Tamil Nadu Agricultural University

Tamil Nadu Irrigated Agriculture Modernization Project

(TN-IAMP) - Phase III

DETAILED PROJECT REPORT

On

MANIMUKTHANADHI

Regional Research Station
Vridhachalam

TAMIL NADU AGRICULTURAL UNIVERSITY

Manimukthanadhi Sub- basin

1. Introduction about the operating centre

1.1. About Regional Research Station, Vridhachalam

Regional Research Station, Vridhachalam is functioning under Tamil Nadu Agricultural University, Coimbatore. This station is situated about 3 km from Vriddhachalam bus stand on Cuddalore Main road. It lies between 11.30°N latitude and 79.19°E longitude and at an altitude of 45 m above MSL in the north eastern zone of Tamil Nadu.

1963 Established as Cashew Research Station

1971 Recognized as one of the Centres under AICRP (Cashew)

1979 Inception of All India Coordinated Research Projects on Groundnut

1979 Inception of All India Coordinated Research Projects on Sesame

1982 Upgraded as Regional Research Station under NARP for North Eastern Zone

1.2. Mandate/Objectives of the station

- To develop high yielding varieties in cashew, groundnut and sesame
- To evaluate and test the adaptability of elite breeding materials
- To develop location specific technologies for increasing the production and productivity of major crops of the region
- To impart training to the farmers and staff of allied departments on crop production technology

1.3. Research Achievements

Regional Research Station, Vridhachalam is the lead centre for research on oilseeds in the state. Since its inception, the centre has made significant progress in groundnut, sesame and cashew research to improve the productivity. So far RRS, Vridhachalam has released 9 varieties in groundnut, 3 varieties in sesame, 4 varieties in cashew and one hybrid in cashew. The technologies *viz*., Agro techniques to optimize the plant density in groundnut, weed

management in groundnut, comprehensive package for post flowering nutrient management in groundnut were developed. Technologies for the control of root rot and late leaf spot in groundnut were developed. Optimized nutrient management technology for sesame. High density planting system, pruning technology and fertilizer schedule were developed for cashew. Spray schedule for the control of tea mosquito bug in cashew were developed.

Project Outline

TNAU is one of the implementing agencies involved in the project. The project would give special emphasis on enhancing crop production to have better market access, crop diversification, value addition and climate resilient agriculture in the sub-basins of Tamil Nadu. TNAU would address all the tasks with the interventions for the crops. It will also spread the technologies demonstrated in all the sub basin areas.

Specific Objectives

- Conducting on-farm trials to identify the location specificity of agricultural technologies under various farming systems.
- Organizing frontline demonstrations to establish production potential of various crops and enterprises on the farmers' fields.
- Organizing need based training of farmers to update their knowledge and skills in modern agricultural technologies related to technology assessment, refinement and demonstration, and training of extension personnel to orient them in the frontier areas of technology development.
- Creating awareness about improved technologies to larger masses through appropriate extension programmes.
- Production and supply of good quality seeds and planting materials, livestock, poultry and fisheries breeds, products and various bio-products to the farming community.
- Work as resource and knowledge centre of agricultural technology for supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district.

2. Description of the Vellar Basin

The Vellar river basin is one of the seventeen river basins of Tamil Nadu. Vellar river basin located in Salem, Villupuram, Perambalur, Ariyalur and Cuddalore districts of Tamil Nadu. The Vellar river originates in the Chitteri Hills of Dharmapuri District in the name of Anaimaduvu river and Thumbal river and Singipuram river are originates at Jallattu reserve forest area at 8 Km east of Salem in Salem district and flows through Villupuram, Namakkal , Perambalur and Ariyalur District and Cuddalore District finally falls into the Bay of Bengal. The Vellar basin is situated between the coordinates of N latitude 110 13'-12000' and E Longitude 780 13' - 790 47'. The Vellar basin is bounded by Pennaiyar and Paravanar basins at north, Cauvery basin in the west & south the Bay of Bengal in the east. This basin has been divided into 7 sub-basins namely as follows;

1. Upper Vellar
2. Swethanadhi
3. Chinnar
4. Anaivariodai
5. Gomukhi nadhi.
6. **Manimukthanadhi**
7. Lower vellar.

Scientists Involved

Dr. K.Subramaniyan	:	Professor & Head TNIAMP Implementing Centre Head
Dr. T. Parthipan	:	Assistant Professor (Agronomy) Scientist In-charge TNIAMP – Manimukthanadhi Sub Basin

2.1. Description about the sub-basin

The basin originates in Kalryan hills with drainage Area of 749.54 Km having two drainages namely Mani river and Muktha river originating in the Northern part of the Eastern slope of the Kalrayn hills in Sankarapuram taluk at an altitude of about 40 km and the Muktha river flows for 32 km. These two rivers confluence Manimukthanadhi sub basin having 18

anicuts, 49 PWD tanks and one Manimukthanadhi reservoir having the total ayacut of 5027 hectares. Average rainfall is 950 mm in this sub basin.

2.2. Proposed Project area at a glance

S. No	Particulars	Area (Ha)
1	Total registered ayacut area	2834.21
2	Full irrigated area	1275.27
3	Partially irrigated area	1011.65
4	Gap area	547.29
	Total	**2834.21**

2.3. List of Blocks covered in Manimukthanadhi sub basin with ayacut in ha.

District	**Block**	**Taluk**	**Tanks**		**Anicut**		**Total Ayacut**
			Nos.	**Ayacut**	**Nos.**	**Ayacut**	
Kallakurichi	Kallakurichi	Kallakurichi, Sankarapuram	5	716.86	3	11.34	728.20
	Sankarapuram	Sankarapuram	9	693.95	5	88.14	782.09
	Rishivandiyam	Sankarapuram	5	118.21	0	0	118.21
	Thiagadurgam	Kallakurichi, Sankarapuram	13	946.26	2	60.77	1007.03
	Chinnasalem	Kallakurichi	2	198.68	0	0	198.68
	TOTAL		**34**	**2673.96**	**10**	**160.25**	**2834.21**

In the Manimuktha Nadhi sub basin, 33 Tanks (33 Non-system Tanks), 31 supply channel and 11 anicuts.

Tank Ayacut (33 Tanks) : 2356.96
Anicut Ayacut (11 Anicuts) : 149.88
Total Ayacuts : 2506.84 Ha.

