.)	21.80	28.86	38.78	50.53	61.71	201.68
5	Value of Milk (In Lakh Rs.)	199	262	352	459	561	1833

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

ESTIMATE FOR ANIMAL HUSBANDRY COMPONENT TO BE INCLUDED IN IAMWARM

PROJECT REPORT

SOUTH VELLAR SUB BASIN

	Components	Physical	Financial (In Lakhs)
1	Productivity enhancement by improving delivery of veterinary services		
	<i>a. Establishment of Sub basin Veterinary Units (SBVU) @ Rs.5,72,720/- per unit</i>	2	11.45
	<i>b. Improving the essential infrastructure in the Government institutions (graduate institutions) @ Rs.33,000/-unit</i>	18	5.94
	<i>c. Improving the essential infrastructure in the Government institutions(subcentres) @ Rs.20,000/-unit</i>	18	3.60
	<i>d. Strengthening the diagnostic facilities in the sub basin by providing special diagnostic tools to sub basin referral institutions @ Rs.3,00,000/- per unit</i>	1	3.00
2	Increasing availability of green fodder in private lands (in ha) - Stylo 25 ha. - Co3 75 ha. - Kolukattai 175 ha		10.50
3	Out reach programmes.		
	<i>a. Infertility cum Total Veterinary Health Care camps @ Rs.6,000 per camp per month for each SBVU</i>	120	7.20
	<i>b. Distribution of mineral mixture @ Rs.1,82,500 per SBVU</i>	2	3.65
	<i>c.). Information, education and communications campaigns</i>	20	11.00
4	Enhancing the knowledge level of human resource		
	<i>a. Training of Farmers</i>	2000	8.00
	<i>b. Enterpruneship training to 31 unemployed veterinary graduates to be placed as Sub basin Veterinary Extension Officer @ Rs.50,000/- per person</i>	3	1.50
	<i>b. Orientation Training for Sub basin Veterinary Extension Officers @ Rs.1,350/- trainee</i>	2	0.03
	<i>c. In-service Training for Veterinarians @ Rs.2,000/- per person</i>	18	0.36
			66.23

Introduction

Trees are a part of global ecosystem with considerable impact on human-ecology. The basic needs of trees "soil, climate, protection" are abundantly available in our country by virtue of its situation in the do in the doldrums. (8° North and 8° south of equator). Trees provide both goods and services. The goods are not only the woody products obtained from the trunks of the trees, but also products derived from the other parts of the trees and from the components of dependant communities e.g. fruits, root tubers, fodder, game-meat, medicines, honey etc. As transition from goods to services is the soil rebuilding role, the protection of soil erosion, producing a continuous flow of clean water, reducing danger of floods, protecting crops and settlements against desiccating winds and excessive temperatures, regulation of microclimate, providing beauty, amenity and recreation. Destruction or overexploitation of trees for production of goods altogether destroy its capacity to provide services and thus its environment value.

Trees as part of our lives:

Every one of us, during each day of our lives, depend to some extent on trees and its products. In fact the old saying "wood is required from cradle to grave" is true in every sense. From birth, man is nurtured in a wooden cradle, play with wooden toys, lives and growth in wooden houses, dies on a wooden cot and finally to flames, with fuel wood or buried in a wooden casket

Similarly look at the house and ceiling we live in, the chairs we sit, the cots we sleep, the beedi-leaf and filters of the cigarettes we smoke, the match-sticks we burn; the pencil we write with ; the fuel we burn for cooking and heating; the lorry and buses-bodies and train-carriages we ride on; the paper and card board we use in so many ways, the media on which news and other printed matter is circulated and read the Rayan cloth we wear, the ships, boats, catamarans and other fishing vessels, we use in our daily life, both as means of living and for communications; the axes, knives, shovels etc., we use in our life the wooden ploughs and carts, so much indispensable for our agriculture will all become useless and immobile without wood our giant industries; like textiles (Bobbins) , pulp and paper mills, Rayan-pulp-factories, plywood, particle-board, fiber-board and similar other factories using fashioned and paneled wood products; Defence equipment (Rifle and gun buttons, gun carriages and other sensitive optical and other scientific equipment); our schools, colleges, and

offices, and in one word every thin in this world; will come to a grinding -halt; if the wood or wood products are withdrawn disappear suddenly to the 80% of rural population live in rural India in villages, sold fuel for cooking ,hunting materials like poles, bamboo, thatching grass etc; fodder and grass for their milch and draught cattle; green-manure for their agricultural production; posts, bamboo, and thorns used for farm and home stead fencing; all form not only an integral part and an ingredient of our rural economy; but also a bare necessity for human and animal survival.