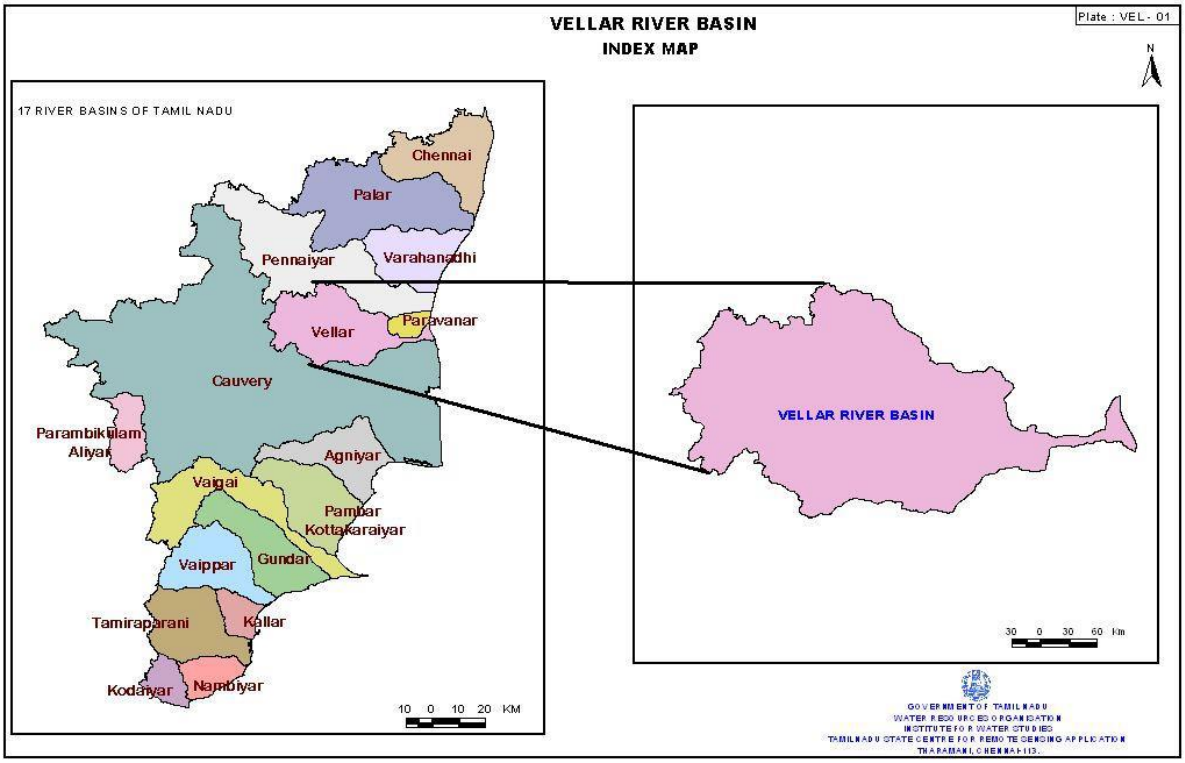
One tank namely Alathur tank left out in this proposal. Seshasamuthram anicut included in this proposal now which is taken under Kudimaramath 2019-2020 because of the dispute between the ayacut dhars and work dropped and intimated to the Government. Hence it is included in this proposal. Ka. Alambalam tank is not taken in this proposal because it was taken

under Kudimaramath scheme 2020-21 and administrative sanction approval for Rs. 50 Lakhs. But the ayacut included in this proposal for agricultural improvements related activities doing by line departments.

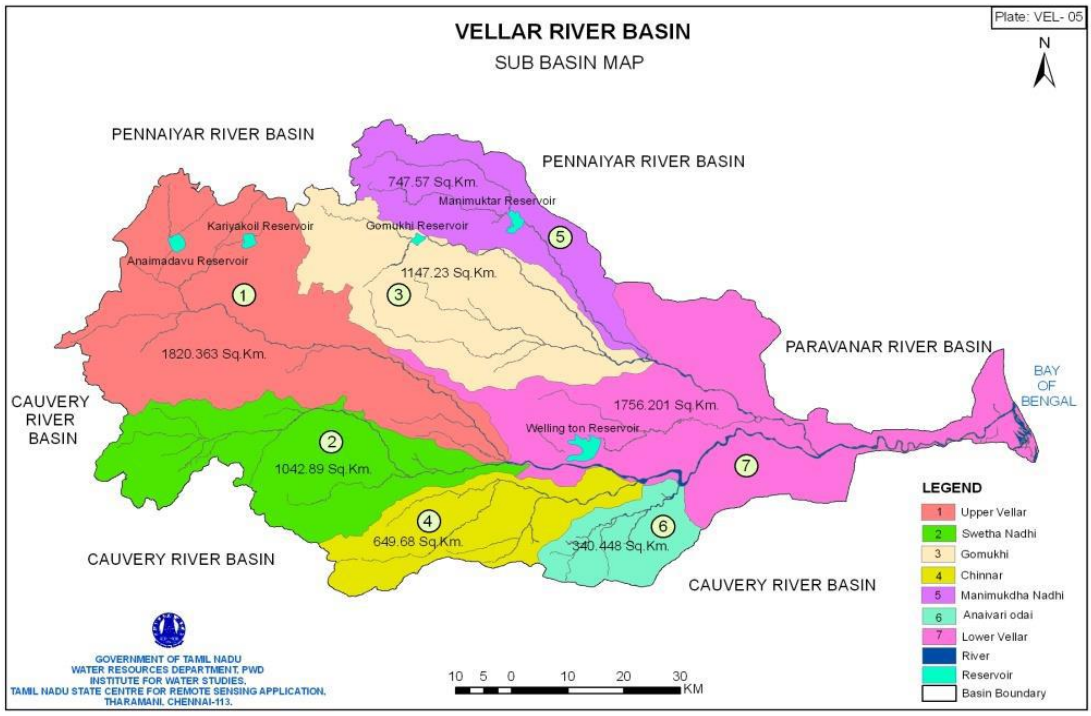
The work Proposed in this sub basin, 34 Tanks (Non – system Tanks), 31 supply channel and 10 anicuts.

Tank Ayacut (34 Tanks)	:	2673.96 ha
Anicut Ayacut (10 Anicuts)	:	160.25 ha
Total Ayacuts		**2834.21 Ha.**

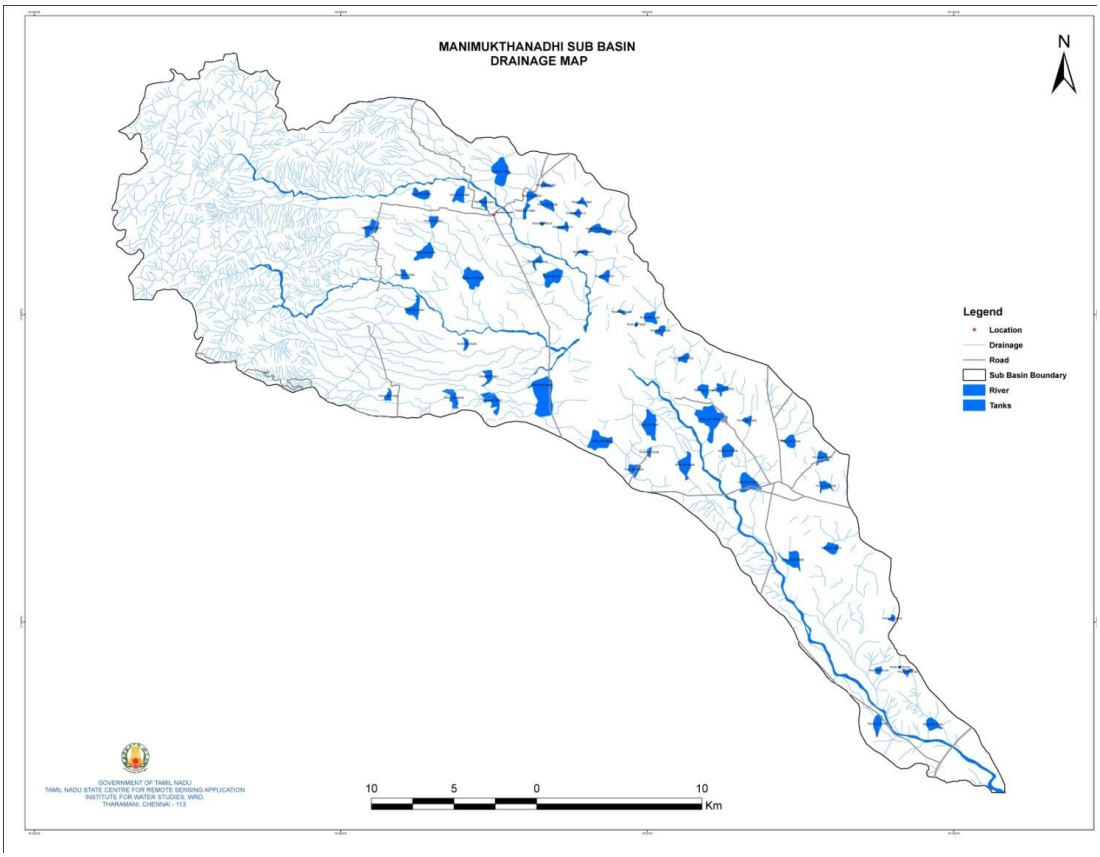
2.4. Sub-Basin map



Index Map of Vellar River Basin



Sub-Basin Map



Manimukthanadhi Sub-basin Drainage Map

2.5 Rainfall details (mm)

Sl. No	Season	Rainfall Range (mm) (1971-2011)
1	Winter	129 – 0.0
2	Summer	566 – 3
3	South West Monsoon	720 - 151
4	North East Monsoon	1142 – 154
	Annual Range	1894 (2005-06) to 528 (1974-75)
	Annual Av. Rainfall (mm)	**1056.50**

2.6 Details of Soil Types in the Sub Basin

The predominant soil types found in this sub-basin are Inceptisol, Alfisol and Vertisol. Inceptisol are suitable for growing crops like, paddy, millets and pulses. Alfisol is the soil type that best suited for cultivation of Groundnut, Pulses, Vegetables, and coconut. Vertisol is suited for cultivating rainfed pulses and groundnut.

2.7 Season-wise focus crops

Though paddy is the mainstay of farming, the other crops also are cultivated in considerable area in the Manimukthanadhi sub-basin.

S. No	Season	Main crops cultivated
1	*Kharif*	Paddy, Maize, Pulses, Oilseeds
2	Rabi	Paddy, Pulses
3	Summer	Paddy
4	Perennial	Fodder crops
5	Annual	Sugarcane and Tapioca

3. Objectives/Interventions:

- Agricultural intensification by improved production technology crop demonstrations.
- Crop diversification with Pulses and oilseeds.
- Climate resilient activity in all the intervention crops.
- Reduce the inorganic fertilizers and pesticides as it affects the Soil health and Environment
- Information Education, Communication and Capacity Building activities

4. Implementation strategy

Project will be implemented using the following strategy in order to achieve increasing water productivity in irrigated agriculture.

- Irrigated Agriculture.
- More production per drop of water.
- Work in convergence with line Departments.
- Cluster approach.
- Crop diversification.
- Sub Basin approach.
- Dove tailing with other departmental schemes.
- Interventions finalized in consultation with the stake holders based on PRA exercise.
- Facilitate AMD to form crop wise commodity groups / FPO/ FPC.

5. Existing crop scenario in the sub-basin

Paddy, Sugarcane, Pulses, Maize, Oilseeds and Tapioca are important crops cultivated in the sub-basin.

6. Existing cropping system in the sub-basin

1. Paddy – Paddy
2. Paddy – Pulses/Oilseeds.
3. Millets-Pulses/Oilseeds
4. Sugarcane/Tapioca

7. Details of Manimukthanadhi Sub Basin – Cropping Pattern- Viluppuram

Name of the sub Basin **: Manimukthanadhi** Fully Irrigated : 1275.27 Ha
Nodal District : **Viluppuram** Partially Irrigated : 1011.65 Ha
Registered Ayacut Area **: 2834.21** Gap : 547.29Ha
No. of WUAs : Total Ayacut Area : **2834.21** Ha

S. No.	Crop	Without Project				With Project				Increasing
		FI	PI	RF/G	TOTAL	FI	PI	RF/G	TOTAL	
I	**Perennial crop**									
1	Coconut	0	0	0	**0**	0	0	0	**0**	0
2	Mango	0	0	0	**0**	0	0	0	**0**	0
3	Guava	0	0	0	**0**	0	0	0	**0**	0
4	Casuarina	0	0	0	**0**	0	0	0	**0**	0
5	Fodder crops	10	0	0	**10**	44	0	0	**44**	34
	Total	**10**	**0**	**0**	**10**	**44**	**0**	**0**	**44**	34
II	**Annual Crop**				**0**				**0**	0
1	Sugarcane	152	0	0	**152**	95	0	0	**95**	-57
2	Banana	0	0	0	**0**	0	0	0	**0**	0
3	Tapioca	85	0	0	**85**	250	0	0	**250**	165
	Total	**237**	**0**	**0**	**237**	**345**	**0**	**0**	**345**	108
III	**1st crop**									
1. a	Paddy	886.27	0	0	**886.27**	131	0	0	**131**	-755.27
b	Paddy - SRI	85	0	0	**85**	710	0	0	**710**	625
2	Maize	0	255	0	**255**	345	0	0	**345**	90
3	Ragi	0	131	0	**131**	173	0	0	**173**	42
4	Minor Millets	0	82	0	**82**	120	0	0	**120**	38
5	Pulses	0	363.65	0	**363.65**	528.21	0	0	**528.21**	164.56
6	Groundnut	0	135	0	**135**	169	0	0	**169**	34
7	Gingelly	0	45	0	**45**	62	0	0	**62**	17
8	Bhendi	21	0	0	**21**	51	0	0	**51**	30
9	Brinjal	5	0	0	**5**	15	0	0	**15**	10
10	Chillies (Green)	10	0	0	**10**	20	0	0	**20**	10
11	Snake gourd	5	0	0	**5**	20	0	0	**20**	15
12	Bitter gourd	1	0	0	**1**	16	0	0	**16**	15
13	Small Onion	10	0	0	**10**	65	0	0	**65**	55
14	Watermelon	5	0	0	**5**	20	0	0	**20**	15
15	Fallow	0	0	547.29	**547.29**	0	0	0	**0**	-547.29
16	Non Agrl. Purposes	0	0		**0**	0	0	0	**0**	0
	Total	**1028.3**	**1011.65**	**547.29**	**2587.21**	**2445.21**	**0**	**0**	**2445.21**	-142
	G. Total (I+II+III)	**1275.27**	**1011.65**	**547.29**	**2834.21**	**2834.21**	**0**	**0**	**2834.21**	0