The trees provide oxygen and carbon dioxide this influencing the climate of the entire earth the role played by trees, that act as effectively carbon sinks, is of greater importance now then every before. For these reason, the cluster of trees are often described as the “green lungs” of the earth by the popular press, the underlying implication of this characterization is that the trees absorbs more carbon dioxide (CO_2) during day time in the process of photosynthesis then they emit at night through respiration. The dimensions of the sink have to be increased quickly and substantially if global temperature is to be maintained. The importance of tree cover in all aspects that are already well known (eg. soil conservation, microclimate) also now assumes considerable urgency in the face of increasingly rapid eco-degradation. Plants on the earth surface consume a staggering 6,50,000 million tones of carbon dioxide every year and produce about 3,50,000 million tones of oxygen. In the past two decades, this process has slowed down making eco-restoration an imperative priority

Water forms the vital input for agriculture, industry and household consumption. Assured availability of adequate water throughout the period is essential for successful crop production and over all development. Earth's 97 percent water, which is in the desalinate. Only about one percent water is readily available for use and the irrigated agriculture consumes over 70 percents of water used by people. Industries accounts for more than 20 percent. Households use only about 8 percent. In other words, the domestic water consumption is the only use that is practically minimum of about 100 liters of water per day for drinking, cooking, and washing, in industrial countries people are using as much as 450liters day , while in the developing countries consumption is as low as 20liters water a day. In one-third of India's agro climatic regions there is water scarcity already in terms of per capital demand and supply of water. This imbalance is bound to lead to conflicts at the local, state and the national levels. At presents, thousands of Indian cities do not have sources of water and in future, it would have to be transported over larger distances as the water sources move much more away from the cities. The country's current and future situation can be gaguged by the trend in water availability. Presently, six of India's 20 major river basins already

fall into water scarce category. By the year 2025, five more river basins are feared to be water scarce. Even Brahmaputra, Barak and west flowing rivers will be water insufficient in the times to come. The glaciers of Himalaya are rapidly melting and it is feared that within next 50 to 80 years, most of the glaciers will disappear. The Gangotri glacier has already shrunk backward by several hundred metres. In such a scenario, there will be considerable changes in the runoff pattern of the rivers like Ganga causing floods, loss of property and life, and loss of agro-production. Water is scarce even for drinking purpose, not to talk about its availability for agriculture, industries, etc. India already faces an alarming situation. Its fragile water resources are stressed and depleting while various sectoral demands are growing rapidly even as about 200 million people in the country do not have access to safe drinking water and nearly 1.5 million children under five die each year due to water-borne diseases. The drought conditions in several parts of the country like Gujarat, Rajasthan, Orissa, and Andhra Pradesh are unfortunately on rise. And, disputes over sharing of the water resources are becoming grimmer. India will face a severe water crisis if the available fresh water resources are not managed properly. According to estimates, by the year 2025 the country will face a severe water shortage leading to serious struggles. Also, it is feared that within a few decades availability of water in the country will be about 1700 to 2000 cubic metres per person as against the world average of 5000 to 9000 cubic metres per person. The most tragic part is that water is a finite natural resource and no technology, till date, has successfully contributed to making or producing water for mass consumption. In India the poverty-rich regions tend to be in the climatic zones subject to drought and other water problems as they are least able to afford alternative sourcing. The crisis about water resources development and management thus arises because more of the water is not available or used and secondly it is characterized by its highly uneven spatial distribution. Environmentalists like Sunderlaxmi Bahuguna are not wrong in saying that the acute scarcity of water may force the powerful nations to wage a new global war for the control of the depleted sources of water. Such a parallel makes the future picture essentially depressing.