S. No.	Crop	Without Project				With Project				Increasing
		FI	PI	RF/G	TOTAL	FI	PI	RF/G	TOTAL	
IV	**2 nd crop**				**0**				**0**	0
1. a	Paddy	210	0	0	**210**	110	0	0	**110**	-100
b	Paddy - SRI	65	0	0	**65**	485	0	0	**485**	420
2	Maize	0	0	0	**0**	0	0	0	**0**	0
3	Ragi	0	0	0	**0**	0	0	0	**0**	0
4	Minor Millets	0	0	0	**0**	0	0	0	**0**	0
5	Pulses	0	155	0	**155**	316	0	0	**316**	161
6	Groundnut	0	0	0	**0**	0	0	0	**0**	0
	Total	**275**	**155**	**0**	**430**	**911**	**0**	**0**	**911**	481
V	**3rd crop**				**0**				**0**	0
1. a	Paddy	205	0	0	**205**	95	0	0	**95**	-110
b	Paddy - SRI	55	0	0	**55**	463	0	0	**463**	408
2	Maize	0	0	0	**0**	0	0	0	**0**	0
3	Ragi	0	0	0	**0**	0	0	0	**0**	0
4	Minor Millets	0	0	0	**0**	0	0	0	**0**	0
5	Pulses	0	0	0	**0**	0	0	0	**0**	0
6	Groundnut	0	0	0	**0**	0	0	0	**0**	0
	Total	**260**	**0**	**0**	**260**	**558**	**0**	**0**	**558**	298
	Grand Total	**1810.3**	**1166.65**	**547.29**	**3524.2**	**4303.2**	**0**	**0**	**4303.21**	779
	Cropping Intensity				**146%**				**178%**	**32%**

8. Existing constraints, challenges and countermeasures.

Constraints	Challenges	Counter measures
Lack of quality planting materials		Supply of certified seeds of agricultural crops
Water shortages		Implementation of AWDI for rice in larger area in the sub-basin and adoption of drip fertigation in annual crops.
Pest problems	Endemic outbreak in occasional cases	Use of bio-control agents and integrated pest management
Lack of Community approach in farming	Lack of awareness	Formation of FPOs
Market rejection of produces due to Pesticide	Lack of awareness	Adoption of eco-friendly practices

residue problems		
Soil health deterioration	Continued usage of inorganic fertilizers at considerable level.	Soil test based fertilizer application to crops
Environmental pollution	Lack of ecofriendly inputs	Supply of bio inputs like Pseudomonas, Biofertilizers like Azospirillum, Phosphobacteria and Rhizobium

9. Details of Walkthrough survey

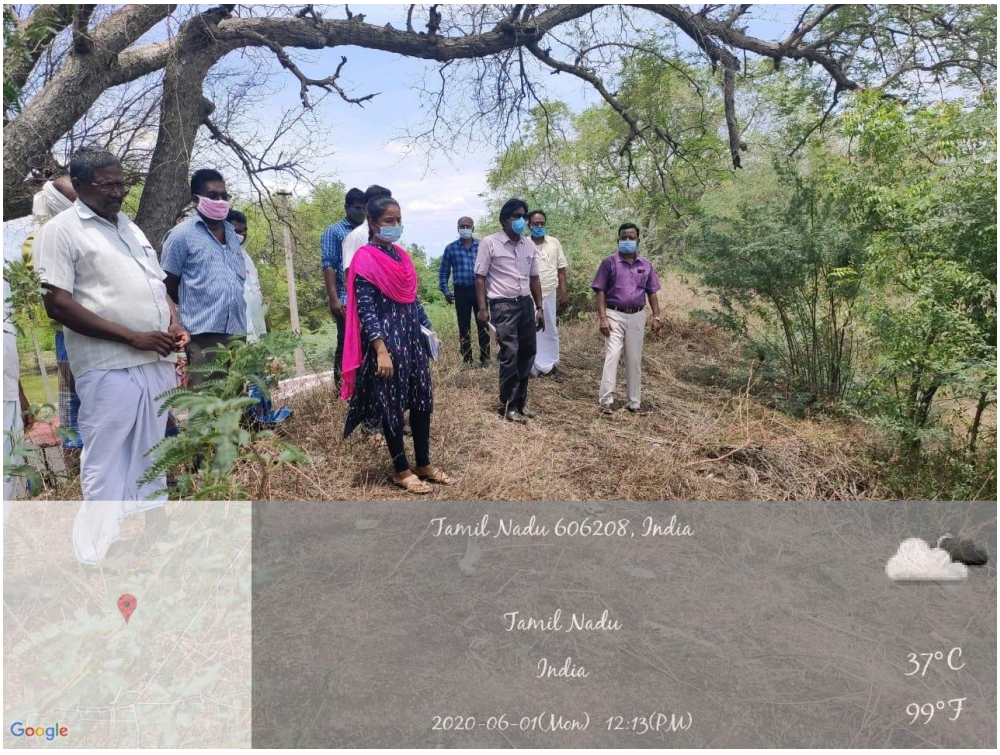
S.No	Date	Location	Status of WUA
1	01.06.2020	Thandalai	To be formed
2	01.06.2020	Alathur	To be formed
3	01.06.2020	Peruvangur	To be formed
4	02.06.2020	Thirukanangur	To be formed
5	02.06.2020	Thiyagai	To be formed
6	02.06.2020	Udhayamampatu	To be formed
7	04.06.2020	Pallagachery	To be formed
8	05.06.2020	Pallagachery Anicut	To be formed

WALK THROUGH SURVEY

WALK THROUGH SURVEY TO THANDALAI VILLAGE ON 01.06.2020



WALK THROUGH SURVEY TO ALATHUR VILLAGE ON 01.06.2020



WALK THROUGH SURVEY TO PERUVANGUR VILLAGE ON 01.06.2020



WALK THROUGH SURVEY TO THIRUKANANGUR VILLAGE ON 02.06.2020



WALK THROUGH SURVEY TO THIYAGAI VILLAGE ON 02.06.2020



WALK THROUGH SURVEY TO UDHAYAMAMPATTU VILLAGE ON 02.06.2020



WALK THROUGH SURVEY TO PALLAGACHERRY VILLAGE ON 04.06.2020



WALK THROUGH SURVEY TO PALLAGACHERRY VILLAGE ON 04.06.2020



10. Interventions demanded by farmers

1. Rice – AWDI
2. Drought tolerant rice cultivars
3. Maize
4. Garden Land Pulses (Black gram)
5. Oilseeds (Groundnut)
6. SSI (Sugarcane)
7. Drip fertigation in tapioca
8. Farmers training
9. Extensional Personnel training
10. IEC/CB activities

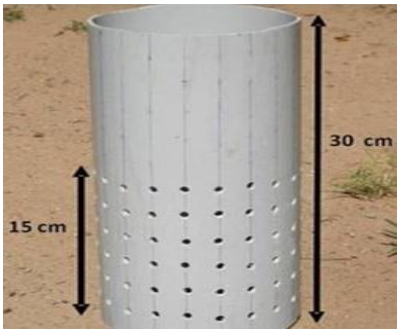
11. Field interventions finalised

11.1. Water Management for Sustainable Rice Production through AWDI

Use of water saving technologies *viz.*, Alternate Wetting and Drying Irrigation (AWDI) method of irrigation up to panicle initiation stage to increase Water Use Efficiency (WUE) and grain yield.

How to implement AWDI?

A practical way to implement AWDI safely is by using a 'Field Water Tube' ('Pani Pipe') to monitor the water depth on the field. The field water tube will be placed @ 3 per hectare since most of the paddy field in this ayacut are fragmented. After disappearance of water, the water level in the pipe up to 15 cm, irrigation water can be applied



Field Water Tube made up of PVC. Note the holes on all sides upto 15 cm height.

Outcome:

- The Alternate Wetting and Drying Irrigation (AWDI) will be an appropriate technology for water saving in rice. This technology saves up to 30 percent of irrigation water without any yield penalty

- 4-5 irrigations will be reduced under AWDI when compared to conventional method.

S. No.	Technology	Total area (ha)	Unit Cost (Rs.)	Total Cost (in lakhs)
1	Water management for sustainable paddy production through AWDI	100	7000	7.00

Details of Unit cost split up for Rice AWDI:

S. No.	Particulars	Unit Cost (Rs.)	Amount (Rs.)	TNAU Cost (Rs/ha)
1	Cost of Soil testing	20	20	20
2	Seed cost - 10 Kg / Ha	30	300	300
3	Cost of nursery raising		600	-
4	Cost of fertilizers (150:50:50 Kg NPK / Ha)			
	Urea - 300 Kg	6	1800	1800
	Muriate of Potash – 80 Kg	16	1280	1280
	$ZnSO_4$ 25 Kg	76	1300	1000
5	Bio fertilizer & Bio inoculants		1600	1600
	Total		**6900**	~~6300~~6000

Details of unit cost split up for AWDI

Sl. No	Particulars	Unit Cost (Rs.)	Amount (Rs.)	TNAU Cost (Rs/ha)
1	Field water tube ~~34~~ Nos./ ha		~~700~~1000	~~700~~1000
	Total		**1000~~700~~**	**1000~~700~~**

11.2. Introduction of drought resistant/ Flood Tolerant/ Salt tolerant Rice Cultivars

a. Drought resistant rice varieties -Anna R-4/ADT 45/ CB MAS 14065/ CB MAS 14110/ CB MAS 14142

The yield reduction in rice crop is being observed in many areas due to the non-availability of water at critical stages. The farmers of these rice growing areas are often experiencing crop loss. In order to overcome the abiotic stress, the drought tolerant rice variety is being introduced in these areas. It will be of greater use in enhancing the yield and farmers income.

b. Flood tolerant rice variety - CR 1009 sub-1/ Co 43 sub-1

Often the rice crop is being affected by flood due to the excess water during the monsoon seasons. This results in low yield. The farmers of the rice low land growing areas are not having any other alternative other than rice. With these view, the flood tolerant rice variety is being introduced in these areas. Apart from enhancing the yield and farmers income it make the crop to survive in flood conditions.

c. Introduction of Salt Tolerant High Yielding Rice Variety - TRY 3/IWP Saltol

In areas of soil having salinity problems, rice crop often experiencing poor yield. In order to overcome the salinity problem, introduction of salt tolerant rice variety is one of the option. The rice variety TRY-3 may be benefitted to the farmers realize good crop yield.

TRY 1 is a high yielding medium duration rice variety released from Anbil Dharmalingam Agricultural College and Research Institute, Trichy for commercial cultivation. It is a derivative of the cross combination ADT 43 and Jeeragasamba. It matures in 135 days with an average yield potential of 5833 Kg/ha. It possesses white coloured medium and bold sized grains and it is moderately resistant to major pests and diseases.

S. No.	Technology	Total area (ha)	Unit cost (Rs.)	Total cost (in lakhs)
1	Drought/saline tolerant rice variety	59	6000	3.54

Details of Unit cost Rice variety

S. No.	Particulars	Unit Cost (Rs.)	Amount (Rs.)	TNAU Cost (Rs/ha)
1.	Seed cost - 10 Kg / ha	30	300	300
2.	Cost of fertilizers (150:50:50 Kg NPK / ha)			
	Urea - 300 Kg	6	1,800	1,800
	Muriate of Potash – 80 Kg	16	1,280	1,280
	$ZnSO_4$ 25 Kg /ha	40	1,000	1,000
3.	Bio fertilizer & Bio inoculants	-	1,170	1,170
4.	PPFM Spray (3 times/ha.) @500ml/ha	Rs.300/lt.	450	450
	Total		**6,000**	**6,000**

11.3. Area expansion and productivity enhancement of pulses under crop diversification in gap areas

Area under pulses in this basin area is very low. Since the pulses are drought tolerant and can grow with minimum inputs area under pulses need to expand.