India is a victim of uneven spatial distribution of water. For example, the hill State of Uttarakhand houses several prominent water bodies but thousands of villages in the state still have to do with insufficient water availability. Similarly, despite being a part of the Ganga river basin, Rajasthan suffers from acute water shortage. Therefore, importance of water has to be recognized and greater emphasis laid on its economic use and better management—simply because in our country, inefficient utilization of water has already created a critical situation. This valuable natural resource of water is

received through precipitation during monsoons which lasts for a short period in a year. In Pudukkottai district, bulk of the annual precipitation is received during north east monsoon and rest of the quantity during the south west monsoon. Notwithstanding the above, human actions have left no stone unturned in accelerating the pace of run off. As a result today, nearly 180 million hectare metre out of the total 400 million hectare metre of rain fall received in India goes as run off. Vegetation that was able to contain most of the run off was unscientifically removed to accommodate development and recourse was taken to engineering structures in lieu. Major and minor irrigation projects constructed by us so far could trap just 20 million hectare metre of run off water. Huge sums of money spent on them have not only not achieved the purpose but created attendant problems of salinity and water logging. At global level it is estimated that as much land is going out of production on account of these problems as being brought under irrigation. As stated earlier, in the scheme of nature, there is more of '**unseen**' water on the land.

A drought proofing measure and serve to ease the water scarcity for human and cattle use as well as irrigation purposes. Water has been the most tangible benefit of tree planting that accrues to the abutting user communities. The utility of the plantations will be quite considerable resulting rise in water table and consequent buoyancy in agriculture. Surface storm flow leaves in basin within minutes, whereas base flow may be retained within the soil mantle for years. The method of disposal of annual precipitation in the wooded environment is shown by the percentages approximately as follows.(figure).

The trees planted on systematic rows/belts in areas characterized by windy conditions, called as shelter belts (or) wind breaks, reduce the velocity of wind. This prevents the wind erosion and reduced evaporation on leeward side so that the moisture is conserved and also gives the crop, livestock, habitations physical protection. In this way, shelter belts benefit crop production.

Conserving water and making it available where it is required most is a major challenge to the present day foresters.

The only viable alternative to attempt to bridge the gaps in production and simply, feeding the "hungry mouths", the constant casualty of human development and to patch up the punctures in the environment is by expanding the green cover to protect our "mother" earth. We need more natural vegetation to check the environmental pollution, and these greeneries act as lungs, which help to purify the air, we inhale and improve our overall microclimate. The Green area serves as an important role in sustaining natural ecosystem and act as a shelter belt or Buffer zone

against noise and air pollution. These wooded areas, also provide suitable habitats for variety of animals and birds and act as rest places, for a brake in the hectic life style of our citizens. In this context the trees becomes crucial and planting them wherever the land is available and whatever manner it can be done. Today, "Mother" earth needs proper clothing (mulch), nutritious food (organic inputs), pest protection (biological repellents), companionships (Trees/cotps), message (being lightly trampled by cattle and farm animals), and a little warmth (?) by human beings. With this perspective, Governments owe to take up massive tree planty to cover all potential sites/blanks by involving stakeholders such way of achiving 25% tovest cover by 2007 cd 33% forest cover by 2012.

Soil Protection

Soil like climate play essential role with growth and development of agricu ltur e and allied activities. They provide water, nutrient and medium of support to crops soil are derived from parent material of different mineral composition and these differences result is soil properties that influence both composition and rate of grow th of vegetation over it.

Due to loss of vegetation we find frequently soil erosion in all kind of lands and landslips on the hills. The valuable top soil available for agriculture is lost. Again the dams and tanks and are also getting starup by the soil erosion through swells and rivers. Soil is our most valuable and limited resource. It needs special care to check unwanted losses of nutrient resource through erosion, which in terms of major nutrient (NPK) alone represents an annual loss of about Rs. 700 Crores in India.

The soil erodibility, or its susceptibility to erosion, depends mainly on two physical attributes: infiltration capacity and detachability. One of the major factors influencing these attributes, which is affected by tress, is the humus c ontent of the soil. Trees exert a positive influence on both water infiltration and soil detachability as a result of sustained litter inputs into the soil and favorable microclimate conditions under tree canopies for various soil organisms that affect soil processes such as decomposition, humificatio and pore formation.

In this context the role of trees becomes crucial. Trees can protect soil against surface erosion by various processes, they affect both the erosive agent (water) and the medium being eroded (soil), influencing the agent and medium being not only independently, but also at the soil surface where mediums and agent interact. They prefect the environment by reducing erosion and replenishing the soil by replacing

nutrients used by crops. Barren area accelerate soil erosion losses from the catchment areas and increase the levels of sediments in the streams. Checking soil erosion and denudation in the catchment area of rivers, lakes, reservoirs in the intersects of soil and water conservation for mitigating floods and droughts and for the retardation of siltation of reservoirs.