S. No.	Technology	Total area (ha)	Unit cost (Rs.)	Total cost (in lakhs)
1	Area expansion and productivity enhancement of pulses	80	5000	4.00

Pulses (Garden Land)

S. No	Particulars	Unit Cost (Rs.)	Amount (Rs/ha)
1	Seed cost– 20 Kg / ha	150	3000
2	DAP 25 Kg / ha	22.50	560
3	Pulse Wonder 2 Kg/ha	220	440
4	Bio fertilizers and Bio inoculants		1000
	Total		**5000**

Productivity enhancement of Pulses

Farmers are not adopting the latest crop production technologies like use of improved high yielding varieties in pulses. Hence it is proposed to conduct demonstration involving improved technologies in pulses viz., use of seeds of high yielding varieties, balanced nutrition and scientific water management. Under this cost of critical inputs like seeds and nutrients are included.

11.4. Fall Army Worm technology capsule to enhance the Productivity of Maize

The Fall Army Worm (FAW), *Spodoptera frugiperda* after invading maize fields in Tamil Nadu during 2018 has caused crop loss substantially. It occurs at all stages of Maize. Being a major crop of Tamil Nadu efforts are being taken to tackle the invaded pest. TNAU has developed a technology capsule to combat the invasion of FAW. It includes general organic practices, IPM capsule encompassing seed treatment, cropping system approach, FAW monitoring and mass trapping. Chemical control at early whorl stages (15-20 DAS), late whorl stage (40-45 DAS) and tasseling and cob formation stage (60-65 DAS).

This technology will result in the control of invasive pest and enhance the yield of maize crop in maize growing areas.

S. No.	Technology	Total area (ha)	Unit cost (Rs.)	Total cost (in lakhs)
1	Fall Army Worm technology capsule to enhance the Productivity of Maize	45	10000	4.50

Details of fall army worm capsule for maize

S. No	Particulars	Unit Cost (Rs.)	Amount (Rs.)	TNAU Cost (Rs/ha)

1	Seed Cost @ 15 kg/ha	320	4800	4800
2	Seed treatment with *Beauveria bassiana* 10g / kg of seed	200 g/ha	75	75
3	Raising border crops either sun flower or cowpea or Sesame (2-3 rows around Maize)		500	500
4	Monitoring with Pheromone trap (@12 Nos/ha and@ 36 sex lures /ha (at monthly interval)	Rs.750/ 12 Nos Rs.1000/ha	1750	1750
5	1st spray with azadirachtin 1% @ 1000ml/ha on 20 days after sowing		1700	1700
6	2nd spray with *Metarhizium anisopliae* @4kg/ha on 40 days after sowing	400	1600	1600
	Total			**10425**
				(Restricted to 10000/-)

11.5. Demonstration of improved production techniques with various oil seed crops with prime focus on improving productivity, encouraging crop diversification

Crop: Groundnut

Low productivity in groundnut is mainly due to poor nutrient availability in the soil, inadequate plant population per unit area and higher percentage of shriveled kernels.

Intervention:
- Sowing by seed drill
- Micro sprinkler
- Decorticator
- Stripper
- Trap crop of castor/red gram
- IPT for groundnut

S. No.	Technology	Total area (ha)	Unit cost (Rs.)	Total cost (in lakhs)
1	Improved production technologies in groundnut	20	5000	1.00

Details of unit cost: Oil seeds-Groundnut

S. No.	Particulars	Unit Cost (Rs.)	Amount (Rs.)	TNAU Cost (Rs/ha)
1	Gypsum 400 kg / ha	5	2000	2000
2	Fertilizers cost	-	1500	1500
3	Pheromone trap and lure for *Spodoptera litura*	-	750	750
4	Micro nutrient spray (DAP–2.5 Kg, Ammonium sulphate – 1 Kg, Borax – 500 gm and planofix–375 Ml) @ Rs.250 for 3 sprays.	250	750	750

	Total		**5000**	**5000**

11.6. Sustainable Sugarcane Initiative (SSI)

The Sustainable Sugarcane Initiative (SSI) aims at providing practical options to the farmers in improving the productivity of land, water and labour, all at the same time. SSI is also expected to reduce the overall pressure on water resources and contribute to recovery of ecosystems. Sustainable Sugarcane Initiative is an innovative method of sugarcane production using less seeds, less water and optimum utilization of fertilizers and land to achieve more yields.

The productivity of water is inter -dependent relationship between the amount of water used and the economic yield realized, 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 (WUE).

S. No.	Technology	Total area (ha)	Unit cost (Rs.)	Total cost (in lakhs)
1	SSI in Sugarcane	5	1000000	5.00

SSI in Sugarcane

S. No.	Particulars	Unit Cost (Rs.)	Amount (Rs.)	TNAU Cost (Rs/ha)
1	Drip cost as per the Govt. norms **@100 %Subsidy.**	72500	72500	72500
2	Cost of Seedlings / ha (15000 Nos./ha)	1.5	22500	22500
3	Water Soluble fertilizer			
	12:61:00 – 50 Kg	100	5000	5000
	Total		**100000**	**100000**

Sl. No	Particulars	Unit Cost (Rs.)	Amount (Rs.)	TNAU Cost (Rs/ha)
1	Drip cost as per the Govt. norms **@ 75% Subsidy**	72500	72500	54400
2	Cost of Seedlings/Ha (15000 Nos./Ha)	1.5	22500	22500
3	12:61:00 – 75 Kg	100	7500	7500
	00:00:50 – 208 Kg	75	15600	15600
	Total		**118100**	**100000**

11.7. Production of Tapioca under precision farming mode by adopting of IPM concept for CMV and Mealy bug (Cost inclusive of Sustainability and replication on the use of Water soluble fertilizers in the subsequent crops)

- Low productivity in tapioca.
- Water shortage in critical period and high consumption of water and wastage in conventional irrigation
- Improper nutrient management and other intercultural operation leads to staggered maturity and MN deficiency which affects tuber size and numbers.

Interventions

- Planting of quality setts
- Proper plant protection treatment for CMV and Mealy bug
- Applications of fertigation through drip

Production of Tapioca under Precision Farming mode

S. No	District	Area (ha)	Unit cost (Rs.)	Amount (Rs. in lakh)
1.	Precision Farming in tapioca	5	120000	6.00

Unit cost for Tapioca under Precision Farming

S. No	Particulars	Unit Cost (Rs.)	Amount (Rs.)	TNAU Cost (Rs/ha)
1.	Drip cost as per the Govt. norms **(100 % Subsidy)**	101100	101100	101100
2.	Cost of setts (1250 stem)	3.0	3750	3750
3.	Cost of bio control agent (egg parasitoids)	870	870	870
3.	Water Soluble fertilizers			
	Urea - 200 kg	6	1200	1200
	MAP-100 kg	90	9000	9000
	Potash-240 kg	17	4080	4080
	Total		**120000**	**120000**