A clearly enunciated policy expressing commitment to the causes of "Conservation of Nature" inspired by environmental consideration: has been enshrined in our constitution under Article 48(A) which states that: "The State shall endeavour to protect and improve the environment and to safeguard the forests and Wild-life of the country".

Article 51(A) (g) prescribes a duty to every citizen in that:

"To protect and improve the natural environment including forest, lakes, river and to have compassion for living creatures".

BACKGROUND INFORMATION

River Cauvery and its tributaries forming the Cauvery delta is spread over an impressive area of 30000 ha in Thanjavur, Thiruvarur and Nagapattinam Districts of Tamilnadu. The river and its irrigation canal systems running to about 10000 km were originally devoid of tree growth but subsequently teak was found to come up well. It was first introduced to the delta in 1956 on an experimental basis and established well. An 80 year old tree of impressive dimensions was spotted near a Public Works Department Rest House by the late Chief Conservator of Forests V.S.Krishnaswamy in 1950 and he initiated action for large scale planting under to second V year plan in 1956. There after there was no looking back and teak planting along the river and canal banks was taken up successfully year after year.

The Value of the existing plantations in the Cauvery delta itself is about Rs.100 Crores. The area has the potential for raising Rs.1000 crores worth of teak plantation along river and canal banks and in gaps in existing plantations. The teak avenue plantation raised in 1976 in Nadupadugai at 2x 2m espacement on either side of the canal showed one of the most impressive growth rates i.e., more than 20m height and 1.5m girth when measurements were last taken over 5 years back. Each tree would fetch at least Rs.20,000/- if sold. It is proposed to tap this potential in this protect continuing the work starts the lact C.C.P in other area specially at along river padugal

and canal irrigation networks of dams such as Mettur, Aliyar, Bhavanisagar, Thirumurthy, Vaigai etc., These canals are under severe threat of encroachment and raising teak plantations is one way of preventing further encroachments. Teak plantations along canal banks also provide different kind of protection and these areas are found to be wider and stronger. In unplanted areas bunds are narrower and encroachments seen. Planting also provides employment and when harvested teak is bound to improve the economy of the local people.

Objectives of Project

To raise teak plantations on canal and river banks (Padugal) in Tamilnadu. Increase the availability of teak timber in the market for use by people. Ensure production of good quality of poles and timber of different classes through use of better inputs. Utilise the currently unused Government lands specifically river and canal banks. Generate employment for local people and improve their standard of living. Improve the local economy as well as economy of the state.

Techniques for Raising Teak Plantation Stump Raising

This is the method to be followed. Stumps will be raised for about one year in the nursery since these are supposed to be best for planting. These good quality stumps will be planted in 10x20 cm polybags for about 3 months and the container stumps will be planted. By raising good quality seedlings and planting teak stumps along the river and canal banks, in both linear and compact planting methods during pre monsoon period success of the plantation will be ensured.

Planting:

Good quality teak container seedlings raised in nursery would be planted in 30 cm pits dug well in advance. Planting in pits is necessary to ensure water availability during pre-monsoon and drought periods after planting is over. The planted container seedlings are watered for alternate days during the first ten days after which watering is continued once in five days till the first monsoon showers are received. The container seedling establishes in about 20 days from planting, well before monsoon. Once monsoon showers begin the established seedling starts to grow faster. When the monsoon is over and dry spell sets in watering is done once in 5 days using women

labourers. The weeds and climbers that grow following monsoon rains are removed in weeding operation around each stump and soil working done to boost the growth.

Cultural Operation

The planted teak stumps establish well and grow to an average height of 6 feet in a year. In the 2nd year following planting, side branches and thick leaves at the bottom are removed leaving behind only the main stem. Leaves are removed in 2/3rd of the portion of main stem from the bottom. Pruning of side branches is carried out a second time during the seventh year of planting. Soil working and weed removal along with climbers is continued till the 3rd year while casualty replacement is done within 2 months from planting in the first year itself. A Second casualty replacement operation is undertaken during the 2nd year during monsoon period

Weeding and soil working are done during the first year as per usual prescription. The first weeding is done alongwith soil working to a depth of 15 cm and to a radius of 50cm around each plant a month after planting. A Second weeding is done towards the end of the monsoon period but before the last showers are over. During the Second year two weedings will be done first in October alongwith replacement of casualties and then in December/January. During the third year pruning and climber cutting operations should be done alongwith cutting back in damaged plants for best results.

Pruning upto 2.5m height is done in all plants with a sharp knife during the third year along with cutting back of damaged plants. Besides, pruning would also be done at the time of silvicultural thinning as mentioned in marking rules.

Estimate for Raising Teak Plantation

S			F.S.R			
No	Qty	Description Work	No	Rate	Per	Amount
		Capital Cost				
1	11000	Cost of Polythene Bags	As per the Model Estimate	461.64	1000	5,077.00
2	250 kg	Cost of Teak Seeds	App. By the C.F	39.60	Kg	9,900.00
3	7.5m ³	Farm Yard Manure for beds including Transporting Charges	Trichy 2005-2006	209.00	m ³	1,567.00
4	11000	Application of Fertilizer	"	500.00	2200	2,500.00
5	11000	Transporting of Teak Container seedlings from Nursery site to planting site upto 0.5 km in bag size 13x25x300g	"	296.71	1000/5 km	3,264.00
6	11000 Nos / 200kg	Application of Bio-fertilizer of the plants @ 20 gram per plant	"	1750.00	2200 / 40kg	8,750.00
7	5 No.	Erection of Name Board	"	500.00	1No.	2,500.00
		Sub Total	"			33,558.00
		B.Labour Cost	"			
8	1000m ³	Clearing the Nursery Site	"	200.01	200m ²	1,000.00
9	50 beds	Forming Nursery beds of 10mx1mx30cm with side supporting dibbling of seeds	"	26.00	-	1,300.00
10	50Nos/ 30days	Watering the mother beds twice daily third days	"	67.77	10 No / days	10,166.00
11	50Nos/ 30days	Watering one daily for 30 days	As per the Model Estimate 2005-06	33.89	10 Days	5,084.00

12	50 days/ 30 W.Da	Alternate days 30/ watering days	"	33.89	10 Days	5,084.00
13	50 Nos. / 30 Days	Once in a week till planting	"	33.89	10 Days	5,084.00
14	10Nos.	Digging water storage pits Top 3mx3m Bottom 2.1m x 2.1 m	"	105.00	1 No.	1,050.00
15	10000/ 5km	Clearing the planting Site	"	9.50	200 No.	475.00
16	10000	Aligning and markeing	"	114.06	1000	1,141.00
17	10000	Digging 45cm ³ pits in canal bank plains	"	266.99	100	26,696.00
18	11000	Preparation of Teak Stumps	"	495.90	1000	5,455.00
19	11000	Planting in container plants with Teak Stumps	"	511.20	1000	5,623.00
20	11000	Watering the container Teak daily once for 30 Days	"	33.89	1000	5,591.00
21	11000	Watering the container Teak alternate days for 60 days 30 Watering days	"	33.89	1000	5,591.00
22	11000	Loading an unloading of container plants	"	126.45	1000	1,391.00
23	10000	Plantig Container seedlings in 453cm ³ pits duirng Sep	"	95.05	100	9,505.00
24	10000/ 7W.Da ys	Watering Alternate days with one pot of water of First 14 days from the date of planting / 7 W.days	"	257.50	1000	18,025.00
25	10000/ 18W.D ays	Watering during dry season once in five days from January to March	"	257.50	1000	46,350.00
26	50 Nos.	Digging wells a one well for 200 plants of 1.5 mt raiodius and 2 mt depth	"	55.65	No.	2,783.00
27	1000	Replacement of Casualties	"	228.53	1000	2,285.00

28	10000/ 2Times	Scrap weeding and soil workign twice	"	101.66	1000	20,330.00
29	5000	Fencing around the plants to a dia of 1 met and height of 1mt.	"	15.00	No.	75,000.00
30	10 Nos / 9 months	Protection watch and ward from first July to 31st March Two Labour for 10 ha. (9 months)	"	818.00	1 Months	73,620.00
		Sub Total	"			3,62,172.00
	LS	Contingences for unforeseen expense	"			2,278.00
		Total				3,64,450.00
		Raising cost for 11000	3,64,450.00			
		15700 nos	5,20,141.00 or 5,20,000.00			

RAISING AND SUPPLY OF JATROPHA, EUCALYPTUS AND MISC. SPECIES TO AYACUT DHARS

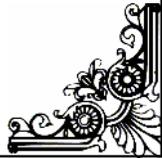
The Ayacut Dhars of South Vellar Project has demanded to supply Jatropha, E.H. and misc. species. It is proposed to Raise 30,000 Nos. of Jatropha curcus species, 35,000 Nos of Euc.Hybrid species and 78,000 Nos. of misc. species such as Parambai, Neem, Punga, Naval, Neermaruthu, Nelli and Acacia Species etc. to fullfill the needs to the Ayacut Dhars.