S. No	Particulars	Unit Cost (Rs.)	Amount (Rs.)	TNAU Cost (Rs./ha)
1.	Drip cost as per the Govt. norms **(75% subsidy)**	75900	75900	75900
2.	Cost of setts (1250 stem)	3.0	3750	3750
3.	Cost of bio control agent (egg parasitoids), trap & trap crop	3500	3500	3500
4.	Water Soluble fertilizers			

	Urea - 200 kg	6	1200	1200
	MAP-150 kg	90	13500	13500
	Potash-250 kg	17	4250	4250
5.	Bio-fungicide-Neem kernel powder -250 kg	50	12500	12500
6.	MN mixture (micro food) -7.5kg	200	1500	1500
7.	Bio-pesticide (Neem oil) -10.0 litre	250	2500	2500
8.	Bio-inoculants /bio-fertilizers		1400	1400
	Total		**120000**	**120000**

Gender Strategy

Gender mainstreaming plays a vital role in water management and agriculture allied activities. To enhance women participation in the project, women farmers will be informed and made aware of their role in operation and maintenance of water management activities, decision making in the agriculture, labour opportunities in agriculture, encourage their participation in WUA, involvement in livelihood activities etc. Specific capacity building programs like exposure visits could be organized for WUA representatives, women in Farmer Producer Organizations (FPO), Farmer Producer Companies (FPC) and Dairy Interest Groups (DIG) etc. Team involvement of women in organized groups such as Self Helping Groups will be encouraged. In anticipation, the percentage of women expected to involve in WRD, agri related and livelihood related activities are 30%, 50% and 54% respectively.

Grievance Redress Mechanism and Schedule for Establishment

Grievance Redress Mechanism (GRM) is an essential component of any project implementation, particularly if the project involves the local communities with diverse socio economic backgrounds as the major stakeholders. The grievance redress process will be a continuous, transparent and participatory process that would be an integral part of the project's accountability and governance agenda.

A project level GRM will be in place for addressing social, environmental and project related grievances. The GRM will have multi-level structures and processes. At the district level the committee is made up of respective JDs of line departments and EE, WRD of the sub-basin, this committee meets on weekly basis. This committee will look after the grievances related to irrigation and water management. At the next level the Collector heads the committee and convenes the meetings monthly once. The Collectors will take care of the other grievances related to the project activities. The next level is the HODs at the state level they contact remotely monthly once and organize meetings at every redress; he calls for a meeting once in six

months and annually. For every six months' report is prepared at all levels and send to the Secretary. Secretary occupies the next level in the structure and in charge of overall appeals and supervision of grievance at all levels.

A register for GRM and a box for receiving the Complaints and Grievances shall be maintained in the O/o the Executive Engineer for WRD and O/o of Joint Directors for line departments, who is implementing the TNIAMP intervention in that respective Sub Basin and a monthly report on the Grievances received and the action taken shall be sent to the respective Environmental Cell Division for review and submission to the MDPU. Periodical Monitoring of the Implementation of the GRM will be carried out by the Environmental Cell Division Engineers.

In the project information boards provided at the working sites, along with the details of the project, the contact address along with official email and contact numbers of the officer to whom the Grievances has to be addressed shall be displayed. Further OK cards system will be used for transparency.

Efforts will be made to create awareness about GRC mechanism to the beneficiaries through use of flyers and pamphlets at the village, Block and District level. The implementation of GRM will operate by the Grievance Redress Cell (GRC) at the Block and District level .The grievances received should be entered in the GRM Register comprising of (a) Serial Number; (b) Case Number; (c) Name of the Grieved/Complainant; (d) Name of Father/Husband; (e) Gender (f) Age; (g) Full Address; (h) Brief details of grievance/complaint; (i) List of documents, if any, attached; (j) Details of previous grievance/complaint, if any; (k) Date of receipt of grievance/complaint and (l) Date of acknowledgement of grievance/complaint. The GRC will acknowledge receipt of all grievances/complaints, by registered post, within 7 days of receipt and will communicate its decisions/redress in writing to the complainants within 4 weeks depending on the nature of complaints and When closing the complaint, agreement should be made with the complainant on remedy, and both parties sign to their approval of the case being closed and outcome accepted. Copies are kept in both hard copy and electronic by both parties.

Contact details:

Name and Address	Contact No.	E-mail ID
Dr. K. Subramaniyan Professor and Head Regional Research Station Vridhachalam – 606 001 Cuddalore Dt.	04143-238231	arsvri@tnau.ac.in

ESMF, ESMP & Screening Check list

For the environmental and social impacts (both positive and negative), Environmental and Social Management Framework (ESMF) enumerates a set of measures to minimize the adverse impacts and enhance the positive impacts which are intended to be adopted during the project implementation with Half yearly report (Annexure-I). This will not only ensure that environmental and social safeguard activities are implemented in accordance with the framework and processes but also that there are adequate funds/resources for implementation and supervision of social and environmental management plans. Accounting the nature and scale of environmental and social impacts, specific and reliable departmental Standard Operating Procedures along with suggested mitigation measures will be adopted for environmental and social safeguards.

Environmental Social Management Plan (ESMP) not applicable for Agriculture activities.

S.No	Implementing Agencies	Constraints & Challenges	Suggested Mitigation Measures
1.	**Agriculture, TNAU , Horticulture and allied departments** ~~**Agriculture, TNAU and Horticulture Related**~~	Lack of quality planting materials	Supply of certified seeds of agricultural crops
2		Water shortages	Implementation of SRI in larger area in the sub-basin
3		Pest problems and Endemic outbreak in occasional cases	Use of biocontrol agents and integrated pest management
4		Lack of Community approach in farming and Awareness	Farmer's field school on seed to seed crop production technologies
5		Residues management and Lack of organized way of management	Supply of vermicompost mobile silpaulin units to on-farm composting
6		Soil health deterioration and Continued usage of inorganic fertilizers at considerable level	Soil test based fertilizer application to crops
7		Environmental pollution and Lack of ecofriendly inputs Pollution due to polymulch disposal	Supply of bio inputs like Pseudomonas, Biofertilizers like Azospirillum, Phosphobacteria, Rhizobium Collection and safe disposal

~~**Include Screening for TNAU**~~

- ~~Pesticides residues is identified as one of the problem – Random samples collected at the before implementation of interventions and gave the suitable recommendation to the farmers.~~
- ~~Environmental and social safeguards: Random samples collected at the harvest time from the vegetables crops from different sub basins and given for residue analysis in the toxicology lab of Dept. of Agricultural Entomology, TNAU, Coimbatore. All the sub basin scientist are instructed to study the methane emission from SRI and Non- SRI method of cultivation.~~

Plan of activities for Environmental Monitoring and Awareness

- Develop Information, Education and Communication (IEC) material in local language for generating awareness regarding safe use of pesticides
- Promote wide application of safe and bio pesticides, wherever possible
- Promote expansion of Alternate Wetting and Drying Irrigation (AWDI) in Rice to reduce water demand
- Work with WUAs in encouraging market based non-water intensive crops where possible and for promoting conjunctive use of water resources
- Demonstrate and scale-up IPM strategy and approach; monitor the adoption rate
- Promote wide use of organic inputs, such as, bio-manure, Farm Yard Manure and bio-fertilizers and provide training on production and use of these alternatives
- Ensure that marginal farmers and poor households are also covered for such demonstrations and training
- Shift to less water intensive crops
- Efficient use of water resources – micro irrigation
- Sustainable Intensification
- CC resilient Package of Practices
- Moderate use of agrochemicals – soil test based fertilizer application
- Pest Management in concurrence with Pest Management Plan (PMP)
- Trainings and demonstrations on restricted pesticides and safe use of pesticides
- Trainings and demonstrations on Integrated Crop Management Practices
- Bio villages, Support for Production of Bio-pesticides.

Capacity Building & Information, Education & Communication

1. Capacity building

1.1. Training to stakeholders

Under this activity, imparting training to all the beneficiaries either as off-campus or as on-campus is planned.

1.2. Exposure visit

In-order to have practical knowledge on various improved farming practices prevailing across the District and State, it has been proposed to expose the stakeholders by organizing educational tours for having better cross learning.

2. IEC including Awareness creation, documentation and IEC equipment

2.1. Organize awareness campaign

Informal meetings with Farmers / Water Users Association through PRA methods – Focus group discussion and transect walk.

- Organizing informal meetings in sub basin villages
- Message on AIR / local cable TV
- Ensure transparency
- Explain about the scheme – organization objectives, activities, project contribution and farmers share
- Emphasis the role of stake holders in the project
- Project the expected benefit

2.2. Documentation

- Maintenance of records and registers
- Field note for each activity
- Daily memorandum sheet
- Receipt and issue of inputs
- Technical observations on soil, water and crop
- Printing books, booklet, leaflet and pamphlets about the technologies and scheme
- Wall paintings

2.3. IEC Equipment's for Documentation

2.4. Out sourcing charges on vehicles

- Expenditure on TA /DA for the purpose of TN-IAM Project
- Fuel bill of university vehicle utilized for the project purposes
- Hiring charges for university vehicle utilized for the project activities.

3. Management Cost

3.1. Outsourcing of technical staff

Outsourcing of technical staff is included in TNAU sub basin plan to carry out the field activities.

YEAR WISE BUDGET

P –Physical in ha F – Financial in lakhs

S. No	Particulars	Unit Cost (Rs/ha)	I Year		II Year		III Year		Total	
			P	F	P	F	P	F	P	F
I	**A. Field interventions**									
1	Water management for sustainable paddy production through AWDI	7000	20	1.40	40	2.80	40	2.80	100	7.00
2	Drought Resistant/ Flood Tolerant /Salt Tolerant high yielding rice variety	6000	19	1.14	20	1.20	20	1.20	59	3.54
3	Area Expansion and productivity enhancement of pulses under crop diversification	5000	20	1.00	30	1.50	30	1.50	80	4.00
4	Fall Army Worm technology capsule to enhance the Productivity of Maize	10000	5	0.50	20	2.00	20	2.00	45	4.50
5	Demonstration of improved production techniques with various oil seed crops with prime focus on improving productivity, encouraging crop diversification – Groundnut	5000	0	0.00	10	0.50	10	0.50	20.0	1.00
6	Sustainable Sugarcane Initiative (SSI)	100000	0	0.00	5	5.00	0	0.00	5.0	5.00
7	Production of Tapioca under precision farming mode	120000	0	0.00	5	6.00	0	0.00	5.0	6.00
	Sub-Total (I)		**64.0**	**4.04**	**130**	**19.00**	**120**	**8.00**	**314**	**31.04**
II	**IEC & CB**									
1	**Capacity Building**									
	a. Training to Stakeholders			0.50		0.50		0.40		**1.40**

	b. Exposure visit			0.30		0.30		0.20		**0.80**
2	**IEC**									
	a. Awareness creation			0.20		0.15		0.15		**0.50**
	b. Documentation			0.40		0.30		0.32		**1.02**
	c.IEC equipments			0.70		0.00		0.00		**0.70**
	d. Out sourcing charges on vehicles			0.65		0.65		0.65		**1.95**
	Sub-Total (II)			**2.75**		**1.9**		**2.25**		**6.37**
III	**Management cost**									
1	Out sourcing of technical staff			**1.6**		**1.8**		**1.7**		**5.10**
	Grand Total (I +II+III)			**8.39**		**22.7**		**11.95**		**42.51**

Abstract

P –Physical in ha F – Financial in Rs.

S. No	Particulars	Unit Cost \(Rs/ha)	Total	
			P	F
I	**A. Field interventions**			
1	Water management for sustainable paddy production through AWDI	7000	100	7.00
2	Drought Resistant/ Flood Tolerant /Salt Tolerant high yielding rice variety	6000	59	3.54
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4	Fall Army Worm technology capsule to enhance the Productivity of Maize	10000	45	4.50
5	Demonstration of improved production techniques with various oil seed crops with prime focus on improving productivity, encouraging crop diversification – Groundnut	5000	20.0	1.00
6	Sustainable Sugarcane Initiative (SSI)	100000	5.0	5.00
7	Production of Tapioca under precision farming mode	120000	5.0	6.00
	Sub-Total (I)		**314**	**31.04**
II	**IEC & CB**			
1	**Capacity Building**			
	a. Training to Stakeholders			**1.40**
	b. Exposure visit			**0.80**
2	**IEC**			
	a. Awareness creation			**0.50**
	b. Documentation			**1.02**
	c. IEC -Equipments			**0.70**
	d. Out sourcing charges on vehicles			**1.95**
	Sub-Total (II)			**6.37**
III	**Management cost**			
1	Out sourcing of technical staff			**5.10**
	Grand Total (I +II+III)			**42.51**

Annexture- I

ESMF- Half Yearly Reporting (March/September)
TNAU

Sub-basin :									**Total Demonstration Area :**			
1	2	3	4	5	6	7	8	9	10	11	12	13
Activity/Sub component	**Soil Testing (Yes/No)**	**Adoption of soil test report recommendations(Yes/No with Remarks)**	**Use of Organic along with Inorganic Fertilizers (%)**	**Use of only Organic Fertilizers in nutrient management (Ha & %)**	**Use of only Bio-pesticides (Ha)**	**Area under Micro irrigation (Ha)**	**Target farmers***	**No of farmers* benefitted**	**List of recommended Bio-pesticides in use**	**Negative Impacts if any**	**Mitigation Measures / ESMF Arrangements**	**Remarks**