CONCLUSION

As conveyed in the meeting a joint walk through exercise were done around 20 villages and Ayacut Dares opinion has been collected. Based on that detailed draft project proposal has been prepared and submitted for approval.



FISHERIES DEPARTMENT



SOUTH VELLAR

FISHERIES PROPOSALS

There is vast scope for aquaculture development in South Vellar Sub basin. There is no reservoir fisheries in this sub basin. There are 316 PWD Irrigation tanks located in the sub basin. They receive water during North East Monsoon. The current estimated fish production is about 100 Kg/ha/year. Predominantly natural fishery which is constituted by Tilapia and minor carps is been exploited. Only very few tanks are utilized for composite fish culture using fast growing carps.

There are five fisherman co-operative societies in the sub basin. Mostly capture fisheries is done by them. There are no fish seed farm located within the basin. However private farms are functioning in the nearby Thanjavur District.

Considering the above existing scenario of the Fisheries activities the following

PROPOSALS ARE MADE

1. **FISH SEED BANK:**

Availability of quality advanced fingerlings at the appropriate time (ie) when the tanks receive water, for stocking is the most important factor influencing aquaculture in the composite fish culture system. Hence to make available advanced fingerling in the sub basin for stocking in suitable water, two fish seed banks are proposed which shall be owned and operated by WUA or members of Fishermen Co-operative Society.

The seed bank with a total water spread area of 600sqm. shall have an out put of 3 lakhs advanced fingerlings. The cost of production will be Rs. 58,000/- for 3 lakhs. The value of this is 2.4 lakhs @ Rs. 800per 1000/- Nos. The Fish seeds out put of 6 lakhs will meet the fish seed requirement of 600 ha of effective WSU of the sub basin. The fish production estimated at 400 kg/ha and total production will be 240 tonnes/ Crop.

2. **FISH SEED REARING IN CAGES:**

Fish seed rearing in net cages is an effective and simple technology. One unit of cage shall have 3 types of cages, will be fixed in tanks having water depth of more than 5 feet and fish seeds reared from early fry to late fry. It is proposed to introduce 10 cage units to be operated and managed by WUAs OR Fishermen Co-operative Societies. The investment cost is Rs.14,000/-per unit and operations cost per year/3 cycles is Rs.16,000/- per unit. The estimated production of advanced fingerling from the 10 cage unit is 6 lakh/annum. A net revenue of Rs. 32,000shall be generated by operation a single unit of cage. This shall be the stocking material for 600ha of effective water spread in this sub basin. Anticipated table fish production is 400kg/ha and the total production will be 240 tonnes/year.

3. **AQUACULTURE IN FARM PONDS:**

Farm Ponds are excavated in the farmers field as a rain water harvesting storage, and as a source of critical irrigation. The Agricultural Engineering Department is identifying the geographic location and execute the excavation. As a source of additional income generating activity aquaculture will be promoted by providing aquaculture inputs like seed, feed etc. To make the pond retain water for a reasonable period of time (>4 months) a clay layer of about

20cm will be provided on the pond bottom to avoid seepage. The total estimated cost of aquaculture input for one farm pond is Rs. 16,500/- and 30 farm ponds will be brought under aquaculture. One of the farm pond having ground water source will be utilized/encouraged to rear stock size fish seed (about 50g) which will serve as stocking material to 30 farm ponds. The number produced will be 30,000 in a rearing period of about 75 day at 10% survival. The fish production in Farm Pond will be 600Kg/crop and the anticipated net revenue is about Rs. 10,000/-.

4. **SUPPLY OF FISHING IMPLMENTS:**

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

TRAINING AND CAPACITY BUILDING

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

CONCLUSION:

- The total fish fingerlings estimated to be produced from the two seed bank s and ten cage unit is about 12 lakhs.
- This will be the stocking material for stocking 1200 ha of effective water spread area.
- Private investors are enthused to invest in fish seed rearing unit.
- Agriculture farmers shall get an additional income of about R s.10000/- from aquaculture in farm ponds.

Abstract of proposals

	South Vellar	Unit	Rs. in Lakhs					Total
			1 year	2 year	3 year	4 year	5 year	
1	Seed bank	2		29				29.00
	Operational cost			1.16	1.16			2.32
2	Aquaculture in farm ponds	30		1.65	1.65	1.65		4.95
3	Supply of fishing implement							0.00
	a) Drag Net.	10		2.00				2.00
4	Fish Seed Rearing in Cages	10		0.70	0.70			1.40
	Operational cost			0.80	0.80			1.60
5	Vehicls Hire charges		0.40	0.40	0.40	0.40	0.40	2.00
6	Documentation		0.10	0.10	0.10	0.10	0.10	0.50
	Total		0.50	34.23	4.23	2.15	0.50	43.77

DETAILS FOR ONE UNIT - FARM POND.

A. Fixed Cost

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

B. Operational Cost (in Rs.)

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

 TOTAL 11,500.00

C. Returns

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

Fish Seed Bank (production and Selling)

Water Spread Area	Sq.m	600
Culture Period	months	50 to 60 days per cycle. Totally 3 cycles
Depth of Water	meter	1.0 meter

				With Project			
				Quantity	Financial Unit Price	Financial Value	Economic Value
					(Rs)	(Rs/Pond)	(Rs/Pond)
				<u>Units</u>	<u>(Rs)</u>	<u>(Rs/Pond)</u>	<u>)</u>
INPUTS, Fixed costs							
Nursery construction							
(Masonry)	LS	1300000		1	1300000		1170000
5 HP Motor cost	LS	20000		1	20000		18000
Pumpshd/pipeline	LS	50000		1	50000		45000
Equipments-							
Nets/Velon/screen	LS	50000		1	50000		45000
Electricity Service							
Connection	LS	30000		1	30000		27000
						1450000	1305000
INPUTS, Recurrent costs							
Lime	Kg	200		5	1000		900
Cowdung	Ton	1.0		1000	1000		900
	Lakh						
Fish early fry	No				0		
	Lakh						
Catla/Rogu/Mirgal	No	6		1000	6000		5400
	Lakh						
Common carp	No	3		1000	3000		2700
Feed Mix	Kg	3000		10	30000		27000
Electricity	LS	6000		1	6000		5400
Rice polish	Kg	0		6	0		
Labour	LS	100		100	10000		9000
Prophylactic measures	LS	1000		1	1000		900
Sub Total	Rs				58000		52200
OUTPUT							
Percentage of recovery							
Fish fingerlings, 7.5 cm each							
Catla/Rogu/Mirgal	%	40%					
Common carp	%	20%					
Fish production							
	Lakh						
Catla/Rogu/Mirgal	No	2.4		80000	192000		172800

	Lakh				
Common carp	No	0.6	80000	48000	43200
Gross Income	Rs			240000	216000
Net Income	Rs			182000	163800
INCREMENTAL NET INCOME	Rs			182000	163800

Fish Seed Cages

Cages Required	cum		40		
Culture Period	months	45 days per cycle. Totally three cycles			
Depth of Water	meter	1.5 meter			
-		With Project			
		Financial		Financial	
		Quantity	Unit	Value	
			<u>Price</u>		
	<u>Units</u>	-	<u>(Rs)</u>	<u>(Rs/Pond)</u>	
INPUTS, Fixed costs					
P40 (10*4*1 meters)	40 cum	1	4500	4500	
P16 (10*4*1 meters)	40 cum	1	4000	4000	
P 8 (10*4*1 meters)	40 cum	1	3500	3500	
Materials (casuarina/wires/buckets)	LS	1	2000	2000	
				14000	
INPUTS, Recurrent costs					
	Lakh				
Fish early fry	No				
	Lakh				
Catla/Rogu/Mirgal	No	2.00	1000	2000	
	Lakh				
Common carp	No	1.00	1000	1000	
Feed Mix	Kg	1000.00	10	10000	
Labour	LS	20.00	100	2000	
Other unforeseen expenditure	LS	1000.00	1	1000	
Sub Total	Rs			16000	
Procurement/storage/selling					
OUTPUT					

Percentage of recovery			
Advance Fish fingerlings, 7.5 cm each			
Early fry to late fry	%	50%	
Late fry to Fingerlings	%	70%	
Fingerlings to advanced fingerlings	%	60%	
Advance Fish fingerlings	Lakh		
production	No	0.63	80000
			50400
Gross Income	Rs		50400
Net Income	Rs		31800
INCREMENTAL NET INCOME	Rs		31800